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2022 Small Grains Report

Southcentral and Southeast Idaho Cereals Research & Extension Program

Juliet Marshall, Belayneh A. Yimer, Tod Shelman, Linda Jones, Justin Hatch, and Sarah Windes

University of Idaho
College of Agricultural and Life Sciences

Southcentral and Southeastern Idaho Cereals Research and Extension Program

www.uidaho.edu/extension/cereals/scseidaho

Cover Image

Field day visit of 2022 Extension Variety Trial plots in Aberdeen, ID. Photo credit: Belayneh A. Yimer

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Kyle Wangemann and Scott Brown – Soda Springs
Gilbert and Carl Hofmeister – Rockland
Trevor Davey – Ririe
Clark Hamilton – Ririe
Luke Adams – Rupert
Duane Grant and Taylor Grant – Rupert
Marc Thiel – Idaho Falls
Greg Torgeson – Soda Springs

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Disclaimer Statement

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2022 Small Grains Report for Southcentral and Southeastern Idaho

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Additions and Changes:

The winter trials in Ririe were abandoned due to poor stand from wind-blown soil. Hence, dryland winter trials were conducted only in two locations: Rockland and Soda Springs. A site was not available for the spring trials in Ashton; hence the trials were planted at the UI Experiment Station in Tetonia instead.

Introduction

The objective of the University of Idaho Small Grain Performance Trials is to provide an unbiased appraisal and evaluation of currently available varieties and advanced experimental lines over multiple locations and years. This information will assist Idaho producers in comparing and selecting varieties best suited to their area and growing conditions. Variety selection is an important part of the economic viability of Idaho crops, and crop enterprise budgets are available at the Department of Agricultural Economics and Rural Sociology website https://www.uidaho.edu/cals/idaho-agbiz/crop-budgets.

Varietal development programs strive not only for greater yield potential, but also for improved end-use quality, better disease and insect resistance, yield stabilization through improved winter hardiness, better straw strength, and other agronomic traits. Bringing a new variety to the marketplace is a cooperative effort by many individuals and organizations.

Varieties are best evaluated by comparing performance over several locations and preferably over more than one year. Varietal performance can change in response to both environmental and cultural/management conditions. This report summarizes yield and agronomic data of small grain (wheat and barley) trials conducted throughout Southcentral and Southeastern Idaho that were harvested in 2022, milling and baking data from trials harvested in 2021, as well as disease data when available from Aberdeen (stripe rust and FHB), Kimberly (FHB) and Logan, UT (dwarf bunt).

Materials & Methods

Locations

Cereal trials were established at seven winter and five spring locations throughout SC and SE Idaho during the fall of 2021 and the spring of 2022. For location details, please see the descriptions on pages 6 to 11. The Soda Springs winter & spring, and Rockland winter trials were grown under dryland conditions. The Ririe winter dryland trial was not harvested due to damage from wind-blown soil. All other trials were grown under irrigation. The trials at Aberdeen, Tetonia and Kimberly were grown at UI Research and Extension Centers, and the remaining trials were grown in producers' fields.

Agronomic Practices

Treated seed was planted at the following rates:

- Irrigated Wheat: 1,000,000 seeds per acre or approximately 95 pounds per acre.
- Irrigated Barley: 800,000 seeds per acre or approximately 80 pounds per acre.
- Dryland Wheat: 700,000 seeds per acre or approximately 65 pounds per acre.
- Dryland Barley: 600,000 seeds per acre or approximately 60 pounds per acre.

Thousand kernel weights and planting rates in pounds per acre for each variety are reported in Table 1. Row spacing was set at 7-inch using double disk openers for all irrigated locations and the Soda Springs winter and spring dryland locations. The Rockland dryland location used a 12-inch row spacing with shanks preceding double disk openers. Plots at all winter locations were planted 5 feet wide by 14 feet long then reduced back to 10 feet long using glyphosate herbicide or tillage. Spring locations were planted 5 feet wide by 20 feet long then sprayed or tilled back to 16 feet. All entries were replicated 4 times at each location in a randomized complete block design. Except for planting and harvest operations, nitrogen fertilization, and miscellaneous maintenance, trials established in producers' fields received the same "grower management" or cultural operations as applied to the surrounding commercial wheat or barley field.

Nitrogen fertilizer in irrigated locations was managed according to the following methodology: Yield goals (bu/A) were set for each class at each location using historical yield data. These yield goals were used to calculate optimal fertility amounts according to the following methods: Soft white winter wheat, soft white spring wheat, and winter barley; lbs/acre nitrogen needed = 2 times yield goal. Hard winter and hard spring wheat; lbs/acre nitrogen needed = 2.5 times yield goal, plus 40 lbs nitrogen/acre topdressed at flowering. Spring 2 row barley: lbs/acre nitrogen needed = 1.7 times the yield goal. Hard wheat nurseries received the remaining balance of nitrogen as urea (46-0-0) topdressed at heading using hand broadcast spreaders. Fertilizers and pesticides applied are listed on pages 6 to 11. Planting and harvesting operations by university personnel were timed to approximately coincide with corresponding cooperator operations. All nurseries were harvested with Wintersteiger Classic small plot combines, and data were recorded using Harvestmaster 800 Classic GrainGage systems and Mirus software.

Evaluation for Diseases

FHB: The winter FHB nursery was established in one location (Kimberly) while spring FHB nurseries were established in two locations (Aberdeen and Kimberly). Each entry was planted in two head-rows in two replications. Corn spawn was spread in the field when plants were at the tillering growth stage in the spring. Additional inoculation of the trials was conducted by spraying the conidial suspension (100,000 spores/ml) at early anthesis. A sprinkler system was installed across the experimental plots to create conducive environment for disease infection and development. FHB rating (measured as FHB incidence and severity from 30 randomly chosen heads per entry) was done at the soft dough growth stage.

Dwarf Bunt: The trial was conducted in a dwarf bunt nursery established by the University of Utah in Logan. The nursery is artificially inoculated with *Tilletia controversa* spores every year. Each winter wheat entries of the soft white winter and the hard winter wheat trials were planted in single head-row in two replications. Dwarf bunt severity was rated on each head row at maturity.

Stripe Rust: Entries planted in the extension variety trials (EVT) in Aberdeen were evaluated for their reaction to stripe rust under natural infection. Stripe rust was rated at the flag leaf stage as infection type (1 – 9 scale), and severity was measured based on modified Cobb scale (0 – 100%).

Description of Agronomic Data

Each entry at each location was measured for grain yield, test weight, plant height, heading date, and lodging (when present).

- Yield is calculated at 60 pounds per bushel for wheat, and 48 pounds per bushel for barley.
- Test weight is reported in pounds per standard bushel.
- Plant height is reported in inches from the soil surface to the tip of the heads, awns excluded.
- Heading date is reported as the date when 50 percent of heads are fully emerged from the boot.
- Lodging is reported as the percent of the plot area that was not standing straight prior to harvest.

Description of End-use Quality Data

Grain protein for each variety was analyzed with a Perten IM 9500 NIR grain analyzer. Protein data are found in conjunction with the agronomic data noted above in tables 4 to 66. These protein values are best utilized in comparisons between varieties within a nursery.

Due to the time necessary to complete milling and baking evaluations, test results from the Idaho Wheat Quality Laboratory are not available for the 2022 harvest in this report. Data are given for these characteristics from the 2021 harvest and are found in tables 67-80.

Milling and baking tests and plump seed evaluations use standardized testing methods and are described below:

- Flour protein: this is the flour protein content, measured on a fixed 14 percent moisture basis. Lower numbers are better for soft wheat; higher numbers are preferred for hard wheat.
- Break flour yield: represents ease of milling or kernel softness; higher numbers are preferred.
- Flour yield: the percent of flour obtained from a sample of wheat; higher percentages are better.
- Whole grain protein percent: protein content of the whole grain on a 12 percent moisture basis. Lower percentages are preferred for soft wheat; higher percentages are preferred for hard wheat.
- Hardness value: a measure of kernel hardness; generally soft white wheats are below 45, hard wheats are above 45.
- SRC (Solvent Retention Capacity): a measure of the flour performance in absorbing water and flour quality.

Additional evaluations include the following:

Hard Wheats

Bake volume: This is the volume of an experimental loaf of bread measured in cubic centimeters and reflects protein quality per unit of protein; higher volume is preferred.

Soft Wheats

Cookie diameter: Diameter of a cookie in centimeters; larger numbers are better.

Barley

- Plumps: Percent plump is the percent of a sample that stayed on top of a 5.5/64" x ¾" slotted screen after shaking and consists of the 6/64" and 5.5/64" percentages combined. Both screen percentages are included in the report for increased precision.
- Thins: the percent of a sample that passed through a 5.5/64" x ¾" screen after shaking.

Statistical Analyses

Data from each nursery were analyzed using SAS 9.4 software with the PROC GLM procedure. Fisher's protected LSD (α=.05) was used for mean comparisons. Three years pooled analyses, and data combined from locations in the growing season were

analyzed using PROC Mixed Plots of SAS 9.4.

Statistical Interpretation

Most tables have a least significant difference (LSD) statistic at the bottom of the table. This statistic is given at the 5 percent error level and is an aid in comparing varieties. If the measured values of any two varieties within a table differ by the LSD value or more, they may be considered different with a confidence level of 95 percent. If the measured values are less than the LSD value, the differences may be due to random error rather than real differences. Coefficient of variation (CV percent) statistic is a general measurement of the precision of each experiment. Lower CV values indicate less experimental variation and greater precision. Most tables that do not have the LSD and CV statistic are averages over locations or years where specific statistical analyses were not run on the combined data or are from data obtained from only one replication or are from a composite sample of all replications (e.g. quality data). Most tables from individual locations also contain yield data from two previous years. The average, LSD, and CV for these data represent the original data set, not just the selected varieties presented in these tables. The Pr>F value shows the validity of the LSD value above it; if the Pr>F value is equal to or greater than .05 (e.g. 0.1504; 0.6250), then the LSD value is void. This does not mean there are not differences between the varieties, it simply means differences cannot be determined at the 95% confidence level.

Varieties Tested Explanation

A list of released varieties tested in 2021-2022 is given in Table 1. Included in this table are seed weight (thousand kernel weight), number of seeds per pound and the adjusted seeding rate. Information is also given on the year of release and the releasing agency or company. A short description of selected varieties is given in Table 2. Additional information is available from the releasing agency or company.

Seasonal average measurements of several plant growth characteristics from the variety trials are shown in Table 3 for comparisons between the time periods of 2012-2022.

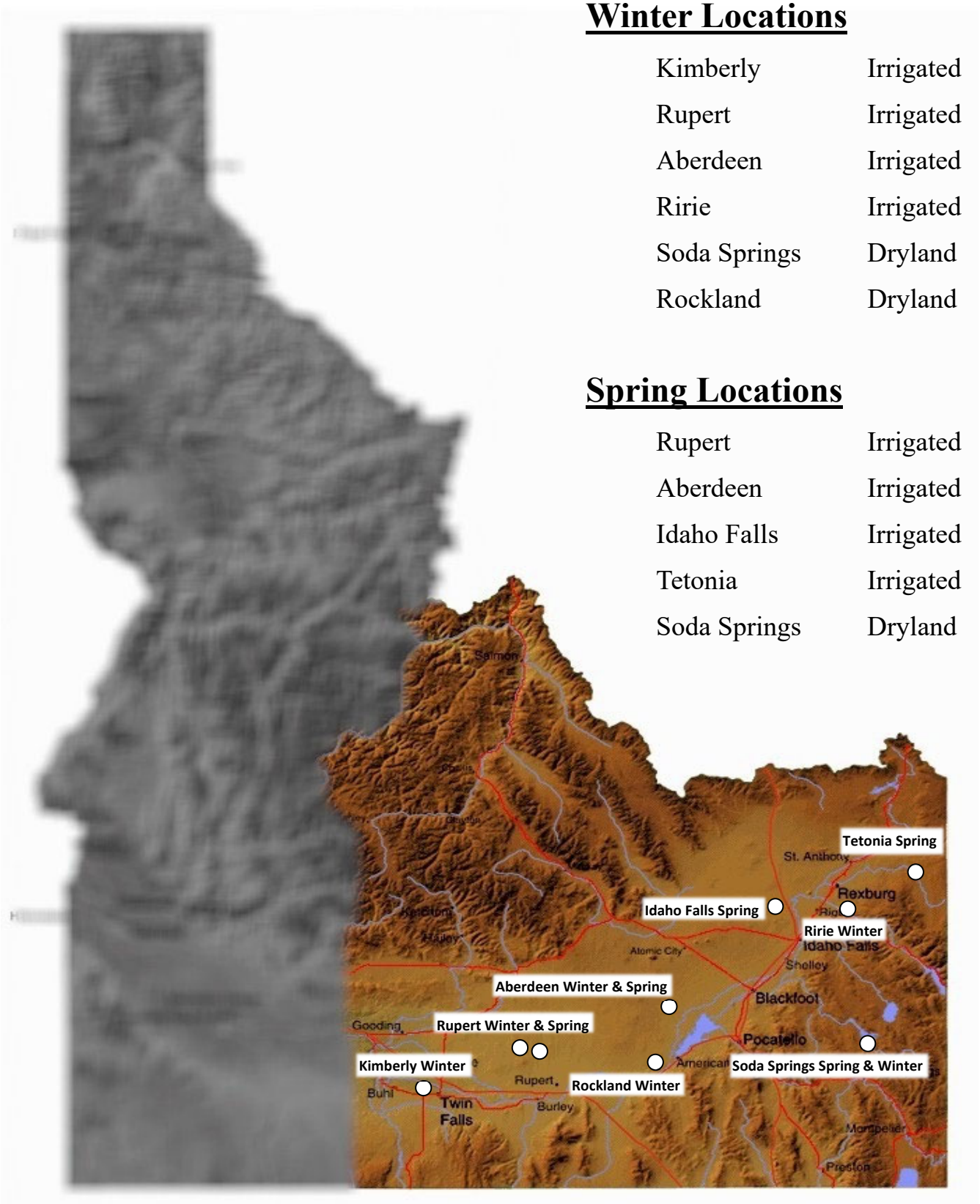
Southcentral & Southeast Idaho Cereal Variety Trial Locations

Winter Locations

Kimberly	Irrigated
Rupert	Irrigated
Aberdeen	Irrigated
Ririe	Irrigated
Soda Springs	Dryland
Rockland	Dryland

Spring Locations

Rupert	Irrigated
Aberdeen	Irrigated
Idaho Falls	Irrigated
Tetonia	Irrigated
Soda Springs	Dryland



Location Descriptions

Kimberly Winter Irrigated:

Kimberly Research & Extension Center
3825 N. 3600 E. Kimberly, ID

Coordinates: 42°33'06.87"N 114°20'34.46"W
Elevation: 3894 ft.
Soil Type: #10 Bahem silt loam, 1-4% slopes
Previous Crop: Dry Beans
Planting Date: September 29, 2021
Harvest Date: August 9, 2022
Chemicals applied: Huskie 15 oz./A, Axial 16 oz./A, Starane Ultra 6 oz./A

Fertility:

	Organic Matter %	pH	Free Lime %	Hard winter wheat N#/A	Soft white winter wheat N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.7	7.9	9.3	386	386	23 ppm	275 ppm	120 ppm
Fertilizer applied (lbs/A)	-	-	-	158	18	85#		100# Elemental S
Total	**1.7**	**7.9**	**9.3**	**544**	**404**	**85#**	**20#**	**100 # Elemental S**

Rupert Winter Irrigated:

Cooperator: Luke Adams
Located at 700 N. 150 E. Rupert, Idaho

Coordinates: 42°43'08.63" N 113°38'10.30"W
Elevation: 4211 ft.
Soil Type: #24 Portneuf silt loam, 1-4% slopes
Previous Crop: Spring Barley
Planting Date: September 24, 2021
Harvest Dates: August 1 & 2, 2022
Chemicals applied: Huskie 15 oz./A, Axial XL 16 oz./A, Starane Ultra 6 oz./A

Fertility:

	Organic Matter %	pH	Free Lime %	Hard winter wheat N#/A	Soft white winter wheat & winter barley N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.8	8.0	9.4	132	132	29 ppm	250 ppm	103 ppm
Fertilizer applied (lbs/A)	-	-	-	294	254	49#	30#	70# ES and 12# S
Total	**1.8**	**8.0**	**9.4**	**426**	**386**	**49#**	**30#**	**-**

Location Descriptions

Aberdeen Winter Irrigated:

Aberdeen Research & Extension Center
1693 S. 2700 W. Aberdeen, ID

Coordinates: 42°57'34.46"N, 112°49'18.49"W
Elevation: 4405 ft.
Soil Type: DeA Declo loam, 0-2%slopes
Previous Crop: Green Manure Oats
Planting Date: September 27, 2021
Harvest Dates: August 11 & 12, 2022
Chemicals applied: Brox – M 1pint/A, Starane Ultra 6 oz./A,

Fertility:

	Organic Matter %	pH	Free Lime %	Hard winter wheat N#/A	Soft white winter wheat & winter barley N #/A	P	K	S
12" soil test results (N & S= 0-24")	2.4	8.1	8.0	168	168	44 ppm	262 ppm	36 ppm
Fertilizer applied (lbs/A)	-	-	-	330	210	60#	-	100#elemental Sulfur 20# S
Total	**2.4**	**8.1**	**8.0**	**498**	**378**	**60#**	**262 ppm**	**20# S**

Ririe Winter Irrigated:

Cooperator: Clark Hamilton
Located at HWY 26 and 200 E, South of highway.

Coordinates: 43°36'22.02"N, 111°40'21.73"W
Elevation: 5108 ft.
Soil Type: #42 Ririe Silt Loam, 4-12% slopes
Previous Crop: Wheat
Planting Date: September 28, 2021
Harvest Date: August 10, 2022
Chemicals applied: MCPA 12 oz, Affinity Broadspec 8 oz, AxialStar 16 oz./A

Fertility:

	Organic Matter %	pH	Free Lime %	Hard winter wheat N#/A	Soft white winter wheat N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.9	8.0	2.1	52	52	19 ppm	319 ppm	77 ppm
Fertilizer applied (lbs/A)	-	-	-	290	250	-	-	-
Total	**1.9**	**8.0**	**2.1**	**342**	**302**	**-**	**-**	-

Location Descriptions

Rockland Winter Dryland:

Cooperators: Gilbert and Carl Hofmeister
1.5 mile south of I 86 and Neeley Road, Rockland, ID

Coordinates: 42°41'18.36"N, 112°55'14.54"W
Elevation: 4511 ft.
Soil Type: #64 Pocatello silt loam, 12-20% slopes
Previous Crop: Fallow
Planting Date: September 23, 2021
Harvest Date: August 15, 2022
Chemicals applied: Banvel 2oz/A, LV6 16oz/A
Fertility:

	Organic Matter %	pH	Free Lime %	Winter wheat N#/A	P	K	S
Fertilizer applied (lbs/A)	-	-	-	40	-	-	5#

Soda Springs Winter Dryland:

Cooperator: Greg Torgesen
6 ½ miles north of Soda Springs on Hwy 34 and ½ mile left on Meadowville Road.

Coordinates: 42°44'50.13"N, 111°34'30.88"W
Elevation: 6133 ft.
Soil Type: 485AA Foundem – Rexburg, very deep complex, 1 to 4% slopes
Previous Crop: Fallow
Planting Date: September 23, 2021
Harvest Date: September 7, 2022
Chemicals applied: Huskie 15 oz/A, Axial Star 16 oz/A
Fertility:

	Organic Matter %	pH	Free Lime %	Winter wheat N#/A	P	K	S
12" soil test results (N & S= 0-24")	2.3	7.0	<1.0	80	44 ppm	364 ppm	19 ppm
Fertilizer applied (lbs/A)	-	-	-	-	-	-	-
Total	**2.3**	**7.0**	**<1.0**	-	-	-	-

Location Descriptions

Rupert Spring Irrigated:

Cooperator: Taylor Grant, Grant 4-D Farms
700 N 100 E., Rupert, ID

Coordinates: 42°43'05.29"N, 113°38'38.42"W
Elevation: 4220 ft.
Soil Type: #36 Sluka silt loam, 1-4% slopes
Previous Crop: Sugar Beets
Planting Date: April 18, 2022
Harvest Dates: August 25&26, 2022
Chemicals applied: Huskie 15 oz/A, AxialStar 16 oz./A,

Fertility:

	Organic Matter%	pH	Free Lime %	Hard Spring wheat N#/A	Soft white spring wheat & spring barley N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.3	7.9	3.6	138	138	36 ppm	327 ppm	60 ppm
Fertilizer applied (lbs/A)	-	-	-	238	158	40	30	24#
Total	**1.3**	**7.9**	**3.6**	**376**	**296**	**40**	**30**	**24#**

Aberdeen Spring Irrigated:

Aberdeen Research & Extension Center
1693 S. 2700 W., Aberdeen, ID

Coordinates: 42°57'31.84"N, 112°49'17.02"W
Elevation: 4405 ft.
Soil Type: DeA Declo loam, 0-2% slopes
Previous Crop: Green Manure Oats
Planting Date: April 6, 2022
Harvest Date: August 23 & 24, 2022
Chemicals applied: Huskie 15 oz./A, Starane Ultra 6 oz./A,

Fertility:

	Organic Matter%	pH	Free Lime %	Hard Spring wheat N#/A	Soft white spring wheat & spring barley N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.3	8.1	7.5	133	133	26 ppm	256 ppm	21 ppm
Fertilizer applied (lbs/A)	-	-	-	200	120	50	-	30# SO_4
Total	**1.3**	**8.1**	**7.5**	**333**	**253**	**95**	**20**	**30#SO_4**

Location Descriptions

Idaho Falls Spring Irrigated:

Cooperator: Marc Thiel
Approximately 25 S. on 45th West Idaho Falls, ID

Coordinates: **43°28'20.19"N, 112°7' 09.06"W**
Elevation: **4689 ft.**
Soil Type: **#22 Pancheri silt loam, 0-2% slopes**
Previous Crop: **Potatoes**
Planting Date: **April 19, 2022**
Harvest Date: **August 30 & 31, 2022**
Chemicals applied: **Huskie 15 oz/A, AxialStar 16 oz./A.**

Fertility: Wheat Field

	Organic Matter%	pH	Free Lime %	Hard Spring wheat N#/A	Soft white spring wheat N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.7	7.8	5.4	195	195	32 ppm	321 ppm	93 ppm
Fertilizer applied (lbs/A)	-	-	-	128	88	#	-	-
Total	**1.7**	**7.8**	**5.4**	**323**	**283**	**#**	-	-

Tetonia Spring Irrigated:

Tetonia Research and Extension Center
888 West Hwy 33 Newdale, Idaho

Coordinates: **43°51'31.55"N, 111°16'39.34"W**
Elevation: **6181 ft.**
Soil Type: **#13517 Kucera – Ririe complex, 0–4% slopes**
Previous Crop: **Fallow**
Planting Date: **May 11, 2022**
Harvest Date: **September 8 & 9, 2022**
Chemical applied: **Huskie 15 oz/A, AxialStar 16 oz./A**

Fertility:

	Organic Matter	pH	Free Lime %	Hard Spring wheat N#/A	Soft white spring wheat & spring barley N #/A	P	K	S
12" soil test results (N & S= 0-24")	1.8	7.3	1.2	80	80	38 ppm	455 ppm	19 ppm
Fertilizer applied (lbs/A)	-	-	-	125	85	10#	-	20#
Total	**1.8**	**7.3**	**1.2**	**205**	**165**	**10#**	**-**	**20#**

Location Descriptions

Soda Springs Spring Dryland:

Cooperators: Kyle Wangemann and Scott Brown

11 miles north of Soda Springs on Hwy 34 and Blackfoot River Rd. east ½ mile.

Coordinates: 42°49'29.64"N 111°32'35.83"W
Elevation: 6194 ft.
Soil Type: #187AA Cinderspring gravelly silt loam 1 to 4 % slopes
Previous Crop: Spring Barley
Planting Date: May 20, 2022
Harvest Date: September 7, 2022
Chemicals applied: Huskie 12 oz/A, Axial Bold 15oz/A, Starane Ultra 6 oz./A

Fertility:

	Organic Matter	pH	Free Lime %	Hard Spring wheat N#/A	Soft white spring wheat N #/A	P	K	S
12" soil test results (N & S= 0-24")	-	-	-	NA	NA	-	-	-
Fertilizer applied (lbs/A)	6# Zn	-	-	50	50	25#	-	20#
Total		-	-	**50**	**50**	**25#**	-	**20#**

Temperature and irrigation/precipitation totals for some locations, recorded with on-site weather stations provided with financial support from the Idaho Wheat commission.

Variety Trial Site	Dates of station recording range	Maximum temperature °F	Minimum temperature °F	# of days above 90°F	# of days below 50°F	# of days below 40°F	Spring & Summer Precipitation and Irrigation (inch)
Rupert Winter	May 4 – August 3, 2022	108	23	37	68	24	8.4
Kimberly Winter	May 4 – August 11, 2022	110	28	34	50	22	5.1
Soda Springs Winter	June 7 – September 8, 2022	102	28	38	67	15	4.0

Table 1. Released varieties tested in 2021-2022 with seed size and adjusted seeding rate.

Variety	Exp. No.	1000 Kernel Weight (g)	Seeds per Pound	Adjusted Seeding Rate[1] (lb/A)	Year Released	Developer(s)/Distributor of variety
Soft White Winter Wheat						
AP Exceed	11PN039#20	34	13,341	75	2020	AgriPro /Syngenta Cereals
AP Iliad	11PN044#84	46	9,861	101	2020	AgriPro /Syngenta Cereals
Appleby CL+	ORI2161250CL+	33	13745	73	2019	Oregon State AES
Brundage	ID86-14502B	36	12,600	79	1996	Idaho AES
Devote	WA8271	27	16,800	60	2019	Washington AES, USDA
Eltan	WA7431	40	11,340	88	1990	Washington AES, USDA
LCS Blackjack	LWW15-71945	33	13,745	73	2019	Limagrain Cereal Seeds, LLC
LCS Hulk	LWW14-73163	30	15,120	66	2017	Limagrain Cereal Seeds, LLC
M-Press		50	9072	110	2019	McGregor
Norwest Duet	LOR-092	30	15,120	66	2015	OSU /Limagrain Cereal Seeds, LLC
Norwest Tandem	LOR-334	29	15,641	64	2016	OSU /Limagrain Cereal Seeds, LLC
Otto	WA008092	28	16,200	62	2011	Washington AES, USDA
Piranha CL+	WA8305	30	15,120	66	2020	Washington AES, USDA
Sockeye CL+	WA8306	31	14,632	68	2020	Washington AES, USDA
Stephens	OR65-116	38	11937	84	1977	Oregon AES
Stingray CL+	WA8275CL+	32	14,175	71	2019	Washington AES, USDA
SY Assure	04PN096-2	42	10,800	93	2016	AgriPro /Syngenta Cereals
SY Ovation	03PN108#21	48	9,450	106	2011	AgriPro /Syngenta Cereals
UI Magic CL+	IDN 09-DH11	39	11,631	86	2015	Idaho AES / Limagrain Cereal Seeds
UI Sparrow	IDO1108DH	32	14,175	71	2016	Idaho AES
VI Presto CL+	UIL17-6451CL+	34	13341	75	2020	Idaho AES / Limagrain Cereal Seeds, LLC
VI Shock	UIL15-72223	21	21,600	46	2020	Idaho AES / Limagrain Cereal Seeds, LLC
VI Voodoo CL+	UIL17-6268CL+	27	16,800	60	2020	Idaho AES / Limagrain Cereal Seeds, LLC
WB1376CLP	BZ6WM09-1030CLP	38	11,937	84	2014	Bayer Crop Science / WestBred
WB1529	BZ6W07-436	44	10,309	97	2013	Bayer Crop Science / WestBred
WB1621		39	11,631	86		Bayer Crop Science / WestBred
WB1783	BZ6W09-471	49	9257	108	2016	Bayer Crop Science / WestBred
WB456	BU6W99-456	38	11,937	84	2009	Bayer Crop Science / WestBred
YSC-215		33	13,745	73	2020	Yield Star Cereals
YSC-268		45	10,080	99	2020	Yield Star Cereals
YSC-93		37	12,259	82		Yield Star Cereals
Hard Red and White (W) Winter Wheat						
Balance		28	16,200	62	2020	Nutrien Ag
Flathead		35	12,960	77	2019	Montana AES
FourOSix	MT1462	34	13341	75	2018	Montana AES
Golden Spike (W)	UT1944-158	29	15,641	64	1999	Utah AES, USDA
Irv (W)	OR2110679	31	14,632	68	2018	Oregon AES
Juniper	IDO 575	36	12,600	79	2005	Idaho AES, USDA
Keldin	ACS55017	45	10,080	99	2011	Bayer Crop Science / WestBred
LCS Jet	NSA 7208	34	13,341	75	2015	Limagrain Cereal Seeds, LLC
LCS Rocket	NSA10-2196	37	12259	82	2018	Limagrain Cereal Seeds, LLC
Milestone		34	13,341	75	2020	Nutrien Ag
Millie (W)	OR2130118H	26	17,446	57	2021	Oregon State AES
Promontory	UT1567-51	37	12,259	82	1990	Utah AES, USDA
Scorpio	WA8268	32	14,175	71	2019	Washington AES, USDA
Sequoia	WA8180	36	12,600	79	2015	Washington AES, USDA
UI Bronze Jade (W)	IDO1706	31	14632	68	2019	Idaho AES
UI Silver (W)	IDO658B	34	13,341	75	2011	Idaho AES, USDA
UI SRG	IDO656	43	10,549	95	2012	Idaho AES, USDA
WB4401		40	11,340	88	2019	Bayer Crop Science / WestBred
WB4510CLP		42	10,800	93	2017	Bayer Crop Science / WestBred
Yellowstone	MT00159	40	11,340	88	2005	Montana AES

[1]Adjusted to plant 1 million seeds per acre under irrigation according to the number of seeds per pound for each variety.

Table 1 (cont'd). Released varieties tested in 2021-2022 with seed size and adjusted seeding rate.

Variety	Exp. No.	1000 Kernel Weight (g)	Seeds per Pound	Adjusted Seeding Rate[1] (lb/A)	Year Released	Developer(s)/Distributor of variety
Soft White Spring Wheat						
Alturas	IDO526	36	12,600	79	2002	Idaho AES, USDA
AP Coachman	08PN2001-07	40	11,340	88	2020	AgriPro / Syngenta Cereals
Hedge CL+ (club wheat)		40	11,340	88	2020	Washington AES, USDA
Louise	WA7921	55	8,247	121	2004	Washington AES, USDA
Melba (club wheat)	WA8193	40	11,340	88	2016	Washington AES, USDA
Ryan	WA8214	36	12,600	79	2016	Washington AES, USDA
Seahawk	WA8162	38	11,937	84	2015	Washington AES, USDA
Tekoa	WA8189	41	11,063	90	2016	Washington AES, USDA
UI Cookie	IDO1405S	37	12,259	82	2019	Idaho AES, USDA
UI Stone	IDO599	47	9,651	104	2012	Idaho AES / Limagrain Cereal Seeds
WB6211CLP		45	10,080	99		Bayer Crop Science / WestBred
WB6430	BZ608-125	46	9,861	101	2013	Bayer Crop Science / WestBred
YSC-603	10C-58	39	11,631	86		Yield Star Cereals
Hard Red Spring Wheat						
Alum	WA8166	50	9,072	110	2015	Washington AES, USDA
AP Renegade	06PN3017-9	40	11,340	88	2018	AgriPro / Syngenta Cereals
Choteau	MT9920	40	11,340	88	2003	Montana AES
Dagmar	MT1621	40	11,340	88	2019	Montana AES
Duclair	MT0832	40	11,340	88	2011	Montana AES
Expresso	DA984-034SRR	40	11,340	88	2006	Bayer Crop Science / WestBred
Glee	WA8074	42	10,800	93	2012	Washington AES, USDA
Holmes	BZ917-221	49	9,257	108	2023	Nutrien Ag Solutions
Jefferson HF	IDO462	46	9,861	101	2020	Idaho AES, USDA
Net CL+	WA8280 CL+	36	12,600	79	2019	Washington AES, USDA
Rocker		36	12,600	79	2020	Nutrien Ag
SY Gunsight	06PN3015-08	46	9,861	101	2017	AgriPro / Syngenta Cereals
WB9668	BZ908-552	36	12,600	79	2013	Bayer Crop Science / WestBred
WB9707	XC9304	58	7,821	128	2019	Bayer Crop Science / WestBred
WB9724CLP		44	10309	97		Bayer Crop Science / WestBred
WB9879CLP	IMICHT79	36	12,600	79	2011	Bayer Crop Science / WestBred
Hard White Spring Wheat						
Dayn	WA8123	40	11,340	88	2012	Washington AES / AgriPro /Syngenta Cereals
SY Teton	SY10136	46	9,861	101	2015	AgriPro / Syngenta Cereals
UI Platinum	IDO694C	42	10,800	93	2014	Idaho AES, Anderson Group
WB7202CLP	XA7320	46	9,861	101	2017	Bayer Crop Science / WestBred
WB7313		48	9,450	106	2020	Bayer Crop Science / WestBred
WB7328	BZ9S09-0133W	40	11,340	88	2014	Bayer Crop Science / WestBred
WB7589	BZ9S09-0735W	36	12,600	79	2014	Bayer Crop Science / WestBred
WB7696	XB9512	42	10,800	93	2018	Bayer Crop Science / WestBred
Winter Barley - malt						
Charles	94Ab1274	50	9,072	88	2005	USDA-ARS, Aberdeen
Clementine		56	8,100	99		Limagrain Cereal Seeds, LLC
Endeavor	95Ab2299	34	13,341	60	2008	Idaho AES, USDA
Fay		45	10,080	79		Limagrain Cereal Seeds, LLC
Flavia		43	10,549	76		Ackermann Saatzucht / Virginia Tech
Hirondella		36	12,600	63		Ackermann Saatzucht / Virginia Tech
KWS Donau		55	8,247	97		KWS Cereals
KWS Faro		45	10,080	79		KWS Cereals
KWS Scala	GW2895	55	8,247	97	2012	KWS Cereals
KWS Somerset	GW3479	48	9,450	85	2017	KWS Cereals
LCS Calypso		56	8,100	99	2017	Limagrain Cereal Seeds, LLC
Lightning	DH130910	51	8,894	90	2020	Oregon AES, USDA
Marouetta		40	11,340	71		Ackermann Saatzucht / Virginia Tech
Thunder	10.0777	52	8,723	92	2016	Oregon AES, USDA
Wintmalt		47	9,651	83	2014	KWS Lochow
Winter Barley - feed and food						
Eight-Twelve	79Ab812	28	16,200	49	1988	Idaho AES, USDA
Sunstar Pride	SDM204-B	29	15,641	51	1995	Sunderman Breeding, Twin Falls, ID
Upspring[2]	05ARS748-270	38	11,937	67	2018	Idaho AES, USDA

[1]Adjusted to plant 1 million seeds per acre for wheat (800,000 for barley) under irrigation according to the number of seeds per pound for each variety.

[2] Hulless

Table 1 (cont'd). Released varieties tested in 2022 with seed size and adjusted seeding rate.

Usage:	Variety	Exp. No.	1000 Kernel Weight (g)	Seeds per Pound	Adjusted Seeding Rate[1] (lb/A)	Year Released	Developer(s)/Distributor of variety
	Two-Row Spring Barley						
Feed	Altorado	BZ509-601	54	8,400	95	2016	Highland Specialty Grains
Feed	Champion	YU501-385	56	8,100	99	2007	Highland Specialty Grains
Feed	Claymore	BZ509-216	50	9,072	88	2015	Highland Specialty Grains
Feed	Diamondback (SB6)	YU510-559d	50	9,072	88	2020	Highland Specialty Grains
Feed	FeedMor	Moravian 169	44	10,309	78	pending	Molson Coors Beverage Company
Feed	Idagold II	C32	46	9,861	81	2002	Molson Coors Beverage Company
Feed	Oreana	BZ509-448	52	8,723	92	2015	Highland Specialty Grains
Food	Goldenhart[2]	2Ab09-X06F058HL-31	43	10,549	76	2018	Idaho AES, USDA
Food	Julie[2]	03AH6561-94	44	10,309	78	2010	Idaho AES, USDA
Food	Kardia	2Ab09-X06F084-51	46	9,861	81	2016	Idaho AES, USDA
Food	Transit[2]	03AH3054-51	46	9,861	81	2010	Idaho AES, USDA
Malt/Feed	Moravian 180	Pop10-022-030	52	8,723	92	pending	Molson Coors Beverage Company
Malt	AAC Connect	TR04282	48	9,450	85	2016	Agriculture Canada / Canterra Seeds
Malt	ABI Eagle	2B11-4949	46	9,861	81	2018	Busch Agricultural Resources, LLC, Ft. Collins, CO
Malt	ABI Voyager	B3719	46	9,861	81	2011	Busch Agricultural Resources, LLC, Ft. Collins, CO
Malt	AC Metcalfe	TR232	44	10,309	78	1994	Agriculture Canada
Malt	BC Ellinor		40	11,340	71		Limagrain Cereal Seeds, LLC
Malt	BC Leandra		52	8,723	92		Limagrain Cereal Seeds, LLC
Malt	BC Lexy		56	8,100	99		Limagrain Cereal Seeds, LLC
Malt	CDC Copeland	TR150	52	8,723	92	1999	CDC University of Saskatchewan/ SeCan
Malt	Conrad	B5057	42	10,800	74	2004	Busch Agricultural Resources, LLC, Ft. Collins, CO
Malt	Esma		46	9,861	81		Ackermann Saatzucht GmbH & Co. KG
Malt	GemCraft	2Ab08-X05M010-65	48	9,450	85	2018	USDA ARS, Idaho AES
Malt	KWS Amadora		48	9,450	85	2015	KWS Lochow
Malt	KWS Fantex		50	9,072	88		KWS Lochow
Malt	KWS Jessie		48	9,450	85	2019	KWS Lochow
Malt	KWS Willis		54	8,400	95		KWS Lochow
Malt	LCS Diablo		50	9,072	88		KWS Lochow
Malt	LCS Genie		50	9,072	88	2011	Limagrain Cereal Seeds, LLC
Malt	LCS Odyssey	NSL08-4556-A	42	10,800	74	2015	Limagrain Cereal Seeds, LLC
Malt	LCS Opera		42	10,800	74		Limagrain Cereal Seeds, LLC
Malt	Merit 57	2B99-2657	46	9,861	81	2009	Busch Agricultural Resources, LLC, Ft. Collins, CO
Malt	Moravian 69	C69	50	9,072	88	2005	Molson Coors Beverage Company
Malt	Moravian 179	C10-116-201	46	9,861	81	2019	Molson Coors Beverage Company

[1]Adjusted to plant 800,000 seeds per acre under irrigation according to the number of seeds per pound for each variety.

[2] Hulless

RESULTS AND DISCUSSION

Planting Conditions

The fall of 2021 was dry and like most years, plots had to be irrigated prior to or after planting for seed to germinate and emerge. Dryland plots emerged prior to winter, unlike in 2021 when seedlings in some areas emerged the following spring. Conditions were good for early to mid-season planting of winter grain at irrigated locations but subsoil moisture at all locations was very low for the second year in a row. At Aberdeen, September precipitation was much lower than average (see Chart 1a), with good moisture in October followed by a very dry winter.

Spring planting conditions were generally good for stand establishment of spring grain, and moisture was average to very good depending on location. A very cool and extended spring with higher-than-average rain resulted in delayed emergence. Upper elevation spring grain emergence was delayed up to a month after planting.

Weather Conditions

Winter conditions were good with little to no winter damage in irrigated fields unless the soil moisture was low. Drought continued from 2021, with annual growing year precipitation recorded as 5.85 inches (Chart 1b). Spring temperatures were very low through June when temperatures exceeded average and continued higher than normal through the summer. The accumulated growing degree days were very low compared to previous years (Figure 1c).

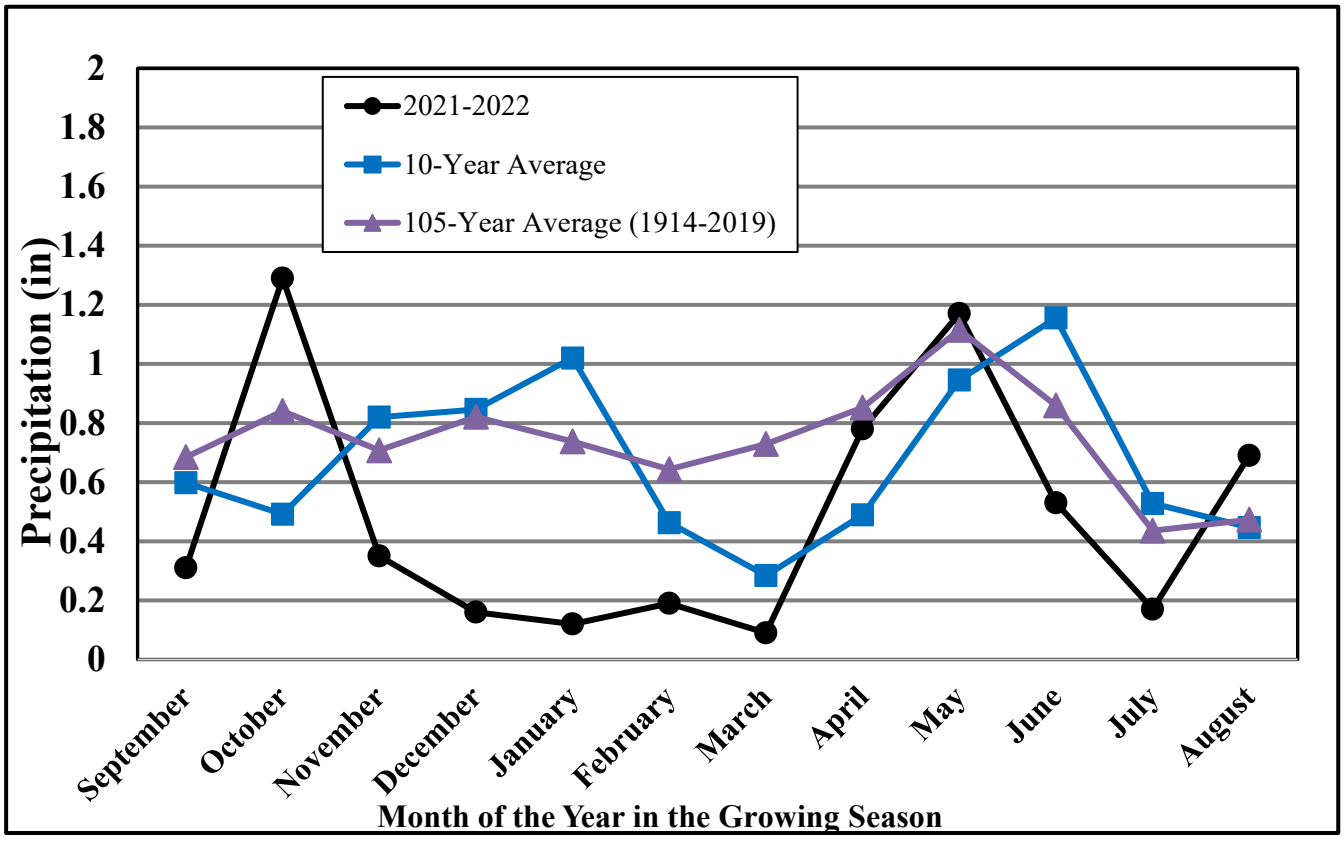


Chart 1a. 2021-2022 growing year precipitation recorded at Aberdeen, ID, versus 10-year and 105-year averages. Source: NWS & Agrimet data.

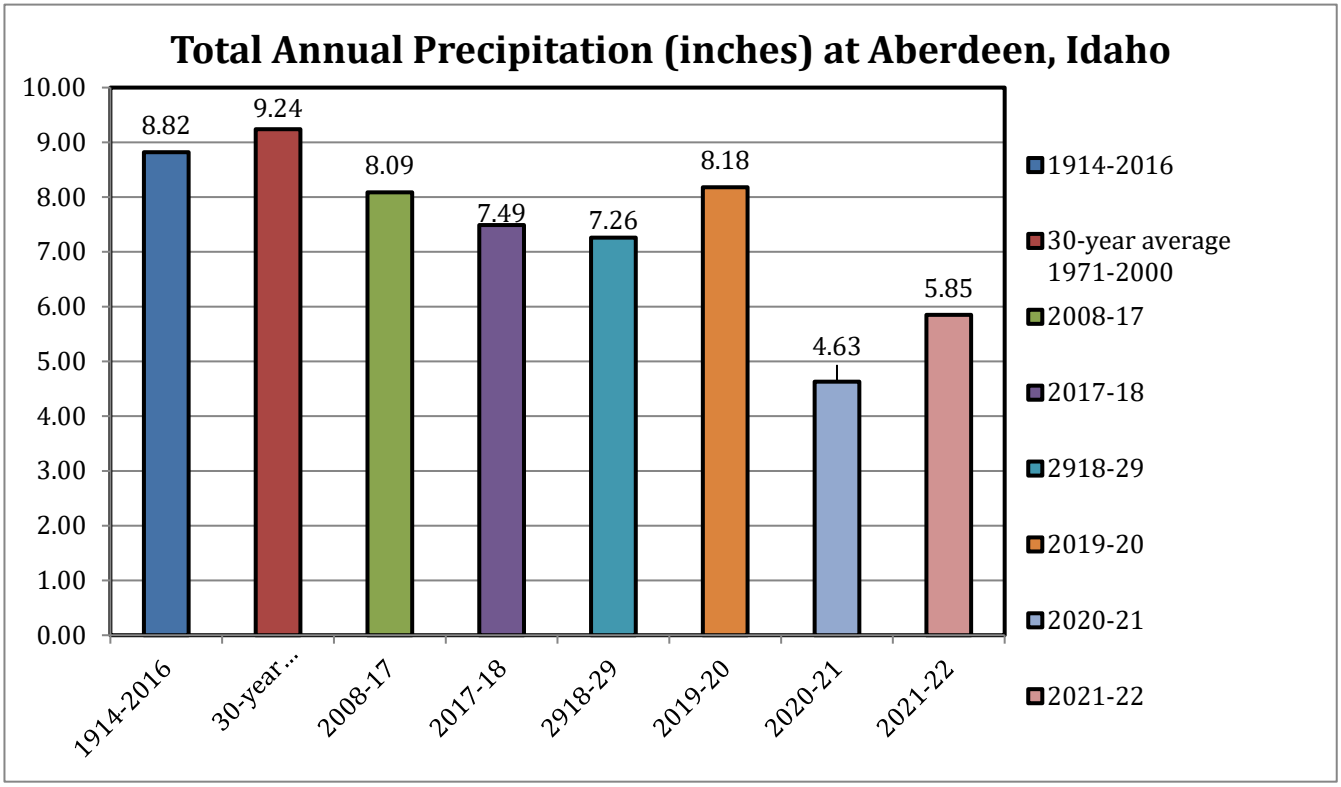


Chart 1b. Growing year precipitation data recorded at Aberdeen, ID, versus 30-year (1971-2000) and 102-year averages. Source: Agrimet data.

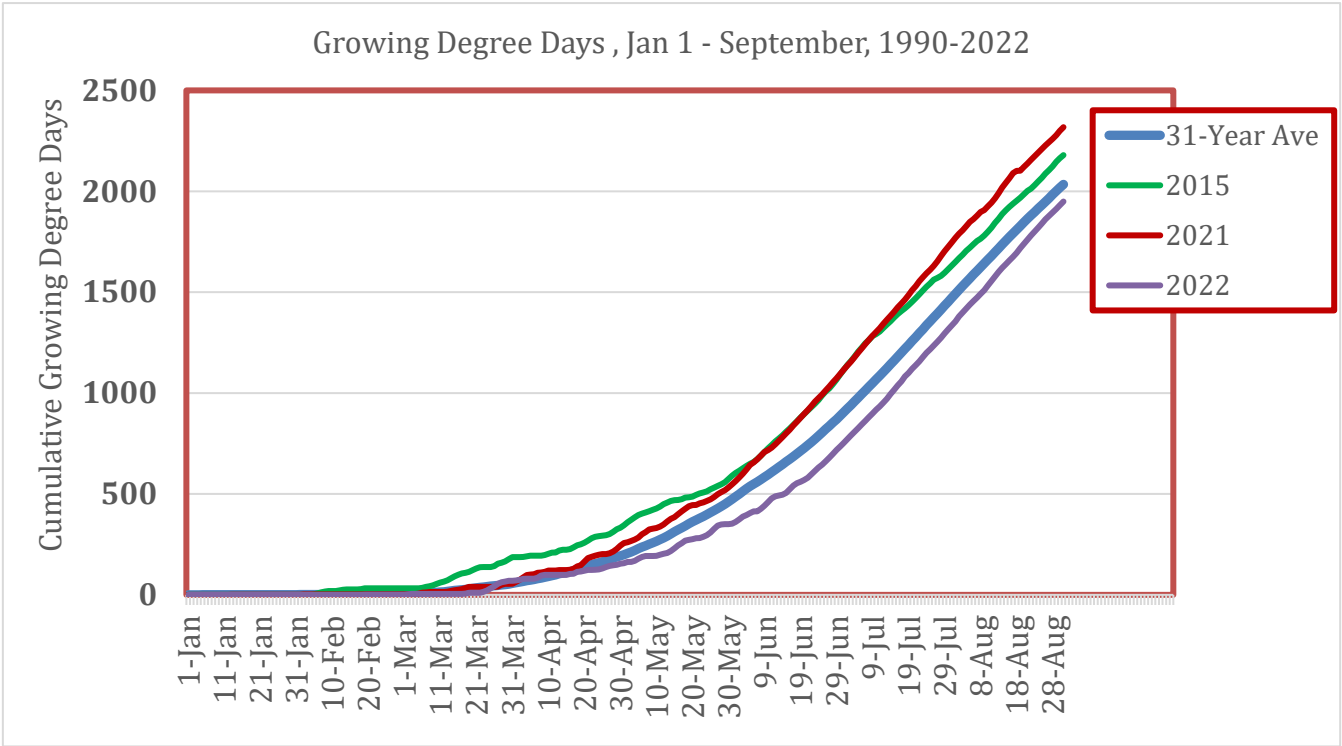


Chart 1c. Growing degree-day data recorded at Aberdeen, ID, in 2022 versus 2015, 2021 and 31-year averages. Source: Agrimet data.

Heading dates of winter and spring wheat were 8 days later than the 10-year average (Table 3).

Spring barley heading dates were also delayed by 6 days from the average for the previous 10 years (Table 3).

High temperatures during heading resulted in heat stress for spring grain during flowering and crop stress during grain fill. Natural precipitation was below the 10-year and 102-previous year averages in almost every month until July and August, when late rain resulted in sprout damage at several locations (Chart 1b). The results of falling number tests can be found on our website.

Over all locations (Table 3), yields were greater than the 10-year average for winter wheat, at the previous 10-year average for spring wheat and lower than average for barley. Plant heights were 3 inches greater than average for winter wheat and 1-2 inches greater for spring barley and for spring wheat. Lodging was average for wheat and below average for spring barley. Due to the excessive heat, dry subsoil conditions, and late-season rain, test weights were low for all wheat crops, with excessive heat and late season rains damaging the spring crops far more than the winter grain.

Crop quality was considered fair to good with very little damage from Fusarium head blight (FHB) and very low to no vomitoxin levels detected overall. Standard practices of fungicide application in fields of grain planted after corn reduced FHB and levels of DON (vomitoxin associated with FHB infection), and overall due to the heat and dry conditions, disease levels were minimized.

Disease and Insect Problems

Major insect and disease issues were limited. Some wireworm damage occurred in the very early part of the season and cereal leaf beetles were consistently responsible for low levels of leaf damage during the season. There were low levels of stripe rust reported late in the growing season in southern and eastern Idaho, and bacterial leaf streak (Xanthomonas) occurred frequently in barley in eastern Idaho without significant yield loss. Physiological leaf spot (PLS) was not a problem in 2022.

There was not significant snow accumulation and very little winter wheat was damaged by snow mold. Overall, foliar diseases were low as compared to previous years when black chaff and bacterial streak were widespread. Infection with *Xanthomonas* often occurs earlier in the season facilitated by hail or sleet events, then develops rapidly as the temperature increases during the summer and then spreads via irrigation. There is very little that can be done to prevent or reduce the disease as fungicides are completely ineffective on bacterial diseases. Reducing frequency of irrigation and increasing amount of irrigation is supposed to reduce how fast the disease spreads with splashing water. Clean seed is also supposed to reduce likelihood of transmission to additional fields; however, the bacteria are everywhere, and hail events are unpredictable and uncontrollable. Effective measures to reduce the disease are often not practical or possible when environmental conditions are conducive for infection and spread.

Wireworms (of various species) were damaging in only a few areas across the region, reducing stand and yield of spring wheat and barley in dryland production, but damage was not severe as in previous years. As the soils quickly became dry and warmed as the season progressed, damage dropped as the wireworms buried deeper into the soil. In general, winter grain could be used to avoid wireworm damage as wireworms are

less active in warmer, drier soils when winter wheat would be planted. However, seedling emergence in dry soils is problematic, and winter kill increases under cold and dry conditions. Most insecticides applied as seed treatments reduce, but do not control, wireworms and the resultant feeding damage. Newer insecticides offer better protection.

Wheat Stem Sawfly (*Cephus cinctus* Norton) was not damaging in dryland spring grain as in previous years. The discovery of Hessian fly (*Mayetiola destructor* Say) in southern Idaho in 2015 raised a great deal of concern, as many of our currently grown varieties are not Hessian Fly resistant. The Hessian fly larvae were discovered in late-planted spring wheat in the Parma area, and may also damage spring barley. There was a second report of Hessian fly in 2021 occurring in volunteer wheat near Parma. Thankfully, Hessian fly has not become a problem in our production areas.

Volunteer grain continues to contribute to some green bridge conditions. Usually, early planted winter wheat and barley suffer from barley yellow dwarf (BYD) and wheat streak mosaic virus (WSMV) infections, but many producers have the equipment necessary to avoid having to plant too early to get all their acreage planted. There was a long hot dry break between spring harvest in 2021 and planting of 2002 winter crop, significantly reducing the green bridge risk.

Stripe rust (*Puccinia striiformis* f.sp. *tritici*) Stripe rust did not infect susceptible varieties of fall-planted wheat, and there was no disease carryover to the spring. Some susceptible spring wheat became infected late in the season but never required fungicide application. Actively scouting fields of susceptible varieties is highly recommended to identify infection as early as possible. Fungicides can then be applied to prevent yield loss especially should stripe rust infect wheat plants prior to flowering. Susceptible varieties, such as Brundage, may need two fungicide applications to control stripe rust in high pressure years. Two-rowed barleys tend to have greater levels of resistance to stripe rust than do the six-rowed varieties, and no barley stripe rust was found in 2022.

Barley scald (*Rhynchosporium secalis*) did not reach the damaging levels and foliar disease throughout the region was limited on barley. In most years, low levels of early season scald infection do little to affect the barley crop and can be ignored. Previous years (2009-2011) were not by any means typical, and scald ran rampant in fields in 2009 where application of fungicides would have prevented significant crop loss. This will be a disease to watch in future years, especially as production of winter barley increases the chances of high levels of disease developing which then may affect early development in spring barley. Barley scald will also increase in minimum and no-till situations where the fungus may reside in residue.

Snow mold *(Typhula spp.)* occurs during long periods of snow cover when snow falls on unfrozen soil. Stand of winter wheat in upper elevation areas was not significantly affected in 2020 through 2022. In 2019 wheat stands were reduced 75-100% in production fields around Ashton. Those fields were replanted with spring grain.

Strawbreaker foot rot (formerly *Pseudocercosporella herpotrichoides* now *Ocumacula yallundae* and *O. acuformis*) is a stem-based disease usually found in winter wheat and barley, but in some years can be found in spring grains. Strawbreaker, also called eyespot, occurred throughout the production region in 2019 and 2020, and in 2020 and 2022 was as prevalent in spring grain as in in winter grain. Infection occurs from residue-borne fungi when there is

excess moisture, humidity and cool temperatures through the winter and spring. Characteristic elliptical lesions form at the lower nodes of the stem, weakening the tiller and increasing lodging. This disease is exacerbated by heavy seeding rates, rainy spring conditions and successive years of grain production. High rates of nitrogen fertilizers also promote the disease, especially when applied alone without other 'balancing' nutrients. The most effective means of reducing this disease is through crop rotation. However, if detected early in the spring, this disease is reduced with the application of benomyl fungicides like Benlate, Topsin M, or Mertect.

Fusarium **spp.** causing foot rot, some ***Rhizoctonia*** **spp.** and **Take-all** (*Gaeumannomyces graminis* var. *tritici*) occurs frequently in grain following grain. Fusarium infection occurs in deficit moisture conditions early to mid-season under dryland conditions and occurs where irrigation was not increased to compensate for moisture deficits. Due to the dry conditions in the winter and spring of 2022, there were only a few incidences of take-all in under over-irrigated and thickly seeded fields. However, there were several spring wheat fields with Pythium and Rhizoctonia infections that occurred when volunteer plants were killed with herbicide immediately prior to planting. It is highly recommended to eliminate volunteer grain in the fall prior to winter setting in, or at least two to *three* weeks prior to spring sowing. Later planting reduces spring yield and quality, but substantial and greater yield reductions occur with soil-borne diseases in grain following grain. Diseases that spread from dying grain can cause a great deal of damage to the developing roots and seedlings of the newly planted crop, reducing tillering, water and nutrient uptake.

Rhizoctonia infections occurred in many production fields where winter wheat followed winter wheat. Symptoms were more severe with heavier wheat straw residue leading to reduced stands in affected areas, with the cool wet spring exacerbating the severity. Symptoms include stunting and yellowing of plants, fewer tillers and leaves with yellow stripes that resembled nutrient deficiencies. Best management practices include crop rotation and even distribution of straw at harvest with combine choppers / spreaders.

Pythium this year was not damaging to winter wheat and early planted spring wheat and barley. Pythium can be very damaging to early planted spring grain when rains and cool temperatures followed planting, which was definitely an issue in 2019 but less so in 2020 and 2021. While conditions were optimal for Pythium in 2022, seed treatments (with metalaxyl, mefenoxam and / or ethaboxam) can prevent or reduce infection of vulnerable seedlings. There are strains of Pythium with resistance to metalaxyl / mefenoxam, that do not show resistance to ethaboxam fungicide.

Luckily, growing conditions in 2022 were not conducive to widespread grain infections of **Fusarium head blight (FHB)** (also called Head Scab, causal organisms *Fusarium graminearum* and other *Fusarium* spp.). Hot and dry conditions at flowering were not favorable for infection. Low levels of DON (<1 ppm) occurred in seed grain that was planted in a field following corn. A significant problem in 2015, FHB reduced yields and contaminated grain with toxins over multiple years - in 2011, 2012, 2014 and 2015. In 2015, *Fusarium graminearum* was widespread but **was not** restricted to where wheat follows corn production. Spores formed on corn residue can travel many miles in the wind. This disease also can be severe where spring barley followed corn, as the fungus reproduces extensively on corn residue. Rejectable levels of deoxynivalenol toxin, (abbreviated as DON

and also called VOM, short for vomitoxin), which is a by-product of the fungal infection process, contaminated 2015 malt barley and many acres of spring barley in the Rupert production region. It is highly recommended that irrigated spring grain be treated with an appropriate fungicide at flowering to reduce infection, especially when a hard white or hard red spring wheat or barley follows corn production. Even in 2019 where conditions did not favor FHB, low levels of DON (less than 2 PPM) were found in barley following corn. In 2020 and 2022, there were very few reported cases of FHB or DON being problematic in spring wheat or spring barley. For prevention, it is essential that a **triazole** fungicide be utilized, as strobilurin fungicides are ineffective in reducing the accumulation of toxins. (See Addendum 3a-3c and 4a-4c for 2022 data of spring wheat reaction to FHB infection, and Addendum 6a-6c and 7a-7c for spring barley.)

The **"Spot Form of Net Blotch**" (SFNB) of barley *Pyrenophora teres* f.sp. *maculata* was first diagnosed in a few fields near Blackfoot in 2013. In 2014, SFNB became severe in many areas throughout Idaho and Montana. This disease occurs widely in North Dakota and the upper Mid-West, reducing yields by up to 50% and grain weight by 20%. SFNB was still problematic in 2019, especially in no-till situations, but was not as severe as in 2015. Areas that have reduced tillage and low crop diversity are at increased risk as this disease survives in barley stubble. Some varieties are more susceptible than others. Crop rotation and fungicide applications significantly reduce the impact of this disease. Fields that had been sprayed with fungicides at herbicide timing have been observed to have significantly less disease. Additional testing to develop control recommendations in our environment is required.

Cereal cyst nematode (*Heterodera avenae*) (CCN) damage was extensive in spring wheat and spring barley fields in the northern Snake River Plain, with visible damage in crops from Rexburg, Plano, and St. Anthony through the Ashton area. CCN affects all grassy crop species and can even infect grassy weeds. Research conducted in St. Anthony with Dr. Richard Smiley (Professor Emeritus, Oregon State University) identified resistant and tolerant varieties of spring wheat and barley and was published in 2015. Dry soil conditions in spring 2021 reduced root invasions, and the CCN screening trials conducted in a heavily infested field west of Rexburg resulted in very low disease pressure and unsuccessful screening. Crop rotation to broadleaf crops will substantially reduce CCN populations in the soil and subsequent damage to spring grain.

