



**Spring Wheat Variety Performance Evaluations Under  
Chemical Fallow Conditions at Northern Agricultural  
Research Center Havre, MT, 2014-2023**



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Results:

This report contains both single-year and long-term data summaries limited to the most recent ten years. It should be noted that 2023 data tables in this report represent varietal performance for a single crop year at a single location only, therefore cannot be considered representative of performance expected when differing conditions due to location, year and management are imposed. By itself, 2023 data shall not constitute in any form a recommendation for or against any variety or breeding line included.

Spring wheat seed yields at Havre averaged just 46 bu/ac (Table 1). 'SY Rockford' was the top yielding entry producing just over 55 bu/ac, with 'Dagmar', 'WB Gunnison' and four breeding lines producing yields statically equal to that of SY Rockford. Test weights of all spring wheat entries for this site averaged just under 57 lb/bu. Wheat stem sawfly cutting in the spring wheat trial at Havre was very low, averaging only three percent. Yield, test weight, protein, heading date, maturity date, plant height and sawfly cutting data for the 2023 Advanced Yield dryland spring wheat trial are summarized in Table 1.

Comparable averages are calculated using a standard check variety when not all entries are present in a specific trial for all years. Variety means are adjusted by multiplying the actual check mean by the ratio of the individual variety mean compared to the check mean for the same years as tested. All varieties are then directly comparable to each other when in the same nursery. A minimum of three years of data is necessary to be included in the comparable average calculation. Ten-year comparable averages (2014-2023) for spring wheat seed yield and test weight for the Advanced Yield trial are summarized in Table 2, while ten-year comparable averages for protein content and wheat stem sawfly cutting are summarized in Table 3. Based on the comparable average calculations, 'MT Dutton', Dagmar, 'MT Carlson' and 'Vida' are the highest yielding varieties at Havre over time. During the same time, Dagmar produced a test weight one pound heavier than the other three top seed yielding entries and had the least amount of cutting by wheat stem sawfly.

Recognition:

This research would not have been possible without the assistance of the following seasonal employees: Clara Haslem, Brady Kueffler, Cleta Lamb, Teresa Miller, and Nevaeh Phillips.

**TABLE 1. Advanced Yield Spring Wheat Cultivar Evaluation Nursery Grown On-Station Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, MT. 2023. (Exp# 23-3102-SW)**