Green Bridge

A "green bridge" is generally defined as the overlap of different cropping cycles (or crop generations) within a year. This means there is the constant availability of living, green host material of a given crop. This occurs in many locations in southern and southeast Idaho for several reasons: 1) late maturing tillers (as occurred in 2010) of winter wheat stay green and growing even after harvest; 2) windy conditions causes shattering of spring grains (as in 2010) prior to complete maturity of the crop; 3) hail storms induce shattering of grains prior to crop maturity. Shattered grain germinates and results in the continuous presence of living host material, which means there is a constant supply of host plant material for disease-causing organisms and insects; 4) In most years, volunteer grain blown out of the combine at harvest germinates and provides a green bridge, increasing the likelihood and risk of higher disease and insect problems for the next growing season. Many growers use the volunteer growth as feed or forage for livestock, but that can result in extensive carryover of pathogenic organisms from year-to-year. In years like 2019, 2020 and

2021 where conditions are very dry in July, August and September, green bridge situations are less of a problem as there is little moisture for germination, unless irrigation is applied to stimulate germination of residual seed.

Other green bridge examples include heavy, unusual rains in August of 2014 prior to harvest, which resulted in extensive losses due to sprout but also set up green bridge conditions when grain shattered and germinated before harvesting could occur. Because of the green bridge, aphids and certain disease-causing organisms can jump to the emerging winter crop, causing direct damage and / or transmitting viruses. In 2015, many growers irrigated the volunteer for forage. With an early harvest and a long warm fall of 2015, the volunteer from the spring crop was in grain fill prior to a killing frost in November. The green bridge situation resulted in extensive BYD and stripe rust infection in the fall volunteer.

In the fall of 2014, 2015 and 2016, high populations of aphids moved into the earliest emerging winter wheat and barley, contributing to a widespread occurrence of BYD in southern Idaho. Corn is a 'silent' host of barley yellow dwarf virus, hosting high concentrations of the virus without symptoms or damage to corn. Late in the fall season, aphids (especially English grain aphids and Bird-cherry oat aphids) move from corn to winter cereals, landing on the newly emerged grain and transmitting the virus to the new crop. Aphid populations may build up before a killing frost occurs. Severe stunting and yellowing of grain become apparent in the spring, resulting in yield reductions of over 50% in the most severely affected fields. However, in the springs of 2017 through 2021, lower levels of fall transmission occurred due to dry summers, delayed fall planting, use of insecticidal seed treatments and excellent growing conditions, preventing widespread losses from BYD.

2022 Report: Discussion of Location Conditions and Results

Following two years of below-average precipitation, subsoil moisture was very low. This became apparent later in the 2022 growing season when patchy areas in production fields quickly dried during grain fill. Without replenishing subsoil moisture, there were no reserves when excessive heat hit in June, July and August. Spring grains were damaged the most, resulting in lower test weights and shriveled grain.

NASS within the USDA reports Idaho 2022 wheat yields at 86.8 bu/A over all categories (irrigated and dryland, winter and spring), up substantially from 2021. Out of 1.157 million acres planted, 1.077 acres were harvested. For spring wheat, 360,000 acres were harvested of the 380,000 acres planted resulting in an average of 81 bu/A. For winter wheat, 710,000 acres were harvested of the 770,000 acres planted with an average yield of 90 bu/A. Overall, quality was reported as good but heat stress reduced yield and test weight, resulting in high protein grain for some areas.

For barley, 540,000 of 560,000 acres planted in 2022 were harvested (NASS) for a total harvest of 59.9 million bushels. The average yield in the state was reported as 111 bu/A.

https://www.nass.usda.gov/Statistics_by_State/Idaho/index.php

It is best to consider three year or multiple year, multiple site averages when choosing varieties for your specific location. Conditions vary tremendously from year to year, and one-year results can often be misleading. Yield stability and disease reactions often require many years and/or locations of evaluations. Balance selections

based on yield, good test weight, protein levels appropriate to market class (low protein for soft wheats, high proteins for hard wheats) as well as disease resistance specific to your production zone. While the multiple location/three-year average data presented in the Tables provide more accurate information, new varieties will have limited performance information, which may not be a good reflection of long-term performance.

Protein Targets

Hard Red Winter Wheat = 12.5% minimum
Hard Red Spring = 14.5% minimum
Soft White Winter = 10.5% (9-12%)
Soft White Spring = 10.5% (9-12%)
Club wheat <10%
Malt Barley = 9.5-12.5%

Keldin + 11-52-0 – In-furrow fertilizer was added to one variety in the hard winter group to test the effect of starter fertilizer on yield. (Monoammonium phosphate or 11-52-0 at 20 lbs phosphate per acre was included in-furrow.) In Table 4, Keldin was 3 bu/A greater than Keldin +11-52-0 with the starter fertilizer which is not considered statistically significant (SE = 3 bu/A at Pr = .01). Table 4 included three years of data over multiple irrigated sites. Other agronomic traits were very similar indicating no effect of starter fertilizer. Under dryland conditions (Table 5), Keldin + 11-52-0 was 4 bu/A greater than Keldin, with the standard error of 2 bu/A. The impact of starter fertilizer is often greater under dryland conditions where there is usually not a lot of excess nutrients left from the previous crop.

Winter Wheat 3-Year Averaged Data

Three-year averages of hard winter wheat over all irrigated locations (Table 4, 11 site-years) put Keldin, LCS Jet, Keldin + 11-20-0, LCS Rocket, Flathead and Yellowstone at the top with 155, 153, 152, 149, 148 and 148 bu/A, respectively. Test weights were low, averaging 58.7 lbs/bu. The protein target for hard red winter wheat is 12.5%, and these trials resulted in lower than average protein. Lower yielding varieties had enough residual soil and applied nitrogen to meet protein goals, but higher yielding varieties required additional protein to hit desired targets. **Averaged over all 2022 irrigated locations**, the highest yielding **hard winter wheat** varieties (Table 6) were Keldin (166 bu/A) and LCS Jet (164 bu/A), with Keldin having higher-than-average test weight. Test weight in 2022 was very low due to hot and dry conditions and some locations having sprout damage from late-season rain. Keldin headed on the average for the trials, was two inches taller and had 13.1% protein. UI Bronze Jade was the highest yielding hard white winter variety, but poor quality will limit marketability of UI Bronze Jade.

Average 3-year dryland yields for hard red and white winter (Table 5) were 35 bu/A, where the top yielding varieties included FourOsix (39 bu/A), Keldin (with 11-52-0 at 39 bu/A), Yellowstone (37 bu/A) and UI Silver (37 bu/A). Protein average for these trials was 12.4%, and test weight averages were low, with 57.4 lbs/bu average. **2022 combined dryland yields** for **hard** red and white **winter wheat** (Table 7) averaged 44 bu/A, much higher than 2021 which was 15 bu/A due to severe drought conditions. The highest yielding varieties in 2022 were LCS Jet (51 bu/A), Keldin with 11-52-0 (51 bus/A), FourOsix (51 bu/a), Flathead (51 bu/A) and Keldin and Yellowstone (48 bu/A). Proteins were very low, averaging only 10.1% grain protein.

The top yielding **soft white winter varieties over the last three years** over all **irrigated** locations (Table 15) are LCS Hulk (156 bu/A) LCS Blackjack and WB1783 (153 bu/A), YSC-215, Piranha CL+ and M-Press (all at 152 bu/A). All test weights were

below 60 lbs/bu, averaging 57.5 lbs/bu. Proteins for the trials were within the soft white winter protein targets between 9–12% grain protein. **Averaged over all 2022 irrigated locations**, the highest yielding **soft white winter wheat** named varieties (Table 17) were WB1783 (162 bu/A) and WB1621 (161 bu/A). Heading date averaged June 9, three days later than in 2021, and average test weights were very low at 55.6 lbs/bu.

Average 3-year dryland yields for soft white winter (Ririe, Rockland and Soda Springs) were 38 bu/A, where the top yielding varieties included LCS Hulk (43 bu/A,) (Table 16), Eltan with 11-52-0, Otto and UI Sparrow (all at 42 bu/A). All had test weight less than 60 lbs/bu and WB1376CLP + had protein over 13%. One-year combined dryland locations for 2022 (Table 18) averaged 45 bu/A, 30 bu greater than in 2021 (15 bu/A), with the highest yielding varieties at 53 bu/A (SY Ovation), 52 bu/A (Sockeye CL+) and 51 bu/A (Eltan with 11-52-0 in furrow). Heading date (6/20) was similar to 2021. Due to drought, heat and late-season rain, test weights averaged 52.4 lbs/bu. Grain protein averaged 10.2%.

Winter Barley 3-Year Averaged Data

Three-year, multiple location averages for winter barley are presented in Table 26. Top yielding released varieties include Thunder (166 bu/A), KWS Donau (162 bu/A), and Sunstar Pride (159 bu/A). There are malt, feed (Sunstar Pride, Eight-Twelve) and food lines in this trial, with Upspring being a hulless food line with very high test weight (comparable to winter wheat) but having reduced spring stands. Proteins were in the target range for malt specs except for the food line Upspring, which averaged 13.9% grain protein, and KWS Scala and LCS Calypso. High protein and low test weights of 2021 and 2022 reduced overall 3-year averages. Plumps of Charles and Endeavor were low and lodging was high compared to the other winter malt varieties. KWS Donau, KWS Faro, and Upspring had lower lodging than average. For the one-year **irrigated averages in 2022** (Table 27), the top yielding lines and varieties are Clementine (202 bu/A), 13ARS537-13, (195 bu/A), Thunder (190 bu/A), and Flavia (187 bu/A). Irrigated trial averages was 170 bu/A with excellent test weight average of 51.1 lbs/bu and high grain proteins at 12.4%. Heading dates averaged three days later than 2021.

Spring Wheat 3-Year Averaged Data

Over **three years over all locations**, averaging over twelve site-years, the highest yielding hard spring varieties under irrigation (Table 31) were Dayn (hard white spring wheat at 123 bu/A), UI Gold (hard white at 122 bu/A), WB9707 (113 bu/A) and WB7696 (hard white at 112 bu/A). The hard reds with the best combinations of test weight and high protein include WB9707, Alum and WB9668. The average 3-year test weight was 60.3 lbs/bu, and the average grain protein was 13.8%. High protein lines were Dagmar (14.9%), WB9668 (14.8%), Expresso (14.5%) and Alum (14.3%). The **2022 combined irrigated average** (four locations) for hard spring wheat (Table 33) was 112 bu/A, 8 bu/A greater than 2021. IDO2002S (W) and WA8342 (W) were the highest yielding lines at 127 bu/A and 124 bu/A, respectively. Dayn and UI Gold averaged 122 bu/A, with protein less than 14%, but as both are hard white varieties, protein targets are greater than 12.5%. High protein red lines were WA 8357 (15.5%), BZ919-101 (15.3%), WB9668 (14.9%) and Dagmar (14.8%).

There is only one **dryland location** for spring wheat (Soda Springs), and the three-year average data is in Table 32. Highest yielding hard spring varieties include Dayn (W) at 37 bu/A, Alum (36 bu/A), Jefferson at 36 bu/A and Dagmar at 36 bu/A. Test

weights were above 60 lbs/bu, but grain protein was less than 12% indicating higher fertilization is required to bring the hard spring wheat up to preferred levels of grain protein. WB 9668 showed high test weight and high grain protein.

Three-year averages for soft white spring wheat over all irrigated locations (Table 40) put WB6430 at the highest yield (120 bu/A) of the named varieties, followed UI Stone and Seahawk (both at 115 bu/A), Alturas and UI Cookie (both 114 bu/A). The **2022 combined irrigated average** for soft white spring wheat (Table 42) was 113 bu/A. WA 8327 yielded 124 bu/A, IDO1902S yielded 123 bu/A with excellent test weight, UI Stone was at 123 bu/A, and WB6430 120 bu/A. Test weight was 59.8 lbs/bu for the average, and grain protein 10.6%, which was good for soft white spring wheat. Yields were higher than in 2021. By 5 bu/A, and test weights were low due to high heat conditions during grain fill.

There is only one **dryland location** for soft white spring wheat (Soda Springs), three-year average data for which is in Table 41. Ryan was the highest yielding variety at 44 bu/A, followed by Melba club wheat at 41 bu/A, AP Coachman at 41 bu/A and Seahawk and UI Stone both at 39 bu/A. Test weight average was 59.9 lbs/bu, and protein was 10.2%.

Spring Barley 3-Year Averaged Data

Spring malt varieties and feed/food lines are reported in separate tables.

Three-year irrigated averages (12 site-years) for the malt varieties (Table 49) puts KWS Jessie, Esma, BC Leandra and KWS Fantex at the top (150, 150, 148, 148 bu/A, respectively), all with excellent test weight, plumps and protein.

For the only dryland location for spring malt (Soda Springs), the three-year average data is in Table 50. KWS Fantex, KWS Jessie, Merit 57 and KWS Amadora were the higher yielding varieties at 42, 41, 39 and 39 bu/A, respectively.

Looking at **combined irrigated averages** for 2022 (Table 51), Esma, KWS Amadora, KWS Fantex, KWS Willis, and BC Lexy yielded 150, 145, 144, 143 and 143 bu/A respectively, all except BC Lexy with good test weight, protein and plumps. The heading date for the 2022 trials was 15 days later than in 2021.

For the feed and food varieties, over three years (12 site-years), Altorado, Oreana, Claymore, and Champion were the highest yielding named feed varieties (Table 58) at 142, 142, 141, and 132 bu/A, respectively. Kardia (hulled) was the highest yielding food barley, followed by Julie, Goldenhart and Transit (all are hulless, as reflected in the very high test weights). In the **combined 2022 irrigated trials** (Table 60), the top yielding named varieties were Oreana (150 bu/A), Altorado (146 bu/A) and Claymore (144bu/A). Kardia was the highest yielding food barley (119 bu/A), but is hulled with lower test weight in comparison to the other hulless food barleys. The heading date for the 2022 trials was 7 days later than in 2021.

For the only dryland location for spring feed and food barley (Soda Springs), the three-year average data is in Table 60. Oreana, Altorado, and Claymore were the higher yielding varieties at 150, 146, and 144 bu/A, respectively. Grain protein averaged 12.3% and heading date for the 2022 trials was 7 days later than in 2021.

Kimberly Research and Extension Center, Irrigated Winter Grain

Winter wheat nurseries were planted following dry beans on September 29, 2021 – and were planted into drier than optimal

conditions. Post-planting irrigation helped provide conditions for uniform germination. The crop suffered no winter damage and was planted late enough to avoid BYDV infection. Stripe rust was absent. Plots were harvested August 9th.

The hard winter wheat group (Table 8) yield ranged from 129 to 201 bu/A. The highest yielding varieties were Keldin at 201 bu/A, WB4510CLP at 185 bu/A, and LCS Jet at 182 bu/A. MT1745, LCS Rocket, Yellowstone and WB4401 were the next highest yielding varieties, yielding 178, 177, 177, and 176 bu/A, respectively. Site average for yield of the hard winter group was 169 bu/A - 45 bu/A greater than 2021 yields and about 3 bu/A less than 2020 (Table 8). Test weight average was 59.3 lbs/bu, and grain protein average for the location was low at 11.8%. The plots were fertilized for expected yield that was lower than the highest yielding varieties, resulting in low grain protein in the higher yielding lines. Heading dates averaged 4 days later than in 2021. Total N available was 544 lbs N/acre. Optimal grain protein for hard red winter wheat should be 12.5% or greater. The ratio of applied N to (169 average) bu/A yield was 3.2, within the 3.0 to 3.5 ratio needed for optimal protein in hard winter wheat.

Soft white winter wheat yields averaged 167 bu/A - 30 bu/A greater than in 2021 and 8 bu/A greater than 2020 (Table 19). Irrigated yield varied from 148 to 191 bu/A with lower CV's for the location than in 2020, and similar to 2021. Sockeye CL+ (191 bu/A), M-Press (180 bu/A), Piranha CL+ (178 bu/A), and LCS Blackjack (177 bu/A) were the highest yielding varieties. Heading dates averaged 4 days later than in 2021. Test weight averaged a low 58.6 lbs/bu potentially due to heat at grain fill, and grain protein average for the location was at 9.9%. With a total of 404 lbs available N in the nursery (see site description on page 6) and average yield for soft white winter wheat nursery at 167 bu/A, the lbs of N to yield calculates to 2.4 lbs of nitrogen per bushel of yield.

Rupert, Luke Adams, Irrigated Winter Grain

Plots were planted September 24, 2021 in silt loam soil following barley into good soil moisture and seedbed conditions. Spring stands of the winter wheat nurseries were good, without cold damage. There were no visual symptoms of BYD occurring at this site. Plots were within a winter barley field, which matured prior to the winter wheat resulting in less irrigation than optimal for winter wheat yield. Plots were harvested August 1st and 2nd.

Winter barley plots averaged 151 bu/A (Table 28). In 2021 the average yields were 154, and in 2020 the average yield was 98 bu/A. Yields ranged from 122 (hulless 12ARS777-2) to 186 bu/A (Thunder). The ratio of available and applied N (404 lbs N/A) to average bushel yield (151) was 2.7 lbs N/bu. Proteins varied widely and were biased up by high protein food barley lines. Grain protein excluding the food lines averaged 12%. Heading date for the winter barley averaged 2 days later than the previous year.

Average yield for the Rupert hard winter wheat trial (Table 9) was 128 bu/A, 28 bu/A less than 2021 and 1 bushel less than 2020. Yield ranged from 100 (WA8309) to 156 bu/A for Keldin (with 11-52-0 added in-furrow). Test weight averaged 55.6 lbs/bu which was low due to induced rain-pre-harvest sprout, but there were still several varieties with good test weight including Flathead, WB4510CLP and Kairos. Grain protein averaged 13.1%. The ratio of total N to average yield was 426 / 128 = 3.3, hitting the 3.0-3.5 recommended to obtain high protein (12.5% or greater) hard red winter wheat. Keldin, Milestone, LCS Jet, Flathead

and LCS Rocket were the highest yielding named lines at 156, 150, 146, 144 and 137 bu/A, respectively.

The soft white winter group (Table 20) ranged in yield from 90 to 143 bu/A, averaging 38 bu/A less than 2021, and 17 bu/A less than 2020. The highest yielding varieties were SY Assure, (143 bu/A), AP Iliad (130 bu/A), Piranha CL+ (130 bu/A), and WB1783, AP Exceed and WB456 (all at 129 bu/A). Test weights averaged very low at 51.4 lbs/bu due to rain initiating pre-harvest sprout. The ratio of available and applied N (386 lbs N/A) to average bushel yield (117) was 3.3 N/bu, too high for soft white winter wheat. The proteins were high with the trial average at 13.0%. Lodging averaged 2% with one variety averaging 20% lodging.

Aberdeen Research and Extension Center, Irrigated Winter Grain

The winter trials in Aberdeen were planted September 27th in a Declo loam soil into good seedbed conditions and soil moisture, and harvested August 11th and 12th. The preceding crop was green manure oats. Neither BYD nor stripe rust was observed in the winter grain.

Winter barley yields were as high as 225 bu/A with an overall average of 189 bu/A (Table 29), 70 bu/A greater than 2021 and 34 bu/A greater than in 2020. High yielding lines and varieties included Clementine (225 bu/A), 13ARS537-13 (217 bu/A), Fay (214 bu/A), and Flavia (204 bu/A). Spring stands were very good, with only one variety showing winter tenderness – the hulless food line Upspring. If winter kill is a problem, the hulless or naked food lines and Charles and Endeavor (older malt barley lines) are often the most susceptible and are the first to show damage. Test weight averaged 51.3 lbs/bu, with an average of 8% lodging, and 12.2% grain protein. Excluding the high protein food lines, average grain protein was 12%. The ratio of applied N to average bushel yield was 2.0 lbs N/bu (378 lbs N/189 bu/A). With the relatively high N, grain protein in some malt lines were higher than optimum.

The CV for this trial is very good (7.3%). The LSD at 19 bu/A indicates that yield differences have to be greater than 19 bu/A to be considered statistically significantly different.

The hard winter wheat survival (Table 10) averaged 100%. Overall yields were greater than 2021 by 20 bu/A, and greater than 2020 by 17 bushels. Lodging was very low and stripe rust was not present in the winter wheat and did not impact yield. The highest yielding lines were Milestone (177 bu/A), MT1745 (167 bu/A), WB4510CLP (167 bu/A), and LCS Jet (165 bu/A). The CV of 10.5% for yield was good. Heading date for this group at Aberdeen was five days later than last year. Test weights were low at 57.4 lbs/bu for the overall average. There was relatively low lodging in the trial, with only one variety showing moderate lodging at 6%. Grain protein averaged 14.6% due to the combination of high N applications in addition to crop stress after heading caused by heat, resulting in low test weights. The ratio of applied N to average bushel yield was good at 3.2 lbs N/bu (498 lbs N/155 bu/A).

The overall yield average in the Aberdeen soft white winter trial (Table 21) was 162 bu/A, 25 bu/A greater than in 2021, and 12 bu/A greater than 2020, ranging from the low of 143 bu/A (OR2130755) to a high of 185 bu/A. The highest yielding named varieties were WB1621 (185 bu/A), WB1783 (179 bu/A) and LCS Blackjack (179 bu/A). Heading date for this group at Aberdeen was six days later than last year. The test weights averaged very low at 56.5 lbs/bu and the overall grain protein was 12.2%. Similar to the hard winter wheat, due

to the combination of high N applications in addition to crop stress after heading caused by heat, resulting in low test weights. The ratio of applied N (378 lbs N) to average bushel yield (162 bu/A) was 2.3 lbs N/bu. There was very low lodging with one variety, Sockeye CL+ showing 26% lodging.

Ririe, Clark Hamilton, Irrigated Winter Wheat

Located near the village of Ririe, this irrigated location was added in 2019 on Hamilton Farm about 600 feet lower in elevation than the dryland plots on the Church farm. The plots were planted September 28th, into silt loam soil following wheat, and harvested August 10.

Spring stand of the hard winter wheat trial at this high elevation location was excellent (Table 11), and the average yield was 150 bu/A, varying from 117 (IDO1906) to 177 bu/A (Keldin). The high yielding lines included Keldin, LCS Jet (163 bu/a), and Flathead (162 bu/A). Test weight averaged 57.3 lbs/bu. Grain proteins were 12.5%, with 2.3 lbs N per bushel (342 total N available /150 bu average yield), indicating less than optimum levels of N to meet yield and protein of the higher yielding varieties. Heading date was one day later than the previous year.

For the soft white winter wheat trial (Table 22), the yield varied from 117 bu/A to 171 bu/A (VI Voodoo CL+ and LCS Hulk). Test weights averaged 55.8 lbs/bu. Grain protein averaged 11.3%. The ratio of lbs N to bushel yield was 1.95 (302 total N available /155 bu average yield), indicating optimum levels of N to meet yield and protein. The high-yielding lines and varieties included LCS Hulk (171 bu/A), WB456 (171 bu/A), WB1783 (168 bu/A), WB1621 (167bu/A) and M-Press (167 bu/A). Heading date was one day earlier than the previous year.

Ririe, LDS Church Farm, Trevor Davey, Dryland Winter Wheat

This is a high elevation location (5600 ft.) and is our main location to test grain for winter hardiness under dryland conditions. Soil moisture was good but very dry below the first foot. Grain was planted late for this location October 1st following safflower. Seed germinated and emerged prior to the onset of winter. The trials were abandoned due to high winds eroding seedlings in the spring.

Rockland, Gilbert and Carl Hofmeister, Dryland Hard and Soft White Winter Wheat

The hard red and white winter wheat trial at the Hofmeisters' was planted following fallow on September 23rd and harvested July 23rd. Snow mold diseases were not a significant problem, and spring stands were very good for dryland hard winter wheat (99% in Table 12) and soft winter wheat (99% in Table 23). Dwarf bunt (*Tilletia controversa* Kuhn) was not a problem this year, but all winter varieties were included in dwarf bunt testing in Logan, UT, by Dr. Margaret Krause, Utah State University professor and wheat breeder. When using varieties that are susceptible to dwarf bunt, it is highly recommended that an appropriate seed treatment is used to prevent dwarf bunt infection.

The hard winter wheat yield average was 44 bu/A, 31 bu/A greater than 2021, and 4 bu/A greater than the 2020 average. The 2022 yield ranged from 30 to 56 bu/A with a yield CV at 13.4%, much improved over the previous year. The top yielding varieties this year were Flathead (56 bu/A), MT1745 (55 bu/A), FourOsix (55 bu/A), and Keldin + 11-52-0 (50 bu/A). Heading date was three days later than 2020 (6/8). Grain proteins were very low at 10.8%.

The soft white winter nursery included at this location reflects the number of growers

in the area that are producing soft white winter wheat, although the area is also well-suited for hard winter wheat production. The soft white winter varieties Eltan with 11-52-0 in furrow, SY Ovation, M-Press, Devote, WB1376CLP, and Piranha CL+, averaged 55, 51, 46, and 46 bu/A respectively (Table 23). The test weights averaged 53.1 lbs/bu. Grain protein averaged 11.2%, good for soft white wheat targets. Heading date was three days later than 2021 (6/10). There was no lodging. Eltan planted with an application of monoammonium phosphate at 20 lbs phosphate per acre 11-52-0 in furrow averaged 14 bu/A greater than without the preplant fertilizer.

Soda Springs, Greg Torgeson, Dryland Winter Wheat

The hard red and white winter wheat trial at the Torgeson's was planted following fallow on September 23rd and harvested September 7th. Spring stands were very good for this dryland location. Dwarf bunt (*Tilletia controversa* Kuhn) was not a problem this year, but all winter varieties were included in dwarf bunt testing in Logan, UT, by Dr. Margaret Krause, Utah State University professor and wheat breeder. When using varieties that are susceptible to dwarf bunt, it is highly recommended that an appropriate seed treatment is used to prevent dwarf bunt infection.

In the hard winter trial (Table 13), twenty-five varieties of hard red and hard white wheat were planted, including one check with in-furrow phosphorus fertilizer. The Keldin 11-52-0 included an in-furrow application of monoammonium phosphate at 20 lbs phosphate per acre but yields (52 bu/A) were not statistically different than Keldin without the in-furrow fertilizer (50 bu/A). With a LSD of 10 bu/A, the yield of Keldin with 11-52-0 would have to be 10 bu/A greater be considered significant.

There was no stripe rust pressure at this location, and the spring stands were very good. The relatively cool spring resulted in average heading dates of 6/25 for HWW in 2022, compared to 6/26 in 2020, 7/2 for 2019, and 4 days later than 2018 (6/21). The highest yielding varieties of the hard variety trial included LCS Jet (55 bu/A), Sequoia (53 bu/A),) Keldin with 11-52-0 (52 bu/A), UI Bronze Jade (52 bu/A), UI SRG (51 bu/A), and WB4401 (51 bu/A). Test weight was poor, averaging 53.5 lbs/bu due to pre-harvest sprout and late season rain. There was no lodging. The ratio of available and applied N (80 lbs N/A) to average bushel yield (46) was 1.7 N/bu. As a result, the proteins were very low with the trial average of 9.4%.

Thirty-six soft white winter wheat varieties were tested in 2021-22 (Table 24). Winter wasn't severe, resulting in an average 99-100% spring stand. Heading dates (6/25) were significantly behind this location in comparison to 2018 (6/21), compared to 7/3 in 2019 and 6/28 in 2020. A relatively dry summer resulted in yields about 10 bu/A less than in 2020 and 4 bu/A less than in 2019. Yield CV's were high at 17.3 %. Average yields for the soft nursery were 48 bu/A. The yield ranged from 32 bu/A (UIL15-451104B) to 59 bu/A (WA 8334). The highest yielding named varieties included Sockeye CL+ (59 bu/A), Brundage (55 bu/A), Norwest Duet (55 bu/A), and SY Ovation (54 bu/A). There was no lodging, proteins were at 9.4% average, and test weights very low (48 lbs/bu) due to last season rains.

The Eltan 11-52-0 included an in-furrow application of monoammonium phosphate at 20 lbs phosphate per acre but yields (46 bu/A) were not statistically different than Eltan without the in-furrow fertilizer (40 bu/A). With a LSD of 12 bu/A, the yield of Eltan with 11-52-0 would have to be 52 bu/A to be considered significantly greater.

The ratio of available and applied N (80 lbs N/A) to average bushel yield (48) was 1.6 N/bu. As a result, the proteins were good to low with the trial average of 9.4%. No lines were above protein optimum levels.

If risking planting winter wheat in this area, it is highly recommended that varieties with snow mold tolerance and dwarf bunt resistance be grown. Varieties susceptible to dwarf bunt should only be grown following appropriate seed treatments for dwarf bunt control.

Spring Grain Locations

Rupert, Duane Grant 4-D Farms, Irrigated Spring Grain

The variety trials in Rupert were planted April 18th in silt loam soils (17 days later than in 2021) with good soil moisture and harvested August 25th and 26th. The preceding crop was sugar beets. There were no major weather-related problems.

There was some lodging for the **hard spring wheat** nursery, averaging at 8% (Table 34) and substantially higher for some lines that would be better adapted to dryland conditions. Average yield was 104 bu/A, compared to 109 bu/A in 2021, 114 bu/A in 2020 and 131 bu/A in 2019. Test weight average was 59.1 lbs/bu, and average protein was at 14.1%. The top yielding lines and named varieties were IDO2004S (125 bu/A and 12.8% protein), Dayn (120 bu/A and 13.7% protein), WB7313 (119 bu/A and 14.2% protein), BZ917-221 (113 bu/A and 14.1% protein) and UI Gold (113 bu/A and 14.0% protein), WB7616 (113 bu/A and 13.6% protein). The ratio of available and applied N (376 lbs N/A) to average bushel yield (104) was 3.6 lbs N/bu. The average grain protein for this trial was 14.1%, below the target of 14.5% for hard red spring wheat, and above the minimum for hard white of 12.5% protein. All hard red and white spring plots were topdressed at flowering with 40 units of N/A. Heading date for this location was one day later than 2021.

The **soft white spring wheat** yield (Table 43) average was 102 bu/A. In 2021, yield averaged 128 bu/A, 2020 was 117 bu/A, and in 2019 it was 140 bu/A. In 2022, WB6430 yielded 112 bu/A at 12.2% grain protein, Ryan yielded 112 bu/A at 10.5% protein, and Seahawk yielded 109 bu/A at 12.2% protein. Grain protein average was at 11.4%. The ratio of available and applied N (296 lbs N/A) to average bushel yield (102) was 2.9 lbs N/bu. The yield CV was also good at 9.8%, indicating the variability in this trial was lower than in 2021.

The **spring malt barley** trial at Rupert (Table 52) had average yields of 131 bu/A, the same as in 2021, about 23 bushels less than 2020. Yield ranged from 105 (Moravian 180) to 152 bu/A (Esma). The ratio of available and applied N (296 lbs N/A) to average bushel yield (131) was 2.3 lbs N/bu. Lodging averaged 44% overall, and grain protein averaged 12.3%, about which would be expected for the available nitrogen. Esma was the top yielding malt barley (152 bu/A), followed by ABI Eagle (150 bu/A), AAC Connect+base+root2 (147 bu/A), BC Ellinor (142 bu/A), KWS Fantex (141 bu/A) and ABI Voyager (140 bu/A). Test weights averaged 48.2 lbs/bu, and percent plumps were 84.8%. Heading date for this trial was 6/23, 11 days later than 2021, reflecting a long cold spring. Lower plumps and test weight than expected is due to high heat conditions during grain fill.

The average yield for two-rowed feed barley in Rupert for 2022 (Table 61) was 127 bu/A, 13 bu/A less than 2021, and 129 bu/A less than 2020. The high yielding two-rowed feed varieties were Claymore (157 bu/A), Oreana (152 bu/A), and Altorado (142 bu/A). Average test weight for this trial was

49.5 lbs/bu for the feed barleys, and 54.3 lbs/bu for hulless and hulled (Kardia) food barleys. The hulless, high beta-glucan food barleys Julie, Transit, 14ARS235-55 and Goldenhart yielded 80, 80, 79 and 62 bu/A but also had high test weights (57.5, 55.0, 56.1 and 55.4 lbs/bu, respectively). For this trial, the ratio of available and applied N (296 lbs N/A) to average bushel yield (127) was 2.3 lbs N/bu with a site average grain protein of 13.4%, with 12.7% for the hulled, and 15.90% for the hulless.

Aberdeen Research and Extension Center, Irrigated Spring Grain

Spring variety trials were planted April 6th, four days later than in 2021, in Declo loam soils with good soil moisture and were harvested August 23rd and 24th. The preceding crop was green manure oats. Stripe rust of wheat was present at very low levels late in the season and overall disease pressure was very low.

The CV's for the Aberdeen spring trials were good, with the CV for the hard spring wheat nursery at 6.4% for yield (Table 35). Hard spring wheat yield varied from 101 bu/A (Net CL+) to 137 bu/A (IDO2004S (hard white spring). The top five named varieties for yield in the hard red and white trial were the hard white springs UI Gold (131 bu/A and 13.3% protein), Dayn (126 bu/A and 13.4% protein), hard red WB9707 (123 bu/A and 14.4% protein), SY Gunsight (121 bu/A with 13.3% protein), and UI Platinum (hard white at 120 bu/A with 13.3% protein). Test weights for the hard spring wheats averaged 58.9 lbs/bu, low due to the excessive heat and dry conditions of the summer. There was some lodging of three varieties (5% average) and the grain protein average was 14.1%. (All hard spring wheat trials are top-dressed at flowering with 40 units of N to promote higher protein hard spring wheat.) The ratio of available and applied N (333 lbs N/A) to average bushel yield (117) was 2.8 lbs N/bu with an average site grain protein of 14.1%. Yields were 8 bu/A greater than 2021, and 30 bu/A greater than in 2020, where plots were planted in a very poor soil location.

The soft white spring wheat yields at Aberdeen (Table 44) averaged 113 bu/A with a range from 100 (Hedge CL+) to 128 bu/A (UI Stone). The average yield was 1 bu/A less than 2021 and 30 bu/A higher than 2020. Highest yields of lines and named varieties were obtained from UI Stone (128 bu/A), IDO1902S (123 bu/A), WA 8351 (121 bu/A), IDO1702S (117 bu/A), and WB6430 (115 bu/A). The heading date of 6/22 was 7 days later than 2021 (6/15). There was higher than usual lodging averaging 14% and test weights averaged 57.9 lbs/bu, very low in comparison to most years due to excessive heat during grain fill. The ratio of available and applied N (253 lbs N/A) to average bushel yield (113 bu) was 2.2 lbs N/bu with an average site grain protein of 10.6%.

Two-rowed malt barley lines yield average was reduced by 13 bu/A compared to 2021, and 18 bu/A from 145 bu/A in 2020 (Table 53). Yield ranged from 102 bu/A (AC Metcalfe) to 150 bu/A (Moravian 69). The top yielding lines were Moravian 69 (150 bu/A), BC Lexy (147 bu/A), GemCraft (145 bu/A) and LCS Genie (144 bu/). The average heading date was 6/25 ten days later than 2021, and lodging averaged 34%. The ratio of available and applied N (253 lbs N/A) to average bushel yield (127 bu/A) was 2.0 lbs N/bu with an average site grain protein of 10.5%.

The average yield for two-rowed feed barley in Aberdeen for 2022 (Table 62) was 131 bu/A, 11 bu/A less than 2021, 29 bu/A higher than 2020. The high yielding two-rowed feed varieties were Oreana (147 bu/A), Altorado (140 bu/A) and Claymore (140 bu/A). Average test weight for this trial was 50.5 lbs/bu. The hulless, high beta-

glucan food barleys Transit, Julie and Goldenhart yielded 94, 85 and 81 bu/A but also had high test weights (53.8, 56.3 and 55.5 lbs/bu, respectively). Kardia is hulled with lower test weight than the hulless lines, but with substantially higher yields (122 bu/A). The heading date for this trial was 6/26, 9 days later than 2021 (6/17). Lodging averaged about 12%. For this trial, the ratio of available and applied N (253 lbs N/A) to average bushel yield (131 bu/A) was 1.9 lbs N/bu with an average site grain protein of 11.4% for the feed lines and 2.6 lbs N/bu for the food lines with 14.2% grain protein.

Idaho Falls, Marc Thiel, Irrigated Spring Grain

The Idaho Falls wheat plot site followed potatoes and was in a field of spring wheat and the barley plot site followed alfalfa and was planted in a barley field. Both were planted April 19th in silt loam soils with good soil moisture and harvested August 30th and 31st.

Average grain yield for the hard spring wheat (Table 36) was 113 bu/A, which was 10 bushels less than 2021 and 2 bushels less than the 2020 average. Hard spring wheat ranged in yield from 89 (Glee) to 128 bu/A (WA 8342). Average grain protein was at 13.8%, and test weight was at 60.3 lbs/bu. The five highest yielding named varieties were WB7313 hard white (124 bu/A and 14.0% protein), Dayn hard white (121 bu/A and 13.6% protein), SY Teton hard white (120 bu/A and 13.0% protein) and UI Platinum (120 bu/A and 12.9% grain protein). Some varieties had high degree of lodging, which overall averaged 5%.

The high protein lines include WA8357 at 15.7%, BZ919-101 at 15.4%, and Net CL+ at 14.5%. Test weight was good overall, averaging 60.3 lbs/bu. The ratio of available and applied N (398 lbs N/A) to average bushel yield (113) was 3.5 lbs N/bu, resulting in good to excellent protein levels.

Alturas, WA 8327, UI Stone, IDO1902S, UI Cookie and WB6430 topped the yield chart (Table 45) for the soft white spring wheat varieties at Idaho Falls at 132, 131, 130, 129, 126 and 125 bu/A, respectively, with an overall average of 118 bu/A, 10 bu/A less than 2021 and 7 bu/A less than 2020. Yields ranged from 85 bu/A (Hedge CL+) to 132 bu/A. Test weight averages were good at 60.3 lbs/bu, and grain proteins were at 11.2%. The ratio of available and applied N (358 lbs N/A) to average bushel yield (118) was 3.0 lbs N/bu, high for even the higher yielding varieties, and too high for lower yielding varieties, but overall the grain protein was good for soft white spring wheat.

Two-rowed malt barley yields (Table 54) averaged 128 bu/A, about 10 bu/A greater than 2021 and 15 bu/A less than 2020. The yield ranged from 99 (Merit 57) to the highest yielding variety Esma which hit 159 bu/A. Other top yielding named varieties included KWS Amadora (156 bu/A), KWS Fantex (152 bu/A) and BC Lexy (145 bu/A). Test weight average was good at 49.9 lbs/bu, protein average was 12.7% and lodging was high at 39%. The ratio of available and applied N (250 lbs N/A) to average bushel yield (128) was 2.0 lbs N/bu, indicating the amount of available N was high enough to raise barley grain protein levels into an unacceptably high range.

Two-rowed feed barley trial (Table 63) averaged 131 bu/A, with the top yielding lines averaging 154 bu/A (Altorado) with 53.5 lb test weight. Claymore yielded 138 bu/A and Oreana 135 bu/A. The test weight average for the feed lines was 52.0 lbs/bu and protein average was 12.9%. The food barleys in the trial would bias the test weight averages higher so they were averaged separately. Test weight of the hulless lines

averaged at 56.5 bu/A (with hulled Kardia, average at 50.1 lbs/bu) and the protein was at 14.5%.

Tetonia Research Center, Irrigated Spring Grain

The Tetonia location was planted May 11th in silt loam soil into good soil moisture following summer fallow. Plots were harvested September 8th and 9th.

The average yield for the hard spring wheat (Table 37) was 113 bu/A, compared to Ashton in 2021 at 73 bu/A, and Ashton in 2020 at 128 bu/A. Heading dates were 14 days later than the Ashton area in 2021. The range in yield varied from 93 bu/A (IDO2103FHB) to 130 bu/A (UI Gold, hard white). Test weights were average at 62.5 lbs/A, and protein averaged 13.0%. The high yielding named varieties were UI Gold (130 bu/A), Alum (124 bu/A), Dayn (W) (121 bu/A), WB7202CLP (121 bu/A) and SY Gunsight (121bu/A). The highest proteins were seen in BZ919-101 (14.6%), WA 8357 (14.4%), Dagmar (14.1%), and WB9668 (at 14.1%). The ratio of available and applied N (205 lbs N/A) to average bushel yield (113) was 1.8 lbs N/bu. The average protein levels for hard spring wheat was 13.0%. Proteins are relatively high in spite of the low N availability.

In the soft spring wheat trial (Table 46), the high yielding named varieties were UI Stone (130 bu/A), WB6430 (127 bu/A), and Melba (club) (125 bu/A). The average yield for the soft white spring trial was 120 bu/A, 55 bu/A greater than the 2021 Ashton location and ranged from a low of 98 bu/A to a high of 141 bu/A (WA 8327). Heading dates averaged 7/12, sixteen days later than the 2021 heading date at Ashton. The test weight average was high at 61.7 lbs/A, with lodging occurring in one variety (Hedge CL+, a club wheat). Grain protein averaged 9.2% (165 N available for 120 bu/A average yield). The low ratio of 1.4 lbs N/bu likely resulted in lower yields than potentially attainable and lower protein.

Two-rowed malt barley yields (Table 55) were 21 bu/A higher than the 2021 trial in Ashton, ranging from 119 bu/A (Moravian 180) to 163 bu/A (KWS Willis). The average was 144 bu/A, with the highest yielding named lines being KWS Willis (163 bu/A), KWS Amadora (162 bu/A), BC Leandra (159 bu/A), and Esma (158 bu/A). Lodging averaged only 6%. Overall test weight was high at 51.5 lbs/bu, protein averages were low at 9.9% and plumps were 93.1%. The N: bu ratio calculates as 1.1 lbs N/bu, indicating there was insufficient N for maximum yield and protein.

The feed lines averaged 147 bu/A, 35 bu/A greater than the 2021 trial at Ashton, with Oreana (166 bu/A), Claymore (152 bu/A) and Altorado (148 bu/A) as the top yielding varieties (Table 64). The food barleys yielded an average of 112, 14 bu/A greater than the 2021 trial in Ashton. Kardia is a hulled, high beta-glucan food line. The hulled lines had a test weight of 51.6 lbs/bu and hulless lines had a test weight of 60.7 lbs/bu. Proteins of the feed lines averaged 9.6%, with a N:bu ratio of 1.1 lbs N/bu, while the food barley lines averaged 10.5% protein and a N/bu ratio of 1.5. Additional N would be required to meet yield and protein goals of the feed and food lines.

Soda Springs, Kyle Wangemann and Scott Brown, Dryland Spring Grain

The only spring dryland extension trials were in Soda Springs. The nursery was planted May 20th (16 days later than in 2021) and harvested September 7th. The previous crop was spring barley. Drought severely affected this location, with little to no precipitation after planting.

Yield averages for the hard red and hard white spring nursery (Table 38) were only 25 bu/A, 7 bu/A greater than 2021, and 29

bu/A less than 2020. The range in yield went from 19 bu/A (Expresso) to 30 bu/A (Dayn). The five highest yielding named varieties were the hard white Dayn (30 bu/A), the hard white WB7313 (29 bu/A), the hard red AP Renegade (29 bu/A) and hard red Dagmar (28 bu/A). The heading dates at this location were 10 days later than in 2021. Test weights averaged 60.0 lbs/bu, and proteins were good, averaging 13.5%.

For the soft white spring wheat (Table 47), the nursery averaged 31 bu/A, 8 bu/A greater than 2021, and 25 bu/A less than 2020. The yield ranged from 25 (UI Cookie) to 36 bu/A (WA 8327). Alturas, AP Coachman, Tekoa, and Seahawk were the five top yielding varieties at 35, 35, 34, 34 and 33 bu/A, respectively. Test weight average was good at 60.4 lbs/bu, and proteins were at 10.8%.

Replicated dryland barley trials were added to Soda Springs trials in 2018. Two-rowed malt barley yields (Table 56) ranged from 35 bu/A (CDC Copeland) to 51 bu/A (KWS Fantex). The average was 43 bu/A, 19 bu/A greater than 2021. The highest yielding named lines were KWS Fantex, KWS Jessie, Esma, Conrad and Merit 57. There was no lodging, overall test weight was 51.3 lbs/bu and plumps were 86.2%. Protein averages were an acceptable 11.5%

The feed lines averaged 48 bu/A, 28 bu/A greater than in 2021. The highest yielding named varieties included Champion (54 bu/A), Claymore (53 bu/A), Idahogold (51 bu/A) and Altorado (47 bu/A) (Table 65). The food barleys yielded an average of 35 bu/A, 11 bu/A greater than in 2021. Kardia is a hulled, high beta-glucan food line, with a test weight of 51.6 lbs/bu and the hulless lines had a test weight of 59.6 lbs/bu. Proteins of the feed lines averaged 12%, and of the food lines, proteins averaged 14.1%.

Table 2. Variety Descriptions

SPRING BARLEY - Malt

AAC Connect (TR04282) – released in 2016 by Agriculture and AgriFood in Manitoba, Canada, AAC Connect is marketed in the U.S. by Meridian Seeds and has been in the trials for five years. AAC Connect has malt quality similar to AC Metcalfe with higher extract and lower beta glucan. It is a mid-maturity, two-rowed variety with moderate resistance to stem rust, spot blotch, spot form of net blotch (SFNB), and FHB. Under Idaho growing conditions, AAC Connect was 2-4 inches taller than average with average lodging, test weight and percent plumps (Table 49). AAC Connect had a little higher protein in the trials and lower than average yield and lodging. In 2022, average yields were at 90% over all locations (Table 57), with yields best in the cooler, upper elevation areas. AAC Connect was moderately resistant to moderately susceptible to FHB.

ABI Eagle (2B11-4949) – a newer release by Busch Agricultural Resources (2018), Eagle is a two-rowed barley that has been tested in the variety trials for six years. Yield and test weight were greater than to ABI Voyager with the previous 3-yr average yield 9 bu/a greater than ABI Voyager (Table 49). ABI Eagle should replace Merit 57, having similar levels of test weight, grain protein and heading date, 3-4 inches shorter, with higher plumps. Lodging was a little less than Merit 57 and Voyager. FHB reaction has been moderately susceptible. In 2022, ABI Eagle performed well in Rupert (Table 52).

ABI Voyager (B3719) – a 2011 release from Busch Agricultural Resources, Voyager yields were below the average of 3-year irrigated trials (Table 49), below LCS Odyssey and similar to AAC Synergy, with similar percent lodging, test weight and plumps. ABI Voyager is similar to Conrad in test weight, has a little earlier heading date (2 d), lower protein, but is taller (1-4 inches). ABI Voyager is susceptible to cereal cyst nematode (CCN), MR to MS to FHB and shows average levels in ppm of DON.

AC Metcalfe (TR232) – two-rowed malting barley released in 1994 by Agriculture and Agri-Food Canada with excellent quality, lower yield potential than average (86% of trial average, Table 57 and Chart 7), and 2-4 inches taller with similar test weight and lodging to Conrad. It is widely adapted to western US and Canadian conditions, but as it is tall, it may lodge under higher production conditions. It is MS to S to FHB with average DON accumulation. Malting quality and extract are excellent.

BC Ellinor – an older two-rowed spring malt and feed variety under testing in Idaho for Limagrain Cereal Seeds. Ellinor was developed in Germany by Breun Craft, targeted for the German all-malt style beers. Ellinor averaged 105% of trial average for yield across all locations in 2022 trials (Table 57). BC Ellinor was 1.5 lbs lower than average for test weight, 2-3 in shorter, and a little later maturing than average with average proteins and plumps. BC Ellinor is susceptible to FHB.

BC Leandra – a two-rowed European malt variety under testing in Idaho for Limagrain Cereal Seeds. Like Ellinor, BC Leandra was developed in Germany by Breun Craft, targeted for the German all-malt style beers. BC Leandra averaged 106% of trial average for yield across all locations in 2022 trials (Table 57), yielding similar to Esma and LCS Odyssey in the 3-yr average (Table 49).

Test weights were a little below and plumps were at average (Table 49). Yields were 19 bu/A greater than ABI Voyager, with 4 d later maturity and 7-8 inches shorter. Initial FHB testing showed BC Leandra to be MS to S for FHB.

BC Lexy - a two-rowed European malt variety under the second year of testing in Idaho for Limagrain Cereal Seeds. BC Lexy yields were 107% of trial average in 2022 (Table 57) and 100% of trial averages in 2021. BC Lexy is short with low test weight, lower grain protein and lower plumps in comparison to 2022 trial averages. Lodging was greater than average and heading date was at average. Despite its shorter than average status, lodging was high.

CDC Copeland (TR150) – a two-rowed malt variety developed by the Crop Development Centre, University of Saskatchewan and released in 1999, Copeland has been in the trials since 2009 in southern Idaho. Copeland yields are similar to Conrad and AC Metcalfe (Table 49). Copeland was 3-6 inches taller than average with greater lodging, and was higher than average for grain protein and plumps, with very good test weight. In FHB screening trials, CDC Copeland is MR-MS for FHB infection and had low-to-average DON levels in the grain.

Conrad (B5057) – two-rowed spring malt barley released by Busch Agricultural Resources in 2005. Conrad has below average yields and good test weight and end use quality. Conrad is tall in height (1-4 inches shorter than ABI Voyager), is average to greater in lodging and protein. Conrad yields were average in the dry land upper elevation areas. Conrad has low disease measures for FHB (moderately resistant) but medium to higher seed-levels of DON accumulation.

Esma – entered into the trials in 2018 by Ackermann Saatzucht GmbH & Co. KG, Esma is the highest yielding two-rowed malt variety over several years, averaging 113% of average for yield in 2022. Over the past three years, Esma has yielded 150 bu/A over all irrigated trials (Table 49). Esma has good test weight, average heading date, is 3-4 inches shorter with lower lodging than average. Esma has good malt quality with low beta-glucan, high extract, and good FAN potential. Esma is MS to S to FHB. Like many of the European malt types, Esma is suited for the craft beer market.

GemCraft (2Ab08-X05M010-65) – released by the USDA-ARS and Idaho AES in 2018, GemCraft is a PVP 2-row malt barley released for the craft industry and favored by the Brewers Association due to its good taste profile. Yields over the previous three years were at trial average, similar to ABI Eagle and LCS Opera (Table 49). Test weight was slightly below trial averages. Height and heading date were similar to ABI Eagle, with lower plumps. Lodging tends to be greater under irrigated production systems. GenCraft is MS to S to FHB.

KWS Amadora – a German two-rowed malt variety registered in 2015, bred by KWS Lochow, introduced into the US through KWS in Illinois and entered into the trials in 2020. KWS Amadora is short, early with very good test weight and plump percentage (Table 47). Heading date is similar to ABI Voyager and ABI Eagle. Yield of KWS Amadora averaged 109 percent of trial average (Table 57), with low protein. KWS Amadora was resistant to PNW races of barley stripe rust in WSU trials and S to FHB in UI trials.

KWS Fantex – German two-rowed malt line bred by KWS and introduced into the

US through KWS in Illinois and entered into the trial in 2020. Yield of KWS Fantex averaged 111 percent of trial average in 2022 (Table 57), and was only 2 bu/A less than Esma (Table 49). Fantex headed 2-3 days later than average and the other KWS varieties. Percent plumps were a little lower than average. KWS Fantex was resistant to PNW races of barley stripe rust in WSU trials, but susceptible to FHB in UI trials.

KWS Jessie – Jessie is a two-rowed French malt line released in 2019 through KWS Momont, introduced into the US through KWS in Illinois and entered into the trial in 2020. KWS Jessie has excellent quality, very high yield potential and low proteins, less than LCS Odyssey (Table 49). Overall 2022 yields were 107% of average, doing very well in Soda Springs dryland location. KWS Jessie has good test weight and is very short with less than average lodging. KWS Jessie was moderately susceptible to moderately resistant to PNW races of barley stripe rust, and was susceptible to FHB in UI trials. KWS Jessie is an approved malt line for traditional German beer.

KWS Willis – in the first year of trials in eastern Idaho, the two-rowed malt variety KWS Willis performed very well for yield, with lower than average test weight. KWS Willis is one of the few "No GN" varieties available in the US, indicating suitability for distilling with seed containing no glycosidic nitrile. KWS Willis was a little shorter than average with high lodging. Grain protein was below trial averages and plumps were high.

LCS Diablo – LCS Diablo is also a non-GN producer (glycosidic nitrile) that was released for dual-purpose malting and brewing with excellent yield potential. Barley varieties used for distilling require low to no GN in the grain. Diablo is a two-rowed malt marketed in the US through LCS. Heading dates were late, and test weights were low – probably affected by high temperatures. Yield was slightly above average, similar to LCS Opera and LCS Odyssey, with lower test weight and later maturity (Table 51). Grain protein and plumps were good. LCS Diablo has good disease resistance, excellent malting quality with high hot water extract and low grain nitrogen.

LCS Genie – a European malt barley released in the U.S. through Limagrain Cereal Seeds, Genie is a short-statured two-rowed malt variety with yields and test weight similar to ABI Eagle (Table 49). Protein was lower and plumps were better than Moravian 69 in 2022 trials. LCS Genie is about 3-5 inches shorter than average with average lodging. Genie is susceptible to FHB and had high levels of DON in seed in the FHB disease nurseries. Genie has excellent malt quality and as a low GN variety, can also be used in distilling.

LCS Odyssey (NSL08-4556-A) – LCS Odyssey is a European two-rowed malt barley released and distributed through Limagrain Cereal Seeds. In 2020, LCS Odyssey yields were 107% of trial averages, and in 2021, Odyssey yielded 113% of trial average. LCS Odyssey didn't do as well in 2022, when the cool spring ran straight into a hot summer, In the past three years of testing, LCS Odyssey was in the highest group of high yielding varieties, greater than ABI Eagle and Explorer (Table 49). Test weights were slightly lower than average with average lodging, even as LCS Odyssey is 3-5 inches shorter than the trial average. Heading date is 1-3 days later than average with average proteins and good plumps. LCS Odyssey is more susceptible than current U.S. malt varieties for FHB and had higher levels of DON accumulation in

harvested grain. LCS Odyssey has excellent resistance to cereal cyst nematode (CCN) and is resistant to PNW races of barley stripe rust. Odyssey has excellent malt quality for all-malt brewing with dual usage in distilling (as a low-GN or glycosidic nitrile variety).

LCS Opera – tested in Idaho from 2018 to 2022, LCS Opera is a very high yielding two-rowed, dual purpose barley for malt and feed. In 2020, irrigated average yields of LCS Opera were 110% of trial average, consistently at or above trial averages at all locations. While the best zone of adaptation is in eastern / northern Washington, irrigated average yield of LCS Opera was 92% of trial average in 2021 and 103% of trial average in 2022, not doing well in years of high heat during grain fill. LCS Opera had low test weight, was 2-3 days later in maturity, and was 3 in shorter in height than average (Table 49). LCS Opera has very good resistance to current PNW races of barley stripe rust.

Merit 57 (2B99-2657) – considered one of the industry standards for malt quality, Merit 57 was released in 2009 by Busch Agricultural Resources. Merit 57 is a later maturity two-rowed malt variety with small seed, lower yields, lower test weight and higher lodging than average. Merit 57 has good plumps and protein. In 2022, irrigated average yield of Merit 57 was at 94% (Table 57) of trial average. Merit 57 is moderately resistant to moderately susceptible to FHB and DON accumulation is at average (Addendum 6a and 7a).

Moravian 69 (C69) - two-rowed spring malt barley released by Molson Coors Beverage Co. in 2005. Moravian 69 (M69) has very high yield potential, especially in the Magic Valley area where it is widely grown, with 3-year yield over all locations similar to ABI Voyager and Conrad (Table 49). M69 is short (2-4 inches below average) but may still be susceptible to lodging. Protein is at average in these trials, while test weight and plumps were below average. Moravian 69 is considered more susceptible to FHB with higher-than-average accumulation of DON in the seed.

Moravian 179 – Moravian 179 is a newer released two-rowed malt line from Molson Coors adapted to the higher production conditions of southern Idaho. Yields of Moravian 179 were similar to ABI Eagle and GemCraft averaged over 3-yr irrigated locations; however, Moravian 179 was not included at the Ashton location so the average is skewed higher (Table 49). Overall locations in 2022, M179 yields were at 101% of trial averages (Table 57). Moravian 179 had high plumps, good test weight and average lodging. Proteins were close to trial average, with plant height similar to Moravian 69 and 2-4 inches shorter than average. Molson Coors lines are under Title V and PVP.

SPRING BARLEY – Food

Goldenhart (2Ab09-X06F058HL-31) – Released by the USDA-ARS in Aberdeen in 2018, Goldenhart is a spring two-rowed hulless food barley with beta-glucan content similar to Transit (9-10%) released for significantly increased yield potential under dry land conditions. Three-year averages for irrigated production (Table 58) and dryland conditions (Table 59) put Goldenhart higher in yield than Transit. In 2022, yields were significantly less than Transit at all locations except Idaho Falls and Soda Springs (Table 66). Goldenhart has very high test weight and protein (Table 57) as expected for hulless barley. Goldenhart and the hulless barleys are MS to S to FHB and DON

accumulation. Goldenhart was submitted for PVP.

Julie (03AH6561-94) – a two-rowed hulless barley released by the USDA-ARS and the University of Idaho AES in 2010 for high-beta-glucan content and intended for human consumption. Julie has high test weight (due to the hulless characteristic) and protein, similar to other food barleys, with greater percentage of seed beta-glucan (averaging 7%) than previous industry standards such as CDC McGwire. Julie is the highest yielding hulless waxy barley currently in the trials (Table 58). Lodging of Julie is less than average and heading date 4-5 days later than Champion. Julie and the hulless barleys are MS to S to FHB and DON accumulation (Addendum 6b and 7b). Careful handling of all hulless barleys prior to planting reduces germ damage and protects seedling stand establishment.

Kardia (2Ab09-X06F084-51) – Kardia is a two-rowed, hulled food barley line released in 2016 by the USDA-ARS in Aberdeen and the University of Idaho AES as a replacement for Salute, with yield improvement of 4-5% over Salute. Yield (3-years, Table 58) of Kardia was greater than Julie, Transit and Goldenhart (all hulless). The beta-glucan level of Kardia is 7- 8.5% compared to 6.5% in Salute. Kardia is MS to S to FHB (Addendum 6b and 7b) and as a hulled line has lower test weight than the hulless food barley. Yields in 2022 were 95% of trial averages (which included feed lines).

Transit (03AH3054-51) – a two-rowed hulless variety released by the USDA-ARS and the University of Idaho AES in 2010 for high-beta glucan content (waxy) and intended for human consumption. Seed beta-glucan content (9-10%) is higher than other previous industry standards such as CDC Fibar and CDC McGwire. Transit yields are lower or similar to Julie but the percent beta-glucan is higher than Julie. As a hulless line, test weights are high for barley. Transit and the hulless barleys are susceptible to FHB and DON accumulation.

SPRING BARLEY – Feed

Altorado (BZ509-601) – Altorado is a 2016 release from Highland Specialty Grains. Altorado is a two-rowed feed barley with very high yield potential. Irrigated 3-yr average yield was greater than Champion with comparable high test weight (Table 58). Altorado is similar to Champion in disease resistance, test weight, plant height, and lodging with lower in grain protein. Altorado's heading date averaged two days later earlier than Champion. In 2022, yield was 119% of average, and in 2021 yields were 123% of trial average. In the hot summer of 2022, Altorado's irrigated yield was less than Oreana (Table 60).

Champion (YU501-385) – a 2007 release from WestBred, LLC, now handled by Highland Specialty Grains. Champion is a very high yielding two-rowed spring feed barley with excellent test weight. Combined over locations and years, Champion yields were above trial average, which included lower yielding food barleys. Champion has slightly greater than average height, less than average protein, and heads 1-3 days earlier than trial average. Champion is MR to MS to FHB (Addendum 6b and 7b).

Claymore (BZ509-216) – two-rowed feed barley from Highland Specialty Grains released in 2015. In three-year averages, Claymore consistently is in the top yielding group of feed lines, comparable to Altorado and Oreana. Claymore is tall and similar in height to Champion (Table 58), is 2-3 days later in heading, with lower test weight. In

2022, yields were 122% of average, and in 2021 (Table 66), yields of Claymore were 117% of trial averages, yielding very well in the Rupert trial. Under dryland conditions, Claymore was the highest yielding feed barley for the last 3 years (Table 59). Claymore has good FHB tolerance (MR to MS).

Diamondback (YU510-599d) – a new six-rowed barley line released in 2021 from Highland Specialty Grains, Diamondback yielded less than Champion and FeedMor in 2022 (Table 60). It was earlier than average for heading, short and had poor test weight, possibly due to excessive heat stress during flowering.

FeedMor (Moravian 169) – Molson Coors released FeedMor as a two-rowed feed line in 2020 for its high yield potential and good test weight. FeedMor is very short, similar to Moravian 69 and Bill Coors 100, with similar yield to Champion in 2022 (Table 60). Over three years, yield was similar to Idagold II, heading date and lodging was at trial average, with high percent plumps kernels. In 2022 trials, FeedMor yielded 104% of trial averages (Table 66), which included the lower yielding food lines.

Idagold II (C32) – a two-rowed spring feed and malt line developed by Molson Coors Beverage Company in Burley and released in 2002. Idagold II is a short line with lower-than-average lodging and high test weight. Protein is average for a malt variety with average plumps. Idagold II is susceptible to FHB and showed higher levels of DON accumulation in the seed (Addendum 6b and 7b). Idagold II is used in these trials for fill plots and for its short stature.

Moravian 180 – is a newly released two-rowed malt from Molson Coors with lower than-average yield performance (98% of trial averages see Table 66). In 2020, yields were similar to CDC Copeland and Conrad with good test weight, heading ten days earlier than CDC Copeland. In 2022, yields were comparable to Diamondback in the feed trial (Table 60), and Merit 57 in the malt trial (Table 51). Moravian 180 was 5-8 inches below trial average and shorter than Moravian 69 and earlier in heading.

Oreana (BZ509-448) – a short, two-rowed feed barley developed by Highland Specialty Grains. In three-year data averages (Table 58), Oreana had good test weight, excellent yields similar to Altorado and Claymore, and was 4-5 inches shorter than average, an unusual combination of high yield and short plant height. Oreana showed moderate susceptibility to PNW races of stripe rust, very susceptible reaction to FHB (Addendum 6b and 7b) and showed higher levels of DON accumulated in the seed. Oreana yields in 2022 were the highest of the feed lines, and in 2021 were 116% of trial average (Table 60 and Chart 8).

WINTER BARLEY – Malt, Feed, Food

Charles (94Ab1274) – Charles is the first AMBA approved two-rowed winter malt variety released by the USDA-ARS and the IAES in 2005. Charles' average yields and test weights are lower than the winter variety average (Table 26), yielding 91% of trial average in 2022 (Table 30 and Chart 4). Charles is shorter than the average, earlier maturing and has a tendency to lodge. Charles has lower plumps but yields very well in the Twin Falls area, even when harsh winter conditions reduce stand as in 2020 near Rupert. Both Charles and Endeavor can suffer significant stand losses under cold, dry winter conditions. For improved winter survival, Charles and Endeavor do best when protected from cold dry winter winds

and with good soil moisture prior to entering winter conditions.

Clementine – a two-rowed winter barley developed in Germany by Breun Craft, targeted for the German all-malt style beers. Clementine yields averaging 225 bu/A in Aberdeen (Table 29) without significant lodging. In the first year of the trials, Clementine had excellent plump, but higher protein and lower test weight. Averaged over both locations, yields were 119% of trial averages (Table 30).

Eight-Twelve – a six-rowed winter feed barley released by the USDA-ARS and the Idaho AES in 1991. Eight-Twelve yields averaged 149 bu/A under irrigation in 2020-2022 (Table 26), and 99% of trial average in 2022 (Table 30). Usually a high yielding variety, Eight-Twelve did not perform well in the higher temperatures in 2021 and 2022. Eight-Twelve has good winter survival but may lodge under high production conditions.

Endeavor (95Ab2299) – Endeavor is the second two-rowed winter malt variety released by the USDA-ARS and the Idaho AES approved by AMBA for malt quality. Released in 2008, Endeavor has improved test weight, malt quality and yield over Charles, especially in the Magic Valley area where winter kill is less of a problem than in eastern Idaho (Table 30, Chart 4). Endeavor has good test weight and protein but had relatively low plumps for malt (Table 27). Yield are low, like Charles, and both are at 91% of trial average (Table 30). For improved winter survival, Endeavor and Charles do best when protected from cold dry winter winds and with good soil moisture prior to entering winter conditions.

Fay – another winter barley developed in Germany by Breun Craft, targeted for the German all-malt style beers. Fay is a two-rowed barley with good disease fungal and viral resistance. Yields in Aberdeen were 214 bu/A with excellent test weight and high percentage plumps. Fay had higher lodging than Clementine and higher grain protein. Fay did not perform as well in Rupert as did Clementine for yield.

Flavia – developed in Germany by Ackerman Saatzucht and carried through Virginia Tech, Flavia was first tested in 2020-21 trials. Flavia is a two-rowed winter malt that is 2-5 days earlier that Wintmalt and 1-2 days earlier than Charles. Yields were comparable to Thunder with higher test weight (Table 27). Lodging resistance was good and proteins were slightly higher than trial average.

Hirondella – also developed in Germany by Ackerman Saatzucht and carried through Virginia Tech, Hirondella was first tested in 2020-21 trials. Yields in the first year of testing were 104% of location averages, doing very well in Rupert at 114% of trial average. In 2022, yields below average and similar to Lightning and Wintmalt, with lower test weight. Like Flavia, Hirondella is earlier that Wintmalt and a little earlier than Endeavor It has resistance to loose smut, stem rust, net blotch, leaf rust, spot blotch, powdery mildew, BSMV, and BYDV. Hirondella had lower test weight, protein and plumps than Flavia (Table 27).

KWS Donau –The variety KWS Donau is a two-rowed winter malt barley produced and released through KWS Lochow in Germany and marketed through KWS Cereals in the U.S. KWS Donau had very high yields, test weight and plumps in the three-year average results (Table 26), doing very well in 2019 and 2020, but not as well in the hotter production year of 2021. In Aberdeen in 2022, yields hit 195 bu/A. Lodging was below average even though it was one of the

yield leaders. Winter survival of the was good, maturity was at the average, and proteins were at 11.6%, compared to the trial averages of 11.5% (Table 26). For end use quality, extract content for Donau is at the level of 81.4% with a low level of proteolytic and cytolytic modification, which is preferred in the craft brewing industry.

KWS Faro – a 2-rowed winter malting variety from KWS Lochow, marketed in the U.S. through KWS Cereals. In the first three years in the trials (Table 26), yield of Faro was at or above trial average but in 2020 had reduced stand due to winter conditions in Rupert (though better than the trial averages). Test weights were slightly above average (and better than the 48 lb/bu required for No. 1 barley). KWS Faro had a 5-7 day earlier-than-average heading date, low lodging, good protein and high plumps. In 2022, KWS Faro yields were 103% of average.

KWS Orbit – New to the trials in 2022, KWS Orbit is a 6-rowed winter malt barley from KWS Lochow with good winter survival. In 2022 UI trials, KWS Orbit yields were below average, yielding 92% of average (Table 30). Test weight and grain proteins were low to below average, and although on the taller side, lodging was very low.

KWS Scala (GW2895) – 2-rowed winter malting variety from KWS Lochow, marketed in the U.S. through KWS Cereals. KWS Scala yielded above 3-year trial averages (Table 26) similar to Wintmalt but with higher lodging. Test weight was at average with high protein and plumps. In 2019 in Aberdeen, yields hit 200 bu/A. In 2022, yields of KWS Scala were 105% of trial average (Table 27 and Chart 4) Scala was 1-2 days earlier in heading date and was 1-2 inches shorter than trial average. Testing in the Logan, UT area in 2012 and 2013 indicated good winter survival.

KWS Somerset (GW3479) – 2-rowed winter malting variety from KWS Lochow, KWS Somerset is marketed in the U.S. through KWS Cereals. In the 3-year summary of testing in southern Idaho, Somerset yields were comparable to feed variety Sunstar Pride with very good test weight, winter survival and plumps (Table 26). Heading dates, plant height and grain protein were close to trial averages and lodging was less than trial average (15% versus 23%). Under stressful conditions in the 2020 Rupert trials, Somerset had the highest percent winter survival and the highest yield.

LCS Calypso – is a two-rowed winter malt barley released by Limagrain Europe to replace LCS Violetta, having improved winter hardiness and yield and excellent malt quality. In 2022, yields were similar to the feed barley Sunstar Pride (Table 27) at 101% of trial averages (Table 30). Over three years, LCS Calypso yields were similar to Wintmalt, but with much better test weight. LCS Calypso has good test weight, was 2 inches taller than average with high grain protein and higher than average lodging.

Lightning (DH130910) – Lightning is a true facultative winter malt barley developed through the doubled haploid program at Oregon State University under Pat Hayes. Lightning was in both the winter and spring trials in 2020, but in some locations did poorly in the spring trials. Winter conditions in Rupert for 2020 were poor, resulting in low spring stands, and yields were below trial average. In 2022, Lightning performed at 99% of trial average (Table 30). Over the previous three years, yield and lodging was

a little below average, test weight and plumps were very good, protein and heading date were average (Table 26.)

Marouetta – a winter malt barley developed in Germany by Ackerman Saatzucht and carried through Virginia Tech, Marouetta was tested for the first time in these trials in 2021-22. Plumps and protein were good and heading date was three days earlier than average; however yield was low, below that of the hulless winter food lines.

Sunstar Pride (SDM204-B) – winter six-rowed feed barley released by Sunderman Breeding in 1995. Sunstar Pride consistently has been one of the highest yielding varieties in the trials, similar to the high-yielding European malt lines (Table 26). Test weight, protein, and plant height is below average. Heading date is up to a week to ten days later than average, with low plumps. Lodging is similar to trial averages.

Thunder (10.0777) – Thunder is an AMBA approved two-rowed winter malt release from Oregon State University (2016) with excellent yield potential and better winter survival than Charles and Endeavor. Thunder averaged 166 bu/A over the three-year summary (Table 26) with good test weight (lower than average but above 48 lbs/bu) and spring stand. In 2020, poor winter conditions reduced significantly spring stand, but in 2021, Thunder yielded 108% of trial averages and in 2022 Thunder yields were 113% of trial averages (Table 30). Heading date is three to five days earlier than the trial average and plant height is 2-5 inches less. Plumps and protein were very good although lodging was greater than trial averages (Table 26), similar to Endeavor and Charles. Thunder is susceptible to preharvest sprouting, as are many of the winter and spring malt varieties.

Upspring (05ARS748-270) – Upspring is a hulless, high beta-glucan (7% BG) winter barley variety and the latest two-rowed food barley released from USDA-ARS breeding program in conjunction with the University of Idaho AES. Upspring was released as an alternative to Buck. While agronomically similar to Buck, Upspring had slightly higher yields. Upspring headed 3 days later than the trial average and had a poor spring stand compared to the hulled varieties. As a hulless barley, test weight approaches that of winter barley, at 59.2 lbs/bu averaged over 3 years (Table 26). Grain protein was 13.9%. Seed germination may be low under dry land conditions, and winter survival was poor in 2020 in both locations (Aberdeen and Rupert). Overall winter survival (measured as spring stand) was 79% in 2021 and 955 in 2022. Upspring was released under PVP.

Wintmalt – a two-rowed winter malt developed by KWS Lochow (Germany) and imported from Europe. Wintmalt is being produced in the PNW, has good foliar disease resistance, and is an AMBA approved malt variety. In the third-year summary (Table 26), Wintmalt's yield was similar to LCS Calypso and Sunstar Pride. Plant height and lodging were at trial average and protein was less than the average. Wintmalt test weight was at average, heading was 1 day later than average, and plumps were excellent.

SPRING WHEAT – Soft White

AP Coachman (08PN2001-07) – a dry land soft white spring from AgriPro / Syngenta Cereals was released in 2020. AP Coachman was tested in the dry land location (Soda Springs, Table 41) and yielded very well from 2019-2020 (60 bu/A) competing with Tekoa and Seahawk. Coachman is slightly

taller than average, with later maturity, average protein and lower test weight. AP Coachman has resistance to current races of stripe rust, Hessian fly and is susceptible to FHB (Addendum 3c and 4c).

Hedge CL+ - softwhite spring lub wheat released in 2020 by WSU and USDA-ARS in Pullman as a replacement for JD with two-gene tolerance to Beyond (imazamox) herbicide. Clearfield wheats have resistance to imazamox herbicides such as to Beyond® herbicide for hard-to-control grassy weeds. Clearfield spring wheats are mostly used behind winter wheat production where imazamox has been applied to reduce potential carryover damage from soil residual. Designed for low rainfall production areas, Hedge CL+ was tested for the first time in 2021 in eastern Idaho EVTs. Irrigated yield and test weights were less than Louise (Table 42), and yield averaged 88% of trial averages (Table 48) whereas Melba club averaged 97% of trial averages. Heading of Hedge CL+ was 3 days later than UI Stone, and it was 2 in taller. Hedge CL+ is susceptible to lodging under irrigated production. End use quality of Hedge CL+ is excellent. Stripe rust resistance is excellent, it has intermediate tolerance to high-acid, Aluminum soils, but Hedge CL+ is susceptible to Hessian Fly. (PVP pending).

Louise (WA7921) – soft white spring wheat released in 2004 from Washington State University's spring wheat breeding program and used as a long-term quality check for soft white spring wheat. Louise is a later maturity, tall wheat with below average yields and high lodging potential under irrigated conditions. Louise performed below average for yield under irrigated conditions over the three previous years (Table 40). Under dryland conditions, yields were similar to WB6430 (Table 41). Louise is susceptible to stripe rust and very susceptible to FHB.

Melba (WA8193) – Melba is a soft white spring club wheat developed by USDA-ARS in Pullman and released in conjunction with the Washington AES in 2016. Melba is one of the first club wheats with good yield performance in southeast Idaho, similar to UI Cookie (Table 40, 48). Melba performed particularly well in 2020, and in 2021 yields were 105% of trial averages. Melba is average in height, 4-5 days later in heading than UI Stone and UI Cookie, with low protein. Melba is resistant to stripe rust and very susceptible to FHB.

Ryan (WA8214) – Ryan is a partial waxy soft white spring wheat released from Washington State University, AES and USDA in 2016. Over three years, Ryan irrigated yields were below trial average, similar to Louise over four irrigated locations (Table 40). Under dry land conditions, yield was similar to Melba and AP Coachman (Table 41). Ryan has Hessian fly resistance, tolerance to low acid / high aluminum soils, and HTAP (high temperature adult plant) resistance to stripe rust. Ryan was early to heading, similar to WB6430, was 1 in shorter than average, had lower test weight and may lodge a little under higher input environments.

Seahawk (WA8162) – a soft white spring wheat released from Washington State University's spring wheat breeding program in 2014 adapted to dry land and irrigated production areas. Seahawk has resistance to Hessian fly, is very resistant to stripe rust, and susceptible to FHB. Seahawk has tolerance to high aluminum, low pH soils. Yield is similar to UI Stone under irrigation (Table 40) and dryland production (Table 41) with better test weight. Plant height is a little above average and heading 3-5 days

later than UI Stone. Seahawk may have a tendency to lodge under high production practices. Seahawk yielded 108% of trial average in 2021 and 102% of trial averages in 2022 (Table 48).

Tekoa (WA8189) – a Washington State University 2016 release, Tekoa is a soft white spring wheat released for higher rainfall areas and will do well under irrigated conditions (Table 40). Tekoa did not yield as well in areas where irrigation was restricted at the end of the growing season. In 3-year summaries, Tekoa yields were below trial average, and in 2021 yields averaged 99% of trial averages. In 2022, yields were at 100% of trial averages. Tekoa is adapted to low pH soils where aluminum toxicity can occur. Tekoa has very good test weight, is 5 days later in maturity (heading date) than UI Stone and 1-2 in higher than average for plant height. Tekoa is resistant to stripe rust, Hessian fly, and susceptible to FHB, similar to Seahawk.

UI Cookie (IDO1405S) – a soft white spring wheat released in 2019 by the University of Idaho Ag Experiment Station. Three-year irrigated averages (Table 40) show UI Cookie at trial average for yield, similar to UI Stone, lower for test weight and higher for grain protein, but overall agronomically very similar to UI Stone. Yield performance under dry land conditions is below trial average (Table 41). UI Cookie has acceptable end use quality, similar or better resistance to FHB than UI Stone, better resistance to stripe rust and improved threshability over Stone.

UI Stone (IDO599) - a soft white spring wheat released by Idaho AES in 2012, UI Stone has average yield potential, similar to Alturas (Table 40). The 3-yr average for yield was at trial average for irrigated and dryland trials, but in 2022 performed at 107% of average yield. UI Stone was selected for good end use quality and reduced FHB susceptibility (carries the Fhb1 resistance gene). In 2022, UI Stone yielded similar to WB6430 and about 7 bu/A greater than UI Cookie (Table 42). The FHB reaction in UI Stone is similar to Seahawk. UI Stone also has tolerance (not resistance) to cereal cyst nematode and is susceptible to the current races of stripe rust. Test weight, height and lodging are close to average, heading is 1 day later than WB6430.

WB6211CLP - a soft white spring wheat intended for a replacement to WB-1035CL+, WB6211CLP is a Clearfield® Plus Variety from WestBred, with two-gene tolerance to Beyond (imazamox) herbicide. Clearfield wheats have resistance to imazamox herbicides such as to Beyond® for hard-to-control grassy weeds. WB6211CLP has resistance to Hessian fly and good resistance to yellow (stripe) rust. In the second year in the trials, WB6211CLP yields were below Altura and Tekoa (Table 42) and overall, below average, yielding 91% of trial averages (Table 48). Plant height of WB6211CLP is 2 inches taller than WB6430.

WB6430 (BZ608-125) – a soft white spring wheat released by WestBred (a unit of Bayer Crop Science) in 2014. WB6430 is a UI Pettit-type of soft white spring wheat with consistently high yield potential, good test weight, and resistance to stripe rust. Maturity is slightly earlier than average and WB6430 is also 2-3 inches shorter than average with good straw strength (Table 40). WB6430 is moderately resistant to stripe rust and susceptible to FHB. FHB reaction is more susceptible than Seahawk, which is moderately susceptible and has high levels of DON accumulation in the grain.

YSC-603 (10C-58) – soft white spring wheat developed by Yield Star Cereal Sciences.

Tested in three irrigated spring locations, YMC-603 averaged 86% of trial average in 2021 and 95% of trial average in 2022 (Table 48), similar to Louise. Heading date and plant height were similar to Seahawk while higher in grain protein. YSC-603 consistently tests as a hard white wheat in kernel hardness.

SPRING WHEAT – Hard White and Red

Alum (WA8166) – hard red spring wheat released in 2015 by Washington State University's Ag Experiment Station for tolerance to aluminum in low pH soils. Over the three years in the trials, Alum has had yields similar Jefferson for yield and test weight, but higher in protein (Table 31). Alum heads about 2-4 days later than, is four to five inches taller than average, and may lodge under high input production conditions. Alum is MR to MS to stripe rust and has moderate resistance to Hessian fly. Alum would be suited for the Ashton area where acidic soils are problematic, and it did well in dry land conditions in 2020.

AP Renegade – AP Renegade (06PN3017-9) – a hard red spring released in 2018 from Agripro/Syngenta, AP Renegade is widely adapted across moisture zones with medium height and maturity in the Washington / Northern Idaho region showing quick germination and emergence. AP Renegade performed well in the dryland trials at Soda Springs, performing 114% of the trial average (Table 39). The dryland trials were under drought stress (Table 38), and AP Renegade performed similarly to Dayn and Dagmar, and was of later maturity (3-4 days) than average and higher plant height. Grain protein was less than average. AP Renegade has resistance to Hessian fly, with good HTAP stripe rust and FHB tolerance.

Choteau – is a semidwarf hard red spring wheat released by Montana State University in 2003. Choteau has the solid-stem characteristic, which contributes to resistance to the stem sawfly. Choteau yields were below average and similar to Jefferson and Duclair under dry land conditions in Soda Springs (Table 38). Choteau is similar in height to Jefferson and 2 days later in maturity. Choteau had average test weight and protein and has acceptable end use quality.

Dagmar (MTS1588) – the dry land hard red spring wheat Dagmar is a 2019 release from Montana State University and in the first year of testing in the 2019 UI trials was the top yielding variety in Soda Springs. In 2020, Dagmar was included in the irrigated trials and yielded well in Ashton and Soda Springs. In 2021, Dagmar yields were 106% of trial average, but in 2022, Dagmar was at 95% of yield average (Table 39 and Chart 5). Dagmar had good test weight, high protein, early to medium maturity and was 3-4 inches taller than the irrigated trial average (Table 33). Dagmar will lodge under high production conditions. Dagmar is PVP Title V and seed was available 2021.

Dayn (WA8123) – Dayn is a hard white spring wheat released in 2012 by Washington AES and the USDA-ARS. Dayn is being handled in southern Idaho through Syngenta Cereals. Dayn was the highest yielding hard white spring wheat (Table 31) over the past seven years of the irrigated trials, yielding 111% of trial averages in 2022 (Table 39). Test weight is above average and heading date was at average. Protein was a little below average. Dayn was 2-3 inches taller than average but has good lodging resistance. End use quality is acceptable. Dayn is resistant to stripe rust and among the "least susceptible" hard white spring wheat for FHB (Addendum 3b and 4b).

Duclair – a hard red spring developed and released by Montana AES in 2011, with solid stem characteristic that reduces impact from wheat stem sawfly. It is currently under testing for adaptability to southeast Idaho conditions for areas where wheat stem sawfly is a problem. Duclair is an awned semi-dwarf variety, similar to Choteau, but heading 1-3 days earlier and about 1-3 inches taller, depending on the year. Yield of Duclair in Soda Springs was a little below trial average, comparable to UI Platinum with similar test weight (Table 38), with average test weight and a little lower protein. Duclair is PVP protected.

Expresso (DA984-034SRR) – a hard red spring wheat bred and released in 2006 by WestBred (Bayer CropScience) with good resistance to stripe rust. Expresso was included due to its susceptibility to low falling number (FN). Yield performance was similar to UI Platinum (Table 31), with higher test weight and later maturity, heading 5 days after UI Platinum. Expresso has high grain protein and medium plant height.

Glee (WA8074) – hard red spring wheat released in 2012 through Washington State University with desirable end use quality and resistance to stripe rust. Glee is included in the trial as a quality check. Yield of Glee is shy of Jefferson in the dry land trials (Table 32) and similar to Jefferson under irrigation (Table 31). Glee has good test weight, is taller than average (4-5 inches taller than WB9668) and is average for percent seed protein.

Holmes (BZ917-221) – a red-chaffed, hard red spring wheat developed by Nutrien Ag Solutions for the PNW for release in 2023. Holmes has been in these UI EVTs for two years and is a one-gene semi-dwarf with medium maturity. In 2021, yields averaged 103% of trial averages similar to WB7313 and WB9707. In 2022 yields were 101% of average, greater than WB9668 and Jefferson with higher test weight. Grain protein averaged over 14%. Heading date has been the same as WB9668 and is two inches taller. Holmes contains Yr36 and is MR to current races of stripe rust.

Jefferson HF (IDO462) – hard red spring wheat released by Idaho AES and USDA-ARS in 1998. Jefferson is primarily intended as a dry land variety due to it being taller than average (about 3-4 inches taller than average under irrigation) and susceptible to lodging. Irrigated and dry land yields have been at or above nursery averages (Table 31, 32). Jefferson has high test weight and good quality when there is adequate soil nitrogen and sulfur, when it has a minimum of 13% grain protein. Jefferson HF was developed from Jefferson but specifically selected for Hessian fly resistance for which it was segregating. Jefferson (HF) is susceptible to the current races of stripe rust and very susceptible to FHB (Addendum 3a and 4a), but resistant to Hessian Fly.

Net CL+ (WA8280 CL+) – a 2019 release from Washington State University, Net CL+ is a hard red spring, two-gene Clearfield variety (having Als1 and Als2). Net CL+ has good end use quality and is intended for dry land production. Under irrigation in the 3-yr summary (Table 31), Net CL+ yields were below trial average and similar to WB9668. Net CL+ headed 4 days later and is 4 inches taller than average with good grain protein. Net CL+ may have a tendency to lodge under higher production conditions. Proteins were above average under irrigation, with excellent test weight in both irrigated and dryland conditions. Under dryland conditions, yield of Net CL+ was above average.

Rocker (BZ917-277) – a hard red spring wheat being released in 2022 by Nutrien Ag Solutions for dryland production with very high test weight even under very droughty conditions in Soda Springs (Table 38). Yield was 1-9% of average (Table 39), similar to AP Renegade, and heading date was 3 d later than average with lower protein. Plant height is about 1-2 inches greater than the trial average. Rocker was selected for tolerance to wheat stem sawfly.

SY Gunsight (06PN3015-08) – Syngenta released this hard red spring in 2016. Average three-year yields were similar to SY Teton and greater than Alum (Table 31). Test weight and grain protein of SY Gunsight are less than average, with similar heading dates to Jefferson. It is moderately 'resistant' stripe rust and to FHB under lower disease pressure, and susceptible to Hessian fly. Grain protein is slightly below average, requiring top dress nitrogen at flowering to hit hard red spring protein targets.

SY Teton (SY10136) – Syngenta Cereals released this hard white spring wheat in 2015. In the 2019-2021 three-year averages, SY Teton was one of the highest yielding of the hard white and hard red spring wheat group, although performance was only 99% of average in 2022 (Table 39) under high heat conditions during grain fill (Table 33). SY Teton was 13 bu/A less than Dayn for yield, with lower test weight and 3-4 inches shorter but with better end-use quality. Heading date is 1-2 d earlier than average, and grain protein is less than average. Reaction to head blight was similar to Dayn, which was less susceptible than the majority of hard white spring wheat varieties. SY Teton is moderately susceptible to stripe rust and may lodge at higher seeding rates.

UI Platinum (IDO694C) – a University of Idaho (IAES) hard white spring wheat, UI Platinum yields were below average with very good end use quality, good test weight and good lodging resistance. Over the last three years, yield has been less than Alum and WB9879CLP, and less than Dayn (W) and SY Teton (W) (Table 31). In some environments, UI Platinum will show dark chaff discoloration similar to black chaff infection, which is not a disease but a genetic trait called melanism. UI Platinum is susceptible to stripe rust and very susceptible to FHB.

WB7202CLP (XA7320) – a hard white spring wheat released by Westbred (a unit of Bayer Crop Science) in 2017. In the three-year summary, the irrigated yield average of WB7202CLP was similar to WB7696 and SY Teton and was at 101% of trial average in 2022 (Table 39). Test weight was at trial average, heading date was 2-3 days earlier than trial average, and WB7202CLP was 2-3 inches shorter. WB7202CLP is a two-gene Clearfield wheat with tolerance to imazamox herbicide Beyond®. Additional use of *spring* Clearfield tolerant wheat includes planting following beans where imazamox may have a residual presence in the soil, or to reduce wheat red volunteer in white spring wheat production. The FHB reaction of WB7202CLP was susceptible, similar to Snow Crest and UI Stone.

WB7313 (XD9201) - the most recently released hard white spring wheat from WestBred, WB7313 has greater yield potential than WB7328, WB7589 and WB7696. While only tested for the previous two years in these trials, yield of WB7313 exceeded that of all other hard white spring wheats except Dayn across irrigated locations in 2021. In 2022 yields were 108% of trial averages. Grain protein and test weight were at trial averages, and WB7313 headed two days earlier than Dayn, was 4 in

shorter and had higher grain protein. WB7313 has good end use quality, resistance to stripe rust and similar FHB tolerance to Dayn.

WB7328 (BZS09-0133W) – most similar to Snow Crest, WB7328 is a hard white spring wheat with similar agronomic characteristics as Snow Crest but is a little shorter. Released in 2015 by WestBred (a unit of Bayer Crop Science) as a Snow Crest replacement, WB7328 has better resistance to stripe rust and higher yield potential. In 2016, a year with high stripe rust pressure, WB7328 showed some susceptibility to stripe rust. Since then, stripe rust has only occurred at very low levels in SE Idaho. Like almost all hard white spring wheat, WB7328 is susceptible to FHB. Yield has been below average (Table 31, 32), although in 2022 yields were at 100% of trial average. WB7328 is 4 in shorter than average and has high grain protein.

WB7589 (BZ9S09-0735W) – a short-statured, hard white spring wheat most similar to Klasic in agronomic and end use quality. WB7589 was released in 2015 by WestBred (a unit of Bayer Crop Science) as a replacement for Klasic, having better resistance to stripe rust and higher yield potential. WB7589 yields a little less than UI Platinum (Table 31) with similar test weight. Under heavy disease pressure, WB7589 was moderately resistant to stripe rust in 2016. Like all hard white spring wheat, WB7589 is susceptible to FHB.

WB7696 (XB9512) – a hard white spring wheat released in 2018 by WestBred (Bayer Crop Science), WB7696 was first tested in these trials in 2019, with yields and test weights similar to WB7202CLP and SY Gunsight (Table 31). WB7696 has good test weight, is mid-maturity with lower-than-average protein. Three-year yields were 9 bu/A greater than WB7589. WB7696 yields were lower than UI Platinum and SY Teton under dry land conditions with shorter plant height, lower test weight and greater protein.

WB9668 (BZ908-552) – a hard red spring wheat, WB9668 has been tested in the trials since 2014. Three-year data shows WB9668 to be lower than average for yield with excellent test weight and grain protein (Table 31) but yields very well under typical production conditions. WB9668 is 1-2 inches shorter than average, has lower lodging and an average heading date. WB9668 is very resistant to the current races of stripe rust and moderately susceptible to susceptible to FHB. WB9668 is also among the most resistant hard red spring wheats for cereal cyst nematodes (CCN).

WB9707 (XC9304) – WB9707 is a hard red spring wheat released by Westbred / Bayer Crop Science in 2020. In the third year of trial testing, WB9707 yields were above trial averages (Table 31) and similar to WB7696 and SY Gunsight, with higher test weight (61.5 lbs/bu) and grain protein (14.3%). Under dryland conditions, yields were at average with excellent test weight (Table 32). WB9707 has excellent test weight and even in a hot year (2021) where test weight averaged 58.7 lbs/bu, test weight of WB9707 was 60 lbs/bu with 14.2% grain protein in irrigated trials. Heading was 2 days earlier than Jefferson, and WB9707 is 1 in shorter. Under dry land conditions in 2020, yield was greater than WB9668. WB9707 has resistance to stripe rust.

WB9879CLP (IMICHT79) – developed by Montana State University and carried by WestBred /Bayer Crop Science, WB9879CLP is a hard red spring wheat with the solid stem characteristic that reduces impact from wheat stem sawfly.

WB9879CLP is a two-gene Clearfield wheat with tolerance to imazamox herbicide Beyond®. Additional use of spring Clearfield tolerant wheat includes planting following beans where imazamox may have a residual presence in the soil, or to reduce wheat red volunteer in white spring wheat production. In 3-year summaries under irrigated conditions, yields were below average and comparable to Alum with slightly lower test weight, protein, and 1 inch shorter in plant height. WB9879CLP headed 4-6 days later than WB9668 (Table 31). Under dry land, yields were similar to slightly greater than Choteau (Table 32) but was 1 inch taller and 3 days later in heading.

WINTER WHEAT – Soft White Winter

Appleby CL+ (ORI2161250CL+) – Appleby CL+ is a soft white winter wheat released in the fall of 2019 as 'Appleby CL+' after Dr. Arnold Appleby, a long-time professor of Weed Science at OSU. Clearfield wheats have resistance to imazamox herbicides such as to Beyond® herbicide for hard-to-control grassy weeds. Appleby CL+ was placed in the dryland trials in 2022, with yields at 96% of average, similar to WB456 and WB529. Appleby CL+ has an earlier heading date than UI-Magic (1-4 days), good resistance to stripe rust, and good yield potential in the low to intermediate rainfall conditions in the PNW with acceptable end-use quality. Appleby CL+ is one of the earliest maturing Clearfield varieties and is susceptible to dwarf bunt.

AP Exceed (11PN039#20) – is a soft white winter wheat primarily adapted to intermediate to high rainfall and irrigated production in Eastern Washington and Eastern Oregon, and has done very well in southern Idaho, yielding 156 bu/A or 111% of irrigated trial averages in 2021 and 104% of trial average in 2022 (Table 25). AP Exceed yields in 2022 were similar to LCS Blackjack and SY Assure, was earlier and shorter than the average of the trials with good straw strength (Table 17) and had good test weight in a very bad year for test weight in 2021. AP Exceed is tolerant to stripe rust, susceptible to soil borne mosaic virus, and susceptible to dwarf bunt.

AP Iliad (11PN044#84) – soft white winter released in 2020 by Agripro Syngenta adapted to intermediate to high-moisture rainfall and irrigated conditions with good straw strength. Over three-year averages (Table 15), AP Iliad yields were less than average, while at the 2020 Kimberly site yield yield was 180 bu/A and in 2021 at the irrigated Ririe site yield was 114% of average. In 2022, AP Iliad averaged 102% of trial averages for yield (Table 25 and Chart 3). At average for height and 2d earlier flowering, AP Iliad also had higher test weight (57.5 lbs/bu) than the 3-year average. AP Iliad has resistance to stripe rust, strawbreaker foot rot, physiological leaf spot (PLS), soil-borne mosaic virus (SBMV), and is susceptible to dwarf bunt.

Brundage (ID86-14502B) – a soft white winter wheat released in 1996 by the Idaho AES. Irrigated yield potential of Brundage is below trial averages, with good test weight and end use quality. Yields in the last three years have been about 90-99% of average (Table 15) as Brundage is very susceptible to several diseases, including stripe rust, dwarf bunt and *Cephalosporium* stripe. In 2016, stripe rust reduced Brundage yield significantly – by as much as 50% or greater of expected. In 2022, (Table 25) Brundage yielded 99% of trial average.

Devote (WA8271) – a soft white winter wheat released in 2019 by the Washington

State Ag Experiment Station and USDA-ARS, intended for rainfed production in areas of <12 inches of precipitation. In Washington, yields exceed Otto and has stripe rust resistance, good eyespot resistance, Fusarium crown rot resistance (FCR or dry land foot rot) resistance and has cold and snow mold tolerance. In Idaho, Devote performs agronomically similar to UI Sparrow with better test weight. Devote and has excellent emergence when deep planted, yielding 105% of average in 2022 and 112% of trial average in 2020. Heading date was a little earlier than Eltan and Otto. Test weight was very good and plant height was about an inch less than Eltan. Devote has good FCR, strawbreaker (eyespot), snow mold and stripe rust resistance. Devote is moderately resistant to dwarf bunt (similar to Eltan) but still requires difenoconazole seed treatment to prevent infection and quality issues. End use quality is better than Eltan.

Eltan (WA7163) – soft white winter wheat released in 1990 by the Washington AES. Eltan has wide adaptability in the dry land production areas with good snow mold tolerance. Yields are still consistently good to average in dry land trials (Table 16). Eltan will lodge under irrigation and is one of the latest varieties for heading date but is still a good choice for dry land production areas. Under heavy stripe rust pressure, Eltan was susceptible to stripe rust, and is moderately resistant to moderately susceptible to dwarf bunt, so difenoconazole seed treatment is recommended. Over the previous three years of dryland production testing, Eltan produced 5 bu/A better when 20 lbs/A 11-52-0 was included in-furrow.

LCS Blackjack (LWW15-71945) – Blackjack is a 2019 release from the Limagrain Cereal Seeds program; it is an awnless soft white winter derived from a Bobtail/Rosalyn cross with excellent yields in the 3-year averages (Table 15), similar to WB1783 and LCS Hulk. In 2022 yields were 104% of trial averages (Table 25). Blackjack was 2-3 inches shorter than WB1783 with similar heading date but with lower test weight. Straw strength was good, and LCS Blackjack is resistant to stripe rust, has good stress resistance and good disease resistance to stem based diseases. LCS Blackjack is susceptible to dwarf bunt.

LCS Hulk (LWW14-73163) – a soft white winter with released in 2018 by Limagrain Cereal Seeds for its wide adaptation in the PNW and high yield potential. Three-year average yields were greater than WB1783 but with lower test weight (Table 15). In 2022, average yield of LCS Hulk was 105% of trial average (Table 25). Under dry land conditions, LCS Hulk yielded slightly higher than UI Sparrow (Table 16), although it was not included in the driest location of Rockland. LCS Hulk has high adaptability, excellent standing power, good resistance to stem based diseases. Height is average under dry land conditions, about 1 inch taller than average under irrigation, and heading date is 1 d later than trial average. LCS Hulk has good test weight and low to average protein. LCS Hulk is susceptible to dwarf bunt and resistant to stripe rust.

M-PRESS – a soft white winter wheat marketed through McGregor and in its third year in southern Idaho trials, M-PRESS yields were 2 bu/A greater than SY Ovation at irrigated locations (Table 15), overall yielding at 107% across all trials in 2022 (Table 25). Test weight was greater than average with similar heading date and plant height to WB1783. M-PRESS is resistant to stripe rust and susceptible to dwarf bunt.

Norwest Duet (LOR-092) – Norwest Duet was released in 2015 by Oregon State

University jointly with Limagrain Cereal Seeds. Norwest Duet is a very tall soft white winter wheat that in the irrigated locations may lodge and is recommended for dryland production areas. Norwest Duet performed at trial average for yield and average for test weight over the previous 3 years (Table 16). Heading date was at average in dry land trials, 3-4 days earlier than Otto for heading, and grain protein was less than average and less than Otto. Norwest Duet is moderately susceptible to dwarf bunt and is resistant to stripe rust. Norwest Duet has desirable end use quality, better than Norwest Tandem.

Norwest Tandem (LOR-334) – a soft white winter wheat that was released in 2016 by Oregon State University jointly with Limagrain Cereal Seeds, LLC. Norwest Tandem yields were below average in 2020-2022 combined irrigated data, similar to UI Sparrow (Table 15). Tandem has earlier to mid-maturity, stiff straw, and is best under irrigation. Tandem had average test weight, acceptable end use quality, and is very susceptible to dwarf bunt, with good resistance to stripe rust.

Otto (WA008092) – a dry land (<12" rainfall production zone) soft white winter released September 2011 by Washington AES, Otto is similar agronomically to Eltan and both are 2-5 days later in heading than trial average (Table 16). Otto has similar yield potential to UI Sparrow, often better than Eltan, with test weight similar to Eltan. Otto has good emergence from deep plantings in the dry land areas with good cold tolerance and straw strength. Otto has resistance to eyespot foot rot and will have similar snow mold tolerance as Eltan, better stripe rust resistance and also is moderately resistant to resistant to dwarf bunt. End use quality was better than Eltan.

Piranha CL+ (WA8305CL+) – Piranha CL+ is a Clearfield soft white winter wheat released in 2020 by WSU AES and the USDA-ARS in Pullman. Clearfield wheats have 2-gene resistance to imazamox herbicides such as to Beyond® herbicide for hard-to-control grassy weeds in winter wheat production. In three years of testing, Piranha CL+ has done very well under irrigated and dryland conditions, with yields at 106% of average in 2022. Irrigated yields were above average (Table 15), but test weights were low due to extreme heat during flowering and grain fill and late-season rain (Table 17). Piranha CL+ emerges well after deep-planting in the dryland production areas and while yielded very well, Piranha CL+ may lodge under irrigated higher production areas. Piranha CL+ is susceptible to dwarf bunt.

Sockeye CL+ (WA8306CL+) – another 2020 release from the Washington State University, Sockeye CL+ is a soft white winter wheat with 2-gene resistance to imazamox herbicide. Sockeye CL+ also has very high yield potential and broad adaptability across productions regions, yielding just below Piranha CL+ in 3-year irrigated testing (Table 15). It is recommended for production in the intermediate and high rainfall areas of the PNW and has performed similarly to SY Ovation and SY Assure for yield in these trials. Sockeye CL+ has a taller plant height and may lodge under irrigation. Yields were less than UI Sparrow and Otto under dryland conditions, had average test weight and had a heading date 3-5 days earlier than Eltan and Otto. Sockeye CL+ is moderately susceptible to dwarf bunt.

Stephens (OR65-116) – a 1977 soft white winter release from Oregon AES, Stephens is kept for long-term check in Idaho EVTs. Yield and test weight under irrigation are

below average (Table 15, and Table 16). Stephens heading date and protein are at average. End use quality is poor. Stephens is moderately susceptible to moderately resistant dwarf bunt, and does not have good resistance to BYDV, snow mold or stripe rust.

Stingray CL+ (WA8275CL+) – Officially released in 2019 through WSU as Stingray CL+, WA8275 CL+ was the top yielding soft white winter 2-gene Clearfield line in Washington, Northern Idaho and Oregon. Stingray CL+ is broadly adapted and has very good stripe rust resistance, eyespot foot rot (strawbreaker) resistance, and very good end use quality. Stingray CL+ has higher falling number values and good test weight. In 3-year summaries of irrigated locations, Stingray CL+ yields were below average, similar to UI Sparrow and Brundage, and in 2022 yields were 96% of irrigated averages. Stingray CL+ has average heading dates, lower test weight and is at average height (Table 15). Stingray CL+ is susceptible to dwarf bunt.

SY Assure (SY96-2) – a soft white winter wheat released in 2016 by Syngenta Cereals, yield in 2020-2022 irrigated trials was comparable to UI Sparrow for yield (Table 15) with very good test weight. SY Assure is broadly adapted with earlier heading than the trial average by 3-5 days and is 3 inches shorter than average. In 2022, SY Assure yields were 106% of irrigated averages and 104% overall (Table 25). SY Assure is moderately resistant to moderately susceptible to dwarf bunt, and resistant to stripe rust.

SY Ovation (03PN108#21) – a soft white winter wheat released by Syngenta Cereals in 2011 for higher rainfall and irrigated production. SY Ovation has had excellent yields over the past seven years with good test weight. 2022 irrigated and dryland yields were above average (Table 15 and 16). Heading date, height and grain protein were average with higher than average test weight (see Table 15). SY Ovation is resistant to soil-borne mosaic virus, moderately susceptible to current races of stripe rust and very susceptible to dwarf bunt. SY Ovation has good end use quality and good threshability.

UI Magic CL+ (IDN 09-DH11) – UI Magic CL+ is a soft white winter wheat and is a two-gene Clearfield line. Clearfield wheats have resistance to imazamox herbicides such as to Beyond® herbicide for hard-to-control grassy weeds. UI Magic CL+ was released in 2015 as a joint release from the Idaho AES and LCS seeds. Yields in 2019-2021 were slightly less than the trial average (Table 15) and similar to UI Sparrow with much better test weight. Heading date is at trial averages, and it is 1-2 inches shorter than average and SY Ovation. UI Magic CL+ is widely adapted, susceptible to dwarf bunt and very susceptible to stripe rust.

UI Sparrow (IDO1108) – a 2016 release from the University of Idaho, UI Sparrow is a soft white winter wheat with high yield potential in irrigated and dry land production. While adapted to both, UI Sparrow has a higher tendency to lodge under irrigated production. Three-year irrigated yield was slightly below average and similar to Northwest Tandem and SY Assure (Table 15). UI Sparrow has low test weight (58.5 lbs/bu) and is 3 days later in heading date than average under irrigation. Under dry land conditions, UI Sparrow was a top yielding variety over the past 3-6 years (Table 16), similar to Otto and LCS Hulk. UI Sparrow is very resistant to dwarf bunt, which is a huge benefit under organic production systems. It was susceptible to

current 2019 races of stripe rust, a low disease pressure year.

VI Presto CL+ (UIL17-6451CL+) – newly released through the UI/LCS joint venture in 2020, VI Presto CL+ is a soft white winter Clearfield line tested under irrigated and dry land conditions, targeted for low to intermediate rainfall areas. VI Presto CL+ has better emergence properties than Norwest Duet, and in 2022 yielded below trial average for irrigated trials (Table 17), similar to Stephens, with better test weight, later heading date and 3 inches greater plant height. VI Presto CL+ has resistance to stripe rust, tolerance to *Cephalosporium* stripe, susceptibility to dwarf bunt and is photoperiod insensitive.

VI Shock (UIL15-72223DH) – a soft white winter wheat released for irrigation through the UI/LCS joint venture in 3-year irrigated trials, VI Shock yields were greater than UI Magic CL+ and Brundage (Table 15). In 2022, yield was similar to Norwest Tandem and Brundage (Table 17 and 25), although with lower test weight at 56.5 lbs/bu compared with 57.1 lbs/bu of Norwest Tandem. VI Shock has medium maturity, low protein and plant height is 1 inch less than average (Table 15). VI Shock is susceptible to dwarf bunt.

VI Voodoo CL+ (UIL17-6268CL+) – A soft white winter released through the UI/LCS joint venture in 2020, VI Voodoo CL+ is a two-gene Clearfield line with yield and agronomic traits similar to SY Ovation over the irrigated three-year averages (Table 15). VI Voodoo CL+ is intended as a replacement for UI Magic CL+, with greater yield potential and resistance to stripe rust. Test weight was below trial average (Table 15), and heading date was similar to SY Ovation. VI Voodoo CL+ susceptible to dwarf bunt.

WB 456 (BU6W99-456) – a soft white winter wheat from WestBred (a unit of Bayer Crop Science). WB 456 was released as an improvement over WB 470 and as a replacement for WB 528. WB 456 yielded similar to Stephens and Brundage in the past three years (Table 15) and has excellent test weight. 2022 yields were below average, about 90% of trial entries (Table 25). WB 456 is similar in height to Stephens (at trial average) with improved lodging resistance. WB 456 has an early heading date, 3-5 days earlier than average, and is moderately susceptible to stripe rust. WB 456 is susceptible to dwarf bunt.

WB1376CLP (WB-1038CL) – soft white winter wheat released by WestBred (a unit of Bayer Crop Science) in 2015. WB1376CLP is imi-tolerant, containing two genes for tolerance to BASF's grass herbicide Beyond®. Irrigated yields were below average at 92% of average (Table 15) and less than WB 456 but with excellent test weights. Dry land yields were below the trial averages, similar to Stephens (Table 16). Height is average and 1-2 inches taller than WB 456. WB1376CLP is susceptible to dwarf bunt, and moderately resistant to moderately susceptible to stripe rust.

WB1529 (BZ6W07-436) – soft white winter wheat released in 2014 by WestBred (a unit of Bayer Crop Science). Yields of WB1529 under irrigation are similar to Brundage over three years 2020-2022 (Table 15), with much higher test weight, 4 inches shorter and good straw strength. Grain protein was at nursery averages. Dry land yields of WB1529 were similar to Brundage (Table 16). WB1529 is 2 days earlier in heading date and 3 inches shorter than WB1783. WB1529 has good milling and baking quality. WB1529 is resistant to

current races of stripe rust and resistant to dwarf bunt.

WB1621 – a recently released awnless soft white winter from Westbred/Bayer Crop Sciences, WB1621 is a medium-late maturity variety with good winterhardiness and high test weight. Yield in 2022 was similar to WB1783 and was 107% of irrigated average yield (Table 17 and 25) and 105% overall. WB1621 has moderate resistance to stripe rust and is susceptible to dwarf bunt.

WB1783 (BZ6W09-471) – a very high yielding soft white winter wheat released in 2016 by WestBred (a unit of Bayer Crop Science). Irrigated yield of WB1783 greater than SY Ovation and slightly less than LCS Hulk (Table 15), with very good test weight and good straw strength. Irrigated yield in 2022 was the highest in the trials (Table 17 and Chart 3), higher than LCS Hulk and SY Ovation. Dry land yields are also usually excellent but were lower than average in the previous three years of testing (Table 16). WB1783 is very resistant to stripe rust and very susceptible to dwarf bunt. WB1783 tends to be a late variety and should not be planted late in the fall.

YSC-93 – a Yield Star soft white winter wheat variety carried by Wagner Seed, YS 93 is in the first year of these trials, yielding 99% of trial averages in the two irrigated trials in which it was tested (Table 23). In Aberdeen, YSC-93 yields were similar to SY Assure with lower test weight, similar heading date, two inches taller and with very high grain protein. YSC-93 is susceptible to dwarf bunt.

YSC-215 – A Yield Star soft white winter wheat variety included at two irrigated locations, Aberdeen and Ririe. YSC-215 yields were below average, close to SY Ovation in Aberdeen, with below average test weight and higher protein. The heading date was 3 days earlier than trial average, and was 1-3 inches taller. YS 215 is available through Wagner Seed. YSC-215 is susceptible to dwarf bunt.

YSC-268 –Another Yellow Star/Wagner Seed soft white winter wheat entered only at the Aberdeen location in 2021and 2022, YSC-268 yields were comparable to AP Exceed and better than Stephens. In 2022, yields were similar to AP Iliad, and below trial yield averages. Test weight and heading date was at average, and it was 5 inches taller than average (Table 21). Grain protein was high. YSC-268 is susceptible to dwarf bunt.

WINTER WHEAT– Hard Red and White

Hard White Winter Wheat

Golden Spike (UT1944-158) – a 1999 release from Utah AES for dry land production, Golden Spike is a hard white winter wheat with a partial waxy endosperm. Golden Spike will lodge under irrigation. Under dry land conditions, Golden Spike's test weight is below average, with 2022 yield at 88% of average (Table 14) and average grain protein. Average yield over the past three years has been below average (Table 5). Plant height was 2-3 inches less than Juniper. Golden Spike is very resistant to dwarf bunt but is susceptible to stripe rust.

Irv (OR2110679) – a hard white winter wheat released from Oregon State University in 2018 for moderate rainfall production conditions, Irv had low yield average under dry land conditions (Table 6). In 2022, Irv yields were 91% of trial averages (Table 14), similar to Millie and

Golden Spike. Irv had average spring stand and heading date, plant height was 3 inches below trial average, and was below average for test weight. Irv has good end use quality, slightly higher than average protein and is moderately resistant to stripe rust. Irv is susceptible to dwarf bunt.

Millie (OR2130118H) (W) – a hard white winter released the fall of 2020, named 'Millie' after Millie Rouch, wife of Chris Rouch, a dry land wheat farm family in eastern Oregon who have been long time supporters of the OSU wheat breeding program. Millie has good straw strength under irrigation, good stripe rust resistance, excellent yield potential across low rainfall zones irrigated. Yields of Millie were lower than average under irrigation (Table 4), similar to Promontory under dryland conditions with similar test weight. Millie is 2-3 inches shorter than average. Millie has acceptable to good quality which depends on hitting protein targets.

UI Bronze Jade (W) (IDO1706) – this hard white winter wheat released by IAES in 2019 has been in the trials for 5 years, and has demonstrated good yield, but very low test weight, overall poor quality and should be grown only with a specific contract market in mind. This dry land variety will lodge under irrigation and is 2-3 inches taller than average. Yields for the 3-year testing was at average, with test weight at 57.5 lbs/bu (compared to trial average of 58.7 lbs/bu). Under dry land conditions, UI Bronze Jade was at average for yield (Table 5), average heading date and plant height, and low for test weight. UI Bronze Jade was susceptible to stripe rust in 2019 and is susceptible to dwarf bunt.

UI Silver (IDO658B) – a hard white winter wheat released in 2011 by the University of Idaho AES. UI Silver yields very well under dry land conditions with good test weight (Table 5), similar to Yellowstone. UI Silver has good end use quality for both bread and Asian noodles. UI Silver has resistance to stripe rust (high temperature adult plant or HTAP), dwarf bunt, and carries the SrTmp gene for resistance to stem rust. It is susceptible to black chaff and lodging, which can be a problem under irrigation. Like Golden Spike, UI Silver is a partial waxy winter wheat. UI Silver is very resistant to dwarf bunt and moderately resistant to stripe rust.

Hard Red Winter Wheat

Balance (WA8248) – a hard red winter wheat released in 2020 by Nutrien Ag, tested in 2021 and 2022 in UI EVT. Average irrigated yield was similar to LCS Rocket and 2 bu/A less than LCS Jet in 2021, but in 2022 Balance yields were 98% of yield average (Table 14). Balance yields under irrigation were similar to WB4401 and Millie. Balance had very good protein, higher than average test weight, was 2 inches shorter than Keldin. Under dryland conditions, yields were similar to Juniper, with lower test weight and 10 inches shorter in height. Balance is susceptible to dwarf bunt.

Flathead – A hard red winter wheat released through Montana State University (MAES) in 2018, Flathead has a Yellowstone background with enhanced stripe rust resistance (two genes for resistance), shorter stature and early maturity. 2022 yield of Flathead was 106%% of trial average (Table 14) doing very well in Rupert (110% of trial average) and Rockland (dryland). In the 3-year summaries, Flathead yields were similar to Yellowstone with higher test weight (Table 4). Test weight and grain protein of Flathead

is excellent. Flathead had higher lodging and lower protein than Yellowstone (Table 4).

FourOsix (MT1462) – a hard red winter released in 2018 by Montana State University as a replacement to Yellowstone, well-known for its high yield, with improved milling and baking qualities. FourOsix has shown high loaf volume, water absorption and mixing characteristics. In the three-year trial averages, FourOsix had comparable yield and slightly lower grain protein than Yellowstone, with the same test weight (>2.5 lbs/bu), and was 4 in shorter. FourOsix has better resistance to stripe rust than Yellowstone with less lodging. FourOsix is very susceptible to dwarf bunt.

Juniper (IDO 575) – hard red winter wheat released in 2005 by the Idaho AES for dry land production areas. Juniper has moderate yield potential under dry land production, yielding the average for the trials (Table 5 and 14). Juniper is extremely tall and will lodge under irrigation. Juniper has good test weight and high protein, yielding similar to Golden Spike and Promontory, is very resistant to dwarf bunt and moderately resistant to stripe rust.

Keldin (ACS55017) – a hard red winter wheat distributed by WestBred (a unit of Bayer Crop Science) for irrigated production, Keldin has consistently been a high yielding hard red winter wheat tested in these trials (Table 4). 2022 yields were at 166 bu/A, the highest in the irrigated trials (Table 6), yielding 111% of trial average yield (Table 14). Keldin is a little shorter than average for height, has very high test weight, and is at average for grain protein. Keldin is susceptible to dwarf bunt and in 2016 and 2018 was moderately susceptible to current races of stripe rust.

Keldin + 11-52-0 – In-furrow fertilizer was added to one variety in the hard winter and soft winter group to test the effect of starter fertilizer on yield. (Monoammonium phosphate or 11-52-0 at 20 lbs phosphate per acre was included in-furrow.) In Table 4 (3-year irrigated averages), Keldin and Keldin +11-52-0 were within 3 bushels of each other (S.E. = 4.7 bu/A), indicating no effect of starter fertilizer on yield, stand or other agronomic traits. Under dry land conditions, Keldin + 11-52-0 was 4 bu/A greater than Keldin, with the S.E. of 1.5 bu/A, which is a statistically significant difference between the two for yield. In 2020, dry land yield was improved by 6 bu/A with the addition of starter fertilizer (11-52-0), resulting in yield at 108% of trial average, as compared to Keldin without starter which yielded 98% of trial average. Over 3-years of testing, Keldin with 11-52-0 had 4 bu/A greater yields than without it.

LCS Jet (NSA 7208) – a hard red winter with released in 2015 by Limagrain Cereal Seeds. LCS Jet has excellent yield potential (Table 4) and has been a top yielding hard red winter for the previous eight years of irrigated testing. In 2022, LCS Jet yielded 112% of irrigated mean (Table 15 and Chart 2), doing particularly well in Rupert, Rockland and Soda Springs. Test weight, grain protein and lodging has been below average, and LCS Jet has been 2-3 inches shorter than average. LCS Jet is very susceptible to dwarf bunt. In 2019, LCS Jet showed an increase stripe rust susceptibility with a susceptible infection type. LCS Jet has good end use quality.

LCS Rocket (NSA10-2196) – is a hard red winter wheat released from Limagrain Cereal Seeds in 2018, demonstrating high yield potential in Northern Idaho and the Palouse area in high rainfall zones. Three-year irrigated average yield comparable to

Yellowstone, with lower test weight and lower grain protein. Yields in 2022 under irrigation were 105% of trial average, while in 2021 yields were 107% (Table 14). Heading date is similar to Keldin (Table 4), at trial average, and LCS Rocket is shorter than Keldin (3 inches) and Yellowstone (7 inches). LCS Rocket has good resistance to stripe rust and is susceptible to dwarf bunt.

Milestone (ACS14132-412) – a new hard red winter wheat released through Nutrien Ag Solutions in Bozeman, MT. Milestone was tested in irrigated trials in 2021 and 2022, yielding over all irrigated trials 104% and 108% of trial averages, respectively. Yield was 9 bu/A greater than Yellowstone, with lower grain protein, and similar test weight. Milestone headed 2-2 days earlier than Yellowstone and was 5 inches shorter. Milestone is susceptible to dwarf bunt.

Promontory (UT1567-51) – a hard red winter wheat released by Utah AES in 1990. Promontory is a dry land variety with excellent test weight. Yield under irrigation has been above average, but it will lodge and was not included in the irrigated trials. Promontory has short coleoptiles and may have trouble emerging when planted deep in dry soils. Over the past three years of testing (Table 5), Promontory yields were below average. Promontory is resistant to dwarf bunt and moderately susceptible to stripe rust. Promontory is taller than average with good grain protein.

Scorpio (WA8268) – a broadly adapted hard red winter wheat released in 2019 by Agricultural Research Center of Washington State University, Scorpio is mid-maturity with short stiff straw well adapted across the >15″ rainfall zones of the Pacific Northwest. Scorpio has high yield potential similar to Yellowstone, and 3-year irrigated averages yields were 144 bu/A (Table 4) with lower (no) lodging than LCS Jet and Yellowstone. Test weight was less than average. Scorpio should be well-adapted to no-till situations with low pH soils and has aluminum tolerance. In dry land trials, Scorpio yields were below average, similar to Promontory. Scorpio had moderately susceptible reaction to stripe rust in 2019, is susceptible to dwarf bunt and has tolerance to Hessian fly. Scorpio has good end use quality.

Sequoia (WA8180) – a hard red winter wheat developed and released in 2015 by the Agricultural Research Center of Washington State University. Sequoia has very good (desirable) end use quality and emerges quickly in deep-planted situations. Sequoia yields under dryland conditions were greater than Keldin and Juniper over the three previous years (Table 5). Test weight was greater than average, grain protein averaged 12.2%, and heading was 4 days later than average. Sequoia has cold tolerance, adult plant resistance to stripe rust, and good straw strength. Sequoia is susceptible to dwarf bunt.

UI SRG (IDO656B) – a hard red winter wheat released in 2012 by the Idaho AES for the dry land conditions of southern Idaho and northern Utah. SRG will lodge under irrigation without the use of growth regulators. Yields in the past three years have consistently been above dry land average, comparable to Yellowstone with slightly lower test weight (Table 5). UI SRG is very resistant to dwarf bunt and resistant to stripe rust and is a good choice for dry land production in southern Idaho.

WB4401 – a hard red winter wheat developed by WestBred (Bayer Crop Science) for the central and southern plains, WB4401 can be used for forage and grain yield. Tested only in Kimberly and Aberdeen, 2020 yields were 110% of trial

average, and in 2021 irrigated yields were 108% of average. In 2022, yields were comparable to FourOsix and Scorpio with very good test weight (Table 6). WB4401 the same plant height as Keldin and 3-4 days earlier in heading. WB4401 is moderately resistant to stripe rust and very susceptible to dwarf bunt.

WB4510CLP (XD4201) – a Clearfield Plus variety, WB4510CLP is a hard red winter wheat released by WestBred (a unit of Bayer Crop Science) in 2017. WB4510CLP is an imi-tolerant winter wheat containing two genes for tolerance to BASF's grass herbicide Beyond®. In the first year of testing, WB4510CLP yielded the same as LCS Jet and LCS Rocket, about 10 bu/A greater than average, but with much better test weight and higher grain protein. In 2022, yields were 104% of average, similar to LCS Rocket. WB4510CLP has good winter hardiness, has medium maturity and was taller than average.

Yellowstone (MT00159) – a hard red winter wheat with excellent yield potential in both irrigated (Table 4, Chart 2) and dry land conditions (Table 5) of southeast Idaho. Yellowstone was released by Montana State University and the AES in 2005 and has above average test weight and height, and average grain protein. Yield in 2022 was 102% of average, similar to WB4510CLP (Table 14). End use quality is average, with good loaf volume. Under very high production inputs, Yellowstone will lodge under irrigation. It is moderately resistant to dwarf bunt and susceptible to stripe rust.

Table 3. Ten year averages of selected agronomic characteristics, 2012-2021 compared to 2022.