ID	1/ Yield bu/ac	Test Wt lb/bu	2/ Protein %	3/ Head date	3/ Maturity date	Plant HT inches	4/ Sawfly %
AAC Concord	44.5	57.3	17.0	171.3	<b>199.0</b>	33.7	2.0
AP Gunsmoke CL2	42.8	57.3	16.5	172.3	200.7	27.7	<b>0.7</b>
AP Smith	36.5	55.6	<b>17.5</b>	172.7	<b>199.7</b>	25.6	<b>1.0</b>
Choteau	43.2	55.4	16.9	171.0	<b>199.0</b>	28.7	3.7
Corbin	40.6	54.8	<b>18.0</b>	168.0	<b>198.0</b>	29.7	<b>0.7</b>
Dagmar	<b>54.9</b>	<b>58.6</b>	15.9	168.3	<b>199.0</b>	30.4	2.3
Duclair	41.4	53.3	<b>17.6</b>	168.3	<b>198.3</b>	30.0	3.7
Lanning	49.6	55.3	16.6	171.0	<b>200.0</b>	29.2	3.7
LCS Ascent	47.6	58.0	15.5	<b>166.3</b>	<b>198.7</b>	28.9	2.3
LCS Boom	45.7	57.4	15.6	<b>167.0</b>	<b>198.0</b>	28.4	3.7
LCS HammerAX	47.4	<b>58.8</b>	14.5	169.3	<b>199.0</b>	27.1	10.0
McNeal	47.4	55.0	16.9	172.7	200.7	29.3	10.0
MS Cobra	47.9	<b>59.7</b>	15.1	169.0	200.5	28.6	3.0
MS Ranchero	39.2	57.0	17.0	175.7	202.3	30.0	<b>0.7</b>
MT Carlson	48.7	56.4	15.9	170.0	<b>198.3</b>	29.8	5.0
MT Dutton	49.0	56.8	16.5	171.3	200.7	29.6	3.7
MT Sidney	40.6	<b>58.3</b>	16.5	169.7	<b>199.0</b>	29.6	2.3
NS Presser CLP	36.9	54.5	<b>18.0</b>	174.3	201.7	26.8	<b>0.7</b>
Reeder	46.5	56.2	16.9	172.3	201.0	30.8	3.7
Rocker	42.7	57.0	<b>18.0</b>	172.0	201.5	27.7	<b>1.0</b>
SY 611 CL2	45.8	58.0	15.7	171.0	201.3	26.0	<b>1.0</b>
Sy Ingmar	41.4	55.6	16.9	172.7	<b>200.0</b>	26.6	2.3
SY Longmire	39.6	54.3	<b>18.2</b>	169.3	<b>198.3</b>	28.0	3.7
SY Rockford	<b>55.3</b>	55.9	16.3	172.5	<b>200.0</b>	29.8	<b>1.0</b>
Thatcher	37.9	55.3	17.1	172.3	201.0	<b>36.3</b>	2.3
Vida	47.5	56.4	16.6	172.3	201.0	29.3	2.3
WB 9516	45.5	<b>58.6</b>	15.8	171.3	201.7	30.0	3.7
WB 9668	44.5	57.3	17.0	<b>166.3</b>	<b>199.3</b>	26.4	3.7
WB 9719	44.7	57.1	16.5	172.3	201.3	28.5	<b>1.0</b>
WB 9879 CLP	46.4	58.0	15.9	171.7	<b>200.0</b>	28.9	<b>1.0</b>
WB Gunnison	<b>55.1</b>	<b>58.5</b>	15.1	171.0	201.3	28.4	<b>0.0</b>
MT 2030	43.0	55.4	16.5	171.7	<b>199.7</b>	29.0	6.7
MT 2049	48.9	<b>58.4</b>	15.2	<b>166.0</b>	<b>198.3</b>	29.1	5.0
MT 2050	47.9	<b>58.1</b>	15.5	171.7	<b>199.7</b>	30.7	<b>1.0</b>
MT 2063	47.2	57.1	16.0	168.7	<b>199.7</b>	30.3	5.0
MT 21016	43.7	57.1	16.2	169.7	<b>198.0</b>	29.1	5.3