NOTE: "Average" values are for years 2012 to 2021

Winter Wheat (all market classes and locations)

YIELD			TEST WEIGHT			PLANT HEIGHT			HEADING DATE				LODGING		
Year	# of Loc.	bu/A	Year	# of Loc.	lb/bu	Year	# of Loc.	in.	Year	# of Loc.	date	Days fr. Jan.1	Year	# of Loc.	%
2022	6	115	2017	6	60.8	2015	6	35	2022	6	6/13	165	2014	5	25
2018	7	104	2018	6	60.3	2022	6	35	2019	6	6/12	164	2021*	6	11
2015	6	103	2020	7	60.2	2016	6	35	2021	6	6/9	161	2016	6	11
2012	5	102	2019	6	60.0	2019	6	33	2020	7	6/8	160	2013	5	8
2020	7	102	2012	5	59.7	2018	7	33	2017	6	6/7	159	**Avg.**	---	**7**
2014	4	101	2016	6	59.4	**Avg.**	---	**32**	2013	5	6/6	158	2022	6	5
2019	6	99	2013	5	59.4	2014	5	32	**Avg.**	---	**6/5**	**157**	2012	5	5
Avg.	---	**97**	**Avg.**	---	**59.0**	2021	6	31	2014	5	6/5	157	2015	6	4
2021	6	95	2015	6	58.1	2013	5	31	2018	7	6/5	157	2019	6	3
2016	6	94	2021	6	56.4	2020	7	30	2012	5	6/4	156	2018	7	1
2017	6	91	2014	4	56.1	2012	5	30	2016	6	5/31	152	2020	7	0.4
2013	5	79	2022	6	55.6	2017	6	29	2015	6	5/31	152	2017	6	0

Spring Wheat (all market classes and locations)

YIELD			TEST WEIGHT			PLANT HEIGHT			HEADING DATE				LODGING		
Year	# of Loc.	bu/A	Year	# of Loc.	lb/bu	Year	# of Loc.	in.	Year	# of Loc.	date	Days fr. Jan.1	Year	# of Loc.	%
2014	5	107	2016	5	61.9	2014	4	34	2022	5	6/30	182	2014	4	16
2018	5	106	2020	5	61.6	2019	5	34	2019	4	6/28	180	2021*	5	5
2020	5	101	2017	5	61.6	2020	5	34	2020	5	6/25	177	2022	5	5
2019	5	100	2013	5	61.4	2022	5	33	2012	5	6/25	177	2019	5	4
2017	5	98	2012	5	61.4	2021	5	31	2017	5	6/24	176	**Avg.**	---	**3**
2015	5	97	2015	5	61.0	2018	5	31	2013	5	6/23	175	2016	5	3
Avg.	---	**96**	2018	5	61.0	**Avg.**	---	**31**	**Avg.**	**---**	**6/22**	**174**	2015	5	2
2022	5	96	2019	5	60.8	2016	5	31	2016	5	6/21	173	2013	5	2
2016	5	91	**Avg.**	---	**60.6**	2015	5	30	2021	5	6/20	172	2017	5	1
2012	5	90	2022	5	60.0	2012	5	30	2018	5	6/20	172	2012	5	0.4
2021	5	89	2021	5	58.4	2017	5	28	2015	5	6/18	170	2018	5	0.3
2013	5	86	2014	5	56.5	2013	5	28	2014	5	6/18	170	2020	5	0.2

Spring Barley (all market classes and locations)

YIELD			TEST WEIGHT			PLANT HEIGHT			HEADING DATE				LODGING		
Year	# of Loc.	bu/A	Year	# of Loc.	lb/bu	Year	# of Loc.	in.	Year	# of Loc.	date	Days fr. Jan.1	Year	# of Loc.	%
2016	5	129	2016	5	53.6	2014	4	36	2022	5	6/30	182	2014	4	56
2012	4	129	2020	5	53.5	2019	5	35	2019	4	6/30	182	2013	4	33
2017	4	128	2022	5	51.9	2018	5	34	2020	5	6/28	180	2019	5	31
2014	4	127	2013	4	51.6	2020	5	33	2021	5	6/25	177	2015	4	24
2015	4	124	2019	5	51.5	2022	5	33	2012	4	6/25	177	**Avg.**	---	**20**
2013	4	122	**Avg.**	---	**51.4**	2013	4	33	**Avg.**	---	**6/24**	**176**	2021	5	18
Avg.	---	**121**	2017	4	51.4	2015	4	33	2017	4	6/24	176	2017	4	17
2020	5	119	2012	4	51.4	**Avg.**	---	**32**	2014	4	6/24	176	2016	5	11
2018	5	117	2018	5	51.4	2017	4	31	2018	5	6/24	176	2018	5	10
2019	5	111	2015	4	50.6	2016	5	31	2013	4	6/21	173	2022	5	5
2022	5	107	2021	5	50.1	2021	5	31	2016	5	6/20	172	2020	5	1
2021	5	100	2014	4	48.8	2012	4	30	2015	4	6/16	168	2012	4	0.4

Table 4. Hard Winter Wheat Irrigated Nurseries, 3-Year Averages (2020-2022; 11 site-years).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Keldin	155	60.5	99	6/4	37	9	12.1
LCS Jet	153	57.9	100	6/5	34	1	11.9
Keldin + 11-52-0	152	60.2	99	6/4	37	9	12.1
LCS Rocket	149	56.8	99	6/4	34	4	11.5
Flathead	148	61.4	100	6/1	38	13	12.0
Yellowstone	148	59.9	99	6/6	41	8	12.2
FourOsix	146	59.9	99	6/5	37	7	11.9
UI Bronze Jade (W)	145	57.5	99	6/6	39	9	12.1
Scorpio	144	57.3	99	6/6	35	0	12.2
Kairos	142	59.1	99	6/1	32	3	11.7
Millie (W)	141	60.3	99	6/6	34	5	12.3
WA 8309	137	55.4	98	6/7	31	0	12.2
IDO1906 (W)	117	56.5	97	6/2	34	0	13.2
Average	**144**	**58.7**	**99**	6/4	**36**	**5**	**12.1**
Standard Error	**3.0**	**0.3**	**0.5**	**0.7**	**0.4**	**2.3**	
Pr >F (variety)	**<0.0001**	**<0.0001**	**0.0014**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (variety*year)	**<0.0001**	**0.0001**	**0.2111**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (variety*location)	**<0.0001**	**<0.0001**	**0.0423**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (year*location)	**<0.0001**	**<0.0001**	**0.0081**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (variety*year*location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	

(W) = White

Table 5. Hard Winter Wheat Dryland Nurseries 3-Year Averages (2020-2022; 7 site-years).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
FourOsix	39	57.5	94	6/16	24	0	12.1
Keldin + 11-52-0	39	57.8	95	6/16	25	0	12.0
Yellowstone	37	58.0	95	6/17	26	0	11.9
UI Silver	37	57.7	95	6/17	26	0	12.3
LCS Jet	37	55.3	94	6/16	21	0	11.7
Sequoia	37	57.9	92	6/20	30	0	12.2
UI SRG	36	58.8	96	6/15	30	0	12.8
Keldin	35	58.3	95	6/16	25	0	12.4
UI Bronze Jade (W)	35	56.8	94	6/17	26	0	12.1
Flathead	35	58.3	97	6/13	25	0	12.3
WA 8309	35	55.1	91	6/17	20	0	12
Juniper	35	58.8	95	6/16	31	0	12.8
Promontory	34	58.4	95	6/16	32	0	12.9
Millie (W)	34	58.5	91	6/18	23	0	12.8
Irv (W)	33	56.7	92	6/17	23	0	12.7
Golden Spike (W)	33	58.0	93	6/18	29	0	12.3
Scorpio	33	56.9	91	6/18	22	0	12.3
IDO1906 (W)	29	54.7	90	6/14	22	0	12.9
Average	**35**	**57.4**	**94**	**6/16**	**26**	**0**	**12.4**
Standard Error	**2.0**	**0.4**	**1.8**	**1.8**	**0.6**	**.**	
Pr >F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr > F (variety*year)	**<0.0001**	**0.0474**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr > F (variety*location)	**0.0001**	**0.0613**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr > F (year*location)	**0.0075**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0012**	**.**	
Pr > F (variety*year*location)	**0.0530**	**0.1653**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	

(W) = White

Table 6. Irrigated Hard Winter Wheat Data Combined from Aberdeen, Kimberly, Rupert and Ririe, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Keldin	166	58.8	100	6/9	40	3	13.1
LCS Jet	164	56.8	99	6/9	36	0	12.9
Keldin + 11-52-0	163	58.3	99	6/9	40	4	13.2
Milestone	161	58.1	99	6/8	38	1	12.6
WB4510CLP	159	60.6	99	6/10	42	0	12.8
LCS Rocket	158	54.7	99	6/8	37	0	12.2
MT1745	157	59.1	99	6/12	41	0	12.5
Flathead	155	60.8	99	6/5	42	1	12.6
IDO2006 (W)	153	56.9	99	6/13	41	0	12.6
Yellowstone	152	58.1	99	6/11	43	0	13.6
UI Bronze Jade (W)	151	56.1	99	6/11	41	0	12.4
FourOsix	150	58.6	99	6/10	39	1	12.7
Scorpio	149	55.8	98	6/10	36	0	13.0
WB4401	149	60.2	98	6/5	40	0	12.8
Millie (W)	145	58.6	98	6/9	36	0	13.7
Balance	145	57.4	98	6/7	38	0	14.7
Kairos	145	58.5	98	6/5	34	0	12.2
WA 8309	141	53.5	98	6/10	33	0	13.6
OR2170199R	138	54.7	98	6/10	34	0	13.2
OR2170052H (W)	137	54.7	97	6/13	41	2	12.9
IDO1906 (W)	121	54.2	96	6/7	36	0	14.1
Average	**150**	**57.4**	**98**	**6/9**	**38**	**1**	**13.0**
Standard Error	**4.7**	**0.7**	**0.5**	**0.4**	**0.3**	**1**	
Pr >F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0**	
Pr > F (location)	**0.0028**	**0.0984**	**<0.0001**	**<0.0001**	**<0.0001**	**0**	
Pr > F (variety*location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0**	

(W) = White

Table 7. Dryland Hard Winter Wheat Data Combined from Soda Springs and Rockland, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
LCS Jet	51	52.5	99	6/17	26	0	9.4
Keldin + 11-52-0	51	56.3	100	6/18	30	0	9.3
FourOsix	51	55.2	99	6/18	28	0	9.6
IDO2006 (W)	49	55.1	100	6/19	29	0	9.8
Flathead	49	54.6	100	6/14	29	0	10.0
MT1745	48	55.7	99	6/19	28	0	9.7
Keldin	48	55.2	99	6/17	31	0	9.6
Yellowstone	48	56.2	100	6/18	31	0	9.7
Promontory	46	56.1	99	6/18	41	0	10.6
UI Bronze Jade (W)	46	54.4	99	6/19	31	0	10.1
Sequoia	45	54.1	99	6/20	34	0	10.3
UI Silver	45	56.1	100	6/18	31	0	10.8
WB4510CLP	45	56.8	100	6/17	29	0	9.9
Juniper	45	57.4	99	6/18	38	0	10.3
Balance	45	55.9	100	6/16	28	0	11.0
WB4401	45	55.6	99	6/14	29	0	9.8
UI SRG	44	54.9	99	6/18	36	0	10.8
Millie (W)	44	56.7	99	6/19	27	0	10.6
WA 8309	41	51.2	99	6/18	24	0	10.4
Irv (W)	41	54.4	100	6/18	27	0	10.7
Golden Spike (W)	40	55.6	100	6/20	34	0	9.9
Scorpio	38	52.3	100	6/18	27	0	10.2
IDO1906 (W)	37	48.7	98	6/16	27	0	10.3
OR2170199R	33	50.9	100	6/18	26	0	10.5
OR2170052H (W)	32	43.0	99	6/19	27	0	9.7
Average	**44**	**54.2**	**99**	**6/18**	**30**	**0**	**10.1**
Standard Error	**3.2**	**1.8**	**0.9**	**0.6**	**0.7**	**.**	
Pr > F (variety)	**<0.0001**	**<0.0001**	**0.9319**	**<0.0001**	**<0.0001**	**.**	
Pr > F (location)	**0.8594**	**0.0222**	**0.3050**	**<0.0001**	**0.0071**	**.**	
Pr > F (variety*location)	**0.0037**	**0.0471**	**0.3575**	**0.0810**	**0.3436**	**.**	

(W) = White

Table 8. Agronomic Data for Hard Winter Wheat at Kimberly, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Keldin	184	145	**201**	61.5	99	6/4	42	1	11.5
WB4510CLP	---	136	**185**	62.5	96	6/5	45	0	11.5
LCS Jet	189	154	182	58.6	97	6/5	38	0	11.9
IDO2006 (W)	131	116	180	58.7	97	6/9	43	0	11.3
Keldin + 11-52-0	187	125	179	60.9	96	6/5	42	0	11.4
MT1745	---	125	178	60.5	98	6/7	45	0	11.6
LCS Rocket	184	137	177	57.0	97	6/4	38	0	11.6
Yellowstone	174	106	177	59.6	98	6/6	46	0	11.7
WB4401	196	134	176	61.8	94	5/30	43	0	10.9
UI Bronze Jade (W)	187	109	174	57.7	97	6/7	43	0	11.4
FourOsix	173	129	172	60.5	97	6/6	41	0	12.0
Scorpio	183	123	172	57.7	93	6/5	39	0	12.8
Flathead	165	118	171	61.9	97	5/31	43	0	11.4
OR2170052H (W)	---	---	166	58.6	94	6/8	44	0	11.7
Balance	---	132	161	59.7	96	6/3	40	0	12.6
Millie (W)	171	129	160	61.1	94	6/4	37	0	12.5
Milestone	---	130	158	60.3	96	6/4	41	0	11.9
Kairos	169	152	155	59.2	96	5/31	35	0	11.5
OR2170199R	---	---	155	57.0	95	6/7	35	0	12.0
WA8309	169	118	153	53.7	93	6/6	32	0	12.1
IDO1906 (W)	160	108	129	57.4	93	6/2	38	0	12.7
AVERAGE	**172**	**122**	**169**	**59.3**	**96**	**6/4**	**40**	**0**	**11.8**
LSD (0.05)	**13**	**21**	**18**	**0.9**	**4**	**2**	**2**	**0**	
CV (%)	**5.4**	**12.3**	**7.4**	**1.0**	**2.9**	**0.90**	**2.6**	**.**	
P>F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0419**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

(W) = White

Table 9. Agronomic Data for Hard Winter Wheat at Rupert, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Keldin +11-52-0	140	162	**156**	56.9	100	6/9	41	18	13.1
Milestone	---	156	**150**	56.9	100	6/8	39	3	13.1
Keldin	134	168	**146**	57.0	100	6/10	42	10	14.1
LCS Jet	114	159	**146**	55.7	100	6/10	37	0	12.9
Flathead	143	167	**144**	60.9	100	6/5	45	4	12.3
LCS Rocket	116	162	**137**	53.1	100	6/9	37	0	11.7
Balance	---	168	132	57.3	100	6/6	39	0	13.9
Scorpio	128	149	131	54.3	100	6/11	37	0	12.2
WB4510CLP	---	159	130	60.9	100	6/9	41	0	12.2
UI Bronze Jade (W)	135	159	129	53.9	100	6/11	41	0	12.7
FourOsix	140	157	127	57.2	100	6/10	41	3	12.9
Kairos	125	151	127	60.1	100	6/4	35	0	12.1
MT1745	---	164	124	57.3	100	6/12	42	0	12.3
OR2170199R	---	---	122	51.7	100	6/10	35	0	14.2
Yellowstone	150	169	117	55.0	100	6/10	44	0	13.6
IDO2006 (W)	---	155	117	54.5	100	6/11	41	0	13.5
OR2170052H (W)	---	---	116	51.1	100	6/13	40	0	13.0
WB4401	---	174	112	58.2	100	6/4	42	0	12.5
Millie (W)	131	149	111	55.4	100	6/8	36	0	14.7
IDO1906 (W)	101	121	108	52.5	100	6/8	37	0	14.2
WA8309	124	142	100	48.8	100	6/12	31	0	14.0
Average	**129**	**156**	**128**	**55.6**	**100**	**6/9**	**39**	**2**	**13.1**
LSD (α=.05)	**13**	**13**	**23**	**4.6**	**0**	**2**	**2**	**12**	
CV (%)	**7.1**	**5.9**	**11.6**	**5.9**	**0**	**0.9**	**3**	**485**	
Pr > F	**<0.0001**	**<0.0001**	**0.0**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.475**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

(W) = White

Table 10. Agronomic Data for Hard Winter Wheat at Aberdeen, Irrigated, 2022.

Variety/Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Milestone	---	136	**177**	57.9	99	6/8	39	0	12.8
WA8309	129	131	**169**	59.5	100	6/5	42	0	15.5
MT1745	---	138	**167**	59.1	99	6/13	42	0	13.8
WB4510CLP	---	143	**167**	58.4	99	6/13	45	0	15.1
LCS Jet	143	130	**165**	57.6	100	6/8	37	0	13.6
Millie (W)	---	---	**163**	59.2	100	6/8	36	0	14.6
UI Bronze Jade (W)	140	138	**162**	56.5	100	6/9	43	0	13.0
LCS Rocket	128	137	**160**	54.6	100	6/7	37	0	13.4
Kairos	120	139	**156**	58.0	99	6/4	35	0	12.8
Yellowstone	161	140	**155**	60.9	100	6/12	44	0	16.3
WB4401	145	139	**154**	60.1	100	6/8	39	0	16.4
Scorpio	---	---	**154**	56.2	100	6/9	37	0	14.2
FourOsix	143	130	153	58.0	99	6/10	40	0	13.1
IDO2006 (W)	---	133	153	57.0	100	6/14	42	0	13.6
OR2170052H (W)	---	---	152	54.9	100	6/12	42	6	14.3
Keldin + 11-52-0	142	134	151	55.9	100	6/9	40	0	15.8
OR2170199R	---	---	150	56.0	99	6/8	36	0	13.8
Flathead	147	146	144	58.9	100	6/5	41	0	14.9
Keldin	141	144	141	57.2	100	6/7	41	0	14.7
Balance	---	133	136	55.5	99	6/5	39	0	18.4
IDO1906 (W)	---	---	132	53.3	100	6/6	37	0	15.7
Average	**138**	**133**	**155**	**57.4**	**100**	**6/8**	**40**	**0**	**14.6**
LSD (α=.05)	**16**	**17**	**23**	**3.0**	**2**	**2**	**2**	**4**	
CV %	**8.3**	**9.1**	**10.5**	**3.4**	**1.3**	**0.90**	**4.1**	**917.0**	
Pr > F	**<0.0001**	**0.0015**	**0.0358**	**0.0002**	**0.8416**	**<0.0001**	**<0.0001**	**0.4756**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = White

Table 11. Agronomic Data for Hard Winter Wheat at Ririe, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Keldin	136	150	**177**	59.6	100	6/13	37	0	12.1
Keldin + 11-52-0	137	148	**167**	59.6	100	6/14	36	0	12.3
IDO2006 (W)	---	122	**165**	57.3	100	6/19	37	0	12.0
LCS Jet	145	141	**163**	55.3	100	6/13	31	0	13.1
Flathead	126	145	**162**	61.4	100	6/10	38	0	11.9
Milestone	---	145	160	57.2	100	6/13	34	0	12.4
LCS Rocket	141	146	160	54.2	100	6/13	34	0	12.0
MT1745	---	143	159	59.5	100	6/16	38	0	12.2
Yellowstone	133	139	158	59.6	100	6/16	39	0	12.6
WB4510CLP	---	142	156	60.4	100	6/14	37	0	12.5
WB4401	---	142	155	60.6	100	6/8	35	0	11.4
Balance	---	144	151	57.3	99	6/14	36	0	13.9
FourOsix	148	132	149	58.9	100	6/15	35	0	12.6
Millie (W)	132	129	148	58.8	98	6/17	33	0	13.1
WA8309	142	121	142	52.0	99	6/19	28	0	12.6
Kairos	130	138	142	56.8	96	6/11	31	0	12.4
Scorpio	---	---	142	54.9	98	6/16	33	0	12.9
UI Bronze Jade (W)	139	136	137	56.5	100	6/16	36	0	12.5
OR2170199R	---	---	127	54.1	97	6/17	32	0	12.6
OR2170052H (W)	---	---	119	54.3	94	6/20	37	0	12.4
IDO1906 (W)	---	---	117	53.8	92	6/14	33	0	13.7
Average	**135**	**134**	**150**	**57.3**	**99**	**6/15**	**35**	**0**	**12.5**
LSD (α=.05)	**13**	**9**	**16**	**1**	**3**	**2**	**2**	**0**	
CV (%)	**7.1**	**5.0**	**7.7**	**1.3**	**1.8**	**0.8**	**4.1**	**.**	
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = White

Table 12. Agronomic Data for Hard Winter Wheat at Rockland, Dryland, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Flathead	38	15	**56**	57.5	100	6/6	28	0	10.7
MT1745	---	17	**55**	57.2	99	6/12	27	0	10.3
FourOsix	44	15	**55**	56.6	98	6/11	27	0	10.7
IDO2006 (W)	---	10	**51**	55.3	100	6/12	28	0	11.0
Keldin + 11-52-0	47	16	**50**	57.2	99	6/11	29	0	9.7
LCS Jet	40	12	**50**	53.6	98	6/8	25	0	9.8
Yellowstone	40	17	**49**	57.0	100	6/11	30	0	10.3
Keldin	41	16	**49**	58.2	97	6/10	29	0	9.8
Balance	---	11	46	57.0	100	6/10	27	0	11.9
Juniper	40	17	46	58.6	98	6/10	37	0	11.2
Millie (W)	38	12	44	57.6	98	6/14	26	0	11.1
UI Silver	51	14	43	56.7	100	6/11	30	0	11.0
Irv (W)	44	9	42	55.9	100	6/10	27	0	11.3
Promontory	43	14	42	58.6	98	6/10	37	0	11.4
WB4510CLP	---	15	42	59.2	100	6/11	28	0	10.5
WA 8309	41	10	42	54.7	98	6/10	24	0	11.1
WB4401	---	12	41	58.0	100	6/8	29	0	10.4
Sequoia	46	11	40	57.7	98	6/12	33	0	10.0
UI SRG	40	18	40	58.2	98	6/10	36	0	10.6
UI Bronze Jade (W)	41	12	40	56.0	97	6/13	29	0	11.0
IDO1906 (W)	36	9	39	56.0	100	6/8	27	0	10.7
Golden Spike	39	13	35	56.6	100	6/13	33	0	10.8
Scorpio	41	10	34	55.6	100	6/11	26	0	10.7
OR2170052H (W)	---	---	33	52.7	100	6/12	26	0	11.5
OR2170199R	---	---	30	52.8	100	6/11	24	0	11.8
Average	**40**	**13**	**44**	**56.6**	**99**	**6/11**	**29**	**0**	**10.8**
LSD (α=.05)	**6**	**4**	**9**	**2.5**	**4**	**1/3**	**2**	**0**	
CV (%)	**11.2**	**23.4**	**13.4**	**3.1**	**3**	**1**	**6**	**.**	
Pr >F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.7988**	**0.0009**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = White

Table 13. Agronomic Data for Hard Winter Wheat at Soda Springs, Dryland, 2022.

Variety or Selection	Yield (bu/A) 2019	2020	2022*	Test Wt. (lb/bu)**	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
LCS Jet	51	62	**55**	51.4	100	6/25	27	0	8.9
Sequoia	71	64	**53**	53.9	100	6/28	36	0	10.5
Keldin + 11-52-0	54	55	**52**	55.5	100	6/25	32	0	8.9
UI Bronze Jade (W)	54	66	**52**	52.8	100	6/26	32	0	9.1
UI SRG	70	58	**51**	51.7	100	6/26	37	0	10.9
WB4401	---	---	**51**	53.1	98	6/21	29	0	9.2
UI Silver	81	55	**50**	55.5	100	6/26	32	0	10.5
Keldin	59	48	**50**	56.8	100	6/25	32	0	9.3
Promontory	67	38	**49**	53.7	100	6/26	44	0	9.8
WB4510CLP	---	---	**48**	54.4	100	6/23	31	0	9.3
IDO2006 (W)	---	---	**47**	55.0	100	6/26	30	0	8.5
FourOsix	44	65	**47**	53.7	100	6/25	30	0	8.5
Yellowstone	63	58	**46**	55.3	100	6/26	32	0	9.1
Flathead	---	47	44	55.7	100	6/22	30	0	9.3
Juniper	47	49	44	56.2	100	6/26	40	0	9.4
Balance	---	---	44	54.8	100	6/23	29	0	10.0
Golden Spike (W)	63	58	44	54.6	100	6/26	35	0	9.0
Millie (W)	52	53	44	55.8	100	6/24	29	0	10.1
Scorpio	48	58	43	53.4	100	6/26	28	0	9.6
WA 8309	---	66	43	47.6	100	6/26	24	0	9.7
Irv (W)	46	53	40	52.9	100	6/26	28	0	10.0
MT1745	---	---	40	54.2	100	6/26	30	0	9.1
OR2170052H (W)	---	---	39	50.5	99	6/27	27	0	7.9
IDO1906 (W)	---	48	38	48.4	95	6/24	27	0	9.9
OR2170199R	---	---	36	49.0	100	6/26	27	0	9.2
Average	**57**	**55**	**46**	**53.5**	**100**	**6/25**	**31**	**0**	**9.4**
LSD (α=0.05)	**17**	**14**	**10**	**4.6**	**3**	**1**	**3**	**0**	
CV (%)	**21.1**	**17.2**	**13.6**	**5.7**	**2.3**	**0.4**	**6.8**	**.**	
Pr > F	**0.0005**	**<0.0001**	**0.0048**	**0.0037**	**0.517**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Test weight data was from the harvestmaster.

(W) = Hard White Winter

Table 14. Hard Winter Wheat Yield Percentage of Location Averages, 2022.

Variety or Selection	Aberdeen	Kimberly	Rupert	Ririe Irrigated	Rockland	Soda Springs	Variety Average
LCS Jet	107	107	114	109	114	120	**112**
Keldin + 11-52-0	97	106	122	112	114	113	**111**
Keldin	91	119	114	118	112	109	**110**
Milestone	114	93	117	107	---	---	**108**
Flathead	93	101	112	108	126	96	**106**
LCS Rocket	103	105	107	107	---	---	**105**
MT1745	107	105	97	106	126	87	**105**
FourOsix	99	101	99	99	124	102	**104**
IDO2006 (W)	99	106	91	110	115	102	**104**
WB4510CLP	107	109	101	104	95	104	**104**
UI Silver	---	---	---	---	98	109	**103**
Sequoia	---	---	---	---	91	115	**103**
Yellowstone	100	104	92	105	112	100	**102**
Promontory	---	---	---	---	95	107	**101**
UI SRG	---	---	---	---	90	111	**101**
UI Bronze Jade (W)	104	103	101	92	90	113	**100**
WB4401	100	104	88	103	93	111	**100**
Juniper	---	---	---	---	103	96	**100**
Balance	88	95	103	100	105	96	**98**
Millie (W)	105	94	87	99	101	96	**97**
Kairos	101	92	99	95	---	---	**96**
Scorpio	99	101	102	95	77	93	**95**
WA8309	109	90	78	95	94	93	**93**
Irv (W)	---	---	---	---	96	87	**91**
Golden Spike	---	---	---	---	80	96	**88**
OR2170052H (W)	98	98	91	79	75	85	**88**
OR2170199R	97	91	95	85	69	78	**86**
IDO1906 (W)	85	76	84	78	88	83	**82**
Location Average (bu/A)	**155**	**169**	**128**	**150**	**44**	**46**	

(W) = White

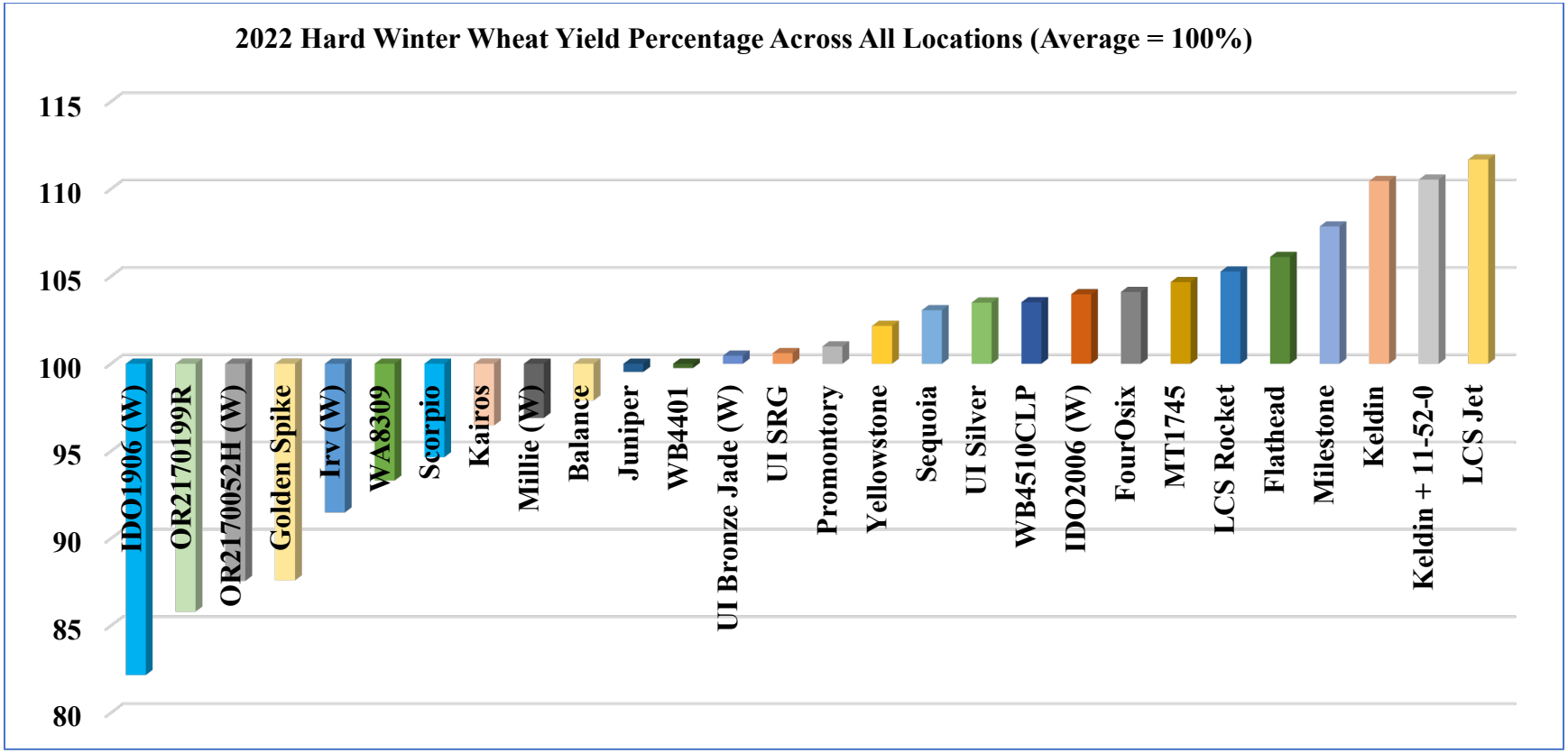


Chart 2. Hard White Winter Wheat Yield Percentage Across All Locations.

Table 15. Soft White Winter Wheat Irrigated Nurseries, 3 Year Averages (2020-2022; 12 site-years).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
LCS Hulk	156	57.5	99	6/6	38	4	10.9
WA 8293	155	57.0	99	6/8	40	2	10.9
LCS Blackjack	153	56.8	99	6/6	36	0	10.8
WB1783	153	59.5	98	6/7	38	4	10.6
YSC-215	152	57.6	99	6/10	38	1	10.9
Piranha CL+	152	57.2	99	6/7	41	12	10.3
M-Press	152	58.0	99	6/7	38	1	10.3
VI Voodoo CL+	150	56.5	99	6/6	37	3	11.0
SY Ovation	150	58.2	99	6/6	38	4	10.7
Sockeye CL+	150	56.7	100	6/7	41	19	11.0
IDO1708	148	54.6	99	6/4	37	9	10.8
SY Assure	147	58.7	99	6/1	34	3	10.8
UI Sparrow	145	56.4	99	6/9	42	7	10.9
Norwest Tandem	144	57.1	99	6/5	33	0	10.6
Stingray CL+	143	56.5	99	6/7	37	5	11.2
Brundage	142	57.6	98	6/4	39	6	10.9
VI Shock	142	56.5	99	6/7	36	6	10.3
WB1529	142	58.9	99	6/5	35	3	10.6
UI Magic CL+	141	57.9	98	6/5	35	6	10.9
AP Iliad	141	58.0	99	6/4	37	3	11.1
WB456	140	58.8	98	6/3	37	5	11.7
Stephens	139	56.7	98	6/5	37	8	10.9
WB1376CLP	135	59.6	99	6/5	37	0	11.4
Average	**147**	**57.5**	**99**	**6/6**	**37**	**5**	**10.8**
Standard Error	**1.9**	**0.3**	**0.4**	**0.2**	**0.3**	**1.7**	
Pr >F (variety)	**<0.0001**	**<0.0001**	**0.1653**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (variety*year)	**<0.0001**	**<0.0001**	**0.1228**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (variety*location)	**<0.0001**	**0.0190**	**0.4111**	**0.0002**	**<0.0001**	**0.0102**	
Pr > F (year*location)	**<0.0001**	**<0.0001**	**0.3968**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (variety*year*location)	**<0.0001**	**<0.0001**	**0.3323**	**<0.0001**	**0.2375**	**0.0066**	

Table 16. Soft White Winter Wheat Dryland Nurseries, 3 Year Averages (2020 - 2022; 7 site years).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
LCS Hulk	43	56.3	98	6/20	24	0	12.1
Eltan + 11-52-0	42	55.3	94	6/21	26	0	12.0
Otto	42	55.4	96	6/22	25	0	12.6
UI Sparrow	42	55.1	94	6/21	27	0	11.8
M-press	40	55.4	95	6/19	24	0	12.1
SY Ovation	40	56.2	96	6/18	24	0	11.6
Devote	40	56.6	95	6/21	24	0	12.1
Sockeye CL+	40	55.3	95	6/19	27	0	11.5
IDO1708	40	54.2	97	6/17	24	0	11.3
Norwest Duet	39	55.1	95	6/19	26	0	11.6
VI Presto CL+	38	56.5	97	6/18	25	0	11.8
Eltan	37	55.5	94	6/21	25	0	11.7
WB1783	37	57.5	95	6/18	24	0	12.5
VI Voodoo CL+	37	54.7	97	6/21	22	0	12.2
WB456	36	55.4	94	6/16	23	0	12.5
Brundage	36	54.7	94	6/16	24	0	12.0
WB1529	35	56.2	93	6/17	22	0	12.1
Piranha CL+	35	53.7	93	6/20	24	0	12.5
SY Assure	35	56.4	94	6/15	21	0	11.8
UI Magic CL+	33	55.8	93	6/18	23	0	12.5
WB1376CLP	33	54.5	92	6/19	24	0	13.4
Stephens	32	54.1	94	6/18	24	0	12.0
Average	**38**	**55.4**	**95**	**6/19**	**24**	**0**	**12.1**
Standard Error	**1.5**	**0.3**	**0.8**	**0.3**	**0.4**	**0**	
Pr >F (Variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr >F (Variety*year)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr >F (Variety*location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr > F (Year*Location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	
Pr > F (Year*Location*Variety)	**0.0102**	**0.0007**	**<0.0001**	**<0.0001**	**0.1083**	**.**	

Table 17. Irrigated Soft White Winter Wheat Data Combined from Aberdeen, Kimberly, Ririe and Rupert, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WB1783	162	58.8	99	6/10	39	0	10.9
WB1621	161	57.9	99	6/10	40	0	11.3
UIL13-046145A	159	55.3	99	6/8	39	5	10.5
M-Press	159	56.0	100	6/11	40	0	11.0
LWW17-5877	159	56.4	98	6/7	37	0	11.7
LCS Hulk	158	55.7	99	6/11	39	0	12.0
Piranha CL+	158	55.3	100	6/12	42	12	11.0
SY Assure	158	58.0	100	6/4	36	0	11.0
LCS Blackjack	157	54.9	100	6/11	38	0	11.7
WA 8293	156	55.7	99	6/13	41	0	12.1
AP Exceed	156	56.0	99	6/8	38	0	11.1
UIL15-423062A	156	52.8	99	6/12	40	0	11.3
Sockeye CL+	155	54.2	99	6/12	42	12	12.2
SY Ovation	154	56.6	99	6/10	39	0	11.5
OR2130755	153	55.3	100	6/10	43	0	11.8
WB1529	153	58.4	100	6/9	37	0	11.0
WB456	153	58.1	99	6/7	38	0	12.3
UIL15-028024	151	56.7	99	6/12	38	0	11.1
IDO1708	150	54.4	100	6/8	39	1	12.4
AP Iliad	150	56.5	100	6/8	39	0	11.1
UI Sparrow	150	54.5	99	6/13	42	0	11.7
Norwest Tandem	149	54.6	100	6/9	35	0	11.4
OR2160243	148	54.3	99	6/9	38	0	11.6
OR2170559	147	54.1	99	6/10	37	0	11.9
IDO2008	147	53.6	99	6/13	41	0	12.1
WB1376CLP	146	59.0	99	6/8	39	0	12.2
Brundage	146	56.1	100	6/8	41	4	11.4
VI Shock	146	53.8	99	6/10	40	0	11.2
OR2160264	145	54.9	98	6/8	36	0	12.0
Stingray CL+	145	54.0	99	6/12	38	0	12.4
UI Magic CL+	142	56.2	98	6/8	37	0	11.6
UIL15-451104B	141	52.9	99	6/8	40	0	11.4
VI Presto CL+	139	57.2	99	6/11	42	0	11.8
Stephens	139	53.9	99	6/9	39	0	12.2
VI Voodoo CL+	139	54.9	98	6/11	35	0	11.3
OR2180377	136	54.2	99	6/12	37	1	11.7
Average	**151**	**55.6**	**99**	**6/9**	**39**	**1**	**11.6**
Standard Error	**3.3**	**0.6**	**0.4**	**0.5**	**0.5**	**2**	
Pr >F (Variety)	**<0.0001**	**<0.0001**	**0.1**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr >F (location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.4**	
Pr >F (Variety*location)	**<0.0001**	**0.0041**	**0.1595**	**0.0025**	**0.2633**	**0.0039**	

Table 18. Dryland Soft White Winter Wheat Data Combined from Rockland and Soda Springs, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
SY Ovation	**53**	54.0	99	6/20	28	0	9.7
Sockeye CL+	**52**	52.2	99	6/20	31	0	10.0
Eltan + 11-52-0	**51**	52.3	99	6/21	30	0	10.3
M-Press	**50**	53.0	99	6/19	28	0	10.6
LCS Hulk	**50**	51.6	100	6/26	30	0	9.9*
UIL15-028024	**50**	54.3	100	6/26	29	0	9.1*
Norwest Duet	**49**	52.5	100	6/21	31	0	10.4
Piranha CL+	**49**	52.8	98	6/20	30	0	10.2
Devote	**48**	54.0	99	6/22	27	0	10.2
Brundage	**47**	50.9	98	6/18	28	0	10.4
AP Iliad	**47**	52.6	100	6/19	28	0	10.2
ORI2190027 CL+	**47**	52.7	99	6/18	28	0	10.7
UI Sparrow	**46**	52.6	99	6/21	30	0	10.1
WA8334	**46**	54.3	100	6/23	29	0	10.1
WB1621	**46**	53.8	97	6/18	29	0	9.6
IDO2008	**46**	51.1	100	6/20	29	0	10.7
Otto	**46**	52.7	100	6/23	28	0	11.2
WB1783	**45**	55.7	100	6/19	29	0	10.3
WB1376CLP	45	53.9	98	6/17	28	0	11.3
SY Assure	45	54.3	99	6/16	27	0	9.5
UIL16-478001	45	50.7	98	6/20	29	0	11.1
WB456	45	53.4	99	6/16	27	0	10.2
WB1529	44	53.6	99	6/18	26	0	10.1
Appleby CL+	44	52.9	99	6/18	28	0	10.5
VI Presto CL+	43	54.3	100	6/18	29	0	10.9
Norwest Tandem	43	50.9	99	6/17	25	0	10.3
UIL14-085001A	43	51.2	99	6/19	28	0	10.1
IDO1708	43	51.3	99	6/16	28	0	10.0
UI Magic CL+	42	53.6	99	6/19	27	0	10.2
UIL15-423062A	41	48.9	100	6/26	28	0	8.6*
UIL16-072025	41	51.0	100	6/19	28	0	10.1
Eltan	40	53.6	99	6/22	29	0	9.4
VI Voodoo CL+	40	50.7	100	6/20	25	0	10.7
Stephens	38	51.3	100	6/18	28	0	10.2
ORI2190025 CL+	38	52.2	100	6/18	27	0	10.4
UIL15-451104B	33	46.0	100	6/24	28	0	8.8*
Average	**45**	**52.4**	**99**	**6/20**	**28**	**0**	**10.2**
Standard Error	**3**	**0.7**	**0.8**	**0.5**	**0.7**	**.**	
Pr>F (variety)	**0.0008**	**<0.0001**	**0.4409**	**<0.0001**	**<0.0001**	**.**	
Pr>F (location)	**0.1153**	**0.3069**	**0.2001**	**<0.0001**	**0.002**	**.**	
Pr >F (variety*location)	**0.0033**	**0.035**	**0.0929**	**0.015**	**0.6554**	**.**	

* Data from only one location (Soda Springs)

Table 19. Agronomic Data for Soft White Winter Wheat at Kimberly, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Sockeye CL+	166	118	**191**	57.0	98	6/6	44	0	9.3
IDO1708	175	127	**182**	58.1	99	6/4	41	0	9.7
M-Press	162	137	**180**	58.9	99	6/7	41	0	9.6
OR2160243	---	147	**179**	58.0	97	6/8	39	0	9.9
Piranha CL+	151	132	**178**	58.1	99	6/8	42	0	9.4
LCS Blackjack	177	146	**177**	57.1	99	6/6	39	0	9.4
LCS Hulk	173	137	176	59.5	97	6/6	41	0	9.8
UIL13-046145A	---	142	174	56.5	98	6/8	41	0	9.4
UIL15-423062A	---	---	173	59.7	97	6/3	43	0	9.5
WB1621	---	---	171	60.3	96	6/4	42	0	10.0
WB1783	145	152	170	60.3	96	6/5	41	0	9.8
IDO2008	---	129	170	57.8	97	6/5	42	0	9.8
VI Shock	---	145	169	58.3	95	6/7	41	0	9.6
AP Exceed	---	164	168	59.4	96	6/6	38	0	9.3
SY Ovation	155	146	168	58.9	98	6/1	41	0	9.5
UIL15-028024	---	134	168	57.1	96	6/5	41	0	9.5
OR2170559	---	---	167	57.3	96	6/3	39	0	10.3
OR2130755	---	---	167	58.5	98	6/5	45	0	10.4
Norwest Tandem	157	132	166	58.0	99	6/5	36	0	10.3
UI Sparrow	158	122	166	59.1	97	5/30	45	0	9.7
LWW17-5877	---	---	166	58.7	94	6/4	38	0	9.7
Stephens	154	139	164	58.2	96	6/4	40	0	10.6
SY Assure	151	150	164	59.8	99	6/8	37	0	10.4
WA 8293	175	126	163	58.7	97	6/4	42	0	9.8
UIL15-451104B	---	---	163	57.0	94	6/5	42	0	10.2
OR2160264	---	155	163	57.8	94	6/4	37	0	10.6
VI Voodoo CL+	---	132	163	58.2	98	6/5	35	0	10.3
Brundage	162	141	162	59.5	99	6/6	43	0	9.4
Stingray	157	138	161	57.9	97	6/4	39	0	9.5
VI Presto CL+	---	137	160	59.3	96	6/4	42	0	10.0
WB1529	116	140	160	60.0	98	6/1	39	0	10.2
UI Magic CL+	155	140	153	59.0	95	6/5	37	0	9.9
WB456	150	129	152	60.3	96	6/4	39	0	9.4
AP Iliad	180	149	151	59.3	98	6/3	41	0	10.0
OR2180377	---	---	149	57.1	97	6/4	37	0	10.3
WB1376CLP	103	133	148	61.1	97	6/3	41	0	10.6
Average	**159**	**137**	**167**	**58.6**	**97**	**6/5**	**40**	**0**	**9.9**
LSD (α=.05)	**23**	**15**	**14**	**0.7**	**4**	**2**	**2**	**0**	
CV (%)	**9.9**	**7.7**	**5.8**	**0.8**	**3.1**	**0.90**	**3.4**	**.**	
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.4715**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 20. Agronomic Data for Soft White Winter Wheat at Rupert, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Weight (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
SY Assure	120	155	**143**	56.2	100	6/3	37	0	12.1
LWW17-5877	---	---	**136**	53.9	100	6/5	37	0	12.8
OR2130755	---	---	**133**	53.4	100	6/10	43	0	10.9
AP Iliad	130	156	**130**	54.2	100	6/7	41	1	12.1
Piranha CL+	153	168	**130**	51.3	100	6/11	42	18	11.8
WA 8293	152	170	**129**	52.4	100	6/11	43	0	12.4
WB1783	133	153	**129**	56.4	100	6/10	40	0	12.1
AP Exceed	---	172	**129**	52.0	100	6/7	38	0	12.9
WB456	130	148	**129**	57.0	100	6/7	38	0	11.6
SY Ovation	147	160	**128**	53.5	100	6/10	40	0	12.3
WB1529	139	148	**127**	56.0	100	6/8	39	0	12.3
UIL13-046145A	---	153	**125**	47.8	100	6/10	39	14	12.2
UIL15-423062A	---	---	**123**	51.5	100	6/11	41	0	12.6
LCS Hulk	138	171	121	51.3	100	6/10	40	0	13.1
WB1376CLP	128	146	120	56.3	100	6/7	39	0	14.5
WB1621	---	---	120	54.6	100	6/10	40	0	13.1
Sockeye CL+	158	160	119	49.4	100	6/10	41	20	14.3
LCS Blackjack	128	162	118	51.2	100	6/11	38	0	13.7
VI Voodoo CL+	137	150	118	51.0	100	6/11	36	0	11
OR2160264	---	152	117	49.5	100	6/7	38	0	13.8
M-Press	146	159	115	51.5	100	6/10	40	0	12.6
UI Magic CL+	129	155	115	49.2	100	6/9	38	0	13.1
UI Sparrow	137	154	115	52.7	100	6/11	42	0	12.2
OR2170559	---	---	114	49.1	100	6/10	38	0	12.8
OR2180377	---	---	112	48.4	100	6/12	37	5	13.1
UIL15-02802A	---	---	111	46.3	100	6/11	39	0	14
OR2160243	---	157	109	48.8	100	6/8	37	0	12.1
IDO1708	151	148	107	49.0	100	6/8	40	5	14.9
Brundage	125	153	105	52.2	100	6/8	43	16	13.4
IDO2008	---	149	104	50.2	100	6/13	41	0	12.5
Norwest Tandem	137	146	103	50.3	100	6/10	35	0	12.8
Stingray	123	157	101	47.9	100	6/10	38	0	14.5
UIL15-451104B	---	---	98	49.8	100	6/5	40	0	13.4
VI Shock	158	175	96	47.0	100	6/10	41	0	13.8
Stephens	123	151	96	46.1	100	6/10	40	0	15.5
VI Presto CL+	---	159	90	53.9	100	6/11	44	0	14.4
Average	**134**	**155**	**117**	**51.4**	**100**	**6/10**	**39**	**2**	**13.0**
LSD (α=.05)	**18**	**15**	**21**	**4.4**	**0**	**3**	**3**	**16**	
CV (%)	**9.4**	**7**	**11.8**	**6.1**	**0**	**1.2**	**4.9**	**482**	
Pr > F	**<0.0001**	**0.0001**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.4811**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 21. Agronomic Data for Soft White Winter Wheat at Aberdeen, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WB1621	---	---	**185**	57.7	100	6/8	41	0	10.6
WB1783	140	150	**179**	60.2	100	6/14	42	0	11.5
LCS Blackjack	157	135	**179**	56.4	100	6/11	39	0	12.6
UIL15-423062A	---	---	**175**	57.1	100	6/8	40	0	11.7
VI Shock	136	143	**174**	55.7	100	6/9	40	0	10.5
M-Press	145	143	**173**	57.9	100	6/13	42	0	10.4
UIL15-028024	---	140	**173**	55.2	100	6/14	39	0	10.0
WA 8293	159	149	**170**	56.3	99	6/13	42	0	14.3
Piranha CL+	157	143	**169**	56.2	100	6/9	45	31	11.2
UIL13-046145A	---	153	**168**	53.8	100	6/13	39	5	9.8
YSC-93	---	---	**166**	56.9	100	6/10	40	0	13.6
LWW17-5877	---	---	**165**	56.5	100	6/14	39	0	12.7
OR2160264	---	142	**165**	58.0	100	6/7	37	0	11.3
SY Assure	157	143	**165**	58.2	100	6/10	38	0	10.5
LCS Hulk	169	148	**165**	55.2	100	6/13	40	0	13.3
WB1529	169	136	**164**	59.2	100	6/7	40	0	11.8
UI Magic CL+	153	132	**164**	58.0	100	6/14	38	1	11.7
Stingray CL+	157	136	**163**	56.4	100	6/9	39	0	13.8
Norwest Tandem	137	134	162	53.3	100	6/7	36	0	11.6
OR2170559	---	---	162	55.3	100	6/5	37	0	13.2
AP Exceed	---	140	162	57.2	100	6/10	40	0	11.5
YSC-268	---	139	159	56.7	100	6/10	45	1	11.7
AP Iliad	144	143	159	55.1	100	6/12	41	0	10.6
Sockeye CL+	137	135	159	55.2	100	6/8	43	26	13.7
IDO2008	---	127	158	52.5	100	6/12	42	0	14.5
UIL15-451104B	---	---	157	56.0	100	6/7	42	0	10.9
Stephens	152	136	156	56.3	100	6/13	41	1	11.2
SY Ovation	138	147	155	57.2	100	6/8	41	0	13.3
OR2160243	---	132	155	55.7	100	6/6	40	0	13.1
YSC-215	144	133	155	55.7	100	6/7	41	3	12.4
VI Presto CL+	---	137	154	58.4	100	6/9	44	1	11.5
WB1376CLP	148	135	154	60.8	100	6/8	41	0	15.0
Brundage	139	131	153	56.5	100	6/10	42	0	12.1
IDO1708	156	129	152	55.8	100	6/13	41	0	14.0
UI Sparrow	141	132	151	57.1	100	6/7	42	0	13.3
OR2180377	---	---	150	56.5	100	6/10	39	0	12.1
WB456	134	122	150	57.6	100	6/11	40	0	10.9
VI Voodoo CL+	177	137	150	56.5	100	6/13	37	0	12.1
OR2130755	---	---	143	53.6	100	6/12	45	0	14.5
Average	**150**	**137**	**162**	**56.5**	**100**	**6/10**	**40**	**2**	**12.2**
LSD (α=.05)	**16**	**17**	**22**	**3.6**	**1**	**2**	**2**	**8**	
CV (%)	**7.5**	**8.9**	**9.4**	**4.5**	**0.4**	**0.9**	**4.2**	**321**	
Pr > F	**<0.0001**	**0.0568**	**0.0759**	**0.0123**	**0.1692**	**<0.0001**	**<0.0001**	**<0.0001**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 22. Agronomic Data for Soft White Winter Wheat at Ririe, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
LCS Hulk	158	142	**171**	56.7	100	6/16	37	0	11.6
WB456	131	129	**171**	57.3	100	6/14	35	0	11.3
OR2130755	---	---	**170**	55.7	100	6/15	38	0	11.3
UIL13-046145A	---	147	**168**	53.0	100	6/13	36	0	10.5
WB1783	144	140	**168**	58.3	100	6/14	35	0	10.8
WB1621	---	---	**167**	59.1	100	6/15	37	0	10.9
M-Press	147	135	**167**	56.0	100	6/17	36	0	11.4
LWW17-5877	---	---	**167**	56.4	99	6/14	34	0	11.6
AP Exceed	---	144	**166**	55.6	99	6/14	36	0	10.6
Norwest Tandem	147	130	**165**	56.9	100	6/14	33	0	10.9
Brundage	149	127	**164**	56.4	100	6/13	37	0	10.8
WA 8293	158	133	**164**	55.2	99	6/18	39	0	11.7
WB1376CLP	134	128	**162**	57.9	100	6/14	36	0	12.1
UI Sparrow	162	123	**162**	58.0	100	6/17	40	0	11.5
IDO1708	151	136	**161**	54.7	100	6/14	35	0	10.9
WB1529	134	131	**161**	58.3	100	6/15	33	0	12.2
AP Iliad	132	136	**161**	57.3	100	6/15	34	0	11.5
SY Assure	140	136	**160**	57.9	100	6/10	33	0	11.1
IDO2008	---	129	**157**	53.7	100	6/18	38	0	11.6
Piranha CL+	160	129	**156**	55.6	100	6/17	39	0	11.5
UIL15-423062A	---	---	155	56.5	99	6/16	36	0	11.4
UIL15-028024	---	148	155	53.0	100	6/17	35	0	10.8
LCS Blackjack	164	138	154	54.9	100	6/16	35	0	11.0
Stingray CL+	146	127	154	54.0	100	6/17	37	0	11.8
VI Presto CL+	---	129	152	57.4	100	6/16	36	0	11.3
Sockeye CL+	154	129	152	55.0	100	6/18	39	0	11.4
SY Ovation	141	133	151	56.9	97	6/16	34	0	11.0
YSC-93	---	---	149	55.3	100	6/13	36	0	10.6
OR2170559	---	---	149	54.8	100	6/16	34	0	11.3
OR2160243	---	123	147	54.8	100	6/15	36	0	11.1
UIL15-451104B	---	---	146	55.3	100	6/15	37	0	11.0
VI Shock	164	140	145	54.1	99	6/15	37	0	10.9
YSC-215	158	129	142	56.2	98	6/16	38	0	11.2
Stephens	140	123	140	55.0	100	6/15	34	0	11.4
OR2160264	---	123	136	54.3	99	6/15	34	0	12.2
UI Magic CL+	139	129	136	54.9	98	6/14	34	0	11.5
OR2180377	---	---	135	55.0	99	6/19	35	0	11.1
VI Voodoo CL+	148	120	117	53.9	95	6/19	33	0	11.8
Average	**145**	**131**	**155**	**55.8**	**99**	**6/15**	**36**	**0**	**11.3**
LSD (α=.05)	**13**	**9**	**15**	**1.2**	**2**	**3**	**3**	**0**	
CV (%)	**6.3**	**5.0**	**6.7**	**1.5**	**1.6**	**1.3**	**5.7**	**.**	
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0104**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 23. Agronomic Data for Soft White Winter Wheat at Rockland, Dryland, 2022.

	Yield (bu/A)			Test Wt.	Spring	Heading	Height	Lodging	Protein
Variety or Selection	**2019**	**2020**	**2021***	**(lb/bu)**	**Stand (%)**	**Date**	**(in.)**	**(%)**	**(%)**
WB1783	---	---	**17**	57.7	78	6/8	22	0	14.3
SY Ovation	29	46	**16**	55.7	84	6/9	20	0	13.1
Sockeye CL+	---	48	**15**	55.5	80	6/10	23	0	13.3
Norwest Duet	33	49	**14**	53.0	76	6/10	20	0	13.2
Piranha CL+	---	---	**14**	55.5	75	6/10	21	0	13.1
OR2130755	---	42	**14**	54.7	78	6/9	21	0	13.8
M-Press with Root2	---	---	**13**	54.1	75	6/11	20	0	12.6
WB1376 CLP	---	---	**13**	53.5	70	6/8	21	0	14.7
M-Press	---	48	**12**	54.1	79	6/10	20	0	13.8
WB456	---	38	**12**	53.1	74	6/7	20	0	14.6
Stephens	---	41	**12**	52.5	74	6/10	21	0	15.3
SY Assure	---	34	**12**	54.3	78	6/7	18	0	14.4
Eltan	27	50	**11**	54.0	79	6/12	20	0	13.1
WA8290	---	---	**11**	55.4	76	6/10	21	0	13.5
Eltan 11-52-0	23	51	**11**	55.7	76	6/11	22	0	13.9
Brundage	26	40	**11**	52.9	74	6/8	19	0	13.5
Otto	29	55	**11**	55.1	80	6/12	22	0	13.8
WB1529	---	38	**11**	55.6	68	6/9	19	0	13.3
Devote	---	51	**10**	57.6	75	6/10	21	0	12.6
UI Sparrow	15	49	**10**	53.0	73	6/12	23	0	14.0
UI Magic CL+	20	40	**10**	55.0	74	6/10	19	0	15.2
Average	**26**	**44**	**12**	**54.7**	**76**	**6/10**	**20**	**0**	**13.8**
LSD (α=.05)	**4**	**6**	**3**	**1**	**10**	**1**	**2**	**0**	
CV (%)	**9.8**	**10.2**	**17.3**	**1.4**	**9.6**	**0.6**	**7.6**	**.**	
Pr > F	**<.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.5028**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 24. Agronomic Data for Soft White Winter Wheat at Soda Springs, Dryland, 2022.

Variety or Selection	Yield (bu/A) 2019	2020	2022*	Test Wt.** (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WA 8334	---	---	**59**	54.6	100	6/28	30	0	9.0
Sockeye CL+	---	49	**59**	51.6	99	6/26	33	0	9.1
Brundage	---	58	**55**	49.8	100	6/23	30	0	9.3
Norwest Duet	45	57	**55**	52.4	100	6/27	33	0	9.6
SY Ovation	54	55	**54**	53.1	100	6/26	31	0	9.4
IDO1708	58	66	**53**	50.8	100	6/22	30	0	8.5
M-Press	---	62	**52**	52.2	99	6/26	29	0	10.4
Piranha CL+	---	---	**52**	53.0	100	6/26	31	0	8.8
UI Sparrow	64	76	**52**	52.7	100	6/27	32	0	9.2
AP Iliad	---	77	**52**	52.3	100	6/25	29	0	9.0
WB1621	---	---	**51**	52.9	100	6/23	30	0	8.0
WB456	---	58	**51**	53.7	99	6/23	29	0	9.5
UIL15-028024	---	---	**50**	54.3	100	6/26	29	0	9.1
LCS Hulk	55	62	**50**	51.6	100	6/26	30	0	9.9
Otto	50	71	**49**	54.1	100	6/29	30	0	9.7
Devote	57	58	**48**	52.8	100	6/27	28	0	9.5
ORI2190025 CL+	---	---	**48**	52.3	100	6/25	28	0	9.2
ORI2190027 CL+	---	---	**48**	53.0	100	6/25	29	0	9.2
WB1376CLP	38	46	**48**	53.2	98	6/25	30	0	10.4
WB1783	42	50	**48**	55.7	99	6/25	31	0	8.8
UIL16-478001	---	---	**47**	51.4	99	6/26	29	0	9.7
Eltan + 11-52-0	54	68	46	50.6	100	6/28	30	0	10.8
SY Assure	36	58	46	53.8	100	6/22	29	0	9.3
UIL14-085001A	---	---	45	52.0	99	6/26	29	0	8.7
UI Magic CL+	51	55	45	52.9	100	6/25	29	0	9.2
WB1529	47	60	45	53.7	99	6/25	28	0	8.9
Appleby CL+	48	58	44	53.5	100	6/25	29	0	10.1
UIL16-072025	---	---	44	50.0	100	6/25	29	0	9.1
IDO2008	---	---	44	49.9	100	6/26	31	0	9.6
VI Presto CL+	61	49	43	53.6	99	6/26	31	0	10.5
Stephens	38	48	42	51.3	100	6/25	29	0	9.3
Norwest Tandem	47	60	42	48.7	100	6/25	26	0	9.9
UIL15-423062A	---	---	41	48.9	100	6/26	28	0	8.6
Eltan	56	59	40	54.4	100	6/28	31	0	8.9
VI Voodoo CL+	60	56	36	48.9	100	6/26	26	0	10.5
UIL15-451104B	---	---	32	45.9	100	6/24	28	0	8.8
Average	**52**	**58**	**48**	**52.1**	**100**	**6/25**	**29**	**0**	**9.4**
LSD (α=0.05)	**17**	**16**	**12**	**3.0**	**2**	**1**	**3**	**0**	
CV (%)	**21.7**	**17.8**	**17.3**	**4.0**	**1.1**	**0.40**	**6.5**	**.**	
Pr > F	**0.0151**	**0.0144**	**0.0223**	**<0.0001**	**0.0305**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Test weight data was obtained from the harvestmaster.

Table 25. Soft White Winter Wheat Yield Percentage of Location Averages, 2022.

	(100% = Average)						Variety
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrigated**	**Rockland**	**Soda Springs**	**Average**
Eltan + 11-52-0	---	---	---	---	128	96	**112**
Norwest Duet	---	---	---	---	105	114	**109**
M-Press	106	108	99	108	112	109	**107**
Sockeye CL+	98	114	101	98	105	122	**106**
LWW17-5877	102	99	116	107	---	---	**106**
Piranha CL+	104	107	111	101	106	109	**106**
UIL13-046145A	104	104	107	109	---	---	**106**
SY Ovation	96	101	109	97	119	113	**106**
WB1783	111	102	110	109	102	99	**105**
Devote	---	---	---	---	111	99	**105**
LCS Hulk	102	106	103	110	---	104	**105**
WB1621	114	102	102	108	96	107	**105**
WA 8293	105	98	110	106	---	---	**105**
AP Exceed	100	101	110	107	---	---	**104**
LCS Blackjack	110	106	101	100	---	---	**104**
ORI2190027 CL+	---	---	---	---	109	99	**104**
SY Assure	102	98	122	103	100	96	**104**
OR2130755	88	100	114	109	---	---	**103**
AP Iliad	98	90	111	104	102	107	**102**
UIL15-028024	106	100	94	100	---	104	**101**
WA 8334	---	---	---	---	79	122	**101**
Otto	---	---	---	---	100	101	**101**
WB1529	101	96	108	104	100	93	**100**
UIL15-423062A	108	104	105	100	---	85	**100**
UI Sparrow	93	100	98	104	96	108	**100**
WB456	93	91	110	110	88	106	**100**
WB1376CLP	95	89	103	105	107	99	**100**
IDO2008	98	101	89	101	117	91	**100**
YSC-93	102	---	---	96	---	---	**99**
Brundage	95	97	90	106	94	115	**99**
YSC-268	98	---	---	---	---	---	**98**
OR2170559	100	100	97	96	---	---	**98**
UIL16-478001	---	---	---	---	98	98	**98**
OR2160243	96	107	93	95	---	---	**98**
IDO1708	94	109	91	104	76	111	**98**
Norwest Tandem	100	100	88	106	103	87	**97**
VI Shock	107	101	82	94	101	---	**97**
OR2160264	102	97	100	88	---	---	**97**
Appleby CL+	---	---	---	---	100	92	**96**
Stingray CL+	101	97	87	99	---	---	**96**
UI Magic CL+	101	91	99	88	94	94	**94**
UIL14-085001A	---	---	---	---	93	94	**94**
YSC-215	96	---	---	91	---	---	**93**
VI Presto CL+	95	96	77	98	---	90	**91**
OR2180377	93	89	96	87	---	---	**91**
VI Voodoo CL+	92	97	100	76	99	76	**90**
UIL16-072025	---	---	---	---	88	92	**90**
Eltan	---	---	---	---	94	84	**89**
Stephens	96	98	82	90	80	88	**89**
UIL15-451104B	97	98	83	94	---	67	**88**
ORI2190025 CL+	---	---	---	---	67	99	**83**
Location Average (bu/A)	**162**	**167**	**117**	**155**	**43**	**48**	

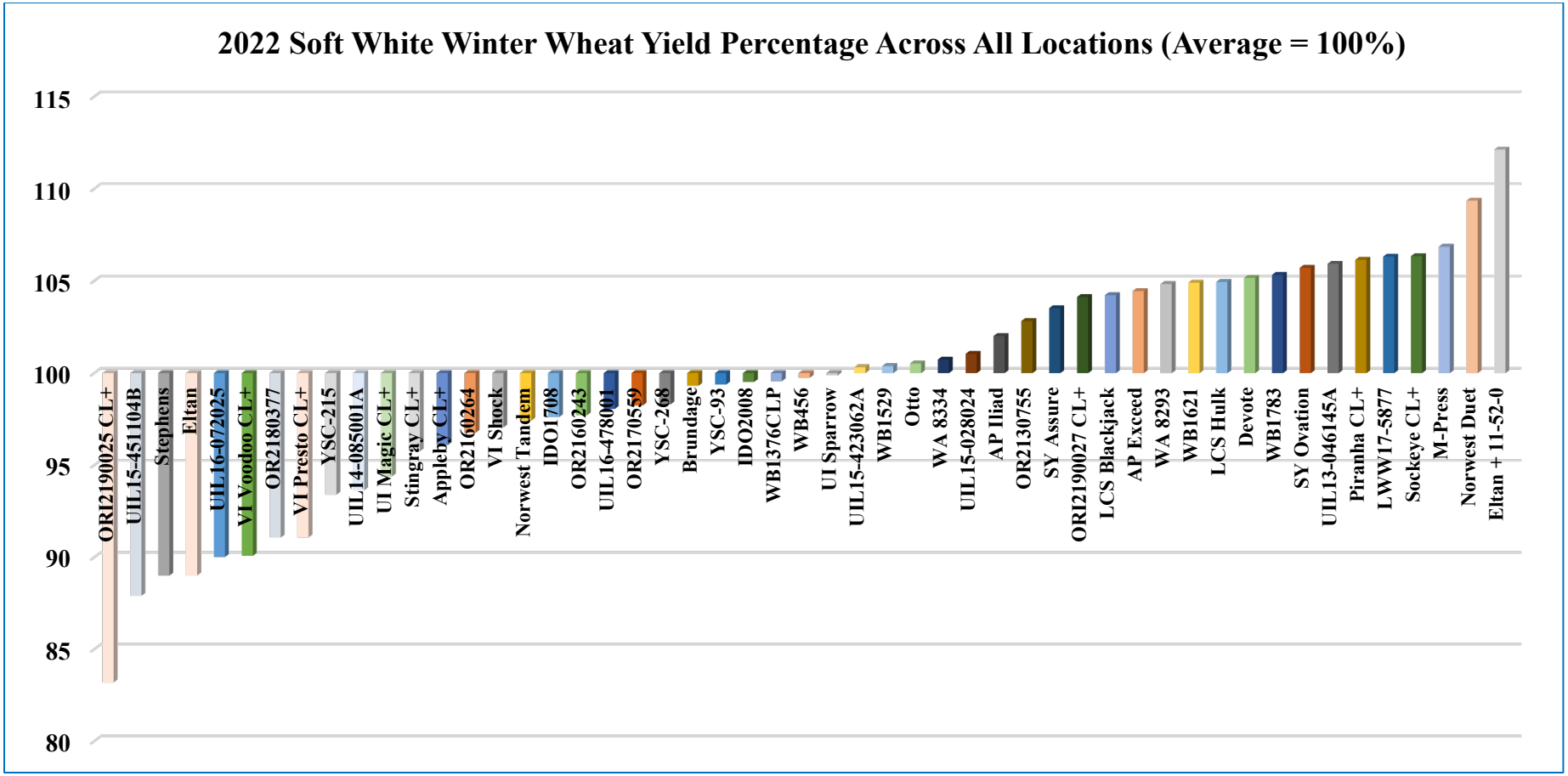


Chart 3. Soft White Winter Wheat Yield Percentage Across All Locations.

Table 26. Winter Barley Irrigated Nurseries, 3-Year Averages (2020-2022; 5 site-years*).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)**	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)**	Plumps (>6/64)	Plumps (>5.5/64)	% thin
Thunder	166	48.7	99	5/28	37	37	11.7	95.4	2.9	1.7
13ARS537-25	165	52.3	99	5/25	36	25	11.3	91.1	6.9	2.0
KWS Donau	162	51.1	98	5/30	40	8	11.6	96.8	1.9	1.3
Sunstar Pride	159	47.0	99	6/8	37	21	10.0	51.8	20.0	28.2
2WI15-8688	157	50.7	99	5/30	39	23	11.2	87.7	7.6	4.7
KWS Somerset	157	51.0	99	5/31	40	15	11.4	97.2	1.8	1.0
KWS Scala	157	50.0	98	5/29	38	25	12.2	96.2	2.4	1.4
KWS Faro	157	50.6	100	5/25	37	9	10.8	94.0	3.8	2.2
WintMalt	156	50.5	99	6/1	40	16	11.1	93.5	4.6	1.9
LCS Calypso	155	51.2	100	5/29	42	19	12.0	94.5	3.7	1.8
2WI14-7577	155	50.5	98	5/29	40	28	11.7	91.6	5.6	2.8
Eight-Twelve	149	48.2	98	5/31	39	31	11.6	61.2	21.4	17.4
Lightning	148	52.1	99	5/29	40	11	11.7	96.6	2.1	1.3
Charles	144	48.8	100	5/30	39	56	11.8	89.5	6.7	3.8
Endeavor	140	51.3	97	6/1	41	40	11.9	82.3	10.5	7.2
Upspring	128	59.2	76	6/4	42	8	13.9	74.8	17.8	7.4
Average	**153**	**50.3**	**97**	**5/30**	**39**	**23**	**11.6**	**87.1**	**7.5**	**5.4**
Standard Error	**4**	**0.9**	**0.9**	**0.4**	**0.6**	**5.1**				
Pr >F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**				
Pr > F (variety*year)	**0.1731**	**0.9856**	**<0.0001**	**0.0009**	**<0.0001**	**0.0054**				
Pr > F (variety*location)	**0.1350**	**0.3300**	**<0.0001**	**0.3924**	**0.5097**	**0.0003**				
Pr > F (year*location)	**<0.0001**	**0.0900**	**0.2561**	**0.1756**	**0.2184**	**0.0387**				
Pr > F (variety*year*location)	**0.3175**	**0.2537**	**0.0128**	**0.8922**	**0.5058**	**0.4062**				

* The 2020 winter plots in Rupert were significantly damaged by winter, hence agronomic data for that specific year and location was not included (only 5 site-year was used for the analyses).

**Test weight and protein averages excludes Upspring, a hulless variety with high test weight.

Table 27. Irrigated Winter Barley Data Combined from Rupert and Aberdeen, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64)	Plump (>5.5/64)	% Thin
Clementine	202	50.7	100	5/28	40	1	12.9	90.2	6.8	3.0
13ARS537-13	195	52.4	100	5/26	34	0	11.3	90.2	6.3	3.5
Thunder	190	44.9	100	5/30	39	23	12.6	96.8	1.9	1.3
Flavia	187	51.5	100	5/30	37	9	13.0	91.8	6.2	2.0
DH141917	186	51.7	100	6/2	41	10	13.0	97.2	1.7	1.1
KWS Donau	183	51.4	100	6/2	39	8	12.4	95.6	2.6	1.8
Fay	182	49.4	100	5/31	39	32	13.3	88.4	6.4	5.2
2WI15-8688	179	50.9	100	6/1	40	16	11.7	81.2	11.4	7.4
13ARS537-19	179	53.3	100	5/26	36	13	11.3	92.7	4.1	3.2
13ARS537-25	178	52.8	99	5/27	35	6	11.8	92.9	4.4	2.7
2WI14-7577	177	51.4	100	6/1	41	27	11.9	85.3	9.7	5.0
KWS Scala	177	50.5	100	6/1	39	8	13.3	96.1	2.4	1.5
KWS Faro	176	51.1	100	5/27	39	0	11.3	91.9	4.9	3.2
LCS Calypso	171	50.4	100	6/1	42	25	12.7	91.1	5.4	3.5
Sunstar Pride	170	46.0	100	6/12	40	6	10.3	33.2	19.8	47.0
KWS Somerset	169	51.6	100	6/2	42	7	11.7	96.4	2.3	1.3
DH141225	168	51.4	100	6/2	43	7	12.6	89.3	7.4	3.3
Eight-Twelve	168	48.4	100	6/1	43	13	12.7	58.5	21.3	20.2
WintMalt	168	51.0	100	6/2	40	6	11.4	92.1	5.5	2.4
DH170472	168	49.4	100	6/1	43	10	13.8	88.3	6.4	5.3
DH141222	167	51.3	100	5/30	41	12	12.5	94.3	3.3	2.4
Lightning	166	52.8	100	5/31	41	5	11.5	96.7	2.1	1.2
DH162310	164	52.4	100	5/26	40	18	13.2	94.7	3.2	2.1
Hirondella	162	47.9	100	6/1	39	12	11.7	86.3	9.0	4.7
DH150683	160	50.4	100	5/27	37	51	11.3	91.3	5.3	3.4
KWS Orbit	157	49.6	100	6/1	43	1	11.0	87.9	8.1	4.0
Charles	155	48.0	100	5/31	41	67	12.4	86.0	9.0	5.0
Endeavor	155	51.2	100	6/2	42	32	13.1	70.7	16.3	13.0
12ARS777-2*	151	55.8	100	6/3	44	8	---	---	---	---
12ARS777-1*	149	55.6	100	6/4	44	7	---	---	---	---
Upspring	141	60.4	95	6/5	44	0	13.2	66.7	23.0	10.3
Marouetta	141	50.1	100	5/28	41	16	11.1	91.2	3.7	2.1
Average	**170**	**51.1**	**100**	**5/31**	**40**	**14**	**12.2**	**86.9**	**7.4**	**5.7**
Standard Error	**5.1**	**1.5**	**0.2**	**0.5**	**0.8**	**8.0**				
Pr > F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**				
Pr > F (location)	**<0.0001**	**0.5873**	**0.0002**	**0.0056**	**0.0228**	**0.1952**				
Pr > F (variety*location)	**0.0012**	**0.4635**	**<0.0001**	**<0.0001**	**0.5199**	**0.0287**				

* Indicates hulless variety

Table 28. Agronomic Data for Winter Barley at Rupert, Irrigated, 2022.

Variety or Selection	2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(>6/64)	Plump (>5.5/64)	% Thin
Thunder	91	154	**186**	53.1	100	5/28	39	21	12.3	95.5	2.6	1.9
Clementine	---	---	**179**	48.1	100	5/29	40	1	12.5	84.1	11.2	4.7
13ARS537-13	---	177	**174**	51.7	100	5/25	34	0	11.5	84.1	10.2	5.7
KWS Donau	136	158	**172**	48.0	100	6/1	39	11	11.6	93.8	3.5	2.7
Flavia	---	165	**171**	48.6	100	5/28	36	18	12.5	91.7	5.8	2.5
DH141917	---	---	**171**	51.7	100	6/2	40	19	13.6	95.8	2.5	1.7
KWS Scala	126	162	**169**	50.6	100	5/29	38	15	13.8	94.8	3.0	2.2
Lightning	101	158	160	52.9	100	5/29	40	3	11.1	95.7	2.5	1.8
2WI15-8688	83	152	156	50.1	100	5/31	39	29	11.4	70.6	17.4	12.0
13ARS537-19	---	159	155	53.3	100	5/24	37	25	11.7	88.8	6.2	5.0
Eight-Twelve	92	148	155	48.2	100	5/30	44	21	12.8	50.6	24.0	25.4
KWS Somerset	157	175	155	50.5	100	6/1	41	0	10.6	96.0	2.4	1.6
13ARS537-25	77	169	155	52.7	100	5/25	35	10	11.9	89.6	6.7	3.7
DH141225	---	148	154	50.8	100	6/1	41	13	12.1	91.7	6.0	2.3
WintMalt	130	158	154	51.3	100	5/31	39	5	10.7	92.6	5.3	2.1
KWS Faro	95	153	153	51.9	100	5/25	39	0	12.1	90.1	6.1	3.8
2WI14-7577	73	144	152	51.0	100	5/31	39	48	11.7	77.7	14.3	8.0
Fay	---	---	150	50.3	100	5/29	38	40	12.7	80.4	10.4	9.2
Sunstar Pride	105	145	149	45.7	100	6/10	41	0	9.9	22.2	20.1	57.7
DH141222	---	148	149	50.3	100	5/28	40	13	12.0	90.6	5.3	4.1
LCS Calypso	87	176	148	52.3	100	5/30	41	45	12.3	86.7	7.8	5.5
DH162310	---	---	145	50.3	100	5/26	40	21	12.0	91.8	5.1	3.1
DH150683	---	---	142	52.0	100	5/27	38	80	12.2	84.9	9.2	5.9
DH170472	---	---	136	52.2	100	5/31	42	19	13.7	80.6	10.1	9.3
KWS Orbit	---	---	136	52.0	100	5/29	42	0	10.2	92.1	4.9	3.0
Endeavor	82	156	133	48.8	100	5/31	42	55	13.0	59.3	23.5	17.2
Marouetta	---	---	133	51.7	100	5/25	40	33	10.9	93.9	3.7	2.4
Charles	105	148	131	49.1	100	5/30	42	66	12.3	83.2	10.3	6.5
Hirondella	---	177	130	51.9	100	5/30	38	24	12.8	81.3	11.9	6.8
Upspring	75	135	130	60.4	100	6/3	44	0	13.3	55.3	30.5	14.2
12ARS777-1**	---	---	125	55.4	100	6/2	43	13	---	---	---	---
12ARS777-2**	---	---	122	57.6	100	6/2	44	15	---	---	---	---
Average	**98**	**154**	**151**	**51.3**	**100**	**5/30**	**40**	**21**	**12.0**	**82.9**	**9.4**	**7.7**
LSD (α=.05)	**44**	**17**	**20**	**2.1**	**0.0**	**2.0**	**3.0**	**33**				
CV (%)	**31.2**	**8.1**	**9.2**	**2.9**	**0.0**	**0.9**	**6.0**	**114.0**				
Pr > F	**0.0013**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**<0.0001**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety

Table 29. Agronomic Data for Winter Barley at Aberdeen, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(>6/64)	Plump (>5.5/64)	% Thin
Clementine	---	---	**225**	47.9	100	5/27	40	1	13.2	96.6	2.2	1.2
13ARS537-13	---	151	**217**	54.1	100	5/27	33	0	11.1	96.8	1.9	1.3
Fay	---	---	**214**	52.0	100	6/1	40	24	13.9	96.5	2.3	1.2
Flavia	---	128	204	50.3	100	5/31	37	0	13.4	91.9	6.6	1.5
2WI14-7577	163	116	203	51.8	100	6/2	43	6	12.0	92.5	5.4	2.1
13ARS537-19	---	144	203	53.0	100	5/27	36	1	10.9	96.6	2.0	1.4
13ARS537-25	164	136	202	53.2	99	5/27	36	3	11.7	95.8	2.5	1.7
2WI15-8688	155	120	202	51.8	100	6/2	41	3	11.9	90.8	5.8	3.4
DH141917	---	---	201	51.2	100	6/2	42	0	12.3	98.5	1.0	0.5
DH170472	---	---	199	52.5	100	6/1	44	1	13.8	95.5	2.8	1.7
KWS Faro	154	125	199	50.9	100	5/27	39	0	10.4	93.6	3.8	2.6
KWS Donau	164	122	195	47.9	100	6/2	40	6	13.1	97.2	1.8	1.0
LCS Calypso	135	124	195	50.9	100	6/2	43	6	13.1	95.3	3.1	1.6
Thunder	156	139	194	52.2	100	6/1	40	26	12.8	97.9	1.3	0.8
Hirondella	---	110	193	51.0	100	6/2	40	0	10.5	91.7	6.2	2.7
Sunstar Pride	174	138	191	46.2	99	6/13	40	13	10.7	44.3	22.1	33.6
DH141222	---	107	185	51.1	100	5/31	43	11	13.0	96.7	2.0	1.3
KWS Scala	149	121	184	48.5	100	6/2	41	0	12.7	97.2	1.9	0.9
DH162310	---	---	183	50.5	100	5/26	41	14	14.4	97.6	1.3	1.1
DH141225	---	111	183	51.8	100	6/2	44	1	13.0	86.8	8.9	4.3
WintMalt	154	131	183	50.7	100	6/3	41	8	12.1	91.4	5.8	2.8
KWS Somerset	163	123	182	50.6	100	6/3	43	14	12.8	96.8	2.2	1.0
Eight-Twelve	184	105	181	50.7	100	6/2	43	5	12.5	66.5	19.1	14.4
Charles	165	118	180	51.6	100	6/1	40	68	12.4	88.3	8.0	3.7
12ARS777-2**	---	---	179	55.8	100	6/3	44	0	---	---	---	---
DH150683	---	---	178	51.3	100	5/27	37	21	10.3	97.7	1.4	0.9
KWS Orbit	---	---	177	50.3	100	6/2	43	3	11.8	84.0	11.0	5.0
Endeavor	144	112	176	48.1	100	6/2	43	9	13.1	83.3	8.0	8.7
12ARS777-1**	---	---	173	52.9	100	6/5	45	1	---	---	---	---
Lightning	149	113	173	52.7	100	6/1	41	8	11.8	97.6	1.7	0.7
Upspring	133	97	152	60.5	90	6/6	44	0	13.1	78.0	15.5	6.5
Marouetta	---	---	148	48.6	100	5/29	42	0	11.2	91.4	5.8	2.8
Average	**155**	**119**	**189**	**51.3**	**100**	**6/1**	**41**	**8**	**12.3**	**90.9**	**5.4**	**3.7**
LSD (α=.05)	**22**	**17**	**19**	**1.8**	**1**	**2**	**3**	**19**				
CV (%)	**8.7**	**10.3**	**7.3**	**2.5**	**0.7**	**0.8**	**4.7**	**180**				
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0331**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety.

Table 30. Winter Barley Yield Percentage of Location Averages, 2022.

	(100% = Average)		
Variety or Selection	**Aberdeen**	**Rupert**	**Variety Average**
Clementine	119	118	**119**
13ARS537-13	115	115	**115**
Thunder	103	123	**113**
Flavia	108	113	**111**
DH141917	106	113	**110**
KWS Donau	103	114	**108**
Fay	113	99	**106**
2WI15-8688	107	103	**105**
13ARS537-19	107	103	**105**
13ARS537-25	107	102	**105**
KWS Scala	97	112	**105**
2WI14-7577	108	100	**104**
KWS Faro	105	101	**103**
LCS Calypso	103	98	**101**
Sunstar Pride	101	99	**100**
KWS Somerset	96	103	**99**
DH141225	97	102	**99**
Eight-Twelve	96	103	**99**
WintMalt	97	102	**99**
Lightning	91	106	**99**
DH141222	98	98	**98**
DH170472	105	90	**98**
DH162310	97	96	**96**
Hirondella	102	86	**94**
DH150683	94	94	**94**
KWS Orbit	94	90	**92**
Charles	95	87	**91**
Endeavor	93	88	**91**
12ARS777-2**	95	81	**88**
12ARS777-1**	92	83	**87**
Upspring	80	86	**83**
Marouetta	78	88	**83**
Location Average (bu/A)	**189**	**151**	

** Indicates hulless lines

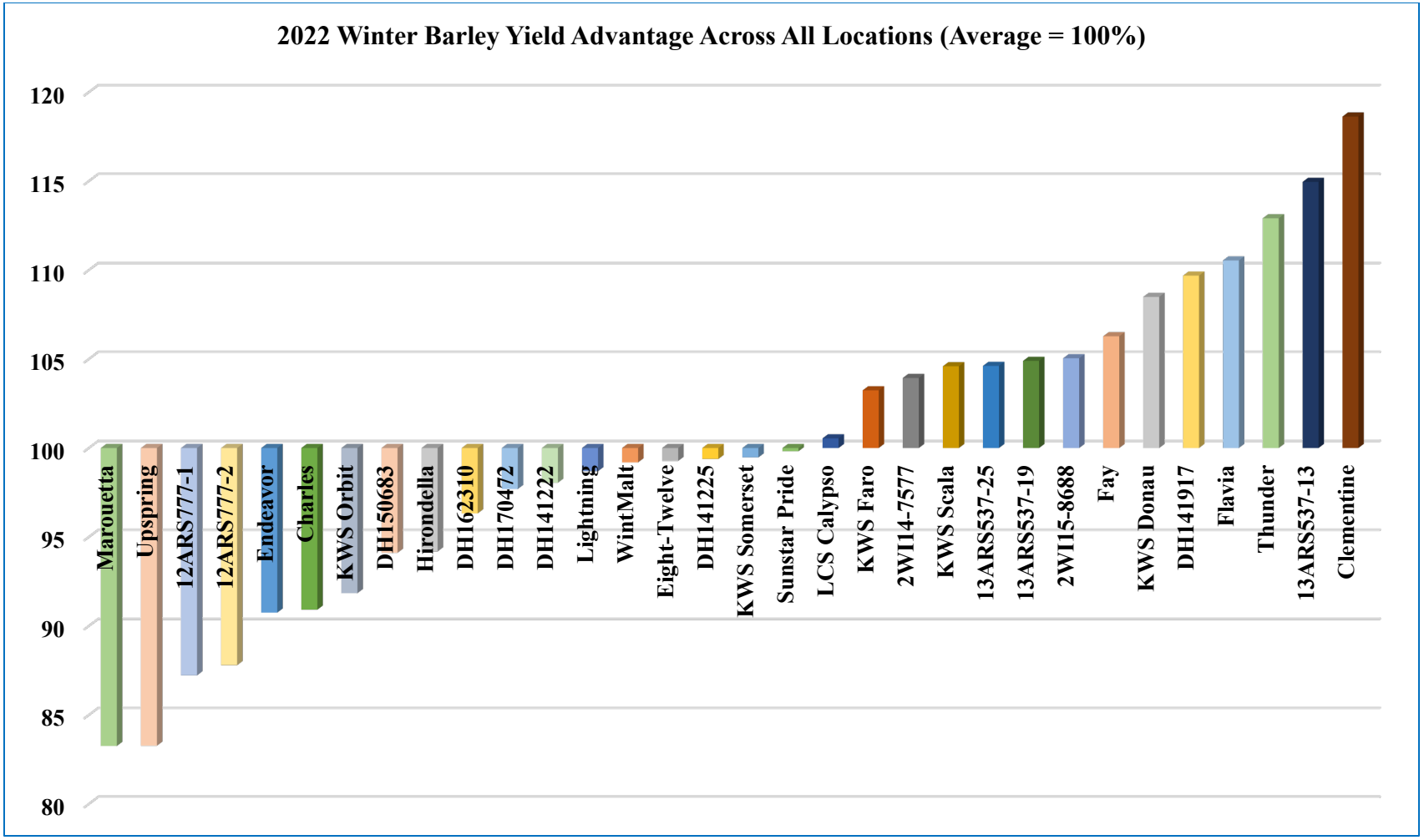


Chart 4. Winter Barley Yield Percentage Across All Locations.

Table 31. Hard Spring Wheat Irrigated Nurseries, 3 Years Average (2020 - 2022; 12 site-years).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in)	Lodging (%)	Protein (%)
Dayn (W)	123	60.6	99	6/21	35	0	13.4
UI Gold (W)	122	60.1	99	6/24	35	1	13.2
IDO1904S	115	59.9	99	6/24	32	0	13.5
WB9707	113	61.5	98	6/20	34	1	14.3
WB7696 (W)	112	60.3	99	6/21	30	0	13.0
SY Gunsight	111	59.2	100	6/23	32	3	13.4
WB7202CLP (W)	110	60.4	100	6/19	29	0	13.2
SY-Teton (W)	110	58.7	100	6/19	31	2	13.2
IDO2002 (W)	110	59.9	98	6/21	31	0	13.1
Jefferson	108	61.0	99	6/22	35	8	13.8
Alum	108	61.0	99	6/23	35	4	14.3
WB9879CLP	108	60.1	99	6/24	36	4	14.2
Glee	106	60.4	99	6/20	35	7	13.6
Dagmar	105	60.6	99	6/20	36	10	14.9
Expresso	104	60.3	99	6/23	32	0	14.5
UI Platinum (W)	104	59.9	100	6/18	31	0	13.0
Net CL+	104	61.3	99	6/25	36	5	14.0
WB7589 (W)	103	59.9	99	6/21	27	0	13.7
WB9668	103	60.6	100	6/20	30	1	14.8
WB7328 (W)	101	60.2	99	6/18	28	1	14.2
Average	**109**	**60.3**	**99**	**6/21**	**32**	**2**	**13.8**
Standard Error	**2**	**0.1**	**0.4**	**0.2**	**0.3**	**1**	
Pr>F (variety)	**<0.0001**	**<0.0001**	**0.2953**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr>F (variety*year)	**<0.0001**	**<0.0001**	**0.8579**	**<0.0001**	**0.0570**	**<0.0001**	
Pr>F (variety*location)	**<0.0001**	**<0.0001**	**0.4336**	**<0.0001**	**0.0168**	**0.0088**	
Pr>F (location*year)	**<0.0001**	**0.0003**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0839**	
Pr>F (variety*year*location)	**0.0002**	**<0.0001**	**0.919**	**0.0011**	**0.7942**	**0.017**	

(W) = Hard White

Table 32. Hard Spring Wheat Dryland Nurseries, 3 Years Average (2020 - 2022; 3 site-years).

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in)	Lodging (%)	Protein (%)
Dayn (W)	37	61.0	98	7/7	28	0	11.1
Alum	36	61.4	100	7/10	28	0	11.2
Jefferson	36	61.1	100	7/7	27	0	11.7
Dagmar	36	61.3	100	7/8	28	0	11.8
UI Gold (W)	35	60.6	99	7/10	25	0	11.2
WB7202CLP (W)	35	60.5	100	7/4	24	0	10.7
Glee	35	61.5	100	7/7	27	0	11.0
SY-Teton (W)	35	59.1	99	7/7	25	0	10.3
Net CL+	34	62.0	100	7/10	28	0	11.3
IDO2002	33	61.0	100	7/8	24	0	10.5
DuClair	33	60.5	100	7/8	27	0	11.1
UI Platinum (W)	33	60.8	99	7/4	24	0	10.4
WB7589 (W)	33	60.7	99	7/6	22	0	11.4
WB9707	32	61.5	99	7/6	27	0	12.0
IDO1904S	32	60.5	100	7/8	25	0	11.7
AP Renegade	31	59.3	100	7/10	26	0	11.0
WB9879CLP	30	60.7	100	7/11	26	0	12.1
WB7328 (W)	30	60.5	95	7/3	23	0	11.7
Choteau	29	60.7	100	7/10	26	0	11.3
WB7696	29	60.6	100	7/7	23	0	11.6
WB9668	29	61.0	100	7/6	23	0	12.9
Expresso	28	60.8	99	7/11	25	0	12.6
Average	**33**	**60.8**	**99**	**7/8**	**25**	**0**	**11.4**
Standard Error	**2**	**0.2**	**1.1**	**0.5**	**0.4**	**0**	
Pr>F (variety)	**<0.0001**	**<0.0001**	**0.4698**	**<0.0001**	**<0.0001**	**.**	
Pr>F (variety*year)	**<0.0001**	**<0.0001**	**0.5742**	**<0.0001**	**<0.0001**	**.**	

(W) = Hard White

Table 33. Irrigated Hard Spring Wheat Data Combined from Rupert, Idaho Falls, Tetonia and Aberdeen, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in)	Lodging (%)	Protein (%)
IDO2004S (W)	127	60.0	100	6/28	36	0	12.7
WA 8342 (W)	124	60.9	99	6/26	35	3	12.9
Dayn (W)	122	60.3	98	6/26	36	0	13.4
UI Gold (W)	122	59.5	100	6/29	36	2	13.3
WA 8356	121	60.6	100	6/25	36	0	13.6
IDO2105S	120	60.7	100	6/27	35	0	13.0
WB7313 (W)	118	60.4	100	6/24	32	7	13.9
IDO1904S (W)	117	59.8	100	6/29	33	1	13.2
SY Gunsight	117	58.9	100	6/28	34	3	13.4
WB7696 (W)	116	59.8	99	6/27	31	0	12.9
WB9707	115	61.4	98	6/26	35	0	14.3
WA 8372 (W)	114	61.2	100	6/26	32	1	13.4
WB7202CLP	114	60.0	100	6/25	30	0	13.1
BZ919-059 (W)	113	61.3	100	6/27	31	1	13.3
Holmes (BZ917-221)	112	60.8	100	6/26	33	2	14.1
IDO2002 (W)	112	59.7	100	6/27	33	0	13.1
IDO2202CL2	111	60.0	100	6/26	36	8	13.5
WB7328 (W)	111	60.2	100	6/24	30	0	14.0
Expresso	111	60.1	100	6/28	34	1	14.4
WA 8330 (W)	111	60.0	100	6/26	35	10	14.4
WB9724CLP	110	60.7	100	6/26	34	1	14.4
SY-Teton (W)	110	58.2	100	6/25	32	1	13.4
WA 8374 (W)	110	60.4	100	6/27	33	0	13.4
WB9879CLP	110	60.2	100	6/29	37	6	14.0
IDO2104HF	109	59.7	100	6/28	36	0	13.3
WA 8359	109	60.1	100	6/27	32	0	13.2
UI Platinum (W)	108	59.8	100	6/24	32	0	13.2
Jefferson	108	60.5	100	6/27	36	20	13.7
WA 8388 CL	108	60.1	99	6/27	34	1	13.6
WB7589 (W)	108	59.0	99	6/26	28	0	13.8
IDO2103FHB	107	59.9	100	6/23	34	4	14.6
Alum	106	60.6	100	6/28	36	11	14.2
Glee	106	59.9	100	6/26	36	11	13.7
WB9668	106	60.4	100	6/26	31	1	14.9
BZ919-101	105	60.2	100	6/26	30	0	15.3
MT2063	105	59.8	100	6/26	35	21	14.0
Dagmar	101	60.5	98	6/26	38	25	14.8
Net CL+	101	61.0	100	6/30	36	11	13.9
WA 8357	96	61.7	98	6/27	42	26	15.5
Average	**112**	**60.2**	**100**	**6/26**	**34**	**5**	**13.8**
Standard Error	**3**	**0.2**	**0.6**	**0.3**	**0.5**	**3.2**	
Pr > F (variety)	**<0.0001**	**<0.0001**	**0.6435**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (location)	**0.0174**	**<0.0001**	**0.0375**	**<0.0001**	**<0.0001**	**0.1052**	
Pr > F (variety*location)	**<0.0001**	**<0.0001**	**0.4704**	**<0.0001**	**0.0141**	**0.0013**	

(W) = Hard White

Table 34. Agronomic Data for Hard Spring Wheat at Rupert, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in)	Lodging (%)	Protein (%)
IDO2004S (W)	---	---	**125**	58.7	100	6/21	34	0	12.8
Dayn (W)	126	113	**120**	59.1	100	6/18	33	0	13.7
WB7313 (W)	---	125	**119**	59.6	100	6/15	31	5	14.2
Holmes (BZ917-221)	---	120	**113**	60.2	100	6/18	31	8	14.1
UI Gold (W)	140	128	**113**	58.2	100	6/21	33	0	14.0
WB7696 (W)	110	109	**113**	58.0	100	6/20	27	0	13.6
IDO1904S (W)	123	116	**112**	58.7	100	6/22	32	0	13.6
SY Gunsight	125	99	**112**	57.0	100	6/20	30	3	13.9
IDO2105S	---	119	**112**	59.3	100	6/20	32	1	13.7
WA 8356	---	114	**111**	59.9	100	6/18	31	0	13.8
Expresso	106	105	110	59.6	100	6/21	32	3	14.4
WA 8342 (W)	---	---	110	60.0	100	6/20	33	10	13.2
WB9707	121	120	109	61.0	100	6/18	33	0	14.9
BZ919-059	---	104	109	61.2	100	6/20	29	0	13.5
WB7202CLP (W)	115	112	107	58.7	100	6/17	28	0	13.8
Glee	117	101	106	59.5	100	6/18	33	24	14.0
IDO2103FHB	---	---	105	59.1	100	6/16	30	18	15.0
IDO2202CL2	---	---	105	58.0	100	6/19	33	31	13.7
WA 8330 (W)	---	109	104	59.5	100	6/19	32	0	14.6
WB9724CLP	---	---	104	60.2	100	6/18	31	0	14.7
Jefferson	116	109	102	60.1	100	6/20	33	18	13.8
WB7589 (W)	110	91	102	56.9	100	6/20	26	0	14.0
WB9879CLP	117	118	102	59.1	100	6/22	34	11	14.0
IDO2104HF	---	---	101	58.6	100	6/20	32	0	13.5
WB7328 (W)	100	98	101	59.1	100	6/16	28	0	15.0
WA 8359	---	---	101	58.6	100	6/20	31	1	13.8
BZ919-101	---	---	100	59.3	100	6/19	28	0	14.7
WB9668	112	98	99	59.1	100	6/19	27	0	15.4
WA 8374 (W)	---	---	98	59.5	100	6/20	29	0	14.3
SY-Teton (W)	120	116	97	57.1	100	6/17	29	1	13.6
IDO2002 (W)	120	108	97	58.3	100	6/20	30	0	13.6
Alum	114	110	96	59.4	100	6/20	34	13	14.8
Dagmar	107	117	95	59.2	100	6/18	36	64	14.9
MT2063	---	107	94	57.6	100	6/19	33	44	14.4
Net CL+	117	99	94	59.9	100	6/22	34	31	14.1
WA 8372 (W)	---	---	93	60.2	100	6/20	30	0	13.8
WA 8357	---	102	86	61.1	100	6/20	39	30	15.9
UI Platinum	113	106	82	59.2	100	6/15	31	0	13.7
Average	**114**	**109**	**104**	**59.1**	**100**	**6/19**	**31**	**8**	**14.1**
LSD (α=.05)	**12**	**14**	**14**	**0.8**	**0**	**2**	**2**	**27**	
CV (%)	**7.3**	**9.0**	**9.8**	**1.0**	**.**	**0.7**	**5.3**	**232**	
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.0004**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = Hard White

Table 35. Agronomic Data for Hard Spring Wheat at Aberdeen, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
IDO2004S (W)	---	---	**137**	59.1	100	6/23	37	1	12.7
WA 8342 (W)	---	---	**134**	59.6	98	6/20	37	1	13.3
UI Gold (W)	90	113	**131**	59.2	99	6/24	36	5	13.3
IDO2105S	---	98	**128**	60.1	99	6/20	37	0	13.2
WA 8356	---	114	**128**	59.1	99	6/17	37	0	14.0
Dayn (W)	102	121	126	59.3	100	6/20	38	0	13.4
WB9707	87	118	123	60.5	98	6/19	36	1	14.4
WA 8372 (W)	---	---	122	59.5	100	6/20	33	0	14.1
SY Gunsight	93	116	121	57.6	99	6/23	37	7	13.3
IDO1904S (W)	91	102	121	58.7	99	6/23	34	0	13.4
IDO2104HF	---	---	121	59.6	99	6/23	38	0	13.6
UI Platinum (W)	78	106	120	58.0	99	6/19	32	0	13.3
WA 8330 (W)	---	105	119	58.2	100	6/19	36	13	14.5
WB9879CLP	85	100	119	58.9	99	6/24	39	13	14.1
IDO2002 (W)	92	110	119	58.2	99	6/20	35	0	13.5
IDO2103FHB	---	---	119	57.4	98	6/17	35	0	15.2
Jefferson	88	109	119	59.9	99	6/21	38	29	13.2
Holmes (BZ917-221)	---	118	118	60.4	99	6/20	35	0	14.8
WB7313 (W)	---	108	118	58.8	100	6/17	32	0	14.6
WB7328 (W)	70	103	118	58.7	99	6/18	31	0	14.3
Glee	89	110	117	58.9	99	6/19	39	11	14.1
WB7696 (W)	94	126	117	57.4	96	6/20	32	0	13.1
IDO2202CL2	---	---	116	59.8	100	6/20	36	0	13.7
SY-Teton (W)	90	114	116	57.5	100	6/19	35	0	13.4
WA 8359	---	---	114	58.8	100	6/21	33	0	13.7
WB7202CLP	86	116	114	58.0	100	6/19	31	0	13.6
WB9724CLP	---	---	114	59.6	100	6/19	35	0	15.1
BZ919-059 (W)	---	100	113	59.5	100	6/20	32	4	13.6
Expresso	71	102	113	58.0	99	6/21	36	0	14.7
MT2063	---	113	112	59.1	99	6/21	37	15	14.1
WA 8374 (W)	---	---	110	58.4	98	6/20	35	0	13.9
WA 8388 CL+	---	---	110	58.5	98	6/20	34	0	14.1
WB7589 (W)	83	109	110	56.8	98	6/19	31	0	14.2
BZ919-101	---	---	109	58.8	100	6/19	32	0	16.3
Dagmar	81	110	108	59.1	94	6/20	37	20	15.0
WA 8357	---	107	108	61.1	100	6/20	42	45	15.8
Alum	95	101	103	59.0	100	6/22	37	18	14.7
WB9668	81	106	103	58.3	98	6/18	34	3	15.4
Net CL+	80	100	101	59.7	99	6/25	38	10	14.1
Average	**87**	**109**	**117**	**58.9**	**99**	**6/20**	**35**	**5**	**14.1**
LSD (α=.05)	**16**	**18**	**10**	**0.9**	**3**	**2**	**3**	**16**	
CV (%)	**13.1**	**11.1**	**6.4**	**1.1**	**2.3**	**0.8**	**6.9**	**233**	
Pr > F	**0.0002**	**0.2446**	**<0.0001**	**<0.0001**	**0.3625**	**<0.0001**	**<0.0001**	**<0.0001**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = Hard White

Table 36. Agronomic Data for Hard Spring Wheat, Idaho Falls, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WA 8342 (W)	---	---	**128**	60.6	100	6/26	36	1	12.7
IDO2105S	---	140	**125**	60.8	100	6/26	37	1	13.2
WB7313 (W)	---	133	**124**	60.6	100	6/24	35	23	14.0
IDO2004S (W)	---	---	**122**	61.0	100	6/27	39	0	13.0
IDO1904S (W)	129	127	**121**	60.2	100	6/29	37	3	13.3
Dayn (W)	143	136	**121**	60.2	100	6/26	40	0	13.6
SY-Teton (W)	119	123	**120**	58.7	100	6/24	35	3	13.0
UI Platinum (W)	105	123	**120**	60.2	100	6/24	34	0	12.9
WA 8374 (W)	---	---	**119**	60.9	100	6/26	35	0	13.6
WA 8356	---	129	**119**	60.5	100	6/26	39	0	13.6
WB7696 (W)	117	126	**118**	60.3	100	6/25	34	0	12.8
WB9707	115	123	**118**	60.7	100	6/26	39	0	14.7
BZ919-059 (W)	---	118	116	61.1	100	6/26	33	0	13.3
Expresso	101	113	116	60.7	100	6/27	35	0	14.4
UI Gold (W)	132	136	115	59.3	100	6/28	40	1	13.7
IDO2002 (W)	107	125	115	59.7	100	6/26	34	0	13.2
IDO2202CL2	---	---	115	59.9	100	6/27	40	1	13.3
WA 8359	---	---	114	61.0	100	6/27	33	0	13.3
WB7202CLP (W)	121	127	114	60.4	100	6/24	32	0	13.0
SY Gunsight	114	122	114	59.4	100	6/28	35	1	13.4
WA 8372 (W)	---	---	114	60.8	100	6/26	33	3	13.4
WB7589 (W)	107	123	114	59.8	100	6/25	28	0	13.7
WB7328 (W)	112	114	113	60.8	100	6/24	31	0	13.8
WB9879CLP	121	119	112	59.7	100	6/28	40	0	14.4
Holmes (BZ917-221)	---	127	111	60.4	100	6/24	35	0	14.1
WB9668	115	115	111	60.7	100	6/26	34	0	14.6
IDO2103FHB	---	---	110	59.6	100	6/23	36	0	14.5
WB9724CLP	---	---	110	60.3	100	6/24	36	3	14.6
BZ919-101	---	---	110	60.4	100	6/25	32	0	15.4
MT2063	---	115	109	61.0	100	6/26	38	25	13.7
WA 8388 CL+	---	---	109	60.2	100	6/27	36	0	13.9
IDO2104HF	---	---	105	59.6	100	6/26	39	0	13.4
WA 8330 (W)	---	118	105	59.7	100	6/26	38	29	14.8
Net CL+	113	116	104	61.2	100	6/29	39	4	14.1
Dagmar	113	126	101	60.8	100	6/26	42	16	15.3
Alum	129	115	101	61.0	100	6/27	39	13	14.3
Jefferson	122	121	100	60.3	100	6/27	38	28	14.3
WA 8357	---	116	97	61.4	100	6/26	46	29	15.7
Glee	111	118	89	59.4	100	6/25	38	6	13.9
Average	**115**	**123**	**113**	**60.3**	**100**	**6/26**	**36**	**5**	**13.8**
LSD (α=.05)	**14**	**12**	**10**	**1.6**	**0**	**1**	**2**	**14**	
CV (%)	**8.9**	**6.8**	**6.9**	**1.9**	**.**	**0.5**	**3.8**	**214**	
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**0.2845**	**.**	**<0.0001**	**<0.0001**	**<0.0001**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = Hard White

Table 37. Agronomic Data for Hard Spring Wheat at Tetonia, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020*	2021*	2022**	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
UI Gold (W)	150	84	**130**	61.5	100	7/13	35	0	12.2
WA 8372 (W)	---	---	**129**	64.6	100	7/11	32	0	12.2
WA 8356	---	68	**127**	63.1	100	7/10	37	0	13.1
Alum	129	76	**124**	62.9	100	7/13	37	1	13.1
IDO2004S (W)	---	---	**124**	61.4	100	7/12	34	0	12.3
WA 8342 (W)	---	---	**123**	63.3	100	7/10	34	0	12.4
Dayn (W)	154	91	**121**	62.5	91	7/10	36	0	12.8
WB7202CLP (W)	126	65	**121**	62.9	100	7/10	30	0	11.9
SYGunsight	121	78	**121**	61.9	100	7/13	33	0	12.9
IDO2105S	---	90	**118**	62.6	100	7/11	33	0	11.7
IDO2002 (W)	137	70	**117**	62.7	100	7/12	32	0	12.1
WB7696 (W)	137	62	**117**	63.4	100	7/12	32	0	12.0
IDO1904S (W)	137	80	116	61.7	100	7/12	31	0	12.4
WA 8330 (W)	---	60	115	62.7	100	7/11	36	0	13.5
WB9724CLP	---	---	114	62.9	100	7/11	32	0	13.3
WB7313 (W)	---	67	114	62.8	100	7/8	31	0	12.7
UI Platinum (W)	114	64	113	61.7	100	7/10	30	0	12.9
Jefferson	125	78	113	61.9	100	7/12	36	5	13.4
BZ919-059	---	69	113	63.4	100	7/12	29	0	12.9
WA 8388CL+	---	---	113	61.5	100	7/12	34	0	12.8
Glee	130	74	112	62.0	100	7/11	35	3	12.7
WB7328 (W)	108	59	112	62.2	100	7/9	29	0	12.8
WA 8374 (W)	---	---	112	62.9	100	7/12	32	0	11.6
WB9707	138	70	112	63.6	95	7/10	34	0	13.3
WB9668	127	61	110	63.4	100	7/11	30	0	14.1
IDO2104HF	---	---	110	61.0	100	7/12	35	0	12.5
IDO2202CL2	---	---	109	62.4	100	7/10	35	0	13.4
Holmes (BZ917-221)	---	71	107	62.5	100	7/10	32	0	13.5
SY-Teton (W)	130	66	107	59.6	100	7/11	31	0	13.5
WB7589 (W)	113	73	107	62.5	98	7/12	28	0	13.3
WB9879CLP	124	67	107	63.0	100	7/12	35	0	13.5
WA 8359	---	---	105	62.2	100	7/12	31	0	11.9
Net CL+	127	80	105	63.1	100	7/14	35	0	13.4
Expresso	132	74	104	62.1	100	7/13	32	0	14.0
MT2063	---	87	104	61.7	100	7/10	35	0	13.6
BZ919-101	---	---	102	62.3	100	7/10	28	0	14.6
Dagmar	133	75	102	62.9	100	7/10	36	1	14.1
WA 8357	---	85	93	63.2	91	7/11	42	0	14.4
IDO2103FHB	---	---	93	63.4	100	7/9	34	0	13.8
Average	**128**	**73**	**113**	**62.5**	**99**	**7/11**	**33**	**0.2**	**13.0**
LSD (α=.05)	**14**	**14**	**13**	**1**	**6**	**1**	**2**	**3**	
CV (%)	**8**	**14**	**8.4**	**1.2**	**4.3**	**0.4**	**4.3**	**777**	
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.5597**	**<0.0001**	**<0.0001**	**0.5509**	

* The trial location in 2020 and 2021 was in Ashton

** Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = Hard White

Table 38. Agronomic Data for Hard Spring Wheat at Soda Springs, Dryland, 2022.

	Yield (bu/A)			Test Wt.	Spring	Heading	Height	Lodging	Protein
Variety or Selection	**2020**	**2021**	**2022***	**(lb/bu)**	**Stand (%)**	**Date**	**(in.)**	**(%)**	**(%)**
Dayn (W)	60	22	**30**	61.0	100	7/11	25	0	12.5
IDO2004S (W)	---	---	**30**	60.1	100	7/11	25	0	11.9
WA 8356	---	18	**30**	60.8	100	7/11	24	0	13.4
IDO2105S	---	18	**30**	60.6	100	7/10	23	0	12.6
MT1939	---	---	**29**	60.1	100	7/12	23	0	12.2
WB7313 (W)	---	16	**29**	59.0	100	7/8	21	0	13.4
AP Renegade	50	14	**29**	59.1	100	7/14	24	0	12.7
Dagmar	57	20	**28**	60.4	100	7/11	24	0	13.1
Rocker	---	20	**27**	61.4	100	7/14	24	0	12.9
UI Gold (W)	61	17	**27**	59.7	100	7/13	22	0	13.4
WA 8330 (W)	---	16	**27**	61.3	100	7/10	24	0	15.1
MT2063	---	18	**27**	60.8	100	7/12	23	0	13.8
Alum	61	22	**26**	60.7	100	7/13	25	0	13.8
Glee	57	20	**26**	61.0	100	7/11	25	0	13.3
IDO2002 (W)	57	17	**26**	60.2	100	7/11	22	0	12.5
IDO2202CL2	---	---	**26**	59.1	100	7/11	24	0	13.5
Holmes (BZ917-221)	---	17	**26**	59.6	100	7/10	23	0	14.4
Net CL+	56	20	**26**	62.3	100	7/14	24	0	13.8
SY-Teton (W)	60	19	**26**	57.0	100	7/12	21	0	12.4
IDO1904S (W)	52	18	25	59.9	100	7/12	22	0	13.5
WB7328 (W)	53	12	25	59.0	100	7/7	21	0	14.2
Jefferson	62	20	25	60.2	100	7/11	23	0	14.2
WB7202CLP (W)	62	19	25	58.4	100	7/8	22	0	13.7
IDO2103FHB	---	---	25	59.4	100	7/9	22	0	12.6
WB9707	53	17	24	60.3	100	7/10	24	0	14.1
WB9724CLP	---	---	24	61.4	100	7/10	21	0	13.5
Choteau	---	17	24	59.9	100	7/13	23	0	13.6
UI Platinum (W)	57	17	24	59.2	100	7/8	22	0	12.7
WB9879CLP	48	17	24	60.2	100	7/13	21	0	14.1
WB7589 (W)	58	16	24	59.7	100	7/11	20	0	13.6
Duclair	53	23	23	59.2	100	7/11	24	0	13.2
IDO2104HF	---	---	23	58.7	100	7/12	22	0	12.3
WA 8357	---	20	23	60.1	100	7/12	25	0	12.7
BZ919-101	---	---	21	58.9	100	7/10	18	0	14.4
BZ919-059	---	---	21	60.1	100	7/10	20	0	13.5
WB9668	50	13	21	59.4	100	7/11	21	0	15.0
WA 8388 CL+	---	---	21	61.6	100	7/12	22	0	15.3
WB7696 (W)	56	12	20	60.7	100	7/11	21	0	15.7
Expresso	55	11	19	60.0	100	7/15	21	0	14.6
Average	**54**	**18**	**25**	**60.0**	**100**	**7/11**	**23**	**0**	**13.5**
LSD (α=.05)	**9**	**4**	**4**	**0.9**	**0**	**1**	**2**	**0**	
CV (%)	**11.5**	**14.3**	**11.8**	**1.1**	**0**	**0.3**	**6.1**	**.**	
Pr > F	**0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
(W) = Hard White

Table 39. Hard Spring Wheat Yield Percentage of Location Averages, 2022.

	(100% = Average)					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Tetonia**	**Soda Springs**	**Variety Average**
MT1939	---	---	---	---	117	**117**
IDO2004S (W)	117	120	108	110	119	**115**
AP Renegade	---	---	---	---	114	**114**
Dayn (W)	108	115	107	107	120	**111**
WA 8356	109	107	105	112	119	**111**
IDO2105S	109	107	110	104	118	**110**
Rocker	---	---	---	---	109	**109**
IDO1804S (W)	112	109	102	115	108	**109**
WB7313 (W)	101	114	110	100	115	**108**
SY Gunsight	103	107	100	107	---	**105**
IDO1904S (W)	103	107	107	102	101	**104**
WA 8372 (W)	104	90	100	114	---	**102**
WB9707	105	105	104	99	97	**102**
WB7202CLP	97	103	100	107	99	**101**
Holmes (BZ917-221)	101	109	98	95	102	**101**
WA 8330 (W)	102	100	92	102	108	**101**
IDO2002 (W)	101	93	102	104	104	**101**
IDO2202CL2	99	100	101	97	103	**100**
WB7328 (W)	100	97	100	99	101	**100**
WB7696 (W)	100	109	104	103	80	**99**
SY-Teton (W)	99	93	106	94	102	**99**
WB9724CLP	97	100	97	101	97	**98**
WA 8374 (W)	94	94	106	99	---	**98**
WB9879CLP	102	98	99	94	95	**98**
Jefferson	101	98	88	100	99	**97**
BZ919-059	96	105	103	100	83	**97**
WA 8359	97	97	101	93	---	**97**
Alum	88	92	89	110	105	**97**
IDO2104HF	103	97	93	97	93	**97**
Glee	100	102	78	99	104	**97**
UI Platinum	102	79	106	100	95	**96**
MT2063	96	91	97	92	107	**96**
WB7589 (W)	94	98	100	94	94	**96**
Choteau	---	---	---	---	96	**96**
IDO2103FHB	101	101	98	82	98	**96**
Dagmar	93	91	89	90	111	**95**
Expresso	96	106	102	92	74	**94**
Duclair	---	---	---	---	93	**93**
Net CL+	86	90	92	93	102	**93**
WB9668	88	95	98	97	83	**92**
BZ919-101	93	96	97	90	85	**92**
WA 8342 (W)	115	106	113	108	0	**88**
WA 8357	92	83	85	82	90	**87**
WA 8388 CL+	94	0	96	100	82	**74**
Location Average (bu/A)	**117**	**104**	**113**	**113**	**25**	

(W) = Hard White

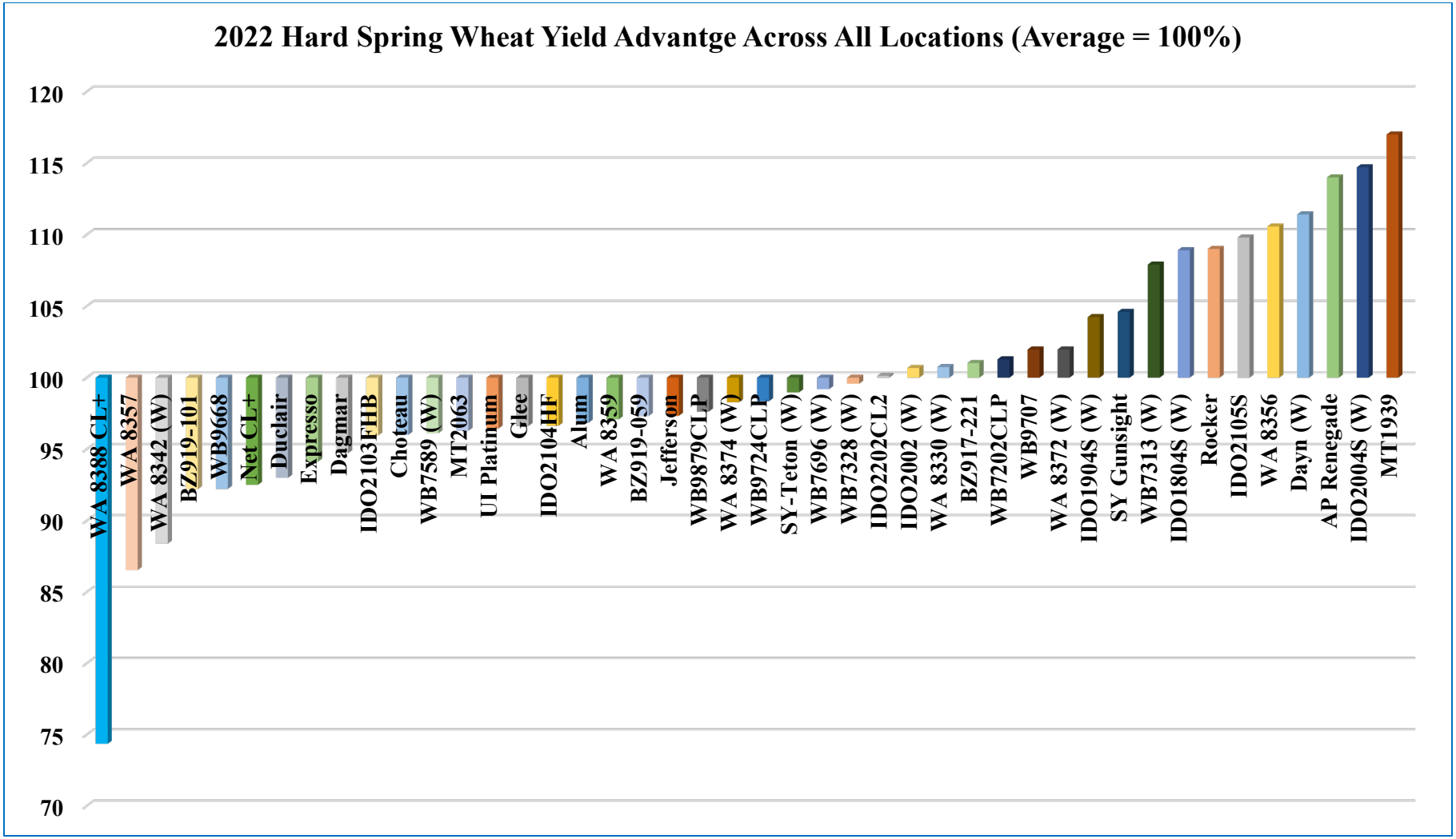


Chart 5. Hard Spring Wheat Yield Percentage Across All Locations.

Table 40. Soft White Spring Wheat Irrigated Nurseries, 3-Year Averages (2020-2022; 12 site-years).

Variety or Selection	Yield (bu/A)	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)
IDO1902S	122	61.2	100	6/22	36	1	10.3
WA 8327	121	59.9	100	6/23	36	2	9.8
WB6430	120	59.2	100	6/20	32	1	9.9
UI Stone	115	59.4	99	6/21	35	2	9.9
Seahawk	115	60.3	99	6/24	36	2	10.1
Alturas	114	59.3	99	6/23	35	1	9.9
UI Cookie	114	58.4	99	6/21	36	0	10.5
Melba*	113	59.2	99	6/25	34	5	9.6
IDO1404S	112	59.6	100	6/24	35	1	10.1
IDO1702S	111	59.8	99	6/19	33	1	10.1
Tekoa	109	60.5	99	6/25	36	8	9.8
Louise	109	59.3	100	6/22	38	19	10.3
Ryan	109	58.5	99	6/20	34	8	10.2
Average	**114**	**59.6**	**99**	**6/22**	**35**	**4**	**10.0**
Standard Error	**2.3**	**0.9**	**0.3**	**0.2**	**0.3**	**1.5**	
Pr>F (variety)	**<0.0001**	**<0.0001**	**0.8895**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr>F (variety*year)	**0.3619**	**<0.0001**	**0.9707**	**0.0034**	**0.0854**	**<0.0001**	
Pr>F (variety*location)	**<0.0001**	**0.0004**	**0.9970**	**<0.0001**	**0.1480**	**<0.0001**	
Pr>F (location*year)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0060**	
Pr>F (variety*year*location)	**0.0069**	**<0.0001**	**0.9979**	**0.0153**	**0.0002**	**<0.0001**	

* Indicates club wheat variety.

Table 41. Soft White Spring Wheat Dryland Nurseries, 3-Year Averages (2020-2022; 3 site-years).

Variety or Selection	Yield (bu/A)	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Ryan	44	59.2	100	7/8	27	0	10.2
Melba*	41	59.7	100	7/13	26	0	10.2
AP Coachman	41	59.2	100	7/12	27	0	10.3
IDO1902S	41	61.3	100	7/8	27	0	9.6
IDO1404S	40	59.8	100	7/10	27	0	10.7
Seahawk	39	60.1	100	7/11	25	0	10.2
WA 8327	39	60.1	93	7/10	28	0	9.8
IDO1702S	39	59.7	100	7/8	25	0	9.7
UI Stone	39	60.2	100	7/8	26	0	10.5
Alturas	38	59.3	100	7/10	26	0	10.0
Tekoa	38	61.3	100	7/11	28	0	10.3
Louise	38	60.1	100	7/11	27	0	10.3
WB6430	36	60.3	100	7/8	24	0	10.2
UI Cookie	35	58.7	99	7/9	26	0	10.2
Average	**39**	**59.9**	**99**	**7/9**	**26**	**0**	**10.2**
Standard Error	**2.2**	**0.3**	**2.0**	**0.6**	**0.5**	**0**	
Pr>F (variety)	**0.2385**	**<0.0001**	**0.4989**	**<0.0001**	**<0.0001**	**.**	
Pr>F (variety*year)	**<0.0001**	**<0.0001**	**0.4741**	**<0.0001**	**<0.0001**	**.**	

* Indicates club wheat variety.

Table 42. Irrigated Soft White Spring Wheat Data Combined from Aberdeen, Rupert, Idaho Falls and Tetonia, 2022.

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WA 8327	124	60.4	100	6/28	37	5	10.2
IDO1902S	123	61.4	100	6/27	36	3	10.5
UI Stone	123	59.8	100	6/27	37	4	10.4
WA 8351	120	61.3	100	6/28	36	19	10.6
WB6430	120	59.3	100	6/26	33	0	10.6
UI Cookie	116	58.8	100	6/27	36	1	10.7
IDO1404S	116	59.8	100	6/29	36	0	10.4
Seahawk	114	60.4	100	6/30	37	3	10.4
TMC 2021	114	60.0	100	7/1	37	1	10.2
IDO2101FHB	113	60.4	100	6/27	35	0	10.7
Ryan	112	58.4	100	6/25	35	20	10.7
Melba*	112	59.3	100	7/1	35	14	10.0
IDO1702S	112	59.9	100	6/25	34	3	10.2
YSC-603	112	60.0	100	7/1	38	0	10.7
Alturas	111	59.4	100	6/28	36	1	10.4
Tekoa	110	60.7	100	6/30	37	8	10.3
WA 8354 CL+	109	59.6	100	6/27	33	7	10.8
WB6211CLP	104	57.6	100	6/27	35	1	11.4
Louise	102	59.0	100	6/23	38	26	11.2
Hedge CL+*	94	60.1	100	6/30	39	44	11.8
Average	**113**	**59.8**	**100**	**6/28**	**36**	**8**	**10.6**
Standard Error	**3.5**	**0.2**	**0.1**	**0.4**	**0.6**	**3.8**	
Pr > F (variety)	**<0.0001**	**<0.0001**	**0.0305**	**<0.0001**	**<0.0001**	**<0.0001**	
Pr > F (location)	**0.0758**	**<0.0001**	**0.1024**	**<0.0001**	**0.0001**	**0.0034**	
Pr > F (variety*location)	**0.0018**	**<0.0001**	**0.0048**	**<0.0001**	**0.1664**	**<0.0001**	

* Indicates club wheat variety.