MT 21031	45.1	<b>59.6</b>	16.2	170.3	<b>200.0</b>	30.6	5.3
MT 21037	45.3	56.1	16.5	167.7	<b>198.3</b>	27.6	3.7
MT 21074	48.5	<b>58.5</b>	<b>17.6</b>	172.0	200.7	27.1	2.3
MT 21104	48.6	<b>58.4</b>	16.0	171.5	<b>200.0</b>	28.8	3.0
MT 21105	42.7	57.6	16.4	171.7	<b>200.3</b>	28.6	3.3
MT 21148	46.4	<b>58.2</b>	16.8	171.0	<b>200.0</b>	29.0	3.7
MT 21173	47.4	57.7	16.1	170.3	<b>199.0</b>	29.6	4.0
MT 21174	50.5	57.2	17.3	168.0	<b>198.7</b>	32.5	2.3
MT 21176	44.5	55.6	<b>17.7</b>	170.7	<b>198.3</b>	30.3	2.3

**TABLE 1. Advanced Yield Spring Wheat Cultivar Evaluation Nursery Grown On-Station Under No-Till Dryland Fallow Conditions. Northern Agricultural Research Center. Havre, MT. 2023. (Exp# 23-3102-SW)**

ID	1/ Yield bu/ac	Test Wt lb/bu	2/ Protein %	3/ Head date	3/ Maturity date	Plant HT inches	4/ Sawfly %
MT 21186	<b>50.8</b>	56.0	16.5	170.0	<b>200.0</b>	30.7	<b>1.0</b>
MT 21211	43.2	<b>59.5</b>	16.0	170.7	<b>199.0</b>	28.5	5.0
MT 21214	43.9	57.3	17.3	169.3	<b>198.3</b>	28.4	3.7
MT 21220	45.5	56.9	17.1	170.0	<b>199.7</b>	30.4	5.3
MT 21224	48.8	57.9	16.4	169.0	<b>199.3</b>	31.6	5.0
MT 21230	<b>51.0</b>	<b>59.7</b>	15.8	172.0	201.3	30.0	<b>1.0</b>
MT 21247	47.9	55.5	16.9	170.3	<b>199.3</b>	28.9	3.7
MT 21262	47.5	<b>59.0</b>	16.2	172.3	202.0	30.2	<b>0.7</b>
MT 21313	46.4	56.4	16.2	<b>167.3</b>	<b>198.3</b>	30.2	11.7
MT 21314	<b>54.7</b>	58.0	15.4	<b>167.3</b>	<b>199.7</b>	31.6	8.3
MT 21352	47.3	57.0	16.9	<b>166.0</b>	<b>199.0</b>	31.3	6.7
MT 21359	48.7	55.2	16.5	169.7	<b>199.7</b>	30.4	3.7
MT 21384	48.5	57.4	15.8	168.0	<b>199.7</b>	31.2	2.3
MT 21473	50.4	56.6	16.1	170.7	<b>199.3</b>	29.7	3.7
MT 21484	<b>51.2</b>	57.2	16.9	169.7	<b>199.7</b>	29.5	<b>1.0</b>
MT 21485	50.4	55.9	16.8	168.0	<b>198.3</b>	31.0	2.3
MT 21487	46.7	57.2	16.8	169.7	<b>199.0</b>	30.1	2.3
NDHRS14-0134-C03	47.1	56.1	16.8	169.7	<b>199.0</b>	29.9	3.7
W-2	45.8	54.3	16.8	<b>167.0</b>	<b>199.0</b>	30.0	3.7
EXPERIMENTAL MEANS	46.3	57.0	16.5	170.2	199.7	29.5	3.3
LSD (0.05)	4.7	1.6	0.9	1.6	2.0	1.7	3.7
C.V.%	6.2	1.8	3.3	0.6	0.6	3.7	68.7
P-VALUE (Entries)	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001