Table 43. Agronomic Data for Soft White Spring Wheat at Rupert, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WB6430	121	145	**112**	59.0	100	6/17	30	0	12.2
WA 8327	123	140	**112**	59.2	100	6/21	35	1	11.2
Ryan	108	134	**112**	57.5	100	6/18	32	0	10.5
Seahawk	119	140	**109**	59.1	100	6/22	33	0	12.2
IDO1902S	126	132	**109**	61.1	100	6/19	33	0	11.7
IDO1404S	117	111	**107**	59.0	100	6/20	33	0	11.0
WA 8351	---	130	**106**	60.1	100	6/20	33	5	12.3
UI Cookie	121	143	**106**	57.7	100	6/19	32	3	11.2
UI Stone	122	127	**103**	59.3	100	6/19	34	0	11.6
Louise	115	133	**102**	59.6	100	6/22	36	0	11.3
Tekoa	119	111	**102**	59.9	100	6/23	32	0	11.1
Alturas	110	131	**102**	57.9	100	6/20	31	0	11.1
Melba**	115	133	**98**	57.9	100	6/24	33	9	11.2
IDO2101FHB	---	---	96	59.6	100	6/20	30	0	11.5
WB6211CLP	---	104	96	56.7	100	6/20	31	0	11.2
Hedge CL+**	---	111	93	59.5	100	6/23	38	16	11.8
IDO1702S	120	135	93	58.9	100	6/18	29	0	10.8
WA 8354 CL+	---	---	89	58.2	100	6/20	30	0	11.7
Average	**117**	**128**	**102**	**58.9**	**100**	**6/20**	**33**	**2**	**11.4**
LSD (α=.05)	**11**	**21**	**14**	**0.7**	**0**	**2**	**3**	**11**	
CV (%)	**6.8**	**11.5**	**9.8**	**0.8**	**.**	**0.70**	**5.6**	**420**	
Pr > F	**0.0032**	**0.0019**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.3153**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

**= Indicates club wheat variety.

Table 44. Agronomic Data for Soft White Spring Wheat at Aberdeen, Irrigated, 2022.

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
UI Stone	71	116	**128**	58.2	100	6/21	38	16	10.1
IDO1902S	95	129	**123**	59.9	100	6/22	37	13	10.5
WA 8351	---	114	**121**	59.7	100	6/24	37	38	11
IDO1702S	80	122	**117**	57.8	100	6/19	35	13	11
IDO1404S	84	117	**116**	58.4	100	6/24	37	0	10.0
WB6430	80	117	**115**	57.2	100	6/20	35	0	10.5
WB6211CLP	---	109	**115**	56.3	100	6/21	36	3	11.5
UI Cookie	79	110	**114**	56.2	100	6/22	37	0	11.2
WA 8327	90	114	**113**	58.6	100	6/23	37	3	10
Ryan	79	114	**112**	56.1	99	6/18	35	38	12
TMC 2021	---	---	**112**	57.5	100	6/24	36	0	10.1
Melba**	86	120	111	57.5	100	6/26	36	19	9.4
YSC-603	---	105	111	58.0	100	6/23	37	0	10.8
Tekoa	80	107	111	58.7	100	6/26	40	28	10.4
Alturas	85	123	111	57.7	100	6/23	37	1	10
IDO2101FHB	---	---	109	58.1	100	6/21	35	0	11
Seahawk	91	124	108	59.0	100	6/25	37	0	9.6
WA 8354CL+	---	---	106	57.3	100	6/20	34	3	10.7
Louise	95	116	102	57.9	100	6/23	40	53	11.0
Hedge CL+**	---	105	100	58.1	98	6/25	38	56	11.7
Average	**83**	**114**	**113**	**57.9**	**100**	**6/22**	**37**	**14**	**10.6**
LSD (α=.05)	**18**	**16**	**16**	**1.1**	**1**	**2**	**3**	**30**	
CV (%)	**15.1**	**9.7**	**10.2**	**1.3**	**0.8**	**0.7**	**5.5**	**139**	
Pr > F	**0.4289**	**0.1555**	**0.2152**	**<0.0001**	**0.0794**	**<0.0001**	**0.0023**	**<0.0001**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates club wheat varieties.

Table 45. Agronomic Data for Soft White Spring Wheat, Idaho Falls, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
Alturas	128	135	**132**	60.2	100	6/26	40	4	11.0
WA 8327	133	138	**131**	61.0	100	6/27	41	15	11.1
UI Stone	137	136	**130**	60.7	100	6/26	40	0	10.4
IDO1902S	132	143	**129**	61.9	100	6/27	40	0	11.0
UI Cookie	132	137	**126**	60.1	100	6/25	39	3	11.3
WB6430	141	138	**125**	60.2	100	6/26	35	0	10.5
IDO1702S	121	126	**123**	61.0	100	6/25	39	0	10.4
Seahawk	133	123	**122**	61.2	100	6/27	42	14	11.1
IDO2101FHB	---	---	**122**	60.9	100	6/26	38	0	11.3
WA 8351	---	131	119	61.6	100	6/27	40	35	10.9
IDO1404S	123	134	118	60.3	100	6/29	40	1	10.5
Tekoa	121	121	116	61.0	100	6/29	39	5	11.4
WA 8354CL+	---	---	114	60.3	100	6/26	37	24	11.3
TMC 2021	---	---	113	59.8	100	6/27	40	3	11.4
Melba**	124	131	113	60.2	100	7/1	37	29	10.3
Ryan	120	130	110	59.0	100	6/24	38	41	11.3
YSC-603	---	116	109	59.6	100	6/27	39	0	11.9
WB6211CLP	---	122	106	57.0	100	6/27	37	0	12.5
Hedge CL+**	---	114	85	60.4	100	7/1	42	86	12.9
Average	**125**	**128**	**118**	**60.3**	**100**	**6/27**	**39**	**14**	**11.2**
LSD (α=.05)	**13**	**10**	**10**	**0.9**	**0**	**1**	**2**	**22**	
CV (%)	**7.4**	**5.5**	**5.9**	**1.0**	**.**	**0.4**	**4**	**115**	
Pr > F	**0.0017**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**<0.0001**	

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates club wheat varieties.

Table 46. Agronomic Data for Soft White Spring Wheat at Tetonia, Irrigated, 2022.

Variety or Selection	Yield (bu/A) 2020*	2021*	2022**	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WA 8327	135	86	**141**	62.4	100	7/12	36	0	8.3
WA 8351	---	70	**134**	63	100	7/12	36	0	8.5
IDO1902S	136	81	**133**	62.3	100	7/11	36	0	8.7
UI Stone	129	52	130	61.0	100	7/12	36	0	9.4
WB6430	147	71	127	60.6	100	7/11	32	0	9.1
WA8354CLP	---	---	127	62.3	100	7/12	34	0	9.4
Melba**	138	64	125	61.1	100	7/14	35	0	9.1
IDO2101FHB	---	---	124	62.9	100	7/13	36	0	9.0
IDO1404S	132	70	121	61.1	100	7/12	35	0	10.0
Alturas	128	69	120	61.3	100	7/13	36	0	9.5
UI Cookie	132	58	120	60.5	100	7/13	36	0	9.0
Seahawk	116	73	119	62.2	100	7/15	36	0	8.8
TMC-2021	---	---	117	61.7	100	7/13	35	0	9.2
Ryan	114	57	115	61.1	100	7/10	35	0	9.2
YSC-603	---	49	115	62.6	100	7/13	37	0	9.5
IDO1702S	122	56	114	62.1	100	7/10	33	0	8.6
Tekoa	131	83	112	62.8	100	7/14	36	0	8.4
WB6211CLP	---	56	98	60.1	100	7/11	34	0	10.3
Hedge CL+***	---	69	98	61.9	100	7/14	39	17	10.7
Average	**129**	**65**	**120**	**61.7**	**100**	**7/12**	**35**	**1**	**9.2**
LSD (α=.05)	**15**	**12**	**14**	**0.7**	**0**	**2**	**2**	**10**	
CV (%)	**8**	**13**	**7.9**	**0.8**	**0**	**0.6**	**4.3**	**837**	
Pr > F	**0**	**<0.0001**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.3924**	

* The trial location in 2020 and 2021 was in Ashton

** Varieties or selections in bold are not statistically different from the top yielding variety.

**= Indicates club wheat variety.

Table 47. Agronomic Data for Soft White Spring Wheat at Soda Springs, Dryland, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)
WA 8327	53	26	**36**	60.1	100	7/14	26	0	11.3
Alturas	57	24	**35**	60.3	100	7/14	24	0	10.3
AP Coachman	67	24	**35**	59.3	100	7/15	25	0	10.9
Tekoa	60	21	**34**	62.5	100	7/15	25	0	10.4
WA 8351	---	26	**34**	61.0	100	7/13	25	0	10.1
Seahawk	54	26	**33**	61.7	100	7/15	22	0	11.1
Hedge CL+**	---	22	**33**	61.5	100	7/15	24	0	10.8
UI Stone	65	24	**32**	60.2	100	7/11	24	0	10.9
WA 8354 CL+	---	---	**32**	59.9	100	7/12	21	0	10.0
IDO1702S	67	21	**32**	60.6	100	7/10	23	0	10.9
IDO1404S	69	20	**31**	60.6	100	7/14	24	0	11.4
Ryan	69	26	**31**	59.0	100	7/11	24	0	11.2
IDO1902S	64	26	29	62.1	100	7/12	25	0	11.1
WB6430	56	21	29	60.8	100	7/11	22	0	10.1
Melba**	70	27	29	61.8	100	7/15	22	0	10.8
Louise	58	29	28	60.1	100	7/14	25	0	11.9
WB6211CLP	---	23	28	57.4	100	7/11	24	0	10.5
IDO2101FHB	---	---	27	58.7	100	7/13	21	0	10.3
UI Cookie	66	18	25	59.4	100	7/11	23	0	10.5
Average	**62**	**23**	**31**	**60.4**	**100**	**7/13**	**24**	**0**	**10.8**
LSD (α=0.05)	**11**	**4**	**6**	**1**	**0**	**1**	**2**	**0**	
CV (%)	**10.5**	**12.6**	**12.0**	**1.1**	**0**	**0.40**	**5.7**	**.**	
Pr > F	**0**	**<0.0001**	**0.0095**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**.**	

* Varieties or selections in bold are not statistically different from the top yielding variety.
** Indicates club wheat variety.

Table 48. Soft White Spring Wheat Yield Percentage of Location Averages, 2022.

	(100% = Average)					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Tetonia**	**Soda Springs**	**Variety Average**
AP Coachman	---	---	---	---	111	**111**
WA 8327	100	110	111	117	115	**111**
UI Stone	113	100	110	108	104	**107**
WA 8351	107	104	100	112	109	**106**
IDO1902S	108	106	110	111	95	**106**
Alturas	98	100	112	100	111	**104**
WB6430	102	110	106	106	94	**104**
Seahawk	96	107	104	99	106	**102**
IDO1404S	103	104	100	101	100	**102**
Tekoa	98	100	98	93	110	**100**
Ryan	99	109	93	96	99	**99**
IDO1702S	104	91	104	95	102	**99**
UI Cookie	101	103	107	100	81	**98**
Melba*	98	96	95	104	94	**97**
WA 8354CL+	94	87	96	106	104	**97**
TMC 2021	99	---	96	98	---	**97**
IDO2101FHB	97	94	103	103	85	**97**
YSC-603	98	---	93	95	---	**95**
Louise	90	100	---	---	91	**94**
WB6211CLP	101	94	90	82	89	**91**
Hedge CL+*	89	91	72	82	105	**88**
Location Average (bu/A)	**113**	**102**	**118**	**120**	**31**	

* Indicates club wheat variety.

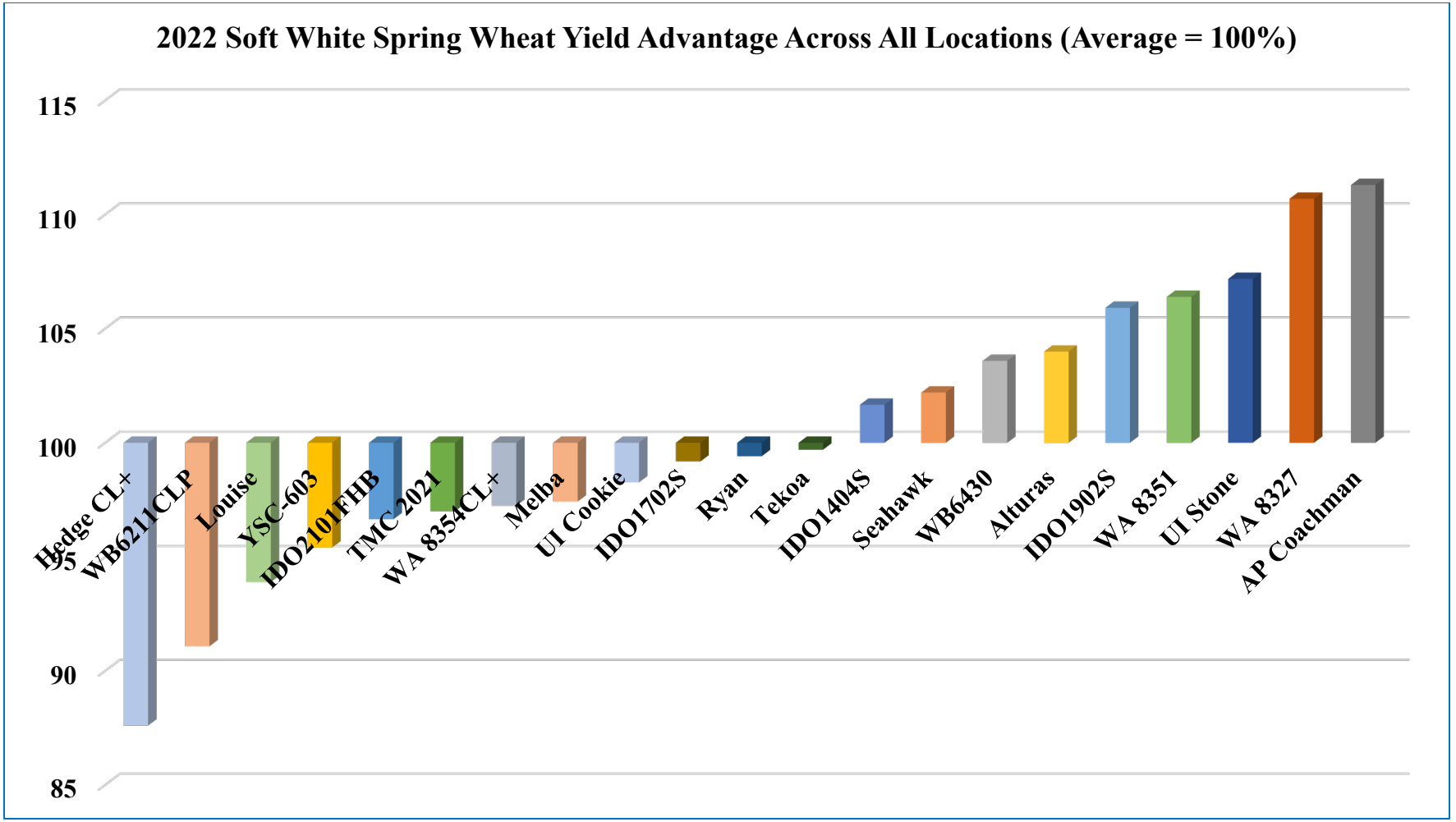


Chart 6. Soft White Spring Wheat Yield Percentage Across All Locations.

Table 49. Spring Malt Barley Irrigated Nurseries, 3-Year Averages (2020-2022; 12 site-years).

Variety or Selection	Yield (bu/A)	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64	Plump (>5.5/64	% Thin
KWS Jessie	150	50.0	100	6/25	28	10	10.1	95.5	2.8	1.7
Esma	150	50.3	100	6/25	32	18	10.5	93.1	4.3	2.6
BC Leandra	148	49.8	100	6/27	30	18	10.9	94.2	3.9	1.9
KWS Fantex	148	50.1	100	6/27	30	13	10.6	92.2	4.9	2.9
LCS Odyssey	147	50.0	100	6/27	31	18	10.6	94.2	3.7	2.1
KWS Amadora	147	51.5	100	6/24	30	12	10.4	95.6	2.9	1.5
BC Ellinor	144	48.9	100	6/27	32	18	10.5	94.3	4.2	2.2
Moravian 179	140	50.7	100	6/27	32	12	11.1	94.4	3.5	2.1
GemCraft	138	50.2	100	6/25	34	24	10.6	91.3	5.3	3.4
ABI Eagle	138	51.2	99	6/25	34	7	11.1	93.8	4.1	2.1
LCS Opera	138	48.3	100	6/28	30	22	10.1	86.5	7.9	5.6
2IM14-8212	133	50.4	99	6/23	35	8	10.6	95.5	2.6	1.9
ABI Voyager	129	51.0	100	6/23	38	22	11.1	96.4	2.2	1.4
AAC Synergy	129	51.1	100	6/24	37	19	11.1	95	3	2
11ARS183-9	129	50.9	100	6/25	38	20	11.2	95	3.1	1.9
11ARS162-4	128	50.1	100	6/25	38	14	11	94.2	3.8	2
Merit 57	127	49.7	99	6/26	37	18	10.9	88.2	7.3	4.5
Conrad	126	51.4	100	6/25	37	21	11.3	95.1	3.1	1.8
Moravian 69	126	49.6	100	6/28	31	17	10.7	89.7	6.6	3.7
CDC Copeland	125	51.0	100	6/26	40	25	10.7	94.1	3.6	2.3
AAC Connect	123	51.1	100	6/24	37	10	11.1	94.6	3.5	1.9
AC Metcalfe	119	51.2	100	6/24	38	28	11.2	94.1	3.7	2.4
Average	**136**	**50.4**	**100**	**6/25**	**34**	**17**	**10.8**	**93.5**	**4.1**	**2.4**
Standard Error	**2.6**	**0.2**	**0.3**	**1.6**	**0.6**	**4.0**				
Pr>F (variety)	**<0.0001**	**<0.0001**	**0.2901**	**<0.0001**	**<0.0001**	**0.0001**				
Pr>F (variety*year)	**<0.0001**	**<0.0001**	**0.0096**	**<0.0001**	**<0.0001**	**0.0053**				
Pr>F (variety*location)	**<0.0001**	**0.0023**	**0.0539**	**<0.0001**	**0.0019**	**0.3724**				
Pr>F (year*location)	**0.0197**	**0.0009**	**0.0159**	**<0.0001**	**<0.0001**	**<0.0001**				
Pr>F (variety*year*location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0080**	**0.0004**				

Table 50. Spring Malt Barley Dryland Nurseries, 3-Year Averages (2020-2022; 3 site-years).

Variety or Selection	Yield (bu/A)	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(>6/64	Plump (>5.5/64	% Thin
KWS Fantex	42	50.8	100	7/15	19	0	10.6	91.3	6.1	2.6
KWS Jessie	41	50.4	100	7/11	20	0	10.3	94.2	3.7	2.1
Merit 57	39	50.3	100	7/13	24	0	11.0	87.4	8.8	3.8
KWS Amadora	39	50.4	100	7/11	19	0	10.6	90.1	7.4	2.5
11ARS162-4	38	49.9	100	7/13	25	0	11.1	88.6	7.7	3.7
GemCraft	38	50.2	100	7/14	22	0	10.4	87.1	9.2	3.7
11ARS183-9	38	50.7	100	7/12	26	0	10.9	95.1	3.6	1.3
Moravian 69	38	50.4	100	7/15	21	0	10.9	87.8	8.7	3.5
Conrad	36	50.9	100	7/14	24	0	11.2	93.7	4.7	1.6
AAC Synergy	35	50.2	99	7/13	25	0	10.6	91.2	6.3	2.5
CDC Copeland	35	50.5	99	7/15	26	0	11.2	95.1	3.5	1.4
ABI Voyager	34	50.8	100	7/13	25	0	11.1	95.5	3.1	1.4
AAC Connect	33	50.3	100	7/12	23	0	11.7	87.1	9.1	3.8
AC Metcalfe	32	50.3	99	7/11	25	0	11.1	92.5	5.6	1.9
Average	**37**	**50.4**	**100**	**7/13**	**23**	**0**	**10.9**	**91.2**	**6.2**	**2.6**
Standard Error	**1.5**	**0.2**	**0.3**	**0.5**	**0.5**	**.**				
Pr>F (variety)	**<0.0001**	**0.1791**	**0.7329**	**<0.0001**	**<0.0001**	**.**				
Pr>F (variety*year)	**<0.0001**	**<0.0001**	**0.0901**	**<0.0001**	**<0.0001**	**.**				

Table 51. Irrigated Spring Malt Barley Data Combined from Aberdeen, Idaho Falls, Rupert and Tetonia, 2022

Variety or Selection	Yield (bu/A)	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64	Plump (>5.5/64	% Thin
Esma	150	50.5	100	6/29	33	28	11.0	91.4	5.2	3.4
KWS Amadora	145	50.8	100	6/30	30	13	10.6	94.2	3.9	1.9
KWS Fantex	144	49.4	100	7/1	30	11	11.0	91.2	5.4	3.4
KWS Willis	143	48.7	100	7/1	33	29	10.9	92.3	4.6	3.1
BC Lexy	143	47.9	100	6/30	31	30	10.6	88.3	6.9	4.8
BC Leandra	141	48.9	100	7/1	29	29	11.4	92.1	5.3	2.6
BC Ellinor	140	48.9	100	7/1	31	20	10.9	91.2	5.5	3.3
GemCraft	140	50.0	100	6/29	35	25	11.5	91.1	5.3	3.6
KWS Jessie	139	48.6	99	6/29	28	8	10.1	92.2	4.9	2.9
Moravian 179	138	50.8	99	7/1	32	13	12.0	95.1	3.3	1.6
LCS Diablo	138	44.3	100	7/2	31	24	10.5	90.2	6.2	3.6
LCS Opera	137	47.7	100	7/2	31	33	10.4	84.5	9.4	6.1
LCS Odyssey	135	48.8	100	7/1	31	33	11.1	89.2	6.6	4.2
2IM14-8212	134	50.3	98	6/28	35	7	11.3	94.7	3.1	2.2
ABI Eagle	134	50.8	98	6/30	35	8	11.7	92.5	5.1	2.4
Moravian 69	133	49.5	100	7/2	30	21	11.7	88.9	7.3	4.5
LCS Genie	133	50.7	100	7/1	31	18	10.7	91.1	5.1	3.8
15ARS182-1	133	49.9	100	7/1	36	26	11.0	92.7	4.5	2.8
2IM17-2221	130	50.3	100	6/29	35	25	11.6	94.2	3.6	2.2
11ARS162-4	130	49.9	100	6/28	38	13	12.0	93.1	4.5	2.4
2IM16-0154	129	51.2	98	6/28	36	27	11.6	93.1	4.2	2.7
ABI Voyager	128	50.7	99	6/27	38	23	12.2	96.8	2.1	1.1
CDC Copeland	127	50.5	100	6/30	42	32	11.1	93.0	5	3.0
Conrad	127	50.5	100	6/30	40	33	12.5	91.2	5.3	3.5
AAC Synergy	124	50.8	100	6/29	38	26	12.0	93.1	4.2	2.7
11ARS183-9	121	50.1	100	6/29	39	28	12.0	92.4	4.7	2.9
Merit 57	119	49.8	96	7/1	38	21	11.3	86.2	8.5	5.3
AAC Connect	118	50.8	100	6/29	38	17	12.1	91.4	5.4	3.2
Moravian 180	115	48.6	99	6/28	29	15	11.8	90.4	5.2	4.9
AC Metcalfe	113	50.6	100	6/29	38	43	12.3	92.2	4.9	2.9
Average	**133**	**49.7**	**99**	**6/30**	**34**	**23**	**11.4**	**91.6**	**5.2**	**3.2**
Standard Error	**3.2**	**0.7**	**0.7**	**0.3**	**0.7**	**6.0**				
Pr > F (variety)	**<0.0001**	**<0.0001**	**0.0244**	**<0.0001**	**<0.0001**	**0.0003**				
Pr > F (location)	**0.0093**	**<0.0001**	**0.0393**	**<0.0001**	**0.0019**	**<0.0001**				
Pr > F (variety*location)	**<0.0001**	**0.0684**	**0.0003**	**<0.0001**	**0.0288**	**0.0409**				

Table 52. Agronomic Data for Two-rowed Malt Barley at Rupert, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64	(>5.5/64	% Thin
Esma	---	145	**152**	48.8	100	6/21	31	54	12.0	82.6	9.1	8.3
ABI Eagle	145	144	**150**	50.6	100	6/22	31	0	12.3	92.5	5.2	2.3
BC Ellinor	162	131	**142**	47.7	100	6/24	30	53	11.9	86.1	7.6	6.3
KWS Fantex	161	136	**141**	47.5	100	6/24	29	34	11.7	84.3	9.1	6.6
11ARS162-4	161	132	**140**	49.2	100	6/22	36	15	12.5	88.6	7.2	4.2
ABI Voyager	146	117	**140**	50.0	100	6/20	36	55	12.3	94.2	3.3	2.5
Conrad	145	118	**139**	49.1	100	6/22	41	48	13.1	85.1	8.5	6.4
BC Leandra	172	131	**135**	48.4	100	6/24	26	34	12.0	90.3	5.5	4.2
LCS Opera	178	114	**135**	45.8	100	6/25	30	58	11.7	76.6	13.1	10.3
2IM17-2221	---	---	**134**	49.4	100	6/22	33	33	12.1	89.5	6.2	4.3
2IM14-8212	158	116	**134**	49.5	100	6/20	34	22	12.3	90.1	5.6	4.3
KWS Jessie	173	150	**134**	47.4	100	6/22	27	16	11.4	87.6	7	5.4
CDC Copeland	160	130	**133**	49.5	100	6/23	42	54	11.7	87.3	7.2	5.5
2IM16-0154	---	---	**132**	50.1	100	6/20	35	40	12.3	87.6	7.5	4.9
GemCraft	162	134	**132**	47.5	100	6/21	32	48	12.4	80.4	10.4	9.2
KWS Willis	---	---	**132**	45.1	100	6/24	33	73	12.5	80.1	11.5	8.4
KWS Amadora	170	140	131	50.2	100	6/23	29	41	11.4	90.1	6.1	3.8
Moravian 179	159	138	131	49.4	100	6/23	30	35	13.4	90.4	6.2	3.4
Merit 57	163	126	131	47.9	100	6/23	35	34	12.7	76	12.9	11.1
15ARS182-1	---	---	130	47.9	100	6/23	34	63	11.4	81.6	11.4	7
LCS Odyssey	168	151	129	46.7	100	6/24	30	69	12.1	78.3	12.1	9.6
AAC Synergy	142	133	127	49.5	100	6/21	37	50	12.3	86.5	8.1	5.4
11ARS183-9	151	137	125	48.8	100	6/22	38	48	13.2	86.4	7.9	5.7
BC Lexy	---	131	123	44.5	100	6/21	31	73	12.2	71	14.3	14.7
Moravian 69	142	127	120	47.5	100	6/24	31	41	12.8	81	11	8
LCS Diablo	---	---	119	44.9	100	6/25	29	51	11.2	82.9	10.1	7
LCS Genie	---	142	118	49.3	100	6/24	30	40	12.1	83.2	8.4	8.4
AC Metcalfe	137	98	115	49.6	100	6/22	37	79	13.4	85.5	8.3	6.2
AAC Connect	128	125	114	50.0	100	6/22	37	35	12.7	88.1	6.6	5.3
Moravian 180	---	---	105	45.8	100	6/20	27	22	13.3	79	9	12
Average	**154**	**131**	**131**	**48.2**	**100**	**6/23**	**33**	**44**	**12.3**	**84.8**	**8.5**	**6.7**
LSD (α=.05)	**15**	**25**	**20**	**2.3**	**0**	**2**	**4**	**44**				
CV (%)	**6.7**	**13.5**	**11**	**3.400**	**.**	**1**	**8**	**72**				
Pr > F	**<0.0001**	**0.0169**	**0.0052**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.1439**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 53. Agronomic Data for Two-rowed Malt Barley at Aberdeen, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64	(>5.5/64	% Thin
Moravian 69	123	118	**150**	49.5	100	6/26	30	0	11.3	94.1	3.8	2.1
BC Lexy	---	147	**147**	49.0	100	6/25	30	0	9.3	97.5	1.5	1
GemCraft	150	141	**145**	50.7	100	6/25	36	0	10.5	97.6	1.4	1
LCS Genie	---	144	**144**	50.0	100	6/25	30	0	9.8	97.3	1.8	0.9
BC Leandra	144	161	**142**	48.9	100	6/25	31	0	11.3	96.3	2.5	1.2
LCS Opera	146	130	**140**	48.8	100	6/26	31	0	9.4	95.2	3.2	1.6
KWS Jessie	133	167	**138**	48.4	100	6/25	28	0	9.4	96.8	2.2	1
KWS Willis	---	---	**137**	49.3	100	6/25	31	0	9.9	97.5	1.6	0.9
KWS Fantex	132	157	**135**	49.3	100	6/26	28	0	11.0	96.7	1.6	1.7
LCS Odyssey	136	151	**135**	49.0	100	6/26	31	0	11.3	97	2.1	0.9
BC Ellinor	150	144	**134**	48.6	99	6/26	32	0	10.2	95.4	2.9	1.7
Esma	156	171	131	49.7	100	6/25	32	0	9.8	97.1	1.9	1
15ARS182-1	---	---	130	49.7	100	6/25	36	0	10.2	98.1	1.1	0.8
2IM14-8212	134	132	130	49.2	100	6/23	34	0	10.0	96.6	1.8	1.6
KWS Amadora	143	147	129	49.0	100	6/26	29	0	9.7	97.2	1.8	1
CDC Copeland	164	119	128	50.4	100	6/25	44	0	9.8	98.1	1.1	0.8
LCS Diablo	---	---	128	48.9	100	6/26	31	6	10.0	97.1	2	0.9
2IM17-2221	---	---	124	49.2	99	6/25	35	0	10.3	97.7	1.5	0.8
Moravian 179	146	155	123	49.1	100	6/26	33	0	10.7	96.3	2.5	1.2
Moravian 180	---	---	121	48.4	100	6/25	28	0	10.5	96.4	2.4	1.2
2IM16-0154	---	---	119	50.3	100	6/24	36	0	10.9	95.4	2.8	1.8
ABI Eagle	159	152	119	49.9	100	6/24	37	0	10.3	96.5	2.4	1.1
Merit 57	145	134	115	49.1	100	6/26	40	0	10.1	92.1	5.9	2.0
11ARS183-9	142	135	115	50.1	100	6/24	40	0	11.4	97.8	1.4	0.8
Conrad	162	131	112	50.1	100	6/25	39	0	11.4	97.6	1.5	0.9
ABI Voyager	122	134	110	49.9	100	6/22	39	0	12.2	98.2	1	0.8
AAC Synergy	170	140	109	49.7	100	6/24	36	0	11.6	96.7	2.5	0.8
11ARS162-4	136	126	107	49.0	100	6/24	40	8	11.6	96.2	2.5	1.3
AAC Connect	160	133	106	49.5	100	6/25	40	13	11.3	93.0	4.3	2.7
AC Metcalfe	137	122	102	50.5	100	6/25	40	13	11.2	97	1.9	1.1
Average	**145**	**140**	**127**	**49.4**	**100**	**6/25**	**34**	**1**	**10.5**	**96.6**	**2.2**	**1.2**
LSD (α=.05)	**20**	**20**	**16**	**1.8**	**1**	**1**	**3**	**10**				
CV (%)	**9.7**	**9.9**	**8.8**	**2.3**	**0.7**	**0.6**	**6.7**	**543**				
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**0.4997**	**0.8281**	**<0.0001**	**<0.0001**	**0.4798**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 54. Agronomic Data for Two-rowed Malt Barley at Idaho Falls, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64	(>5.5/64	% Thin
Esma	152	139	**159**	50.8	100	6/27	37	59	11.9	92.7	5.5	1.8
KWS Amadora	163	128	**156**	51.7	100	6/27	32	13	11.6	95.8	3.1	1.1
KWS Fantex	161	109	**152**	50.3	100	6/29	34	11	12.2	92.9	4.9	2.2
BC Lexy	---	117	**145**	48.2	99	6/28	35	46	11.7	90.9	6.4	2.7
Moravian 179	150	112	143	51.5	98	6/29	37	19	13.3	96.4	2.4	1.2
KWS Willis	---	---	142	49.4	100	6/29	37	43	11.6	94.6	3.4	2
11ARS162-4	127	126	140	50.4	99	6/25	41	13	13.1	94.1	3.9	2
KWS Jessie	172	134	138	48.6	97	6/27	31	18	10.8	91.1	5.5	3.4
LCS Diablo	---	---	136	47.4	100	7/1	36	39	12.0	90.7	5	4.3
BC Ellinor	158	123	135	49.7	100	6/29	35	26	12.0	92.8	4.6	2.6
2IM14-8212	137	117	133	50.6	91	6/25	40	6	12.8	95.9	2.3	1.8
LCS Odyssey	156	132	131	48.9	100	6/29	35	54	12.1	89.2	7	3.8
Moravian 69	131	98	129	49.3	100	6/29	33	41	13.3	87.5	7.7	4.8
ABI Voyager	141	126	128	51.2	98	6/24	41	30	13.0	97.9	1.2	0.9
GemCraft	134	109	128	49.9	99	6/27	39	30	13.1	92.4	4.9	2.7
BC Leandra	166	106	127	46.9	100	6/29	32	81	12.9	87.1	8.8	4.1
LCS Genie	---	121	126	51.3	100	6/29	34	31	11.7	91.8	5.1	3.1
AAC Synergy	136	131	124	51.0	100	6/27	41	44	13.7	92.4	4.5	3.1
AAC Connect	132	138	122	51.2	99	6/26	42	14	13.6	91.1	5.9	3
2IM16-0154	---	---	121	51.5	93	6/24	41	50	13.4	93.5	3.8	2.7
2IM17-2221	---	---	121	50.2	99	6/27	38	65	13.6	94.1	3.8	2.1
ABI Eagle	137	127	120	51.5	90	6/28	39	23	13.3	94	4.1	1.9
15ARS182-1	---	---	119	50.2	100	6/28	41	23	12.3	95.5	2.7	1.8
LCS Opera	167	77	119	46.5	98	7/1	34	73	11.1	81.2	11.1	7.7
Moravian 180	---	---	118	49.6	97	6/23	33	36	13.4	91.6	4.9	3.5
CDC Copeland	122	100	116	49.7	99	6/28	44	53	13.2	90.6	5.7	3.7
AC Metcalfe	---	106	113	50.8	100	6/26	39	69	13.6	95.6	2.8	1.6
Conrad	130	115	112	50.0	99	6/29	42	76	14.8	90.1	5.8	4.1
11ARS183-9	138	112	107	50.1	99	6/29	41	59	13.3	90.2	5.8	4.0
Merit 57	136	109	99	50.3	86	6/29	42	44	12.8	87.3	7.5	5.2
Average	**143**	**118**	**128**	**49.9**	**98**	**6/27**	**37**	**39**	**12.7**	**92.0**	**5.0**	**3.0**
LSD (α=.05)	**14**	**28**	**15**	**1.8**	**8**	**1**	**3**	**44**				
CV (%)	**7.5**	**15.7**	**8.3**	**2.5**	**5.6**	**0.4**	**6**	**80**				
Pr > F	**<0.0001**	**0.0283**	**<0.0001**	**<0.0001**	**0.0281**	**<0.0001**	**<0.0001**	**0.0191**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 55. Agronomic Data for Two-rowed Malt Barley at Tetonia, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020*	2021*	2022**	Test Wt (lb/bu)	Spring Stand %	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64	(>5.5/64	% Thin
KWS Willis	---	---	**163**	51.2	100	7/14	29	0	9.5	97.1	1.8	1.1
KWS Amadora	147	122	**162**	52.3	100	7/13	30	0	9.5	94.1	4.1	1.8
BC Leandra	157	144	**159**	51.2	100	7/17	29	0	9.3	93.9	4.5	1.6
Esma	---	124	**158**	52.6	100	7/12	32	0	10.3	94.1	3.6	2.3
BC Lexy	---	119	**156**	50.0	100	7/15	30	0	9.0	93.6	4.3	2.1
Moravian 179	---	---	**156**	52.9	100	7/16	29	0	10.7	95.6	2.9	1.5
LCS Opera	140	133	**155**	49.7	100	7/17	28	1	9.2	84.6	10.1	5.3
GemCraft	145	133	**154**	52.1	100	7/15	33	24	10.1	94.3	4.1	1.6
15ARS182-1	---	---	**151**	52.1	100	7/17	34	18	9.9	94.6	3.3	2.1
BC Ellinor	161	135	**149**	49.7	100	7/15	29	0	9.4	91.3	6.5	2.2
KWS Jessie	147	144	148	49.8	100	7/13	27	0	8.9	93.3	4.8	1.9
KWS Fantex	179	139	147	50.5	100	7/15	28	0	8.9	90.5	6.5	3
ABI Eagle	148	125	146	51.0	100	7/15	34	9	10.7	87.5	8.4	4.1
LCS Odyssey	155	146	145	50.5	100	7/16	29	11	8.9	91.7	5.6	2.7
LCS Diablo	---	---	145	49.3	100	7/17	28	0	8.9	91.2	6.5	2.3
LCS Genie	---	134	145	52.3	100	7/16	31	0	9.2	92.1	5	2.8
2IM16-0154	---	---	145	53.0	100	7/12	34	18	9.9	95.4	2.8	1.8
2IM14-8212	146	107	144	52.1	100	7/12	35	1	10.1	96.2	2.5	1.3
Conrad	124	115	144	52.8	100	7/14	38	6	10.7	93.5	4.4	2.1
2IM17-2221	---	---	142	52.2	100	7/12	34	1	10.5	95.9	2.7	1.4
Moravian 69	---	---	140	51.6	100	7/16	28	0	9.2	92.3	5.4	2.3
11ARS183-9	135	125	137	51.6	100	7/12	37	4	10.0	95.5	3.3	1.2
AAC Synergy	133	116	136	53.0	100	7/12	36	10	10.2	96.1	2.4	1.5
11ARS162-4	122	106	134	50.9	100	7/12	37	15	10.7	93	5	2
ABI Voyager	132	114	134	51.9	100	7/12	36	7	11.1	96.3	2.4	1.3
Merit 57	131	105	133	51.9	100	7/14	34	8	9.7	88.6	8.3	3.1
AAC Connect	113	114	132	52.6	100	7/12	35	8	10.6	92.7	5.1	2.2
CDC Copeland	125	127	130	52.5	100	7/14	36	21	9.6	92.3	5.5	2.2
AC Metcalfe	132	108	122	51.8	100	7/12	37	11	11.0	91.6	6.1	2.3
Moravian 180	---	---	119	50.7	100	7/12	27	0	9.9	93.1	4.2	2.7
Average	**---**	**---**	**144**	**51.5**	**100**	**7/14**	**32**	**6**	**9.9**	**93.1**	**4.7**	**2.2**
LSD (α=.05)	**---**	**---**	**14**	**1**	**0**	**2**	**3**	**17**				
CV (%)	**---**	**---**	**6.9**	**1.3**	**0**	**0.6**	**5.6**	**207**				
Pr > F	**---**	**---**	**<0.0001**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**0.0764**				

* The trial location in 2020 and 2021 was in Ashton

** Varieties or selections in bold are not statistically different from the top yielding variety.

Table 56. Agronomic Data for Two-row Spring Malt Barley at Soda Springs, Dryland, 2022.

Variety or Selection	Yield (bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (>6/64)	(>5.5/64)	% Thin
KWS Fantex	52	22	**51**	52.5	100	7/17	19	0	10.3	87.0	8.8	4.2
KWS Jessie	47	26	**50**	51.7	100	7/13	20	0	10.4	89.1	6.8	4.1
Esma	---	23	**48**	52.0	100	7/17	21	0	11.3	84.3	11.4	4.3
Conrad	40	20	**48**	51.8	100	7/17	23	0	12.3	91.7	6.2	2.1
Merit 57	48	23	**48**	52.0	100	7/16	22	0	11.3	80.3	13.4	6.3
11ARS183-9	46	21	**47**	51.3	100	7/16	24	0	11.6	91.5	6.3	2.2
KWS Amadora	48	22	**47**	51.9	100	7/14	20	0	10.9	85.3	10.4	4.3
KWS Willis	---	---	**47**	52.1	100	7/14	22	0	10.8	94.8	3.0	2.2
11ARS162-4	45	25	**44**	50.5	100	7/16	23	0	11.3	81.7	12.1	6.2
GemCraft	46	25	**43**	50.9	100	7/17	20	0	11.6	80.0	13.0	7.0
AAC Synergy	37	24	**43**	50.2	100	7/16	25	0	11.0	84.4	11.1	4.5
ABI Voyager	38	22	42	51.7	100	7/16	23	0	12.2	93.3	4.8	1.9
AAC Connect	37	23	40	50.2	100	7/15	21	0	13.0	75.5	17.2	7.3
15ARS182-1	---	---	40	50.2	100	7/19	19	0	10.9	81.8	12.1	6.1
Moravian 180	---	---	39	50.9	100	7/11	17	0	11.1	91.6	5.0	3.4
AC Metcalfe	38	21	38	51.8	100	7/15	25	0	12.1	87.5	9.2	3.3
Moravian 179	---	---	38	51.7	100	7/17	20	0	12.3	86.7	9.1	4.2
Moravian 69	51	26	36	50.5	100	7/18	20	0	11.4	78.4	15.2	6.4
CDC Copeland	46	23	35	51.0	100	7/17	25	0	12.5	92.7	5.3	2.0
AVERAGE	**45**	**24**	**43**	**51.3**	**100**	**7/16**	**21**	**0**	**11.5**	**86.2**	**9.5**	**4.3**
LSD	**7**	**4**	**8**	**0.9**	**0**	**2**	**2**	**0**				
CV	**10.7**	**12.4**	**11.7**	**1.2**	**0**	**0.6**	**5.3**	**.**				
P>F	**<0.0001**	**0.0013**	**0.0004**	**<0.0001**	**.**	**<0.0001**	**<0.0001**	**.**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

Table 57. 2-Row Spring Malt Barley Yield Percentage of Location Averages, 2022.
(100% = Average)

Variety or Selection	Aberdeen	Rupert	Idaho Falls	Tetonia	Soda Springs	Variety Average
Esma	103	116	123	110	112	**113**
KWS Fantex	106	108	118	102	119	**111**
KWS Amadora	102	100	121	113	109	**109**
KWS Willis	108	100	110	113	108	**108**
BC Lexy	116	94	112	108	---	**107**
KWS Jessie	109	102	107	102	116	**107**
BC Leandra	112	103	98	110	---	**106**
BC Ellinor	105	108	105	104	---	**105**
GemCraft	114	101	99	107	101	**104**
LCS Opera	110	103	92	107	---	**103**
LCS Odyssey	106	99	102	101	---	**102**
2IM14-8212	102	102	103	100	---	**102**
Moravian 179	97	100	111	108	88	**101**
ABI Eagle	93	114	93	102	---	**101**
LCS Genie	113	90	97	101	---	**100**
LCS Diablo	100	91	106	101	---	**99**
11ARS162-4	84	107	108	93	102	**99**
Conrad	88	106	87	100	111	**98**
15ARS182-1	103	99	92	105	92	**98**
Moravian 69	118	92	100	97	84	**98**
2IM17-2221	97	102	94	98	---	**98**
2IM16-0154	94	101	94	100	---	**97**
ABI Voyager	86	107	99	93	98	**97**
11ARS183-9	91	96	83	95	110	**95**
AAC Synergy	86	97	96	94	101	**95**
Merit 57	91	100	77	92	111	**94**
CDC Copeland	101	102	90	90	82	**93**
AAC Connect	83	87	95	92	93	**90**
Moravian 180	96	80	92	82	91	**88**
AC Metcalfe	80	88	87	85	88	**86**
Location Average (bu/A)	**127**	**131**	**129**	**144**	**43**	

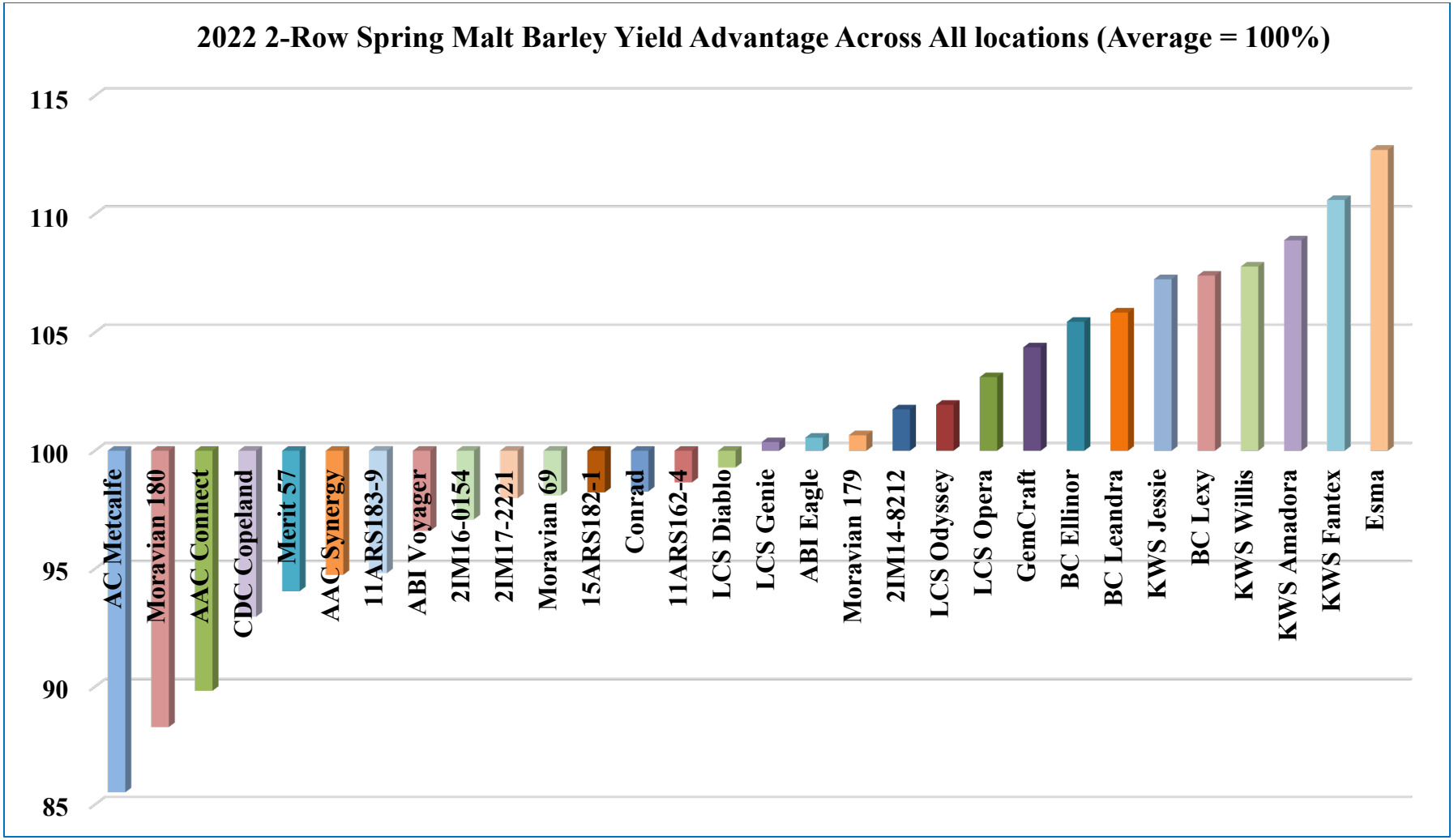


Chart 7. 2-Row Spring Malt Barley Yield Percentage Across All Locations.

Table 58. 2-Row Spring Feed Barley Irrigated Nurseries, 3-Year Averages (2020-2022; 12 site-years)

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley										
HO516-429	147	51.8	100	6/24	38	16	10.5	94.1	3.5	2.4
Altorado	142	52.4	100	6/24	35	8	10.7	92.9	4.8	2.3
Oreana	142	51.3	99	6/26	31	19	10.5	88.3	7.6	4.1
Claymore	141	51.2	100	6/24	37	15	10.5	92.4	5.1	2.5
Champion	132	52.5	100	6/22	37	18	11.1	93.0	4.4	2.6
Idagold II	128	51.6	100	6/24	35	15	10.9	91.6	5.1	3.3
FeedMor	127	51.6	100	6/25	30	10	11.1	96.1	2.0	1.9
Feed Average	**137**	**51.8**	**100**	**6/24**	**35**	**14**	**10.8**	**92.6**	**4.6**	**2.7**
2-Row Spring Food Barley										
Kardia	127	50.4	100	6/27	37	21	10.7	90.2	6.5	3.3
Julie*	95	59.2	97	6/29	36	5	14.0	89.2	7.4	3.4
Goldenhart*	91	57.8	96	6/26	36	24	14.2	85.4	9.3	5.3
Transit*	87	56.6	98	6/26	39	11	14.4	79.2	15.2	5.6
Food Average	**100**	**56**	**98**	**6/27**	**37**	**15**	**13.3**	**86.0**	**9.6**	**4.4**
Standard Error	**2.5**	**0.2**	**0.4**	**0.2**	**0.4**	**2.8**				
Pr>F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0002**				
Pr>F (variety*year)	**0.0007**	**0.0052**	**<0.0001**	**0.0002**	**0.8248**	**0.0176**				
Pr>F (variety*location)	**0.1346**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0326**	**0.0279**				
Pr>F (year*location)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**				
Pr>F (variety*year*location)	**0.0174**	**0.1206**	**<0.0001**	**<0.0001**	**0.0005**	**0.0742**				

* Indicates hulless variety.

Table 59. 2-Row Spring Feed Barley Dryland Nurseries, 3-Year Averages (2020-2022; 3 site-years)

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley										
Claymore	45	51.1	98	7/12	26	0	10.5	87.5	9.4	3.1
HO516-429	44	51.8	100	7/11	25	0	10.7	91.0	6.7	2.3
Champion	43	53.0	100	7/13	25	0	11.0	88.2	8.9	2.9
Altorado	43	51.3	100	7/12	24	0	10.5	83.5	13.2	3.3
Idagold II	41	51.9	100	7/12	23	0	10.9	90.2	7.0	2.8
Oreana	40	52.2	99	7/14	21	0	11.0	88.5	8.1	3.4
FeedMor	35	51.7	100	7/12	20	0	11.5	95.4	2.1	2.5
Feed Average	42	51.9	99	7/12	23	0	10.9	89.2	7.9	2.9
2-Row Spring Food Barley										
Kardia	32	51.0	99	7/15	23	0	12.4	92.7	5.5	1.8
Goldenhart*	31	56.6	90	7/15	22	0	13.8	68.0	23.3	8.7
Julie*	26	56.3	92	7/19	22	0	14.3	81.7	14.3	4.0
Transit*	26	55.6	97	7/14	26	0	14.2	64.7	27.0	8.3
Food Average	**29**	**54.9**	**94**	**7/15**	**23**	**0**	**13.7**	**76.8**	**17.5**	**5.7**
Standard Error	**1.8**	**0.6**	**0.8**	**0.4**	**7.1**	**.**				
Pr>F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**				
Pr>F (variety*year)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**				

* Indicates hulless variety.

Table 60. Irrigated 2-Row Spring Feed and Food Barley Data Combined from Aberdeen, Rupert, Idaho Falls and Tetonia, 2022

Variety or Selection	Yield (bu/A)	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley										
Oreana	150	50.7	100	6/30	33	32	11.5	85.2	9.0	5.8
Altorado	146	52.0	100	6/28	36	14	11.6	89.4	6.9	3.7
Claymore	144	50.6	100	6/28	38	26	11.6	88.2	7.4	4.4
HO516-429	139	51.2	100	6/29	39	24	11.1	90.9	5.3	3.8
10ARS191-3	134	51.2	100	6/29	39	28	11.5	89.5	6.4	4.1
Idagold II	133	51.2	100	6/28	36	17	11.8	88.5	6.7	4.8
Champion	130	51.6	100	6/27	38	33	12.0	87.8	7.7	4.5
FeedMor	127	50.9	100	6/30	31	28	11.8	94.6	2.8	2.6
Diamondback (SB6)	119	44.5	100	6/28	28	14	12.6	78.3	14.4	7.3
Moravian 180	116	48.7	100	6/26	27	13	11.5	90.2	5.3	4.5
HO517-126**	97	59.1	100	6/23	34	0	11.5	70.4	21.5	8.1
Feed Average	**130**	**51.1**	**100**	**6/27**	**34**	**21**	**11.7**	**86.6**	**8.5**	**4.9**
2-Row Spring Food Barley										
Kardia	119	49.8	100	7/2	39	36	12.8	84.5	8.9	6.6
14ARS235-5*	100	56.3	98	7/1	38	21	13.0	76.9	15.2	7.9
Transit*	86	56.5	100	7/1	40	22	14.8	73.1	18.2	8.7
Julie*	85	58.7	96	7/4	37	11	13.2	85.5	9.3	5.2
Goldenhart*	80	57.6	98	7/1	37	34	14.0	79.2	13.2	7.6
Food Average	**94**	**55.8**	**98**	**7/1**	**38**	**25**	**13.6**	**79.8**	**13.0**	**7.2**
Standard Error	**3.5**	**0.3**	**0.6**	**0.3**	**0.6**	**6.1**				
Pr>F (variety)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0**				
Pr>F (location)	**0.0077**	**<0.0001**	**0.0083**	**<0.0001**	**0.0001**	**<0.0001**				
Pr > F (variety*location)	**0.0067**	**<0.0001**	**<0.0001**	**<0.0001**	**0.2561**	**0.1349**				

SB6 = six row barley

* Indicates hulless variety.

Table 61. Agronomic Data for Spring Feed and Food Barley, Rupert, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley												
Claymore	170	148	**157**	49.2	100	6/21	37	46	11.9	77.3	12.3	10.4
Oreana	161	155	**152**	49.5	100	6/22	31	70	13.1	73.0	15.5	11.5
Altorado	142	166	**142**	50.2	100	6/22	34	48	12.5	74.2	15.9	9.9
Idagold II	153	133	128	48.7	100	6/21	34	61	12.5	70.5	16.1	13.4
HO516-429	173	156	126	49.5	100	6/23	37	54	12.7	78.6	11.8	9.6
10ARS191-3	---	---	125	49.2	100	6/21	37	53	12.3	77.8	12.3	9.9
FeedMor	149	133	125	50.1	100	6/23	29	44	13.6	91.0	4.3	4.7
Champion	146	131	120	49.8	100	6/20	36	80	12.4	70.7	17.1	12.2
Moravian 180	---	142	113	46.7	100	6/18	26	20	12.9	79.4	10.1	10.5
HO517-126	---	---	107	59.3	100	6/22	31	0	11.8	68.5	19.2	12.3
Diamondback (SB6)	---	140	101	42.0	100	6/22	25	8	14.0	62.1	23.7	14.2
Feed Average	**156**	**140**	**127**	**49.5**	**100**	**6/21**	**32**	**44**	**12.7**	**74.8**	**14.4**	**10.8**
2-Row Spring Food Barley												
Kardia	155	132	98	48.4	100	6/25	37	73	14.2	71.0	15.0	14.0
Julie**	125	109	80	57.5	100	6/26	38	31	14.1	67.1	18.4	14.5
Transit**	115	94	80	55.0	100	6/25	39	41	16.0	56.9	26.0	17.1
14ARS235-5**	---	105	79	56.1	95	6/24	35	33	15.4	73.0	16.8	10.2
Goldenhart**	119	90	62	55.4	100	6/24	35	75	15.4	70.7	15.1	14.2
Food Average	**128**	**106**	**80**	**54.3**	**99**	**6/25**	**37**	**51**	**15.0**	**67.7**	**18.3**	**14.0**
LSD (α=.05)	**16**	**26**	**23**	**1.9**	**2**	**2**	**2**	**38**	**13.4**			
CV (%)	**7.6**	**13.2**	**12.8**	**2.6**	**1.4**	**0.90**	**4.2**	**59.0**				
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0022**	**<0.0001**	**<0.0001**	**0.002**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety.

SB6 = six row barley.

Table 62. Agronomic Data for Spring Feed and Food Barley, Aberdeen, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley												
Oreana	118	147	**147**	49.8	100	6/25	33	0	10.5	95.0	3.7	1.3
Altorado	111	155	**140**	51.1	100	6/21	37	0	11.4	95.7	3.1	1.2
Claymore	115	152	**140**	50.2	99	6/23	40	16	11.8	93.1	5.3	1.6
HO516-429	78	163	139	51.0	99	6/23	38	0	10.3	98.1	1.2	0.7
Idagold II	97	134	133	51.2	99	6/22	36	0	11.6	96.8	2.3	0.9
10ARS191-3	---	---	132	50.5	100	6/24	40	6	12.1	95.5	3.3	1.2
FeedMor	75	140	124	49.8	100	6/23	30	6	10.9	97.0	1.8	1.2
Diamondback (SB6)	---	138	122	44.5	100	6/21	29	0	13.5	83.2	11.1	5.7
Champion	120	140	120	50.6	100	6/20	40	0	11.5	96.1	2.8	1.1
Moravian 180	---	129	115	48.5	100	6/20	28	0	10.8	97.0	1.9	1.1
HO517-126	---	---	96	57.7	100	6/23	38	0	11.2	72.3	24.2	3.5
Feed Average	**102**	**142**	**131**	**50.5**	**100**	**6/22**	**35**	**3**	**11.4**	**92.7**	**5.5**	**1.8**
2-Row Spring Food Barley												
Kardia**	63	128	122	49.2	100	6/26	40	16	12.9	91.0	5.2	3.8
14ARS235-5**	---	95	105	52.3	100	6/26	40	13	14.3	73.0	17.1	9.9
Transit**	115	95	94	53.8	100	6/26	40	16	16.7	75.9	17.6	6.5
Julie**	108	92	85	56.3	99	6/29	37	1	13.6	92.1	5.8	2.1
Goldenhart**	112	101	81	55.5	100	6/24	38	15	13.3	84.5	12.3	3.2
Food Average	**112**	**102**	**97**	**53.4**	**100**	**6/26**	**39**	**12**	**14.2**	**83.3**	**11.6**	**5.1**
LSD (α=.05)	**23**	**23**	**18**	**2.2**	**1**	**2**	**3**	**21**				
CV (%)	**15.2**	**10.3**	**10**	**2.7**	**0.8**	**0.7**	**6.2**	**242**				
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.1275**	**<0.0001**	**<0.0001**	**0.4839**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety.

SB6 = six row barley.

Table 63. Agronomic Data for Spring Feed and Food Barley at Idaho Falls, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley												
Altorado	163	107	**154**	53.5	100	6/27	42	8	13.0	93.3	4.5	2.2
Claymore	159	129	138	51.1	100	6/26	43	40	13	91.2	5.3	3.5
Oreana	150	141	135	51.0	100	6/29	35	59	13	78.8	13.1	8.1
Champion	146	117	133	52.8	100	6/25	42	54	14	91.3	5.7	3.0
Diamondback (SB6)	---	37	133	54.1	100	6/27	32	49	12.9	77.5	15.5	7
HO516-429	182	130	128	51.7	100	6/27	45	38	12	91.5	5.1	3.4
Idagold II	141	100	125	52.0	100	6/26	42	8	13	92.5	4.6	2.9
FeedMor	148	105	123	51.6	99	6/29	38	60	13	94.2	3.0	2.8
10ARS191-3			121	52.4	100	6/27	42	36	13.1	91.7	5.0	3.3
Moravian 180	---	89	118	49.8	98	6/24	31	33	13	90.3	5.6	4.1
Feed Average	**153**	**104**	**131**	**52.0**	**100**	**6/27**	**39**	**38**	**12.9**	**89.2**	**6.7**	**4.1**
2-Row Spring Food Barley												
Kardia**	145	115	113	50.1	100	6/30	42	39	14.2	83.6	9.1	7.3
14ARS235-5**	---	91	103	58.1	97	6/29	43	40	13.3	83.7	9.5	6.8
Julie**	111	95	82	59.0	86	7/3	41	11	14.2	91.7	5.7	2.6
Goldenhart**	108	86	80	57.8	93	6/30	42	48	16.1	82.5	9.7	7.8
Transit**	106	71	76	57.3	100	6/30	45	31	14.7	74.2	18.5	7.3
Food Average	**118**	**92**	**91**	**56.5**	**95**	**6/30**	**42**	**34**	**14.5**	**83.1**	**10.5**	**6.4**
LSD (α=.05)	**17**	**28**	**15**	**1.5**	**6**	**1**	**4**	**46**				
CV (%)	**8.4**	**19.7**	**8.6**	**1.9**	**4.2**	**0.4**	**6**	**88**				
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**0.0008**	**<0.0001**	**<0.0001**	**0.3816**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety.

SB6 = six row barley.

Table 64. Agronomic Data for Spring Feed and Food Barley at Tetonia, Irrigated, 2022

Variety or Selection	Yield (Bu/A) 2020*	2021*	2022**	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	(> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley												
Oreana	120	119	**166**	52.7	100	7/16	31	0	9.7	90.2	7.1	2.7
HO516-429	111	131	**164**	52.7	100	7/13	36	6	9.4	95.5	3.3	1.2
10ARS191-3	---	---	**159**	52.9	100	7/14	35	18	8.6	93.3	5.0	1.7
Claymore	117	131	152	51.7	100	7/13	34	0	10.0	91.0	6.7	2.3
Altorado	134	125	148	53.3	99	7/13	33	0	9.3	94.0	4.3	1.7
Idagold II	119	114	148	52.9	100	7/12	33	0	9.8	94.1	3.8	2.1
Champion	124	133	147	53.3	100	7/12	37	0	10.7	92.9	5.2	1.9
FeedMor	115	106	138	52.0	100	7/13	27	0	10.1	95.7	2.4	1.9
Diamondback (SB6)	---	69	126	46.4	100	7/13	25	0	9.8	90.7	7.1	2.2
Moravian 180	---	86	120	49.8	100	7/12	25	0	9.0	94.7	3.2	2.1
Feed Average	**120**	**113**	**147**	**51.8**	**100**	**7/13**	**32**	**2**	**9.6**	**93.2**	**4.8**	**2.0**
2-Row Spring Food Barley												
Kardia***	138	132	142	51.6	100	7/15	36	17	10.0	93.5	5.1	1.4
14ARS235-5***	---	104	120	58.9	100	7/17	34	0	8.9	78.0	17.3	4.7
Transit***	83	79	100	60.3	100	7/15	36	0	11.7	82.7	13.4	3.9
Julie***	98	86	99	62.0	99	7/19	34	0	11.0	91.3	6.8	1.9
Goldenhart***	99	91	98	61.7	99	7/16	33	0	11.0	77.3	17.5	5.2
Food Average	**101**	**98**	**112**	**58.9**	**100**	**7/16**	**35**	**3**	**10.5**	**84.6**	**12.0**	**3.4**
LSD (α=.05)	**16**	**21**	**13**	**0.9**	**1**	**1**	**2**	**18**				
CV (%)	**10**	**13**	**6.7**	**1.2**	**0.9**	**0.4**	**5.6**	**472**				
Pr > F	**0.0937**	**<0.0001**	**<0.0001**	**<0.0001**	**0.4708**	**<0.0001**	**<0.0001**	**0.5566**				

* The trial location in 2020 and 2021 was in Ashton

** Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety.

SB6 = six row barley.

Table 65. Agronomic Data for Spring Feed and Food Barley at Soda Springs, Dryland, 2022

Variety or Selection	Yield (Bu/A) 2020	2021	2022*	Test Wt. (lb/bu)	Spring Stand (%)	Heading Date	Height (in.)	Lodging (%)	Protein (%)	Plump (> 6/64)	Plump (5.5/64)	% Thin
2-Row Spring Feed Barley												
Champion	51	26	**54**	53.1	100	7/14	26	0	11.8	85.3	11.2	3.5
Claymore	61	20	**53**	50.8	99	7/14	24	0	11.6	83.5	11.7	4.8
Idagold II	49	25	**51**	52.2	100	7/15	22	0	12.0	89.8	7.4	2.8
HO516-429	55	27	**49**	52.7	100	7/15	25	0	12.1	92.4	5.3	2.3
Altorado	53	28	**47**	52.4	100	7/15	23	0	11.8	83.3	13.1	3.6
Oreana	55	19	**47**	52.4	100	7/16	20	0	12.1	87.1	9.2	3.7
10ARS191-3	---	---	**45**	51.2	100	7/17	22	0	12.4	78.3	14.5	7.2
Moravian 180	---	14	**45**	51.5	100	7/10	17	0	11.5	93.5	4.0	2.5
FeedMor	51	14	42	51.9	100	7/16	19	0	12.9	95.8	2.1	2.1
Feed Average	**52**	**20**	**48**	**52.0**	**100**	**7/15**	**22**	**0**	**12.0**	**87.7**	**8.7**	**3.6**
2-Row Spring Food Barley												
14ARS235-5**	---	18	44	60.8	97	7/16	22	0	12.0	70.5	23.2	6.3
Kardia**	41	18	37	51.6	100	7/17	23	0	14.7	92.1	5.6	2.3
Goldenhart**	43	14	36	61.8	91	7/18	20	0	15	64.2	26.4	9.4
Transit**	36	11	30	57.6	100	7/14	24	0	14.5	40.7	42.3	17.0
Julie**	40	11	29	59.4	85	7/21	21	0	14.6	81.5	14.2	4.3
Food Average	**40**	**14**	**35**	**58.2**	**95**	**7/18**	**22**	**0**	**14.1**	**69.8**	**22.3**	**7.9**
LSD (α=.05)	**7**	**5**	**9**	**0.9**	**5**	**1**	**2**	**0**				
CV (%)	**9.6**	**19.1**	**14**	**1.1**	**3.4**	**0.5**	**6.9**	**.**				
Pr > F	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**.**				

* Varieties or selections in bold are not statistically different from the top yielding variety.

** Indicates hulless variety.

Table 66. 2-Row Spring Feed and Food Barley Yield Percentage of Location Averages, 2022.

	(100% = Average)					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Tetonia**	**Soda Springs**	**Variety average**
Feed Barley						
Claymore	116	140	118	112	123	**122**
Oreana	122	136	115	123	109	**121**
Altorado	116	127	131	110	109	**119**
HO516-429	116	112	109	121	114	**115**
Idagold II	111	114	107	109	118	**112**
Champion	100	107	113	109	124	**111**
10ARS191-3	110	111	104	118	105	**110**
FeedMor	103	111	105	102	97	**104**
Diamondback (SB6)	102	90	113	93	---	**100**
Moravian 180	95	101	101	89	103	**98**
HO517-126	---	96	---	---	---	**96**
Location Average (bu/A)	**109**	**113**	**112**	**109**	**111**	
Food Barley						
Kardia*	102	88	96	105	86	**95**
14ARS235-5*	88	71	88	89	102	**87**
Transit*	78	71	65	74	70	**72**
Julie*	71	71	70	74	67	**71**
Goldenhart*	68	55	69	73	84	**70**
Location Average (bu/A)	**81**	**71**	**77**	**83**	**82**	

SB6 = Six row barley

* Indicates hulless varieties.

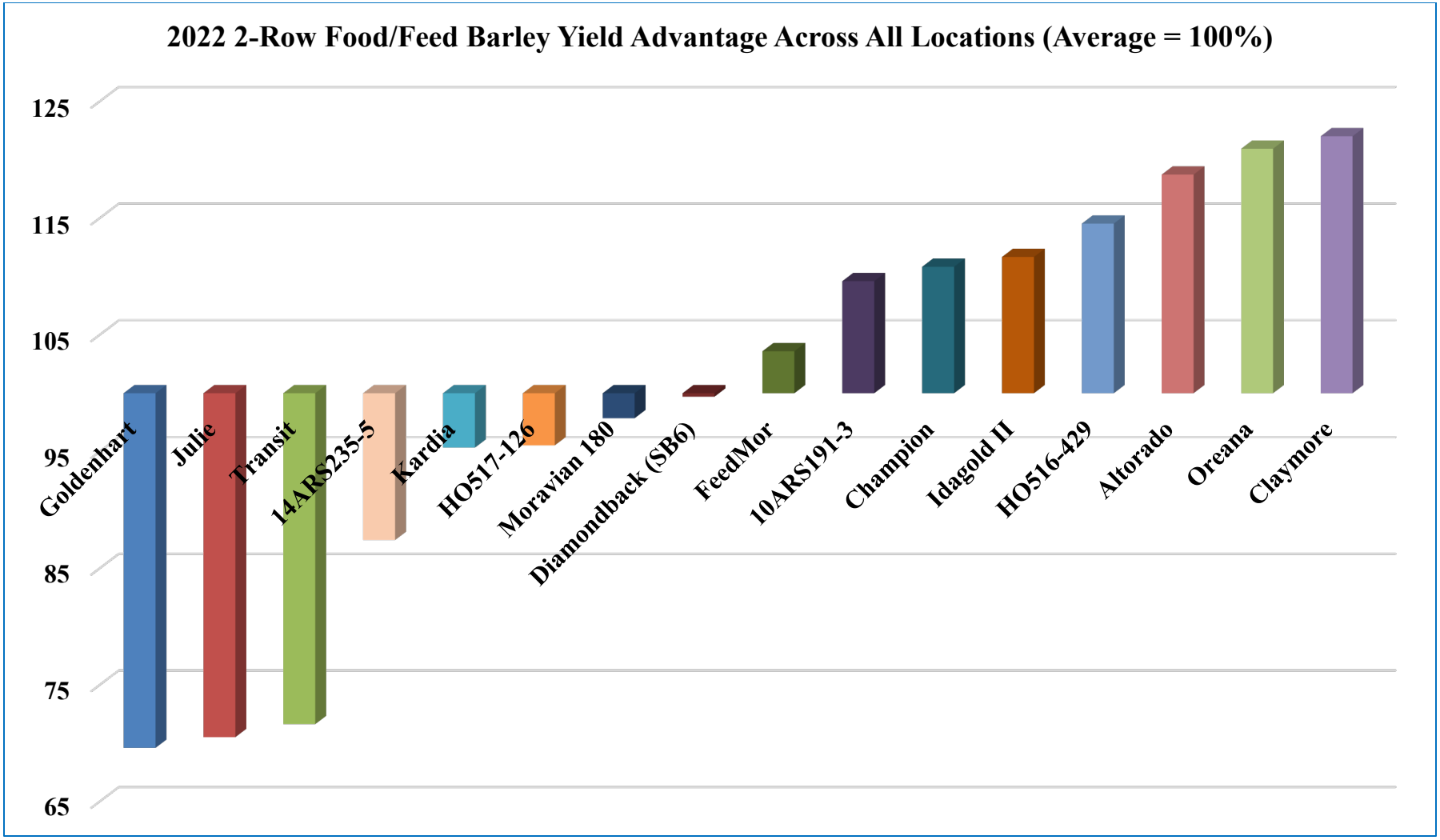


Chart 8. 2-Row Spring Food/Feed Barley Yield Percentage Across All Locations.

Table 67. Grain Protein & Kernel Hardness of Hard Winter Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	----------Grain Protein %----------						----------Kernel Hardness 0-100----------					
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**
Balance	13.2	12.6	11.8	12.2	13.5	**12.7**	90	74	88	82	91	**85**
Flathead	12.2	12.7	11.1	12.2	13.6	**12.4**	86	88	89	95	86	**89**
FourOsix	11.9	12.7	11.5	12.1	12.6	**12.2**	79	76	88	80	87	**82**
IDO1806 (W)	13.5	13.5	11.5	12.5	13.1	**12.8**	83	77	86	86	87	**84**
IDO1906 (W)	13.1	12.6	13.0	12.7	14.2	**13.1**	73	70	85	82	82	**78**
IDO2006 (W)	11.9	12.2	10.6	11.7	12.6	**11.8**	74	67	80	77	74	**74**
Irv (W)	12.5	13.1	12.2	12.3	14.0	**12.8**	83	75	89	89	90	**85**
Kairos	11.6	11.8	11.4	11.6	---	**11.6**	69	63	78	76	---	**72**
Keldin	11.9	12.3	11.1	11.7	12.7	**11.9**	76	78	82	78	74	**78**
Keldin + 11-52-0	12.2	12.2	11.3	11.1	12.8	**11.9**	74	76	83	76	72	**76**
LCS Jet	12.8	12.2	11.5	11.5	13.5	**12.3**	76	76	90	75	83	**80**
LCS Rocket	11.9	12.2	10.6	10.9	---	**11.4**	78	69	86	78	---	**78**
Milestone	12.5	12.6	11.1	12.0	---	**12.0**	79	76	84	88	---	**82**
Millie (W)	12.2	12.6	10.6	12.3	13.2	**12.2**	80	70	78	78	83	**78**
MT1642	12.8	14.1	11.4	12.3	13.0	**12.7**	85	73	83	85	79	**81**
MT1745	12.0	12.2	10.9	11.1	12.0	**11.6**	90	70	84	82	87	**83**
OR2150168H (W)	12.3	12.8	12.0	12.0	13.5	**12.5**	75	66	81	72	83	**75**
OR216011R	11.6	12.2	11.1	11.2	12.7	**11.8**	77	72	90	81	81	**80**
Scorpio	12.9	12.6	11.1	12.3	13.1	**12.4**	84	76	82	80	79	**80**
UI Bronze Jade (W)	13.2	12.8	11.4	11.9	13.9	**12.6**	91	83	91	98	86	**90**
UT-10926-1	12.3	13.0	11.1	12.3	13.1	**12.4**	79	78	80	80	79	**79**
Utah 100	12.6	12.5	11.2	12.1	13.3	**12.3**	94	86	99	92	97	**94**
WA8309	12.1	12.8	12.1	11.7	12.9	**12.3**	68	67	78	67	68	**70**
WB4401	12.2	12.0	10.3	11.0	13.0	**11.7**	94	95	94	102	92	**95**
WB4510CLP	11.6	13.6	12.1	11.5	12.4	**12.2**	80	80	89	92	84	**85**
WB4623CLP	13.4	11.9	10.8	13.2	13.1	**12.5**	79	87	95	84	82	**85**
WB4792	11.1	12.8	10.8	10.8	12.3	**11.6**	92	80	83	92	93	**88**
Yellowstone	12.5	12.6	10.7	12.1	12.9	**12.2**	85	79	83	93	87	**85**
Golden Spike (W)	---	---	---	---	13.1	**13.1**	---	---	---	---	85	**85**
Juniper	---	---	---	---	13.5	**13.5**	---	---	---	---	94	**94**
LCS Yeti (W)	---	---	---	---	12.8	**12.8**	---	---	---	---	73	**73**
LCS Zoom	---	---	---	---	12.9	**12.9**	---	---	---	---	79	**79**
OR2160065H (W)	---	---	---	---	13.1	**13.1**	---	---	---	---	74	**74**
Promontory	---	---	---	---	13.5	**13.5**	---	---	---	---	93	**93**
Sequoia	---	---	---	---	12.3	**12.3**	---	---	---	---	80	**80**
UI Silver	---	---	---	---	13.2	**13.2**	---	---	---	---	95	**95**
UI SRG	---	---	---	---	12.7	**12.7**	---	---	---	---	93	**93**
Location Average	**12.3**	**12.6**	**11.3**	**11.9**	**13.1**	**12.4**	**81**	**76**	**86**	**84**	**84**	**83**

(W) = Hard White Winter

Table 68. Percent Flour Protein and Flour Yield of Hard Winter Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Flour Protein (14% mb)						Flour Yield (%)					
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**
Hard Red Winter Wheat												
Balance	13.7	12.9	10.8	12.5	14.1	**12.8**	74	70	72	75	70	**72**
Flathead	12.4	12.4	11.0	12.3	13.7	**12.4**	78	72	75	77	72	**75**
FourOsix	12.3	12.6	10.8	12.2	13.3	**12.2**	76	71	74	76	72	**74**
Kairos	11.9	12.3	11.0	11.6	---	**11.7**	75	70	72	74	---	**73**
Keldin	12.0	12.0	10.5	11.7	13.4	**11.9**	75	71	72	75	70	**73**
Keldin + 11-52-0	12.4	12.1	10.6	11.4	13.5	**12.0**	73	69	73	75	70	**72**
LCS Jet	12.7	11.8	10.3	11.6	14.4	**12.2**	73	72	72	75	72	**73**
LCS Rocket	11.5	12.2	9.9	10.8	---	**11.1**	75	68	72	75	---	**73**
Milestone	12.2	12.1	10.0	11.8	---	**11.5**	72	69	72	73	---	**71**
MT1642	12.4	13.9	10.6	12.2	13.6	**12.5**	73	64	72	73	70	**70**
MT1745	11.7	12.0	10.6	11.2	12.0	**11.5**	74	70	74	74	72	**73**
OR216011R	11.1	12.4	10.5	11.0	13.0	**11.6**	74	70	74	74	72	**73**
Scorpio	12.5	12.6	10.4	12.0	13.1	**12.1**	71	67	72	72	72	**71**
UT-10926-1	12.4	12.8	10.8	12.0	12.8	**12.1**	71	67	70	71	68	**69**
Utah 100	12.1	12.2	10.7	11.3	12.8	**11.8**	72	70	72	72	71	**71**
WA8309	11.7	12.4	11.3	11.6	13.3	**12.0**	71	68	69	71	69	**69**
WB4401	11.9	11.5	9.8	10.8	13.2	**11.5**	68	66	68	70	66	**67**
WB4510CLP	11.8	13.8	12.0	11.5	12.5	**12.3**	73	69	70	74	70	**71**
WB4623CLP	13.6	11.6	9.8	13.4	13.1	**12.3**	69	69	69	70	69	**69**
WB4792	10.3	12.6	10.3	10.4	12.8	**11.2**	72	69	72	72	71	**71**
Yellowstone	12.2	12.6	10.7	12.0	13.8	**12.2**	73	70	72	74	70	**72**
Juniper	---	---	---	---	14.0	**14.0**	---	---	---	---	71	**71**
LCS Zoom	---	---	---	---	13.6	**13.6**	---	---	---	---	68	**68**
Promontory	---	---	---	---	13.7	**13.7**	---	---	---	---	71	**71**
Sequoia	---	---	---	---	12.7	**12.7**	---	---	---	---	72	**72**
UI Silver	---	---	---	---	13.5	**13.5**	---	---	---	---	71	**71**
UI SRG	---	---	---	---	13.5	**13.5**	---	---	---	---	71	**71**
Location Average	**12.1**	**12.4**	**10.6**	**11.7**	**13.3**	**12.3**	**73**	**69**	**72**	**73**	**70**	**71**
Hard White Winter Wheat												
IDO1806 (W)	13.6	13.7	11.3	12.5	13.7	**13.0**	74	70	73	75	72	**73**
IDO1906 (W)	13.2	12.8	12.3	12.9	14.8	**13.2**	73	67	69	73	69	**70**
IDO2006 (W)	11.6	12.2	9.9	11.5	12.7	**11.6**	73	69	71	73	71	**71**
Irv (W)	12.4	12.6	11.0	11.9	14.6	**12.5**	74	68	71	73	73	**72**
Millie (W)	12.0	12.6	10.0	12.3	13.6	**12.1**	73	68	72	72	72	**71**
OR2150168H (W)	12.1	12.6	11.1	12.1	13.4	**12.3**	70	67	69	70	70	**69**
UI Bronze Jade (W)	13.1	12.6	10.8	11.5	13.7	**12.3**	73	69	73	74	73	**73**
Golden Spike (W)	---	---	---	---	13.5	**13.5**	---	---	---	---	72	**72**
LCS Yeti (W)	---	---	---	---	13.1	**13.1**	---	---	---	---	72	**72**
OR2160065H (W)	---	---	---	---	13.7	**13.7**	---	---	---	---	71	**71**
Location Average	**12.6**	**12.7**	**10.9**	**12.1**	**13.7**	**12.7**	**73**	**68**	**71**	**73**	**71**	**71**

mb = moisture basis

Table 69. Bake Volume of Hard Winter Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Bake Volume (cc)					
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**
Hard Red Winter Wheat						
Balance	1150	1050	775	1000	1000	**995**
Flathead	1050	1100	850	1000	900	**980**
FourOsix	950	1150	875	1075	875	**985**
Kairos	900	1025	925	1050	---	**975**
Keldin	925	1025	875	1025	975	**965**
Keldin + 11-52-0	900	1025	875	975	925	**940**
LCS Jet	900	900	825	925	950	**900**
LCS Rocket	950	1025	800	950	---	**931**
Milestone	925	750	700	1025	---	**850**
MT1642	1050	1075	825	1150	950	**1010**
MT1745	950	950	800	1025	950	**935**
OR216011R	700	950	700	900	900	**830**
Scorpio	825	975	700	875	975	**870**
UT-10926-1	950	975	700	900	975	**900**
Utah 100	900	1025	750	850	925	**890**
WA8309	875	950	800	975	850	**890**
WB4401	725	750	<400	725	900	**775**
WB4510CLP	1075	1075	925	975	850	**980**
WB4623CLP	1125	675	600	925	925	**850**
WB4792	775	1150	850	775	850	**880**
Yellowstone	1025	1050	825	1025	875	**960**
Juniper	---	---	---	---	1000	**1000**
LCS Zoom	---	---	---	---	975	**975**
Promontory	---	---	---	---	1075	**1075**
Sequoia	---	---	---	---	975	**975**
UI Silver	---	---	---	---	1075	**1075**
UI SRG	---	---	---	---	1025	**1025**
Location Average	**935**	**983**	**799**	**958**	**919**	**919**
Hard White Winter Wheat						
IDO1806 (W)	1025	1150	875	1075	950	**1015**
IDO1906 (W)	1025	1025	900	1050	1175	**1035**
IDO2006 (W)	850	1075	875	1000	925	**945**
Irv (W)	800	1025	925	1025	925	**940**
Millie (W)	875	1150	675	1075	925	**940**
OR2150168H (W)	925	925	750	1100	900	**920**
UI Bronze Jade (W)	850	950	700	750	950	**840**
Golden Spike (W)	---	---	---	---	725	**725**
LCS Yeti (W)	---	---	---	---	1025	**1025**
OR2160065H (W)	---	---	---	---	1075	**1075**
Location Average	**907**	**1043**	**814**	**1011**	**958**	**946**

Table 70. Grain Protein & Kernel Hardness of Soft White Winter Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	--------Grain Protein %--------						--------Kernel Hardness 0-100--------					
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**
AP Exceed	9.3	10.1	10.0	9.1	---	**9.6**	25	24	35	26	---	**28**
AP Iliad	10.2	11.1	10.3	10.2	---	**10.4**	29	33	35	30	---	**32**
Brundage	10.7	11.1	9.7	9.8	13.0	**10.9**	30	28	30	30	33	**30**
IDO1708	10.4	10.8	9.8	10.2	---	**10.3**	25	25	26	30	---	**27**
IDO2008	10.8	10.6	9.5	10.1	---	**10.2**	25	22	31	23	---	**25**
LCS Artdeco	9.7	10.0	9.2	9.6	---	**9.6**	25	18	26	25	---	**24**
LCS Blackjack	10.8	10.4	8.9	10.1	---	**10.1**	31	23	27	26	---	**27**
LCS Hulk	9.8	10.7	10.0	10.0	---	**10.1**	25	23	31	26	---	**26**
LWW17-8185	10.8	10.1	9.0	9.1	---	**9.7**	30	21	31	27	---	**27**
M-Press	9.7	10.1	9.1	10.7	12.9	**10.5**	31	30	34	34	35	**33**
M-Press with Root2	10.1	11.0	9.2	10.3	12.5	**10.6**	33	32	32	35	37	**34**
Nixon	10.1	11.1	9.3	10.6	---	**10.3**	25	24	36	25	---	**28**
Norwest Duet	10.8	11.0	9.9	9.9	13.1	**11.0**	34	34	36	38	33	**35**
Norwest Tandem	10.7	10.0	9.4	10.1	---	**10.0**	31	26	40	32	---	**32**
OR2160243	10.8	10.9	9.6	9.9	---	**10.3**	29	28	29	29	---	**29**
OR2160264	10.2	11.1	9.9	10.6	---	**10.5**	30	29	31	28	---	**30**
OR2X2 CL+	11.0	11.6	10.6	11.1	---	**11.1**	27	27	28	27	---	**27**
ORI2190027 CL+	12.3	11.5	10.6	10.9	---	**11.3**	35	27	36	31	---	**32**
Stephens	10.2	10.9	10.2	10.3	14.6	**11.3**	30	29	37	31	39	**33**
Stingray CL+	10.9	11.4	9.7	10.5	---	**10.6**	27	25	29	26	---	**27**
SY Assure	10.4	10.8	9.0	10.2	13.5	**10.8**	26	26	31	30	40	**31**
SY Ovation	9.8	10.3	9.5	10.4	12.7	**10.5**	29	28	30	33	38	**32**
SY Raptor	9.5	10.1	9.8	10.3	---	**9.9**	32	31	41	33	---	**34**
UI Magic CL+	11.1	10.8	9.9	9.9	14.1	**11.2**	30	26	34	29	40	**32**
UI Sparrow	11.2	11.2	9.1	10.9	13.1	**11.1**	38	33	33	35	36	**35**
UIL13-046145A	10.2	10.1	8.7	9.0	---	**9.5**	36	25	32	29	---	**31**
UIL13-553051A	10.9	11.3	9.8	11.1	---	**10.8**	26	27	32	31	---	**29**
UIL13-587007A	10.6	10.9	8.5	10.3	---	**10.1**	32	32	29	31	---	**31**
UIL15-028024	9.9	11.1	8.9	9.6	---	**9.9**	33	35	36	34	---	**35**
VI Shock	10.1	10.1	8.8	10.0	---	**9.7**	24	21	31	30	---	**27**
VI Voodoo CL+	10.5	10.6	9.4	10.5	---	**10.2**	28	19	29	26	---	**26**
VI Presto CL+	11.3	11.3	10.0	9.8	---	**10.6**	29	25	31	24	---	**27**
UIL17-7706A CL+	10.3	10.7	8.8	10.2	---	**10.0**	27	28	31	26	---	**28**
WA8293	9.8	11.6	9.5	10.2	---	**10.3**	27	30	33	30	---	**30**
Piranha CL+	10.9	10.7	8.8	10.6	12.6	**10.7**	23	25	28	27	31	**27**
Sockeye CL+	10.9	10.5	9.4	10.4	12.3	**10.7**	28	26	32	29	31	**29**
WB456	12.4	10.4	10.4	11.2	14.3	**11.7**	35	35	41	42	40	**39**
WB1376CLP	10.9	11.7	10.0	10.7	13.9	**11.4**	29	34	38	29	36	**33**
WB1529	11.0	10.1	9.9	10.1	12.8	**10.8**	30	25	32	30	35	**30**
WB1783	10.7	10.4	8.8	10.1	13	**10.6**	39	25	39	38	46	**37**
YSC-201	11.0	---	---	10.2	---	**10.6**	33	---	---	26	---	**30**
YSC-215	11.3	---	---	10.6	---	**10.9**	26	---	---	28	---	**27**
YSC-268	11.6	---	---	---	---	**11.6**	33	---	---	---	---	**33**
Devote	---	---	---	---	12.34	**12.3**	---	---	---	---	32	**32**
Eltan	---	---	---	---	12.5	**12.5**	---	---	---	---	30	**30**
Eltan 11-52-0	---	---	---	---	12.89	**12.9**	---	---	---	---	32	**32**
OR2130755	---	---	---	---	12.72	**12.7**	---	---	---	---	29	**29**
Otto	---	---	---	---	12.58	**12.6**	---	---	---	---	30	**30**
WA8290	---	---	---	---	12.52	**12.5**	---	---	---	---	34	**34**
Average	**10.6**	**10.8**	**9.5**	**10.2**	**13.0**	**10.8**	**30**	**27**	**33**	**30**	**35**	**30**

Table 71. Percent Flour Protein and Flour Yield of Soft White Winter Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Flour Protein (%)						Flour Yield (%)					
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**
AP Exceed	8.9	9.0	9.4	8.9	---	**9.0**	74	73	73	74	---	**73.5**
AP Iliad	9.7	10.2	9.8	9.9	---	**9.9**	75	72	73	76	---	**74.2**
Brundage	10.0	9.7	9.2	9.4	12.3	**10.1**	75	72	74	76	70	**73.3**
IDO1708	10.2	9.5	9.1	10.0	---	**9.7**	73	72	71	75	---	**72.6**
IDO2008	9.6	9.4	8.8	9.6	---	**9.4**	73	70	74	75	---	**73.0**
LCS Artdeco	9.4	9.2	9.0	9.2	---	**9.2**	73	70	72	75	---	**72.3**
LCS Blackjack	10.0	9.3	8.3	9.6	---	**9.3**	76	75	77	77	---	**76.0**
LCS Hulk	9.3	9.7	9.5	9.5	---	**9.5**	74	72	73	75	---	**73.4**
LWW17-8185	10.6	8.9	8.3	8.9	---	**9.2**	72	69	73	76	---	**72.3**
M-Press	9.3	8.9	8.4	10.1	12.3	**9.8**	76	74	76	76	71	**74.4**
M-Press with Root2	9.7	9.2	8.7	9.7	12	**9.9**	75	73	75	76	71	**74.2**
Nixon	9.4	9.7	8.8	9.8	---	**9.4**	74	72	75	73	---	**73.4**
Norwest Duet	10.1	9.7	9.1	9.2	12.1	**10.0**	74	73	73	76	70	**73.3**
Norwest Tandem	9.9	8.8	8.4	9.5	---	**9.2**	72	72	73	74	---	**72.6**
OR2160243	10.8	9.8	9.1	9.3	---	**9.7**	73	72	74	75	---	**73.6**
OR2160264	9.8	10.3	9.5	10.2	---	**10.0**	76	74	75	76	---	**75.3**
OR2X2 CL+	10.5	10.6	9.9	10.4	---	**10.3**	74	73	74	75	---	**73.9**
ORI2190027 CL+	11.7	10.8	9.9	10.2	---	**10.7**	73	70	72	73	---	**71.9**
Stephens	9.9	10.1	9.7	9.8	13.6	**10.6**	77	73	76	75	68	**73.6**
Stingray CL+	10.2	10.1	9.1	9.6	---	**9.8**	74	70	74	74	---	**73.1**
SY Assure	10.4	10.9	9.2	9.7	12.7	**10.6**	75	74	74	75	68	**73.1**
SY Ovation	9.3	9.2	8.6	9.8	12.3	**9.8**	76	73	76	76	71	**74.5**
SY Raptor	9.2	9.9	9.0	9.7	---	**9.4**	76	74	74	75	---	**74.7**
UI Magic CL+	10.6	9.9	9.2	9.3	13.4	**10.5**	74	71	74	76	69	**72.7**
UI Sparrow	10.3	10.5	8.2	9.7	12.1	**10.2**	74	70	74	72	68	**71.5**
UIL13-046145A	9.3	9.7	8.4	8.5	---	**9.0**	75	70	74	74	---	**73.3**
UIL13-553051A	10.4	9.9	9.2	10.4	---	**10.0**	72	68	72	73	---	**71.3**
UIL13-587007A	10.2	10.1	8.0	9.7	---	**9.5**	74	74	75	74	---	**74.2**
UIL15-028024	9.3	10.0	8.1	9.2	---	**9.2**	74	72	74	75	---	**74.1**
VI Shock	9.8	9.8	8.4	9.5	---	**9.4**	74	72	74	74	---	**73.8**
VI Voodoo CL+	10.0	9.6	8.8	10.1	---	**9.6**	75	70	74	76	---	**73.7**
VI Presto CL+	10.9	11.0	9.4	9.9	---	**10.3**	74	73	74	77	---	**74.4**
UIL17-7706A CL+	10.0	10.4	8.3	9.5	---	**9.6**	74	71	74	76	---	**73.8**
WA8293	9.5	11.0	8.8	9.6	---	**9.7**	76	70	74	76	---	**74.0**
Piranha CL+	10.5	10.2	8.2	9.4	11.9	**10.0**	73	72	74	75	70	**72.5**
Sockeye CL+	10.4	10.0	8.6	9.9	11.7	**10.1**	73	72	74	75	71	**73.0**
WB456	12.3	10.8	9.9	10.2	13.7	**11.4**	73	72	74	75	69	**72.4**
WB1376CLP	10.4	9.7	9.1	9.3	13.3	**10.4**	73	72	73	73	68	**71.9**
WB1529	10.5	9.8	9.4	9.4	12.18	**10.3**	72	71	72	75	69	**71.8**
WB1783	10.1	9.5	8.2	10.6	12.24	**10.1**	75	73	75	75	71	**73.8**
YSC-201	10.3	---	---	10.0	---	**10.1**	74	---	---	74	---	**73.8**
YSC-215	11.1	---	---	10.1	---	**10.6**	74	---	---	75	---	**74.3**
YSC-268	11.2	---	---	---	---	**11.2**	73	---	---	---	---	**72.9**
Devote	---	---	---	---	11.47	**11.5**	---	---	---	---	70	**70.5**
Eltan	---	---	---	---	11.69	**11.7**	---	---	---	---	69	**69.1**
Eltan 11-52-0	---	---	---	---	11.91	**11.9**	---	---	---	---	69	**69.3**
OR2130755	---	---	---	---	12.26	**12.3**	---	---	---	---	71	**71.2**
Otto	---	---	---	---	12.33	**12.3**	---	---	---	---	69	**69.2**
WA8290	---	---	---	---	11.92	**11.9**	---	---	---	---	70	**70.4**
Average	**10.1**	**9.9**	**8.9**	**9.7**	**12.4**	**10.1**	**74.1**	**71.8**	**73.8**	**74.9**	**69.7**	**73.0**

Table 72. Percent Break Flour Yield and Cookie Diameter of Soft White Winter Varieties and Selections Grown in Southeast Idaho, 2021.

	Break Flour Yield (%)						Cookie Diameter (cm)					
Variety or Selection	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**	**Aberdeen**	**Kimberly**	**Rupert**	**Ririe Irrig**	**Rockland**	**Average**
AP Exceed	48.9	51.5	45.0	49.9	---	**48.8**	9.1	9.1	9.0	9.2	---	**9.1**
AP Iliad	46.7	48.0	42.5	49.4	---	**46.7**	9.2	9.3	9.1	9.4	---	**9.3**
Brundage	48.9	51.1	45.9	51.4	49.4	**49.3**	9.2	8.9	9.1	9.3	8.8	**9.1**
IDO1708	47.0	48.5	45.7	49.1	---	**47.6**	8.9	8.7	8.9	9.1	---	**8.9**
IDO2008	51.3	52.3	47.7	54.0	---	**51.3**	9.4	9.1	9.4	9.4	---	**9.3**
LCS Artdeco	47.9	50.9	44.4	49.8	---	**48.3**	9.0	8.8	9.0	9.0	---	**8.9**
LCS Blackjack	47.2	50.4	46.1	49.6	---	**48.3**	9.3	9.2	9.2	9.3	---	**9.3**
LCS Hulk	47.8	50.0	44.3	49.4	---	**47.9**	9.4	9.1	9.0	9.2	---	**9.2**
LWW17-8185	48.1	51.5	45.6	50.8	---	**49.0**	8.9	8.8	8.9	9.3	---	**9.0**
M-Press	47.9	49.4	45.3	49.1	44.0	**47.1**	9.2	9.1	9.1	9.3	8.9	**9.1**
M-Press with Root2	48.0	48.5	44.5	48.6	44.9	**46.9**	9.2	9.2	9.3	9.4	8.9	**9.2**
Nixon	49.3	52.5	44.3	49.8	---	**49.0**	9.3	9.3	9.2	9.3	---	**9.3**
Norwest Duet	47.6	49.7	44.2	48.0	47.5	**47.4**	8.9	8.9	8.9	8.9	8.7	**8.9**
Norwest Tandem	46.8	49.9	41.7	47.3	---	**46.4**	9.1	9.2	9.2	9.2	---	**9.2**
OR2160243	49.5	51.5	47.3	52.6	---	**50.2**	9.4	9.2	9.3	9.4	---	**9.3**
OR2160264	49.0	51.1	46.8	51.1	---	**49.5**	9.2	9.2	9.1	9.1	---	**9.2**
OR2X2CL+	47.1	50.2	44.6	50.3	---	**48.1**	9.3	9.1	9.0	9.2	---	**9.1**
ORI2190027CL+	44.7	46.1	41.3	44.5	---	**44.1**	8.7	8.9	8.8	8.9	---	**8.8**
Stephens	47.0	47.8	44.8	46.8	41.6	**45.6**	9.2	9.3	9.1	9.2	8.4	**9.0**
Stingray CL+	49.9	51.0	47.3	50.5	---	**49.7**	9.1	9.0	9.2	9.2	---	**9.1**
SY Assure	49.4	51.1	47.0	50.1	45.1	**48.5**	9.1	9.2	9.2	9.2	8.9	**9.1**
SY Ovation	48.4	49.4	46.7	48.4	44.2	**47.4**	9.2	9.1	9.0	9.1	8.8	**9.0**
SY Raptor	46.9	49.4	42.8	47.5	---	**46.7**	9.3	9.4	9.1	9.2	---	**9.3**
UI Magic CL+	47.6	51.5	44.7	49.4	42.9	**47.2**	9.0	9.2	9.0	9.1	8.6	**9.0**
UI Sparrow	44.9	47.1	43.7	46.7	45.0	**45.5**	8.7	8.7	8.9	8.8	8.8	**8.8**
UIL13-046145A	49.5	52.1	46.3	51.2	---	**49.8**	9.2	9.2	9.3	9.3	---	**9.3**
UIL13-553051A	47.7	48.0	44.8	48.4	---	**47.2**	9.2	9.0	9.3	9.3	---	**9.2**
UIL13-587007A	44.6	48.1	44.1	46.3	---	**45.8**	8.9	9.0	9.0	9.0	---	**9.0**
UIL15-028024	48.3	49.7	46.7	49.6	---	**48.6**	9.3	9.3	9.5	9.3	---	**9.4**
VI Shock	50.0	52.8	48.1	53.2	---	**51.0**	9.2	9.2	9.6	9.1	---	**9.3**
VI Voodoo CL+	48.4	52.9	46.5	53.8	---	**50.4**	9.1	9.1	9.1	9.1	---	**9.1**
VI Presto CL+	44.4	48.0	42.8	48.5	---	**45.9**	9.1	9.3	9.2	9.2	---	**9.2**
UIL17-7706A CL+	46.9	48.7	43.2	53.8	---	**48.1**	9.0	8.9	9.1	9.1	---	**9.0**
WA8293	46.2	47.9	45.1	49.9	---	**47.2**	9.1	8.8	8.9	9.1	---	**9.0**
Piranha CL+	48.1	49.9	46.3	51.6	46.1	**48.4**	9.3	9.1	9.2	9.3	8.9	**9.1**
Sockeye CL+	50.6	51.2	46.8	52.4	47.7	**49.7**	9.1	9.3	9.2	9.2	8.8	**9.2**
WB456	45.3	49.2	43.2	45.6	42.6	**45.2**	8.8	8.8	9.0	8.8	8.8	**8.8**
WB1376CLP	45.4	48.8	41.5	47.5	44.7	**45.6**	9.3	9.4	9.0	9.0	8.6	**9.1**
WB1529	45.8	49.3	44.1	48.8	47.0	**47.0**	9.3	9.4	9.1	9.3	8.8	**9.2**
WB1783	43.6	46.0	42.4	45.4	42.7	**44.0**	8.7	8.7	8.6	8.9	8.5	**8.7**
YSC-201	48.3	---	---	50.8	---	**49.6**	9.2	---	---	9.4	---	**9.3**
YSC-215	48.7	---	---	52.1	---	**50.4**	9.1	---	---	9.4	---	**9.3**
YSC-268	43.7	---	---	---	---	**43.7**	8.9	---	---	---	---	**8.9**
Devote	---	---	---	---	48.9	**48.9**	---	---	---	---	8.6	**8.6**
Eltan	---	---	---	---	49.2	**49.2**	---	---	---	---	8.5	**8.5**
Eltan 11-52-0	---	---	---	---	48.0	**48.0**	---	---	---	---	8.6	**8.6**
OR2130755	---	---	---	---	49.1	**49.1**	---	---	---	---	8.7	**8.7**
Otto	---	---	---	---	49.2	**49.2**	---	---	---	---	8.5	**8.5**
WA8290	---	---	---	---	46.3	**46.3**	---	---	---	---	8.8	**8.8**
Location average	**47.5**	**49.8**	**44.9**	**49.6**	**46.0**	**47.9**	**9.1**	**9.1**	**9.1**	**9.2**	**8.7**	**9.0**

Table 73. Solvent Retention Capacity data for Soft White Winter Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Aberdeen				Kimberly				Rupert				Ririe Irrigated				Rockland			
Variety or Selection	**Water**	**Sucrose**	**Na2CO3**	**LacticAcid**	**Water**	**Sucrose**	**Na2CO3**	**LacticAcid**	**Water**	**Sucrose**	**Na2CO3**	**LacticAcid**	**Water**	**Sucrose**	**Na2CO3**	**LacticAcid**	**Water**	**Sucrose**	**Na2CO3**	**LacticAcid**
AP Exceed	49.7	86.0	60.7	60.5	49.1	88.8	61.0	65.1	49.5	86.4	62.1	59.4	49.3	85.4	67.0	70.7	---	---	---	---
AP Iliad	50.3	89.1	61.2	63.8	49.6	93.7	61.1	68.5	50.8	88.5	63.9	70.6	50.5	87.5	68.5	71.3	---	---	---	---
Brundage	49.6	89.6	63.5	68.9	49.9	91.8	62.6	71.8	49.4	86.8	61.9	64.1	49.7	86.7	68.9	70.5	48.9	97.0	63.0	91.7
IDO1708	51.1	93.6	63.7	85.5	49.7	95.6	62.7	81.4	49.9	91.7	62.3	74.4	50.4	91.6	67.1	92.3	---	---	---	---
IDO2008	48.8	93.6	61.8	73.9	48.7	97.0	65.6	82.2	49.3	88.3	62.9	64.8	48.8	92.1	68.6	78.8	---	---	---	---
LCS Artdeco	51.1	97.4	62.4	98.8	50.8	104.2	66.6	95.2	50.3	92.7	64.3	86.6	50.1	92.5	69.1	94.8	---	---	---	---
LCS Blackjack	50.3	87.2	59.1	76.4	48.7	88.3	57.4	76.5	49.7	83.8	61.2	64.4	49.3	84.4	67.0	76.9	---	---	---	---
LCS Hulk	50.1	89.4	62.3	74.5	50.2	96.5	64.2	80.5	48.9	89.1	63.5	63.7	49.3	89.5	66.4	78.8	---	---	---	---
LWW17-8185	51.4	93.1	64.4	92.2	51.0	101.4	68.5	91.8	49.8	85.7	63.1	74.1	50.8	87.2	71.0	85.9	---	---	---	---
M-Press	50.4	86.7	61.9	77.2	50.5	89.1	61.8	79.5	50.3	85.9	62.4	72.9	49.7	87.1	65.5	87.5	50.1	93.4	62.0	96.5
M-Press with Root2	50.5	88.1	61.1	78.1	51.5	90.4	61.8	79.7	50.3	86.0	63.6	74.4	50.3	85.3	65.5	83.8	49.7	94.9	61.8	93.8
Nixon	47.6	88.9	58.3	59.3	47.4	93.6	61.8	68.4	48.4	85.2	62.6	56.8	45.7	92.1	63.3	64.4	---	---	---	---
Norwest Duet	49.9	89.8	61.6	80.0	49.9	91.1	63.4	74.9	50.9	88.2	63.7	72.6	49.9	85.8	69.2	75.2	49.9	103.7	66.9	96.5
Norwest Tandem	50.0	91.2	58.9	80.9	49.7	93.2	61.8	78.0	52.7	88.9	63.6	66.4	51.3	90.7	66.3	77.3	---	---	---	---
OR2160243	49.3	92.1	60.3	86.5	49.1	92.8	61.8	82.9	49.6	85.8	62.3	64.9	48.7	86.6	66.0	81.6	---	---	---	---
OR2160264	49.0	85.8	59.2	74.5	48.2	89.1	58.5	77.5	48.8	84.9	59.7	69.7	47.7	84.7	62.4	76.3	---	---	---	---
OR2X2CL+	49.1	89.1	59.0	71.0	49.9	94.7	62.2	76.9	50.0	89.2	62.0	71.8	48.4	99.2	69.7	76.9	---	---	---	---
ORI2190027CL+	53.9	97.1	64.9	74.0	52.3	97.8	64.3	72.9	53.3	91.6	65.3	71.3	52.7	95.2	70.7	76.6	---	---	---	---
Stephens	51.0	89.1	61.6	61.3	51.0	90.4	60.8	69.1	52.0	89.0	63.4	62.6	49.4	91.8	64.5	70.2	51.3	95.9	60.3	98.4
Stingray CL+	49.9	92.1	62.0	65.7	48.3	97.0	64.6	75.2	49.9	88.9	64.3	56.1	48.1	94.9	66.0	65.6	---	---	---	---
SY Assure	50.2	92.9	61.2	62.5	50.2	94.3	64.8	67.4	51.6	89.4	64.1	63.9	49.3	94.3	67.8	66.7	49.8	99.4	66.2	67.4
SY Ovation	50.4	86.6	61.5	60.6	49.4	85.3	60.5	63.9	51.0	86.0	64.4	59.5	48.7	87.5	65.7	70.9	49.8	91.0	60.9	90.4
SY Raptor	48.7	85.6	59.8	51.5	48.4	85.4	60.9	51.5	50.2	85.3	64.1	51.8	48.5	86.9	65.8	54.5	---	---	---	---
UI Magic CL+	50.6	90.2	60.1	95.1	49.3	95.1	62.5	84.2	50.5	87.0	61.6	71.2	50.3	91.0	66.7	83.6	50.1	99.0	61.7	97.6
UI Sparrow	53.3	92.0	64.3	88.9	52.1	95.2	64.7	91.0	53.1	87.4	65.3	72.7	51.8	93.9	69.4	75.9	50.9	97.2	66.8	103.0
UIL13-046145A	52.0	90.7	62.7	75.5	51.2	97.0	66.1	77.1	51.5	88.1	65.3	65.0	49.8	92.3	66.1	93.0	---	---	---	---
UIL13-553051A	49.4	90.2	60.5	65.7	50.5	94.3	62.9	67.4	51.2	86.7	64.2	60.8	50.1	94.2	67.8	71.4	---	---	---	---
UIL13-587007A	52.0	90.9	63.4	83.6	50.7	92.1	62.4	81.9	52.9	89.0	64.7	69.1	50.2	94.6	65.0	84.6	---	---	---	---
UIL15-028024	50.6	87.2	62.7	75.4	49.7	91.0	62.8	84.5	51.3	84.3	64.1	64.0	49.9	88.3	69.3	82.3	---	---	---	---
VI Shock	49.2	91.5	61.0	81.0	48.9	97.9	63.0	80.6	49.2	85.8	61.3	60.3	50.2	97.4	71.5	83.9	---	---	---	---
VI Voodoo CL+	51.2	90.4	60.7	91.1	49.2	103.3	65.2	100.5	50.4	88.0	63.6	79.7	49.4	98.9	69.7	100.4	---	---	---	---
VI Presto CL+	49.0	89.1	59.0	68.8	48.0	89.9	57.8	64.4	48.0	83.2	58.9	56.6	47.8	89.0	62.9	61.2	---	---	---	---
UIL17-7706A CL+	50.3	91.0	61.2	78.9	50.5	94.4	61.3	84.1	50.7	87.3	62.6	65.0	50.2	93.6	66.2	80.3	---	---	---	---
WA8293	51.1	89.8	63.6	68.0	51.2	101.8	66.0	84.8	50.2	87.6	63.3	66.2	51.0	95.7	72.5	76.4	---	---	---	---
Piranha CL+	49.7	96.5	65.0	76.5	49.2	98.6	64.7	75.0	49.8	87.6	62.3	62.9	50.1	100.3	72.0	72.4	49.5	102.3	63.9	90.3
Sockeye CL+	50.7	97.6	66.4	84.1	48.2	95.6	63.2	75.9	48.7	87.5	62.1	63.4	49.3	97.0	69.2	72.9	47.8	97.1	62.8	90.3
WB 456	51.9	94.3	62.2	86.9	53.4	99.2	67.2	70.6	50.3	85.1	60.8	61.8	50.9	89.1	65.1	89.1	50.0	97.1	61.4	71.8
WB1376CLP	50.1	89.3	61.2	66.4	50.4	90.8	61.3	71.6	50.2	86.7	61.7	57.6	49.4	92.9	64.3	92.9	50.1	98.0	63.3	79.2
WB1529	53.0	96.1	65.7	89.8	48.9	89.1	61.0	63.7	50.4	88.0	61.7	70.6	50.6	94.4	72.0	94.4	51.0	103.6	70.7	103.9
WB1783	55.7	98.4	70.0	78.9	49.8	97.2	63.9	76.1	55.2	93.2	67.5	67.9	53.6	99.7	72.9	99.7	53.5	100.5	68.9	83.1
YSC-201	49.0	89.9	60.6	71.1	---	---	---	---	---	---	---	---	47.9	91.4	65.1	91.4	---	---	---	---
YSC-215	49.9	94.0	63.1	88.9	---	---	---	---	---	---	---	---	48.6	93.0	66.4	93.0	---	---	---	---
YSC-268	52.0	95.3	64.9	78.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Devote	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	50.5	107.4	71.0	84.3
Eltan	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	50.4	105.0	71.5	111.0
Eltan 11-52-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	51.7	107.3	69.7	112.8
OR2130755	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	49.7	100.3	65.5	96.9
Otto	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	50.4	109.0	70.4	104.9
WA8290	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	50.1	99.6	64.1	108.6
Location average	**50.5**	**91.1**	**62.1**	**76.1**	**49.9**	**94.1**	**62.9**	**76.6**	**50.5**	**87.5**	**63.0**	**66.3**	**49.7**	**91.6**	**67.5**	**79.7**	**50.2**	**99.9**	**65.4**	**93.9**

Table 74. Grain Protein & Kernel Hardness of Hard Spring Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	----------Grain Protein %----------						----------Kernel Hardness 0-100----------					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**
Hard Red Spring												
A15047S-1CL2	13.1	12.3	13.2	12.7	9.9	**12.2**	71	77	82	66	70	**73**
A16028S-IMI-1CL2	13.8	12.8	12.7	14.4	10.0	**12.7**	80	79	76	76	74	**77**
Alum	14.3	14.1	14.1	12.7	10.5	**13.1**	84	90	90	67	79	**82**
AP Renegade	12.2	13.0	12.7	13.5	10.6	**12.4**	74	88	78	75	75	**78**
AP Renegade + base	13.9	13.1	12.3	14.1	10.3	**12.7**	86	85	79	73	80	**81**
AP Renegade + base + Root2	13.7	13.1	12.4	13.2	10.1	**12.5**	83	90	78	76	72	**80**
BZ917-221	14.2	13.5	13.2	15.1	10.8	**13.4**	83	96	87	84	87	**87**
BZ919-059	13.1	12.9	12.9	13.8	---	**13.1**	68	78	76	86	---	**77**
Dagmar	14.6	14.4	14.0	14.0	11.3	**13.7**	102	101	91	81	88	**93**
Expresso	14.1	14.0	13.4	13.2	12.1	**13.3**	85	97	86	81	86	**87**
Glee	13.3	13.1	13.2	12.5	10.5	**12.5**	77	82	82	67	83	**78**
IDO2105S	13.6	12.7	12.5	13.6	10.0	**12.5**	86	89	83	96	83	**87**
Jefferson HF	13.4	13.3	12.8	12.7	11.1	**12.6**	78	87	78	79	85	**81**
MT1716	13.9	13.6	13.7	13.6	10.4	**13.0**	86	89	86	80	85	**85**
MT2063	13.7	13.4	13.1	12.8	11.0	**12.8**	79	86	81	65	85	**79**
MT2075	14.6	13.4	13.1	12.2	11.3	**12.9**	77	91	78	54	86	**77**
Net CL+	13.4	13.3	12.8	13.6	10.8	**12.8**	90	78	88	80	92	**86**
SY Gunsight	13.0	13.6	12.6	13.5	---	**13.2**	71	93	78	65	---	**77**
WA 8355	13.4	13.8	12.4	12.6	10.2	**12.5**	74	81	70	56	77	**72**
WA 8356	13.1	13.0	12.8	13.3	9.9	**12.4**	75	79	79	60	69	**72**
WA 8357	14.9	14.5	13.5	13.2	11.8	**13.6**	82	85	81	70	82	**80**
WB9668	14.1	14.0	13.0	14.7	11.9	**13.5**	78	85	80	94	83	**84**
WB9707	14.0	13.3	13.1	14.3	10.9	**13.1**	86	86	85	84	87	**86**
WB9879CLP	14.3	13.2	13.5	13.1	11.3	**13.1**	85	85	84	75	88	**83**
Dayn (W)	13.0	12.9	12.7	13.3	10.5	**12.5**	81	89	80	86	83	**84**
IDO1804S (W)	13.2	13.0	12.7	13.3	11.2	**12.7**	97	99	86	65	96	**89**
IDO1904S (W)	13.5	13.1	13.3	13.5	11.5	**13.0**	83	86	89	55	90	**81**
IDO2002 (W)	13.5	12.6	12.7	13.1	9.9	**12.4**	67	66	77	69	71	**70**
SY-Teton (W)	12.9	12.4	12.4	13.5	9.7	**12.2**	63	69	68	80	69	**70**
UI Platinum (W)	12.4	12.2	12.3	14.0	9.7	**12.1**	64	65	68	81	67	**69**
WA 8330 (W)	13.8	13.8	13.2	12.4	10.8	**12.8**	71	74	84	58	79	**73**
WB7202CLP (W)	12.9	12.4	13.2	14.1	9.6	**12.4**	73	81	82	78	74	**78**
WB7313 (W)	13.7	13.4	12.6	14.3	9.6	**12.7**	79	89	84	79	76	**81**
WB7328 (W)	13.6	13.4	13.0	14.0	10.9	**13.0**	66	68	74	88	61	**71**
WB7589 (W)	13.8	13.2	12.7	13.1	10.2	**12.6**	73	82	78	69	73	**75**
WB7696 (W)	12.3	12.0	12.2	13.0	9.8	**11.8**	64	67	69	70	65	**67**
Choteau	---	---	---	---	11.3	**11.3**	---	---	---	---	84	**84**
Duclair	---	---	---	---	10.4	**10.4**	---	---	---	---	86	**86**
Rocker	---	---	---	---	11.1	**11.1**	---	---	---	---	103	**103**
Location Average	**13.6**	**13.2**	**12.9**	**13.4**	**10.6**	**12.6**	**78**	**84**	**80**	**74**	**80**	**80**

(W) = White

Table 75. Percent Flour Protein and Flour Yield of Hard Spring Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Flour Protein (14% mb)						Flour Yield (%)					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**
Hard Red Spring												
A15047S-1CL2	13.3	12.7	13.7	12.5	10.0	**12.4**	76	76	75	74	75	**75**
A16028S-IMI-1CL2	14.2	13.4	13.0	13.5	10.1	**12.8**	75	73	73	72	74	**73**
Alum	14.3	14.4	14.0	13.7	10.5	**13.4**	75	73	73	74	75	**74**
AP Renegade	11.8	12.2	12.8	12.3	10.3	**11.9**	76	74	72	72	72	**73**
AP Renegade + base	13.6	12.8	12.1	12.1	9.9	**12.1**	76	73	73	72	72	**73**
AP Renegade + base + Root2	13.1	13.2	12.5	12.1	9.7	**12.1**	75	73	73	72	71	**73**
BZ917-221	13.9	13.0	13.0	12.7	10.3	**12.6**	75	72	72	70	68	**71**
BZ919-059	12.9	13.1	13.1	13.6	---	**13.2**	76	74	74	73	---	**74**
Dagmar	14.5	14.8	13.9	14.4	11.1	**13.7**	74	72	73	72	70	**72**
Expresso	14.2	14.2	13.4	14.3	12.4	**13.7**	74	72	72	72	71	**72**
Glee	13.6	13.7	13.3	13.0	10.5	**12.8**	75	74	73	74	72	**74**
IDO2105S	14.1	13.1	12.5	13.0	10.0	**12.5**	75	75	74	74	72	**74**
Jefferson HF	13.7	13.6	12.7	13.2	10.7	**12.8**	75	75	74	74	72	**74**
MT1716	14.2	14.0	14.0	14.1	10.3	**13.3**	74	74	74	73	72	**73**
MT2063	13.5	13.4	12.5	13.1	10.1	**12.5**	70	71	70	69	67	**69**
MT2075	14.8	13.8	13.4	14.3	11.2	**13.5**	72	73	73	72	71	**72**
Net CL+	13.2	14.0	12.8	13.3	10.4	**12.7**	74	73	73	73	71	**73**
SY Gunsight	13.2	13.8	12.8	13.2	---	**13.3**	74	73	72	72	---	**73**
WA 8355	13.7	14.3	12.9	13.4	9.8	**12.8**	75	72	74	76	72	**74**
WA 8356	13.3	13.2	13.1	13.0	9.8	**12.5**	76	73	74	76	72	**74**
WA 8357	15.2	15.1	13.4	14.9	11.2	**14.0**	74	72	73	75	70	**73**
WB9668	13.9	14.9	12.8	15.0	12.2	**13.8**	72	70	72	72	69	**71**
WB9707	14.3	14.0	13.1	12.7	10.8	**13.0**	75	73	72	75	72	**73**
WB9879CLP	14.1	13.5	13.2	15.2	11.3	**13.5**	72	70	70	72	70	**71**
Choteau	---	---	---	---	11.8	**11.8**	---	---	---	---	71	**71**
Duclair	---	---	---	---	10.0	**10.0**	---	---	---	---	71	**71**
Rocker	---	---	---	---	10.4	**10.4**	---	---	---	---	69	**69**
Location Average	**13.8**	**13.7**	**13.1**	**13.4**	**10.6**	**12.7**	**74**	**73**	**73**	**73**	**71**	**73**
Hard White Spring												
Dayn (W)	13.1	12.9	12.6	12.7	10.3	**12.3**	75	73	73	75	71	**73**
IDO1804S (W)	13.0	13.3	12.5	13.5	11.1	**12.7**	74	72	72	73	71	**72**
IDO1904S (W)	13.9	13.5	13.4	13.1	11.5	**13.1**	73	72	72	73	70	**72**
IDO2002 (W)	13.3	13.1	12.6	12.9	9.8	**12.3**	73	72	73	73	72	**72**
SY-Teton (W)	12.7	12.5	12.2	12.3	9.5	**11.8**	73	71	74	73	71	**72**
UI Platinum (W)	12.2	12.9	12.0	12.9	9.8	**12.0**	75	73	75	75	73	**74**
WA 8330 (W)	13.7	14.0	13.3	12.5	10.5	**12.8**	73	70	74	73	71	**72**
WB7202CLP (W)	12.9	12.7	13.0	12.5	9.7	**12.1**	71	69	72	72	69	**70**
WB7313 (W)	14.5	13.4	12.4	13.3	9.6	**12.6**	74	70	73	73	70	**72**
WB7328 (W)	14.3	14.0	12.9	14.1	11.3	**13.3**	74	69	73	71	68	**71**
WB7589 (W)	14.1	13.9	12.9	13.6	10.4	**13.0**	74	69	73	74	72	**72**
WB7696 (W)	12.8	12.5	12.5	12.6	10.1	**12.1**	75	71	74	73	73	**73**
Location Average	**13.4**	**13.2**	**12.7**	**13.0**	**10.3**	**12.5**	**74**	**71**	**75**	**73**	**71**	**72**

mb = moisture basis

Table 76. Bake Volume of Hard Spring Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Bake Volume (cc)					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**
Hard Red Spring Wheat						
A15047S-1CL2	975	950	1075	1125	750	**975**
A16028S-IMI-1CL2	1025	925	950	1050	775	**945**
Alum	1225	1000	1125	1000	850	**1040**
AP Renegade	975	900	975	1000	875	**945**
AP Renegade + base	1050	950	1000	>1200	800	**950**
AP Renegade + base + Root2	1050	950	975	1125	800	**980**
BZ917-221	1100	975	1100	1075	775	**1005**
BZ919-059	1075	950	1075	1100	---	**1050**
Dagmar	1100	1200	1100	1050	975	**1085**
Expresso	975	1100	1025	900	875	**975**
Glee	1150	1175	1075	1025	925	**1070**
IDO2105S	1150	850	975	975	775	**945**
Jefferson HF	1050	1050	1025	1025	900	**1010**
MT1716	1075	1000	1100	1125	850	**1030**
MT2063	1025	1125	1075	1000	850	**1015**
MT2075	975	950	1025	925	875	**950**
Net CL+	1000	975	1075	1000	800	**970**
SY Gunsight	1000	1025	975	1125	---	**1031**
WA 8355	1100	1125	975	1050	800	**1010**
WA 8356	1125	1125	1000	1075	900	**1045**
WA 8357	>1200	1125	925	1050	975	**1019**
WB9668	>1200	1050	975	1225	1075	**1081**
WB9707	1100	1150	1025	1025	925	**1045**
WB9879CLP	975	875	950	1150	925	**975**
Choteau	---	---	---	---	975	**975**
Duclair	---	---	---	---	825	**825**
Rocker	---	---	---	---	800	**800**
Location Average	**1058**	**1021**	**1024**	**1052**	**866**	**1004**
Hard White Spring Wheat						
Dayn (W)	1025	1050	1075	1075	925	**1030**
IDO1804S (W)	1000	1075	1000	1125	950	**1030**
IDO1904S (W)	>1200	1175	1150	950	1050	**1081**
IDO2002 (W)	1075	950	1050	>1200	875	**988**
SY-Teton (W)	1025	1000	1050	1025.0	925	**1005**
UI Platinum (W)	1050	1050	1025	1200	875	**1040**
WA 8330 (W)	1200	1150	1025	1125	900	**1080**
WB7202CLP (W)	1100	925	1100	1100	750	**995**
WB7313 (W)	1000	1050	1025	1000	775	**970**
WB7328 (W)	1050	1125	1125	1125	875	**1060**
WB7589 (W)	950	1075	1100	1025.0	950	**1020**
WB7696 (W)	1000	975	1075	1150	1025	**1045**
Location Average	**1043**	**1050**	**1067**	**1082**	**906**	**1029**

Table 77. Grain Protein & Kernel Hardness of Soft White Spring Wheat Varieties and Selections Grown in Southeast Idaho , 2021.

	--------Grain Protein %--------						--------Kernel Hardness 0-100--------					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**
Alturas	9.7	9.8	10.2	10.5	9.1	**9.9**	18	24	21	21	22	**21**
Hedge CL+	10.5	10.3	10.6	11.0	9.8	**10.4**	29	37	31	32	35	**33**
IDO1404S	10.2	10.4	10.1	10.7	9.6	**10.2**	27	26	25	28	33	**28**
IDO1702S	10.5	9.9	10.1	10.7	9.2	**10.1**	22	18	19	20	21	**20**
IDO1902S	10.1	10.0	9.9	11.2	9.1	**10.1**	28	29	22	30	28	**27**
Louise	9.9	9.7	10.4	10.9	9.3	**10.0**	26	27	22	26	29	**26**
Melba	8.8	9.5	9.4	10.6	9.2	**9.5**	23	32	25	35	29	**29**
Ryan	10.7	10.3	10.4	10.7	8.9	**10.2**	26	28	25	25	26	**26**
Seahawk	9.7	9.1	10.5	10.5	9.4	**9.9**	26	28	25	32	35	**29**
Tekoa	9.3	9.4	10.3	10.7	9.1	**9.7**	23	22	24	28	32	**26**
UI Cookie	10.4	10.0	10.5	11.2	10.8	**10.6**	23	20	19	21	24	**21**
UI Pettit	9.4	9.3	9.9	10.4	10.1	**9.8**	22	25	24	22	32	**25**
UI Stone	9.7	9.2	9.9	10.6	8.8	**9.6**	23	17	21	22	18	**20**
WA 8321	9.0	9.8	9.3	9.7	8.0	**9.1**	22	28	24	23	26	**25**
WA 8325	9.3	9.5	9.3	10.0	7.9	**9.2**	23	29	23	24	25	**25**
WA 8327	9.3	9.4	9.7	9.9	8.5	**9.4**	27	31	24	27	31	**28**
WA 8351	8.7	9.3	9.5	9.8	8.0	**9.1**	23	26	24	23	28	**25**
WB6211CLP	9.9	11.1	10.9	11.7	10.2	**10.8**	13	25	21	19	29	**21**
WB-1035CL+	11.3	11.0	11.6	12.5	11.1	**11.5**	26	29	29	28	38	**30**
WB6430	9.6	9.2	9.4	10.5	8.8	**9.5**	23	22	19	24	22	**22**
AP Coachman	---	---	---	---	9.1	**9.1**	---	---	---	---	33	**33**
TMC2021	---	---	---	---	9.5	**9.5**	---	---	---	---	29	**29**
Location Average	**9.8**	**9.8**	**10.1**	**10.7**	**9.3**	**9.9**	**23.7**	**26.2**	**23.4**	**25.5**	**28.4**	**25**

Table 78. Percent Flour Protein and Flour Yield of Soft White Spring Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Flour Protein (14% mb)						Flour Yield (%)					
Variety or Selection	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**	**Aberdeen**	**Rupert**	**Idaho Falls**	**Ashton**	**Soda Springs**	**Average**
Alturas	9.1	9.4	9.5	10.2	8.2	**9.3**	76	73	74	75	73	**74**
Hedge CL+	9.5	9.8	9.8	9.9	8.6	**9.5**	76	74	74	76	72	**74**
IDO1404S	9.6	9.8	9.4	10.1	8.3	**9.4**	77	72	74	76	73	**74**
IDO1702S	9.7	9.6	9.2	10.0	8.4	**9.4**	75	71	72	73	71	**72**
IDO1902S	8.9	9.5	9.1	10.2	8.2	**9.2**	77	73	74	76	73	**74**
Louise	9.0	9.4	9.5	10.0	8.3	**9.3**	77	74	73	75	73	**74**
Melba	7.6	9.0	8.7	9.8	8.1	**8.7**	77	75	75	76	72	**75**
Ryan	9.5	9.8	9.5	10.0	8.0	**9.4**	75	73	74	75	72	**74**
Seahawk	9.3	8.7	9.6	9.8	8.2	**9.1**	77	74	75	77	73	**75**
Tekoa	8.5	8.9	9.5	9.6	8.3	**8.9**	77	74	75	77	74	**75**
UI Cookie	9.3	9.5	9.8	10.4	9.7	**9.7**	73	71	72	73	68	**71**
UI Pettit	8.6	9.0	8.8	9.9	9.0	**9.1**	76	74	75	76	73	**75**
UI Stone	8.4	9.0	9.4	9.6	8.3	**8.9**	76	74	75	75	73	**75**
WA 8321	8.2	9.1	8.4	8.6	6.9	**8.2**	74	74	74	75	71	**74**
WA 8325	8.5	8.7	8.3	9.1	7.2	**8.4**	76	75	75	75	73	**75**
WA 8327	8.6	8.6	8.9	9.1	7.6	**8.5**	75	74	74	75	73	**74**
WA 8351	8.1	9.2	8.6	9.3	7.1	**8.4**	77	76	75	77	73	**76**
WB6211CLP	9.1	10.0	9.8	10.9	9.0	**9.8**	71	67	68	70	68	**69**
WB-1035CL+	10.1	10.5	10.8	12.0	10.2	**10.7**	73	72	70	74	70	**72**
WB6430	8.9	8.8	9.1	9.7	8.2	**8.9**	76	74	75	76	72	**75**
AP Coachman	---	---	---	---	7.9	**7.9**	---	---	---	---	71	**71**
TMC2021	---	---	---	---	8.7	**8.7**	---	---	---	---	73	**73**
Location Average	**8.9**	**9.3**	**9.3**	**9.9**	**8.3**	**9.1**	**76**	**73**	**74**	**75**	**72**	**74**

mb = Moisture basis

Table 79. Percent Break Flour and Cookie Diameter of Soft White Spring Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

	Break Flour (%)						Cookie Diameter (cm)					
Variety or Selection	Aberdeen	Rupert	Idaho Falls	Ashton	Soda Springs	Average	Aberdeen	Rupert	Idaho Falls	Ashton	Soda Springs	Average
Alturas	51	49	51	50	49	**50**	9.1	9.3	8.9	8.7	9.4	**9.1**
Hedge CL+	51	49	50	49	46	**49**	9.5	9.3	9.5	9.2	9.3	**9.3**
IDO1404S	51	51	50	50	47	**50**	9.2	9.4	9.5	9.2	9.2	**9.3**
IDO1702S	51	52	50	52	47	**51**	8.7	8.9	9.1	9.1	9.3	**9.0**
IDO1902S	51	51	51	50	48	**50**	9.3	9.2	9.4	9.0	9.3	**9.2**
Louise	53	51	50	50	47	**50**	9.4	9.4	9.3	9.5	9.0	**9.3**
Melba	54	52	54	52	48	**52**	9.7	9.3	9.7	9.4	9.6	**9.5**
Ryan	50	51	49	52	48	**50**	9.2	9.0	9.4	8.9	9.3	**9.1**
Seahawk	51	51	51	50	46	**50**	9.1	9.3	8.9	8.9	9.3	**9.1**
Tekoa	52	54	54	53	48	**52**	9.7	9.5	9.2	9.0	9.3	**9.3**
UI Cookie	47	53	49	50	45	**49**	9.5	9.1	9.4	9.1	9.0	**9.2**
UI Pettit	50	52	51	51	46	**50**	9.4	9.7	9.6	9.5	9.2	**9.5**
UI Stone	52	54	53	53	51	**52**	9.3	9.4	9.2	9.2	9.5	**9.3**
WA 8321	51	54	52	52	49	**52**	9.3	9.2	9.4	9.1	9.4	**9.3**
WA 8325	53	51	53	52	50	**52**	9.5	9.4	9.8	9.5	9.3	**9.5**
WA 8327	54	53	53	52	50	**52**	9.2	9.2	9.3	9.3	9.3	**9.2**
WA 8351	52	52	53	54	49	**52**	9.4	9.3	9.4	8.9	9.5	**9.3**
WB6211CLP	49	45	47	48	44	**47**	9.1	9.1	9.0	8.6	9.0	**9.0**
WB-1035CL+	43	43	43	47	41	**43**	8.9	8.8	8.9	8.4	8.8	**8.8**
WB6430	52	52	53	53	48	**51**	9.6	9.4	9.4	9.3	9.5	**9.4**
AP Coachman	---	---	---	---	44	**44**	---	---	---	---	9.2	**9.2**
TMC2021	---	---	---	---	45	**45**	---	---	---	---	9.2	**9.2**
Location Average	**51**	**51**	**51**	**51**	**47**	**50**	**9.3**	**9.3**	**9.3**	**9.1**	**9.3**	**9.2**

Table 80. Solvent Retention Capacity data for Soft White Spring Wheat Varieties and Selections Grown in Southeast Idaho, 2021.

Variety or Selection	Aberdeen				Rupert				Idaho Falls			
	Water	Sucrose	Na2CO3	LacticAcid	Water	Sucrose	Na2CO3	LacticAcid	Water	Sucrose	Na2CO3	LacticAcid
Alturas	48.9	93.5	66.9	91.4	50.3	87.8	60.0	93.3	50.3	92.7	66.7	103.3
Hedge CL+	48.4	90.4	70.2	65.4	48.6	84.0	63.9	62.9	48.6	86.1	66.1	70.8
IDO1404S	47.5	88.5	65.9	69.7	47.6	83.6	58.2	71.5	47.3	86.1	59.7	76.9
IDO1702S	51.1	102.9	77.3	94.8	49.9	95.5	67.9	99.4	49.2	98.0	69.0	94.6
IDO1902S	47.9	89.0	64.7	87.3	49.1	84.8	61.9	93.9	47.9	88.1	64.5	101.3
Louise	48.1	90.0	67.1	87.2	48.8	83.5	62.3	84.8	48.8	90.3	67.0	102.4
Melba	47.8	82.9	65.0	63.3	49.4	79.3	61.6	65.6	47.1	80.7	65.4	68.8
Ryan	49.1	91.4	66.8	84.2	50.4	85.0	63.1	81.3	49.2	88.3	63.3	81.1
Seahawk	48.5	91.3	72.9	73.5	49.3	83.0	63.5	68.0	49.4	91.7	72.9	85.7
Tekoa	45.8	87.7	62.2	77.6	46.5	83.2	59.8	85.2	46.2	90.2	66.2	97.0
UI Cookie	47.0	92.8	63.5	83.2	48.3	87.3	63.7	92.1	47.0	91.2	64.5	95.4
UI Pettit	48.0	86.3	64.2	71.3	47.8	81.7	60.0	67.4	47.2	82.8	60.8	68.4
UI Stone	47.6	88.8	63.7	83.2	47.8	83.8	59.0	90.1	48.0	87.0	64.5	98.5
WA 8321	50.8	95.5	71.7	83.1	51.7	90.8	68.1	82.3	51.6	92.9	68.3	87.8
WA 8325	48.1	85.3	69.6	69.2	50.1	80.3	63.8	69.2	48.3	81.5	64.9	69.9
WA 8327	47.9	89.3	64.8	82.6	51.2	85.0	64.0	80.2	48.6	89.8	65.3	96.0
WA 8351	47.1	87.7	63.0	82.0	49.5	84.6	64.3	83.8	49.3	92.0	65.4	95.0
WB6211CLP	50.0	107.2	72.7	73.2	50.1	97.8	67.3	65.7	52.5	108.2	73.2	84.1
WB-1035CL+	52.6	100.9	71.2	87.7	52.3	96.1	66.2	73.6	53.3	105.4	68.0	86.0
WB6430	47.3	86.9	66.8	65.0	47.4	82.7	61.7	60.5	48.7	88.8	66.4	59.9
AP Coachman	---	---	---	---	---	---	---	---	---	---	---	---
TMC2021	---	---	---	---	---	---	---	---	---	---	---	---
Location average	**48.5**	**91.4**	**67.5**	**78.7**	**49.3**	**86.0**	**63.0**	**78.5**	**48.9**	**90.6**	**66.1**	**86.1**

Variety or Selection	Ashton				Soda Springs			
	Water	Sucrose	Na2CO3	LacticAcid	Water	Sucrose	Na2CO3	LacticAcid
Alturas	50.3	100.6	73.5	114.2	49.4	91.7	65.6	98.0
Hedge CL+	50.1	93.9	73.5	69.8	50.6	87.3	66.8	65.1
IDO1404S	49.3	92.1	73.1	78.3	49.0	86.3	63.9	71.5
IDO1702S	53.3	111.7	84.8	109.4	49.8	96.1	68.9	96.0
IDO1902S	51.1	96.2	76.5	110.0	50.0	87.0	64.8	97.8
Louise	49.0	94.5	68.7	105.1	51.5	87.1	68.7	94.2
Melba	49.6	87.0	70.7	69.5	50.7	83.2	62.8	65.5
Ryan	49.4	95.0	72.0	94.4	51.2	87.5	65.6	80.7
Seahawk	52.2	94.9	76.0	80.5	52.5	90.2	68.5	78.1
Tekoa	48.6	94.2	71.1	98.8	50.1	85.6	65.4	82.5
UI Cookie	51.7	103.8	77.2	115.9	49.8	96.1	66.6	112.0
UI Pettit	49.8	92.1	69.5	84.8	50.3	86.2	62.0	76.8
UI Stone	50.0	97.1	77.9	105.8	48.2	88.7	64.4	96.9
WA 8321	50.9	101.8	77.6	98.3	51.2	90.9	68.6	84.1
WA 8325	49.7	89.8	76.1	80.2	49.9	82.3	65.5	69.9
WA 8327	49.6	94.9	70.3	99.9	51.8	88.1	66.9	87.9
WA 8351	51.6	95.2	77.8	100.4	50.2	86.3	64.1	85.3
WB6211CLP	61.1	127.9	93.2	108.0	50.4	101.3	70.0	89.0
WB-1035CL+	58.2	117.2	89.2	109.8	54.0	98.4	70.6	97.5
WB6430	51.1	95.7	78.1	69.9	48.3	84.8	60.6	60.9
AP Coachman	---	---	---	---	51.7	92.4	66.1	78.4
TMC2021	---	---	---	---	50.9	88.0	63.0	82.9
Location average	**51.1**	**95.7**	**78.1**	**69.9**	**50.3**	**88.4**	**63.2**	**74.1**

Addendum 1. Stripe rust (*Puccinia striiformis* f. sp. *tritici*) ratings for 2019 winter wheat. Stripe rust was not severe in 2020 - 2022 in southest Idaho. Ratings were based on an index of percent tissue affected by stripe rust multiplied by infection type.

Table 1. Reaction of hard winter wheat varieties and selections to stripe rust under naturally occuring infection, Aberdeen, 2019.

Variety or Selection	Stripe Rust Infection Type (IT)	Percent Leaf Area Infected (PLAI)	IT x PLAI %	Stripe Rust Rating
AP Nugrain (W)	6.0	40	2.40	S
Bobcat	0.0	0	0.00	R
FourOsix	6.0	1	0.06	R
Greenville	6.0	45	2.40	VS
IDO1506 (W)	6.0	20	1.20	S
IDO1607	6.0	70	4.20	VS
IDO1806 (W)	6.0	50	3.00	VS
Irv (W)	0.0	0	0.00	R
Keldin	6.0	40	2.40	S
Keldin + 11-52-0	6.0	40	2.40	S
LCS Jet	7.0	20	1.40	S
LCS Rocket	0.0	0	0.00	R
LCS Yeti (W)	7.0	20	1.40	S
LCS Zoom	0.0	0	0.00	R
Millie (W)	0.0	0	0.00	R
Norwest 553*	0/7	0/60	0/2.4	R/S
Ray	5.0	20	1.00	S
Scorpio	7.0	5	0.35	MR
Sequoia	7.0	60	4.20	VS
UI Bronze Jade (W)	7.0	50	3.50	VS
Utah 100	6.0	60	3.60	VS
WA8252 (W)	6.0	20	1.20	S
WA8289	6.0	30	1.80	S
WB4311	0.0	0	0.00	R
WB4623CLP	0.0	0	0.00	R
WB4792	6.0	40	2.40	S
Whetstone	7.0	70	4.90	VS
Yellowstone	6.0	40	2.40	S
Average	**4.7**	**28**	**1.80**	

* Mixture

(W) = White

Infecton Type: on a scale of 0 to 9, where 0 is immune,

1 is resistant, and 8 to 9 is very susceptible.

TIPS:

R to MR - should not need fungicides

R to MR - should not need fungicides unless disease pressure becomes high

MR to MS - consider spraying with protective fungicides under medium to high disease pressure

S = will need protective fungicide application when stripe rust is present

VS = will need fungicdes in the presence of stripe rust, at times up to three applicatons in severe years

Table 2. Reaction of soft white winter wheat varieties and selections to stripe rust under naturally occuring infection, Aberdeen, 2019.

Variety or Selection	Stripe Rust Infection Type (IT)	Percent Leaf Area Infected (PLAI)	IT x PLAI %	Stripe Rust Rating
Appleby CL+	6.0	2	0.12	R
Brundage	8.0	80	6.40	VS
Bruneau	6.0	10	0.60	MS
IDO1708	7.0	1	0.07	MR
Jasper	7.0	1	0.07	MR
LCS Artdeco	0.0	0	0.00	R
LCS Blackjack	0.0	0	0.00	R
LCS Drive	0.0	0	0.00	R
LCS Ghost	6.0	1	0.06	R
LCS Hulk	0.0	0	0.00	R
LCS Shark	0.0	0	0.00	R
Nixon	0.0	0	0.00	R
Norwest Duet	0.0	0	0.00	R
Norwest Tandem	0.0	0	0.00	R
OR2X2CL+	0.0	0	0.00	R
Purl	6.0	2	0.12	R
Rosalyn	6.0	5	0.30	MR
Stephens	6.0	40	2.40	S
Stingray CL+	0.0	0	0.00	R
SY Ovation	8.0	10	0.80	MS
SY Assure	0.0	0	0.00	R
SY Raptor	0.0	0	0.00	R
UI Castle CL+	6.0	5	0.30	MR
UI Magic CL+	6.0	50	3.00	VS
UI Sparrow	7.0	50	3.50	VS
UIL 11-456031A	0.0	0	0.00	R
UIL 17-6333 (CL+)	0.0	0	0.00	R
UIL 17-6546 (CL+)	0.0	0	0.00	R
UIL 17-6834 (CL+)	0.0	0	0.00	R
VI Bulldog	0.0	0	0.00	R
VI Shock	0.0	0	0.00	R
VI Voodoo CL+	6.0	1	0.06	R
WB 456	6.0	10	0.60	MS
WB1376CLP	7.0	10	0.70	MS
WB1529	0.0	0	0.00	R
WB1783	7.0	2	0.14	MR
Average	**3.1**	**8**	**0.53**	

Addendum 2. Stripe rust (*Puccinia striiformis* f. sp. *tritici*) ratings for 2019 spring wheat. Stripe rust was not severe in 2020 - 2022 in southeast Idaho. Ratings were based on an index of percent tissue affected by stripe rust multiplied by infection type.

Table 1. Reaction of hard spring wheat varities and selections to stripe rust under naturally occuring infection, Aberdeen, 2019.

Variety or Selection	Stripe Rust Infection Type (IT)	Percent Leaf Area Infected (PLAI)	IT x PLAI (%)	Stripe Rust Rating
12SB0224 (W)	0	0	0.0	R
Alum	0	0	0.0	R
Alzada (D)	6	1	0.1	R
AP Octane	0	0	0.0	R
AP Venom	6	5	0.3	MR
APRenegade	0	0	0.0	R
Cabernet	6	1	0.1	R
CPX36619	0	0	0.0	R
Dayn (W)	0	0	0.0	R
Glee	0	0	0.0	R
IDO1603S	6	2	0.1	R
IDO1701S	0	0	0.0	R
IDO1702S	6	1	0.1	R
IDO1805S	0	0	0.0	R
Imperial (D)	3	5	0.2	R
Jefferson	7	30	2.1	S
Klasic (W)	6	30	1.8	S
Klasic (W) 1.2	6	30	1.8	S
Klasic (W) 1.4	6	30	1.8	S
SY Coho	6	10	0.6	MS
SY Gunsight	0	0	0.0	R
SY-Teton (W)	6	10	0.6	MS
UI Platinum (W)	5	20	1.0	S
WA8280 CL+	6	1	0.1	R
WB7202 CLP	0	0	0.0	R
WB7328 (W)	6	20	1.2	S
WB7589 (W)	6	1	0.1	R
WB7696	6	30	1.8	S
WB9411	0	0	0.0	R
WB9590	6	40	2.4	S
WB9668	0	0	0.0	R
WB9879CLP	7	30	2.1	S
Average	**3.5**	**9.2**	**0.55**	

(W) = White
(D) = Durum
(CLP) = 2-gene Clearfield

Table 2. Reaction of soft white spring wheat varieties and selections to stripe rust under naturally occuring infection, Aberdeen, 2019.

Variety or Selection	Stripe Rust Infection Type (IT)	Percent Leaf Area Infected (PLAI)	IT x PLAI (%)	Stripe Rust Rating
Alturas	6	40	2.4	S
IDO1401S	6	60	3.6	VS
Louise	4	5	0.2	R
Melba	0	0	0.0	R
Ryan	6	2	0.1	R
Seahawk	0	0	0.0	R
SY Saltese	6	1	0.1	R
Tekoa	6	1	0.1	R
UI Cookie	4	40	1.6	S
UI Pettit	7	50	3.5	VS
UI Stone	6	40	2.4	S
WA 8297 CL+	0	0	0.0	R
WA 8303	0	0	0.0	R
WB 6121	0	0	0.0	R
WB 6430	0	0	0.0	R
WB-1035CL+	7	50	3.5	VS
Average	**3.6**	**18.3**	**1.1**	

Infecton Type: on a scale of 0 to 9, where 0 is immune, 1 is resistant, and 8 to 9 is very susceptible.

TIPS:

*** R to MR** - should not need fungicides

*** MR** - should not need fungicides unless disease pressure becomes high

*** MR to MS** - consider spraying with protective fungicides under medium to high disease pressure

*** S** = will need protective fungiicde application when stripe rust is present

*** VS** = will need fungicdes in the presence of stripe rust, at times up to three applicatons in severe years consider spraying at herbicide timing to prevent infection in S and VS varieties.

Addendum 3a. Results from the 2021 FHB Spring Wheat Screening nursery, Aberdeen, ID where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 1. Reaction of hard red spring wheat varieties and selections to FHB, Aberdeen 2021.

Variety or Selection	Resistance Rating	FHB Index* (%)		FDK (%)		DON (ppm)	
DuClair	MS	8.3	G	1.1	B	1.5	H
MT1716	MS	10.5	G	5.5	AB	1.7	H
Rollag	MS	17.4	G	4.2	AB	1.5	H
A15047S-1CL2	S	44.8	B-E	2.0	AB	2.9	GH
A16028S-IMI-1CL2	S	30.2	C-G	1.5	AB	5.1	C-H
Alum	S	35.9	B-F	9.1	AB	5.9	C-H
BZ917-221	S	42.6	B-E	4.9	AB	5.8	C-H
Dagmar	S	30.0	C-G	2.1	AB	4.0	E-H
Glee	S	40.4	B-E	6.3	AB	3.4	FGH
HRS3419	S	21.5	FG	5.7	AB	3.5	FGH
MT2063	S	29.0	C-G	6.1	AB	5.6	C-H
MT2075	S	24.7	EFG	8.7	AB	9.6	BCD
Net CL+	S	30.5	C-G	6.5	AB	8.5	B-F
WB9707	S	30.2	C-G	4.0	AB	4.5	D-H
AP Renegade	VS	43.1	B-E	39.8	AB	7.6	B-G
BZ919-059	VS	49.8	ABC	6.7	AB	10.1	BC
Choteau	VS	41.3	B-E	---	---	12.4	B
Expresso	VS	41.5	B-E	---	---	18.6	A
IDO2105S	VS	49.3	ABC	7.6	AB	4.0	E-H
Jefferson	VS	39.9	B-E	9.0	AB	7.1	C-G
Rocker	VS	30.1	C-G	17.5	AB	8.5	B-F
SY Gunsight	VS	27.1	D-G	42.2	A	7.3	B-G
WA 8355	VS	47.8	A-D	5.1	AB	6.1	C-H
WA 8356	VS	45.8	A-E	10.0	AB	5.6	C-H
WA 8357	VS	38.1	B-F	---	---	3.6	FGH
WB9668	VS	66.6	A	6.8	AB	5.6	C-H
WB9879CLP	VS	55.0	AB	19.0	AB	8.9	B-E
	P (α=0.05)	0.0004	**	0.7236	ns	<.0001	**

FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 3b. Results from the 2021 FHB Spring Wheat Screening nursery, Aberdeen, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 2. Reaction of hard white spring wheat varieties and selections to FHB, Aberdeen 2021.

Variety or Selection	Resistance Rating	FHB Index* (%)		FDK (%)		DON (ppm)	
Dayn	S	47.0	ABC	1.8	B	3.9	DE
IDO2002	S	33.2	BC	4.1	B	11.1	BCD
UI Platinum	S	36.9	ABC	1.4	B	5.0	B-E
WA 8330	S	40.9	ABC	0.5	B	2.1	E
WB7313	S	28.4	C	1.3	B	4.1	CDE
WB7328	S	49.3	ABC	2.4	B	4.8	B-E
IDO1804S	VS	61.0	A	3.5	B	11.8	BC
IDO1904S	VS	51.8	ABC	32.5	A	27.2	A
WB7202CL	VS	56.6	AB	9.5	B	5.7	B-E
WB7589	VS	54.6	ABC	6.5	B	12.2	B
WB7696	VS	44.9	ABC	1.3	B	7.9	B-E
SY Teton	---	29.4	C	---	---	6.2	B-E
	P (α=0.05)	0.1652	ns	0.0516	ns	0.001	**

Table 3. Reaction of durum wheat varieties and selections to FHB, Aberdeen 2021.

Variety or Selection	Resistance Rating	FHB Index* (%)		FDK (%)		DON (ppm)	
Alzada	VS	65.1	A	82.5	AB	41.1	A
Havasu	VS	49.8	AB	88.5	A	25.9	ABC
Salzburg	VS	41.3	AB	59.5	ABC	13.9	C
Sedici	VS	36.7	B	70.0	AB	25.3	ABC
Soft Alzada	VS	50.1	AB	67.5	ABC	32.2	AB
Soft Havasu	VS	48.5	AB	78.5	AB	23.3	ABC
Soft Svevo	VS	59.0	AB	35.0	C	19.1	BC
Svevo	VS	36.2	B	48.0	BC	17.9	BC
	P (α=0.05)	0.267	ns	0.0818	ns	0.1134	ns

FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 3c. Results from the 2021 FHB Spring Wheat Screening nursery, Aberdeen, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 4. Reaction of soft white spring wheat varieties to FHB, Aberdeen 2021.

Variety or Selection	Resistance Reating	FHB Index* (%)		FDK (%)		DON (ppm)	
IDO1702S	MS	15.0	F	1.2	C	2.2	F
Seahawk	MS	11.7	F	1.3	C	6.6	CDE
UI Stone	MS	14.4	F	1.3	C	5.2	C-F
WA 8351	MS	15.7	F	0.5	C	3.3	EF
YSC-603	MS	16.8	EF	0.7	C	3.2	EF
Alturas	S	14.9	F	3.0	BC	4.5	DEF
Hedge CL+ (club)	S	39.9	A-E	3.4	BC	7.6	BCD
IDO1404S	S	16.8	EF	1.6	BC	5.3	C-F
IDO1902S	S	21.9	DEF	1.0	C	4.7	DEF
Louise	S	44.9	A-D	1.1	C	4.7	DEF
Ryan	S	31.2	A-F	1.9	BC	5.5	C-F
Tekoa	S	24.1	C-F	2.6	BC	8.6	BC
TMC2021	S	30.9	A-F	1.0	C	4.6	DEF
UI Cookie	S	21.2	EF	1.8	BC	4.6	DEF
UI Pettit	S	24.3	B-F	1.8	BC	3.2	EF
WA 8321	S	33.1	A-F	1.4	BC	3.6	DEF
WA 8327	S	21.5	DEF	5.1	ABC	6.6	CDE
WB-1035CL+	S	27.6	A-F	1.6	BC	6.0	C-F
WB6211CLP	S	30.4	A-F	5.2	ABC	5.6	C-F
WB6430	S	24.3	B-F	3.4	BC	11.1	AB
AP Coachman	VS	45.6	ABC	8.1	ABC	14.4	A
Melba (club)	VS	50.3	A	13.9	A	7.4	BCD
WA 8325	VS	47.7	AB	11.0	AB	5.5	C-F
	P (α=0.05)	0.0423	*	0.2829	ns	0.0008	**

FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 4a. Results from the 2021 FHB spring wheat screening nursery, Kimbrly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 1. Reaction of hard red spring wheat varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		FDK (%)		DON (ppm)	
Rollag	S	25.5	C	6.2	H	11.8	J
A15047S-1CL2	VS	46.6	ABC	33.0	C-H	20.6	HIJ
A16028S-IMI-1CL2	VS	51.8	ABC	37.0	C-G	29.1	F-I
Alum	VS	31.7	ABC	69.0	AB	53.3	BCD
AP Renegade	VS	60.7	A	83.0	A	46.3	B-E
BZ917-221	VS	50.7	ABC	53.0	A-F	35.6	EFG
BZ919-059	VS	46.0	ABC	22.0	FGH	51.9	BCD
Choteau	VS	60.2	A	56.5	A-E	58.9	B
Dagmar	VS	50.8	ABC	26.0	E-H	26.5	GHI
DuClair	VS	42.3	ABC	18.5	FGH	21.6	HIJ
Expresso	VS	52.5	ABC	82.0	A	71.7	A
Glee	VS	54.9	AB	12.0	FGH	26.8	GHI
HRS3419	VS	28.3	BC	28.3	E-H	18.1	IJ
IDO2105S	VS	64.0	A	59.5	A-D	37.6	EFG
Jefferson	VS	54.0	ABC	48.5	B-G	46.2	B-E
MT1716	VS	41.4	ABC	8.0	GH	18.2	IJ
MT2063	VS	58.1	A	64.0	ABC	55.8	BC
MT2075	VS	47.9	ABC	25.7	E-H	43.2	C-F
Net CL+	VS	53.7	ABC	49.0	A-G	48.1	B-E
Rocker	VS	47.7	ABC	58.5	A-D	37.6	EFG
SY Gunsight	VS	51.9	ABC	58.5	A-D	53.8	BCD
WA 8355	VS	67.7	A	72.5	AB	58.0	B
WA 8356	VS	54.6	AB	74.0	AB	31.8	FGH
WA 8357	VS	49.5	ABC	33.0	C-H	25.4	GHI
WB9668	VS	51.2	ABC	62.0	A-D	42.1	DEF
WB9707	VS	54.5	AB	32.0	D-H	31.3	FGH
WB9879CLP	VS	69.5	A	---	---	45.1	B-F
P (α=0.05)		0.4365	ns	0.0001	**	<0.0001	**

* FHB Index = (% Severity x % Incidence)/100
Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 4b. Results from the 2021 FHB spring wheat screening nursery, Kimbrly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 2. Reaction of hard white spring wheat varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		FDK (%)		DON (ppm)	
Dayn	VS	35.9	D	37.9	CD	25.8	F
IDO1804S	VS	52.6	ABC	87.5	A	63.3	B
IDO1904S	VS	66.8	A	84.5	A	87.0	A
IDO2002	VS	65.6	A	79.9	AB	55.4	BC
SY Teton	VS	46.6	BCD	40.5	BCD	49.0	CD
UI Platinum	VS	59.6	AB	24.0	CD	34.2	EF
WA 8330	VS	43.2	CD	17.5	D	33.8	EF
WB7202CLP	VS	43.1	CD	71.5	AB	57.7	BC
WB7313	VS	56.5	ABC	9.5	D	33.5	EF
WB7328	VS	61.7	AB	22.0	D	44.2	DE
WB7589	VS	62.0	A	80	A	64	B
WB7696	VS	56.2	ABC	55.5	ABC	48.4	CD
P (α=0.05)		0.0136	**	0.0015	**	<0.0001	**

* FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 4c. Results from the 2021 FHB spring wheat screening nursery, Kimbrly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 3. Reaction of soft white spring wheat varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		FDK (%)		DON (ppm)	
IDO1702S	S	15.9	GH	5.6	G	17.4	I
IDO1902S	S	21.7	FGH	7.0	G	29.4	GHI
Alturas	VS	24.9	FGH	10.0	FG	38.1	D-I
AP Coachm	VS	53.3	A-D	44.5	ABC	81.3	A
Hedge CL+ (club)	VS	51.2	A-E	50.0	AB	67.5	ABC
IDO1404S	VS	27.6	E-H	18.5	C-G	55.8	B-E
Louise	VS	32.8	C-H	8.5	FG	45.6	C-G
Melba (club)	VS	45.0	A-F	70.0	A	89.0	A
Ryan	VS	56.3	A-D	34.0	B-F	55.6	B-E
Seahawk	VS	13.4	H	14.5	EFG	41.8	D-H
Tekoa	VS	30.7	D-H	28.0	B-G	41.7	D-H
TMC2021	VS	58.6	AB	10.0	FG	48.8	B-G
UI Cookie	VS	24.4	FGH	12.0	FG	32.8	F-I
UI Pettit	VS	42.9	A-F	15.0	EFG	40.4	D-H
UI Stone	VS	32.3	C-H	5.1	G	22.4	HI
WA 8321	VS	33.2	B-H	10.4	FG	41.1	D-H
WA8325	VS	26.6	E-H	18.0	D-G	34.2	E-I
WA 8327	VS	41.0	A-G	38.5	B-E	58.8	BCD
WA8351	VS	27.5	E-H	4.6	G	32.0	F-I
WB1035CLP	VS	25.9	E-H	8.5	FG	51.1	B-G
WB6211CLP	VS	57.0	ABC	42.5	BCD	53.2	B-F
WB6430	VS	44.1	A-F	16.0	EFG	68.0	AB
YSC-603	VS	61.5	A	32.0	B-G	48.6	B-G
P (α=0.05)		0.0118	**	0.0015	**	<0.0001	**

Table 4. Reaction of durum wheat varieties to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		FDK (%)		DON (ppm)	
Alzada	VS	55.3	A	83.5	AB	71.8	A
Havasu	VS	63.7	A	71.5	AB	70.9	A
Salzburg	VS	60.3	A	68.5	AB	47.4	B
Sedici	VS	42.4	A	83.5	AB	56.6	AB
Soft Alzada	VS	63.6	A	92.5	A	57.6	AB
Soft Havasu	VS	59.0	A	82.0	AB	55.7	AB
Soft Svevo	VS	72.7	A	65.0	B	49.7	AB
Svevo	VS	56.4	A	62.5	B	66.8	AB
P (α=0.05)		0.5737	ns	0.2239	ns	0.207	ns

* FHB Index = (% Severity x % Incidence)/100
Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 5a. Results from the 2021 FHB winter wheat screening nursery, Kimberly, ID, where Plots were inoculated with corn spawn colonized with *Fusarium graminearum*, and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 1. Reaction of hard winter wheat varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		FDK (%)		DON (ppm)	
WB4623CLP	MS	8.9	L	1.8	H	3.9	H
LCS Yeti (W)	S	7.1	L	33.0	D-H	17.4	D-H
Balance	VS	36.4	D-J	67.0	A-D	26.3	B-H
Caledonia	VS	35.0	E-J	40.5	C-F	19.9	D-H
Flathead	VS	40.3	B-H	53.0	A-F	28.2	B-G
FourOsix	VS	40.8	B-H	52.0	A-F	22.5	B-H
Golden Spike (W)	VS	37.5	C-I	15.5	E-H	20.5	C-H
IDO1806 (W)	VS	68.7	A	63.0	A-D	39.8	ABC
IDO1906 (W)	VS	44.6	B-G	58.5	A-D	20.2	C-H
IDO2006 (W)	VS	14.8	KL	63.5	A-D	36.1	A-D
Irv (W)	VS	52.7	A-E	62.0	A-D	27.4	B-G
Juniper	VS	35.4	E-J	19.5	E-H	20.5	C-H
Kairos	VS	45.3	B-G	54.0	A-E	10.0	FGH
Keldin	VS	56.7	ABC	11.0	FGH	23.4	B-H
LCSJet	VS	40.7	B-H	85.0	AB	17.7	D-H
LCS Rocket	VS	51.9	A-F	89.7	A	31.0	B-E
LCS Zoom	VS	17.9	I-L	88.0	A	17.9	D-H
Milestone	VS	45.7	B-G	65.0	A-D	26.1	B-H
Millie (W)	VS	16.9	JKL	54.0	A-E	24.6	B-H
MT1642	VS	42.5	B-H	68.0	ABC	55.4	A
MT1745	VS	52.6	A-E	67.0	A-D	42.3	AB
OR2150168H (W)	VS	56.2	A-D	78.0	AB	37.6	A-D
OR216001R	VS	34.6	E-K	69.0	ABC	17.6	D-H
OR2160065H (W)	VS	35.3	E-J	74.0	AB	24.8	B-H
Promontory	VS	27.0	G-L	8.0	GH	24.0	B-H
Scorpio	VS	45.9	B-G	82.5	AB	23.0	B-H
Sequoia	VS	33.0	E-K	47.0	B-F	10.4	E-H
UI Bronze Jade (W)	VS	58.1	AB	67.5	A-D	38.0	A-D
UI Silver	VS	40.6	B-H	14.0	E-H	20.6	C-H
UI SRG	VS	24.0	H-L	45.0	B-F	27.1	B-G
UT-10926-1	VS	40.0	B-H	12.5	FGH	7.5	GH
Utah 100	VS	39.3	B-H	38.0	C-G	20.3	C-H
WA 8309	VS	58.0	AB	91.5	A	54.2	A
WB4401	VS	32.6	F-K	50.0	B-F	12.3	E-H
WB4792	VS	51.0	A-F	35.0	C-H	22.4	B-H
Yellowstone	VS	52.2	A-F	37.5	C-G	30.5	B-F
P (α=0.05)		<0.0001	***	<0.0001	***	0.0042	***

* FHB Index = (% Severity x % Incidence)/100
W = white winter wheat
Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 5b. Results from the 2021 FHB winter wheat screening nursery, Kimberly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum,* and sprayed with *F. graminearum* conidia. Results are based on one year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 2. Reaction of soft winter wheat varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		FDK (%)		DON (ppm)	
Brundage	S	19.8	F-J	7.5	C-F	20.9	PQR
IDO2008	S	12.8	HIJ	14.0	B-F	25.2	M-R
OR2X2CL	S	11.3	J	3.8	EF	15.8	QR
Stingray	S	24.5	D-J	6.4	C-F	20.8	PQR
VI Presto CL+	S	25.8	D-J	3.6	F	14.2	R
WA 8293	S	17.6	G-J	12.5	B-F	26.9	L-R
Sockeye CL+	S	25.3	D-J	4.9	DEF	27.1	K-R
AP Dynamic	VS	46.2	A-F	52.5	ABC	54.0	ABC
AP Iliad	VS	29.3	D-J	48.0	ABC	44.3	B-K
Caledonia	VS	30.1	D-J	13.2	B-F	26.3	M-R
Devote	VS	35.2	A-J	34.0	A-F	42.3	B-M
Eltan	VS	38.6	A-I	6.5	C-F	28.7	I-R
IDO1708	VS	59.7	AB	44.0	A-E	44.7	B-I
IDO1810	VS	42.5	A-G	32.5	A-F	47.7	B-F
LCS Artdeco	VS	12.3	IJ	44.0	A-E	23.0	O-R
LCS Blackjack	VS	19.8	F-J	47.0	ABC	39.8	B-O
LCS Hulk	VS	37.9	A-J	15.5	B-F	26.0	M-R
LWW17-8185	VS	34.4	A-J	56.5	AB	32.5	E-Q
M-Press	VS	47.0	A-E	32.5	A-F	47.4	B-G
Nixon	VS	33.4	A-J	10.0	C-F	53.5	ABC
Norwest Duet	VS	37.4	A-J	37.0	A-F	51.1	BCD
Norwest Tandem	VS	40.1	A-G	39.5	A-F	32.5	E-Q
OR2130755	VS	51.6	A-D	49.5	ABC	37.3	C-P
OR2160243	VS	39.4	A-I	45.0	A-D	45.4	B-I
OR2160264	VS	40.4	A-G	49.5	ABC	44.2	B-L
ORI2190027 CL+	VS	21.5	E-J	53.4	ABC	27.3	J-R
Otto	VS	34.0	A-J	25.0	A-F	56.6	AB
Stephens	VS	17.3	G-J	39.5	A-F	49.6	B-E
SY Assure	VS	40.1	A-G	29.0	A-F	27.3	J-R
SY Ovation	VS	41.5	A-G	26.5	A-F	42.0	B-M
SY Raptor	VS	33.1	A-J	12.0	B-F	37.1	C-P
UIL13-046145A	VS	40.8	A-G	23.5	A-F	24.3	N-R
UIL13-553051A	VS	47.4	A-E	25.5	A-F	46.9	B-H
UIL13-587007A	VS	39.7	A-H	54.0	ABC	53.2	ABC
UIL15-028024	VS	32.6	B-J	22.5	A-F	40.1	B-O
VI Shock	VS	40.4	A-G	33.0	A-F	34.4	D-P
VI Voodoo CL+	VS	59.1	ABC	41.5	A-F	49.7	B-E
UIL17-7706A CL+	VS	16.8	G-J	42.0	A-F	40.8	B-N
UI Magic CL+	VS	26.0	D-J	14.0	B-F	41.0	B-N
UI Sparrow	VS	34.3	A-J	21.5	A-F	30.7	F-R
VI Frost	VS	36.9	A-J	15.0	B-F	30.3	G-R
WA 8290	VS	27.9	D-J	8.0	C-F	31.7	F-Q
Piranha CL+	VS	27.0	D-J	14.5	B-F	30.3	G-R
WB1376CLP	VS	39.7	A-H	14.5	B-F	29.6	H-R
WB1529	VS	59.1	ABC	34.5	A-F	44.5	B-J
WB1783	VS	60.2	A	60.5	A	69.0	A
WB456	VS	24.6	D-J	13.0	B-F	32.6	E-Q
YSC-201	VS	32.1	C-J	44.0	A-E	20.1	PQR
YSC-215	VS	45.2	A-F	35.5	A-F	40.3	B-O
YSC-268	VS	47.7	A-E	10.6	B-F	33.3	E-P
P (α=0.05)		0.0333	*	0.1410	ns	<0.0001	**

* FHB Index = (% Severity x % Incidence)/100
Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DISK = (0.3DON + 0.2 Incidence + 0.2 Severity + 0.3 FDK)

Resistance Rating	DISK
MR	0 - 10
MS	10.1 - 18
S	18.1 - 30
VS	> 30

Addendum 6a. Results from the 2021 FHB Spring Barley Screening nursery, Aberdeen, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* . Results are based onone year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 1. Reaction of two-rowed malt barley varieties and selections to FHB, Aberdeen, 2021

Variety or Selection	Resistance Rating	FHB Index*		DON (ppm)	
Chevron (check)	R	0.0	M	2.1	J
Clho4196 (check)	R	0.1	M	5.7	G-J
11ARS162-4	MR	1.5	J-M	6.5	E-J
11ARS183-9	MR	0.8	KLM	9.5	B-J
CDC Copeland	MR	1.4	J-M	5.8	G-J
Far15-52A (check)	MR	1.2	KLM	2.5	IJ
Merit 57	MR	0.2	LM	9.0	B-J
10ARS191-3	MS	3.9	D-J	11.4	B-H
2IM14-8212	MS	4.6	C-H	7.7	D-J
2IM15-9456	MS	4.6	C-G	6.7	E-J
2IM16-0141	MS	1.7	J-M	6.1	F-J
AAC Connect	MS	2.5	F-M	5.6	G-J
AAC Synergy	MS	2.0	H-M	10.2	B-H
ABI Eagle	MS	5.0	C-F	8.5	C-J
ABI Voyager	MS	2.4	G-M	6.1	F-J
AC Metcalfe	MS	1.8	I-M	7.5	E-J
Conrad	MS	3.1	E-K	13.5	B-F
Esma	MS	3.3	E-K	5.7	G-J
Explorer	MS	2.7	E-L	10.0	B-I
GemCraft	MS	3.0	E-K	7.1	E-J
Golf	MS	1.4	J-M	7.2	E-J
ICB 111809 (check)	MS	5.0	C-F	4.9	HIJ
KWS Thalis	MS	4.5	C-H	8.6	C-J
MS-21B1	MS	1.2	KLM	7.0	E-J
BC Ellinor	S	4.8	C-G	15.8	ABC
BC Leandra	S	5.2	CDE	13.2	B-G
KWS Amadora	S	6.6	C	10.1	B-I
KWS Fantex	S	4.7	C-G	11.5	B-H
KWS Jessie	S	6.5	C	13.8	B-E
LCS Genie	S	6.2	CD	15.3	BC
LCS Odyssey	S	6.6	C	15.7	BC
Moravian 179	S	5.0	C-F	23.4	A
Moravian 69	S	4.3	C-I	15.2	BCD
LCS Opera	VS	10.3	B	16.3	AB
PI383933 (check)	VS	89.8	A	9.9	B-J
P (α=0.05)		<.0001	**	0.0014	**

* FHB Index = (% Severity x % Incidence)/100
Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DIS = (0.6DON + 0.2 Incidence + 0.2 Severity)

Resistance Rating	DIS
R	0 - 4.9
MR	5 - 10
MS	10.1 - 20
S	20.1 - 30
VS	> 30

Addendum 6b. Results from the 2021 FHB Spring Barley Screening nursery, Aberdeen, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* . Results are based onone year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 2. Reaction of two-rowed feed/food barley varieties and selections to FHB, Aberdeen, 2021

Variety or Selection	Resistance Rating	FHB Index*		DON (ppm)	
Chevron (check)	R	0.4	G	3.1	D
Clho4196 (check)	R	0.6	FG	3.3	D
14ARS235-5	MS	3.3	D-G	4.8	D
Altorado	MS	1.7	EFG	5.8	D
Champion	MS	3.9	D-G	5.0	D
Claymore	MS	5.0	CDE	5.2	D
Far15-52A (check)	MS	2.7	D-G	3.8	D
FeedMor	MS	2.7	D-G	4.7	D
Goldenhart	MS	4.6	DE	8.8	CD
Golf	MS	2.9	D-G	10.3	BCD
HO516-429	MS	4.9	DE	8.0	CD
ICB 111809 (check)	MS	2.9	D-G	5.6	D
Idagold II	MS	2.9	D-G	8.7	CD
Julie	MS	5.1	CDE	7.8	CD
Kardia	MS	4.6	DE	7.5	CD
Moravian 180	MS	4.9	DE	8.3	CD
Transit	MS	5.3	CDE	4.6	D
Xena	MS	1.7	EFG	4.7	D
BillCoor	S	4.4	DEF	16.9	BCD
Moravian 179	S	6.3	CD	12.0	BCD
Oreana	S	3.1	D-G	21.0	BC
Diamondback	VS	14.6	B	39.4	A
Moravian 164	VS	8.9	C	23.5	B
PI383933 (check)	VS	95.6	A	5.1	D
P (α=0.05)		<0.0001	**	0.0083	**

* FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DIS = (0.6DON + 0.2 Incidence + 0.2 Severity)

Resistance Rating	DIS
R	0 - 4.9
MR	5 - 10
MS	10.1 - 20
S	20.1 - 30
VS	> 30

Addendum 7a. Results from the 2021 FHB Spring Barley Screening nursery, Kimberly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* . Results are based onone year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 1. Reaction of two-rowed malt barley varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index		DON (ppm)	
Far15-52A (check)	MR	0.7	G	4.5	J
2IM14-8212	MS	4.0	D-G	16.4	E-J
2IM15-9456	MS	4.1	D-G	11.4	E-J
2IM16-0141	MS	6.5	C-G	9.7	F-J
AAC Connect	MS	3.2	EFG	8.6	G-J
AAC Synergy	MS	4.3	D-G	9.2	F-J
ABI Voyager	MS	2.1	FG	7.1	HIJ
CDC Copeland	MS	1.6	G	8.9	G-J
Chevron (check)	MS	5.0	C-G	6.2	IJ
Clho4196 (check)	MS	3.9	EFG	11.1	E-J
Explorer	MS	3.9	EFG	14.3	E-J
Merit 57	MS	4.8	C-G	10.5	E-J
MS-21B1	MS	2.7	EFG	6.7	IJ
10ARS191-3	S	7.3	B-G	17.8	E-I
11ARS162-4	S	5.0	C-G	18.8	E-H
11ARS183-9	S	6.1	C-G	15.5	E-J
ABI Eagle	S	8.2	B-G	21.2	DEF
AC Metcalfe	S	5.2	C-G	15.9	E-J
Conrad	S	2.4	EFG	21.2	DEF
Esma	S	9.7	B-G	21.2	DEF
GemCraft	S	5.7	C-G	16.5	E-J
Golf	S	7.2	B-G	10.8	E-J
ICB 111809 (check)	S	6.1	C-G	17.1	E-I
Moravian 69	S	5.5	C-G	18.0	E-I
BC Ellinor	VS	13.0	B-E	38.1	BC
BC Leandra	VS	8.5	B-G	33.0	CD
KWS Amadora	VS	7.7	B-G	22.4	DE
KWS Fantex	VS	9.4	B-G	40.5	BC
KWS Jessie	VS	15.3	ABC	38.2	BC
KWS Thalis	VS	8.7	B-G	20.6	EFG
LCS Genie	VS	6.9	C-G	42.6	BC
LCS Odyssey	VS	24.6	A	55.1	A
LCS Opera	VS	14.6	A-D	46.2	AB
Moravian 179	VS	12.6	B-F	34.8	BC
PI383933 (check)	VS	17.7	AB	38.8	BC
P (α=0.05)		0.0426	*	<0.0001	**

*FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DIS = (0.6DON + 0.2 Incidence + 0.2 Severity)

Resistance Rating	DIS
R	0 - 4.9
MR	5 - 10
MS	10.1 - 20
S	20.1 - 30
VS	> 30

Addendum 7b. Results from the 2021 FHB Spring Barley Screening nursery, Kimberly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* . Results are based onone year's data. Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 2. Reaction of two-rowed feed/food barley varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		DON (ppm)	
Transit	MS	6.0	D	6.0	E
14ARS235-5	S	6.1	D	9.4	DE
Chevron (check)	S	6.9	CD	8.9	DE
Claymore	S	8.2	CD	11.0	CDE
Far15-52A (check)	S	5.6	D	10.1	CDE
Goldenhart	S	6.1	D	12.6	CDE
Golf	S	8.7	CD	16.4	CDE
Julie	S	8.2	CD	7.3	E
Kardia	S	7.5	CD	15.0	CDE
Xena	S	6.6	CD	19.1	B-E
Altorado	VS	10.3	CD	31.9	B-E
BillCoor	VS	9.6	CD	47.1	B
Champion	VS	8.3	CD	23.4	B-E
Clho4196 (check)	VS	9.9	CD	30.3	B-E
Diamondback	VS	44.3	B	93.7	A
FeedMor	VS	9.8	CD	22.3	B-E
HO516-429	VS	10.7	CD	17.2	B-E
ICB 111809 (check)	VS	17.4	C	25.6	B-E
Idagold II	VS	8.6	CD	22.6	B-E
Moravian 164	VS	12.2	CD	102.0	A
Moravian 179	VS	11.2	CD	37.8	BCD
Moravian 180	VS	11.0	CD	31.3	B-E
Oreana	VS	8.1	CD	39.9	BC
PI383933 (check)	VS	93.6	A	30.2	B-E
P (α=0.05)		<0.0001	**	<0.0001	**

* FHB Index = (% Severity x % Incidence)/100

Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DIS = (0.6DON + 0.2 Incidence + 0.2 Severity)

Resistance Rating	DIS
R	0 - 4.9
MR	5 - 10
MS	10.1 - 20
S	20.1 - 30
VS	> 30

Addendum 8. Results from the 2021 FHB winter barley screening nursery, Kimberly, ID, where plots were inoculated with corn spawn colonized with *Fusarium graminearum* , and sprayed with *F. graminearum* conidia. Results are based on one year's data.Rankings may change from year to year and with high disease pressure. Lines with the same letter in a column are not significantly different.

Table 1. Reaction of winter barley varieties and selections to FHB, Kimberly, 2021

Variety or Selection	Resistance Rating	FHB Index*		DON (ppm)	
2WI14-7577	R	0.1	I	3.3	LM
Avalon	R	0.2	HI	4.9	I-M
DH130718	R	0.0	I	7.9	E-M
DH131679	R	0.2	HI	5.9	G-M
DH161619	R	0.6	D-I	2.9	LM
DH161645	R	0.2	HI	3.4	LM
DH162303	R	0.1	I	6.5	F-M
DH162310	R	0.1	I	2.0	M
DH170417	R	0.2	HI	10.5	C-K
DH170472	R	0.0	I	4.0	KLM
VA16M-84	R	0.1	I	3.0	LM
05ARS849-15	MR	0.5	E-I	5.1	H-M
07ARS520-19	MR	1.1	C-I	7.8	E-M
13ARS537-25	MR	0.8	C-I	5.8	G-M
DH140963	MR	0.5	F-I	9.8	C-K
DH141077	MR	0.8	D-I	5.7	G-M
DH141222	MR	1.1	C-I	7.6	E-M
DH141225	MR	1.1	C-I	5.2	H-M
DH141364	MR	0.4	GHI	11.5	B-I
DH141917	MR	0.6	D-I	7.9	E-M
DH141944	MR	0.4	GHI	8.6	D-M
DH141947	MR	0.1	I	7.8	E-M
DH142010	MR	0.5	E-I	7.4	E-M
DH161602	MR	0.5	E-I	11.7	B-H
DH161615	MR	1.0	C-I	6.2	F-M
DH161632	MR	0.2	HI	7.2	F-M
DH170413	MR	0.3	HI	8.7	D-L
DH170826	MR	0.8	D-I	6.3	F-M
KWS Faro	MR	1.1	C-I	4.8	J-M
KWS Scala	MR	0.4	F-I	7.3	E-M
KWS SomerSET	MR	0.3	HI	7.0	F-M
LCS CalypSO	MR	0.6	D-I	8.7	D-L
Thunder	MR	0.8	C-I	9.1	D-L
Upspring	MR	0.8	C-I	7.3	F-M
13ARS537-13	MS	1.4	C-H	6.9	F-M
13ARS537-19	MS	0.8	D-I	11.2	B-J
2WI15-8688	MS	1.5	C-G	15.0	BCD
Charles	MS	1.2	C-I	15.9	BC
DH130765	MS	0.7	D-I	15.0	BCD
DH141132	MS	1.8	CD	8.6	D-M
DH150120	MS	0.8	C-I	12.1	B-G
DH150683	MS	2.0	C	11.1	B-J
DH160839	MS	1.0	C-I	23.4	A
DH170952	MS	1.1	C-I	9.5	C-L
Endeavor	MS	0.5	E-I	12.2	B-F
Flavia	MS	1.2	C-I	10.9	B-J
Hirondel	MS	3.3	B	14.8	BCD
KSW Joyau	MS	1.7	CDE	12.8	B-F
KWS Donau	MS	1.0	C-I	10.8	B-J
LightninG	MS	1.0	C-I	10.0	C-K
WintMalt	MS	1.6	C-F	11.5	B-I
Eight-TweLVE	S	9.7	A	17.4	AB
Sunstar PRIDE	S	10.5	A	13.9	B-E
P (α=0.05)		<0.0001	***	<0.0001	***

* FHB Index = (% Severity x % Incidence)/100
Data analyzed using PROC GLYMMIX in SAS

Resistance rating was calculated using the formula: DIS = (0.6DON + 0.2 Incidence + 0.2 Severity)

Resistance Rating	DIS
R	0 - 5
MR	5.1 - 10
MS	10.1 - 20
S	20.1 - 30
VS	> 30

Addendum 9a. Resistance reaction of hard winter wheat varieties in a heavily inoculated dwarf bunt (*Tilletia controversa*) nursery, Logan, UT, 2021-22 data. Thanks to our cooperator Dr. Margaret Krause, Utah State University.

Wheat Variety	Disease Reaction	Bunted Heads (%)
Promontory	VR	0
UI Silver	VR	0
UI SRG	VR	0
Golden Spike (W)	R	0.5
IDO1906 (W)	R	1
LCS Jet	MS	9
Keldin	MS	11
UI Bronze Jade (W)	MS	11
Sequoia	MS	12.5
LCS Rocket	MS	13.5
Keldin + 11-52-0	MS	15
OR2170052H (W)	S	17.5
OR2170199R	S	22.5
IDO2006 (W)	S	25
MT1745	S	30
Irv (W)	S	32.5
WB4510CLP	S	32.5
Yellowstone	S	32.5
Balance	S	35
Flathead	S	35
Scorpio	S	35
WA8309	S	35
Milestone	S	37.5
Bobtail (susceptible check)	S	45.5
FourOsix	S	50
WB4401	S	50
Millie (W)	S	80
Juniper	S	82.5

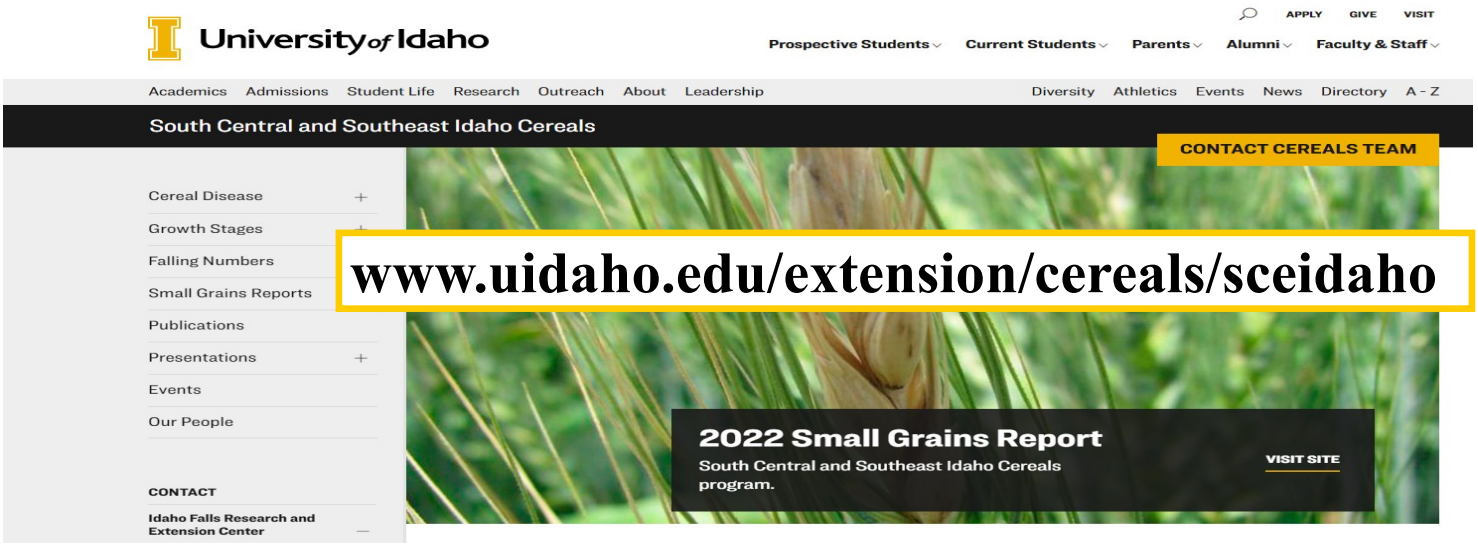
Bunted Head (%)	Disease Reaction
0	VR = very resistant
1_3	R = resistant
4_6	MR = moderately resistant
7_15	MS = moderately susceptible
>15	S = susceptible

Addendum 9b. Resistance reaction of SWW varieties in a heavily inoculated dwarf bunt (*Tilletia controversa*) nursery, Logan, UT, 2021-22 data. Thanks to our cooperator Dr. Margaret Krause, Utah State University

Variety	Disease Reaction	Bunted Heads (%)
UI Sparrow	VR	0
Otto	R	0.5
Stephens	R	1
WA8334	R	2
OR2180377	R	2.5
Devote	R	3
IDO1708	R	3
ORI2190027CL+	R	3
Eltan 11-52-0	MR	4
UI Magic CL+	MR	5
Eltan	MR	6.5
LCS Hulk	MR	6.5
SY Assure	MR	6.5
Norwest Duet	MS	7.5
OR2130755	MS	7.5
Sockeye CL+	MS	7.5
UIL14-085001A	MS	8.5
LCS Blackjack	MS	10
M-Press	MS	10
UIL16-478001	MS	10
VI Voodoo CL+	MS	10
WB1529	MS	10
WB1621	MS	10
YSC-93	MS	14
AP Iliad	MS	15
Appleby CL+	MS	15
UIL15-423062A	MS	16
LWW17-5877	S	17.5
ORI2190025 CL+	S	17.5
UIL16-072025	S	17.5
YSC-215	S	17.5
OR2160243	S	20
OR2170559	S	20
VI Presto CL+	S	20
WA8293	S	20
YSC-268	S	20
UIL15-028024	S	21
UIL13-046145A	S	21.5
VI Shock	S	25
Piranha CL+	S	27.5
WB456	S	30
IDO2008	S	32.5
AP Exceed	S	35
WB1376CLP	S	35
WB1783	S	37.5
Brundage	S	40
OR2160264	S	40
Norwest Tandem	S	45
Bobtail (susceptible check)	S	45.6
SY Ovation	S	50
Stingray CL+	S	55.5
UIL15-451104B	S	60

Bunted Head (%)	Disease Reaction
0	VR = very resistant
1_3	R = resistant
4_6	MR = moderately resistant
7_15	MS = moderately susceptible
>15	S = susceptible

Web Resources for Southcentral and Southeast Idaho Grain Production



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