1/ Volumetric yields are based on plot weights adjusted to uniform 13 percent grain moisture and 60 lbs/bu as the standard test weight for wheat.

2/ Protein values are adjusted to 13 percent grain moisture.

3/ No. of Days from January 1 (170 = June 19, 200 = July 19).

4/ Sawfly rating is reported as the percentage of cut and lodged stems.

**Bold** indicates either the highest or lowest value within a column (whichever is most desirable for the specific characteristic)

**Bold** indicates values equal to the underlined value within a column based on Fisher's protected LSD (P=0.05).

#### Management Information (23-3102-WW)

Seeding Date: April 28, 2023

Harvest Date: August 2, 2023

Fertility: 49-9-5-5

System: No-till

Herbicide: Vendetta (24 oz/ac)

Insecticide: none

Previous Crop: Chemical Fallow - Winter Wheat

Precipitation: 5.84" (Seeding to harvest maturity)

**TABLE 2. Ten-Year Yield and Test Weight Summary on Selected Entries from Dryland Advanced Spring Wheat Nursery. Northern Agricultural Research Center. Havre, Montana. 2014-2023. (Exp# 3102-SW)**

2/ VARIETY or SELECTION	3/ No. of YEARS TESTED	1/ YIELD (Bushels Per Acre)									TEST WEIGHT (Pounds Per Bushel)						
		2019	2020	2021	2022	2023	3/ AVE. for YEARS TESTED	4/ % of CHECK	5/ 10-YR COMP. AVE. YIELD	2019	2020	2021	2022	2023	3/ AVE. for YEARS TESTED	4/ % of CHECK	5/ 10-YR COMP. TEST WT
MT 1809 MT DUTTON (++)	5	52.9	71.0	28.0	42.9	49.0	48.8	105.0	46.9	58.5	60.6	59.0	57.5	56.8	58.5	100.0	58.0
MT 1621 DAGMAR (++)	7	49.8	71.9	25.3	45.6	54.9	46.0	103.1	46.0	59.4	61.4	59.7	59.4	58.6	59.8	101.9	59.1
MT 1939 MT CARLSON (++)	4		64.5	23.4	43.4	48.7	45.0	100.4	44.9		61.4	57.4	58.1	56.4	58.3	100.2	58.1
PI642366 VIDA (+)	10	53.1	64.4	24.7	42.6	47.5	44.7	100.0	44.7	59.4	60.1	58.3	58.2	56.4	58.0	100.0	58.0
PI676978 LANNING (++)	10	43.0	66.4	21.5	35.2	49.6	42.2	94.5	42.2	59.7	60.5	58.2	57.2	55.3	57.8	99.6	57.8
IMICHT-79 WB9879CLP (P+)	10	51.3	64.6	25.0	39.3	46.4	42.1	94.3	42.1	58.8	61.0	57.7	58.7	58.0	58.2	100.4	58.2
MT 1716 MT SIDNEY (++)	6	51.6	63.5	22.5	36.1	40.6	43.1	93.4	41.7	59.9	61.0	57.9	59.7	58.3	59.7	101.7	58.9
ND695 REEDER (+)	10	42.8	61.1	21.1	38.7	46.5	41.7	93.3	41.7	59.8	61.1	58.3	58.5	56.2	58.3	100.5	58.3
SYN 182 SY LONGMIRE (P+)	6	50.4	66.8	22.4	37.5	39.6	43.0	93.3	41.6	60.9	60.9	59.0	59.3	54.3	59.2	100.8	58.5
BZ902-413R WB-GUNNISON (P+)	10	52.0	61.0	29.3	36.0	55.1	41.4	92.6	41.4	60.0	61.3	58.5	59.3	58.5	58.8	101.3	58.8
PI679964 NS PRESSER CL (P+)	8	46.0	59.9	26.5	40.0	36.9	40.6	92.1	41.1	58.1	58.4	58.4	57.0	54.5	57.2	97.9	56.8
MS 211 AAC CONCORD	3		26.6	34.4	44.5	35.2	91.9		41.1			57.0	58.9	57.3	57.7	100.2	58.1
O4S0258-12 SY INGMAR (P+)	10	45.5	56.4	23.7	37.9	41.4	41.0	91.7	41.0	60.5	61.2	59.2	60.0	55.6	59.1	101.9	59.1
MS 212 MS COBRA (P+)	3		19.0	38.2	47.9	35.1	91.6		40.9			59.1	58.7	59.7	59.2	102.7	59.5
PI574642 McNEAL	10	46.8	55.8	21.5	35.3	47.4	40.4	90.5	40.4	58.5	58.4	57.5	57.9	55.0	56.9	98.1	56.9
PI660981 DUCLAIR (+)	10	47.7	64.8	21.2	39.4	41.4	40.3	90.3	40.3	58.4	59.4	56.6	57.7	53.3	57.1	98.4	57.1
PI671855 EGAN (+)	8	44.0	63.6	20.5			40.0	89.9	40.1	57.1	58.3	56.3			56.5	97.2	56.4
BZ 996-434 CORBIN (P+)(sawfly tol)	10	44.8	56.8	28.8	37.3	40.6	40.1	89.8	40.1	59.8	60.4	59.6	58.4	54.8	58.4	100.7	58.4
SYN 183 SY 611 CL2 (P+)	6	46.3	60.6	18.3	33.7	45.8	41.4	89.8	40.1	61.1	61.5	59.1	59.8	58.0	60.1	102.4	59.4
SYN 212 AP GUNSMOKE CL2 (P+)	3		23.6	36.7	42.8	34.3	89.8		40.1			57.1	58.6	57.3	57.7	100.1	58.0
PI633974 CHOTEAU (+)(sawfly tol)	10	43.5	64.9	24.6	37.5	43.2	39.3	88.0	39.3	58.7	61.0	57.6	58.2	55.4	57.8	99.6	57.8
MS 201 MS RANCHERO (P+)	4		55.4	24.2	36.7	39.2	38.9	86.8	38.8		59.5	58.5	57.7	57.0	58.2	99.9	58.0
SYN 211 AP SMITH (P+)	3		21.9	40.6	36.5	33.0	86.3		38.5			58.4	59.2	55.6	57.7	100.2	58.1
MEANS (For Entries Listed)		46.9	62.7	23.5	38.5	45.0			41.5	59.2	60.4	58.3	58.8	56.6			58.2
6/ Growing Season Precipitation (in.)		6.33	5.55	3.85	5.51	6.37	5.87										
Soil PAW (in.) to SD @ Planting		11.29	10.52	10.00	8.15	11.95	11.88										
Total Plant Available Water (in.)		n/a	8.66	8.30	8.30	5.72	8.21										
Soil NO3 (lbs.) to SD at Planting		n/a	14	12	14	12	14										
SD (Sampling Depth in Inches)		300	171	120	211	171	135										
Fertilizer Applied	(# N)	47	45	45	48	36	45										
	(# P <sub>2</sub> O <sub>5</sub> )	100	100	100	46	46	94										
	(# K <sub>2</sub> O)	20	20	20	9	9	18										
	(# S)	10	10	10	5	5	9										
Check variety is Vida.		10	10	10	5	5	7										

1/ See MCES Bulletin 1093 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/crops/index.html> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 Pending.

3/ Only the most recent 5 years shown, but summary calculations include all years noted.

4/ Percent of Vida yield or test weight for the same data years as those in which a given entry was tested.

5/ 10-Yr Comparable Average = (x/y) \* z where x = average yield or test weight of a given entry for years tested, y = average yield or test weight for Vida for the same years, and z = 10-Yr average yield or test weight for the check variety Vida.

6/ Seeding to 14 days prior to harvest maturity.

**TABLE 3. Ten-Year Protein and Wheat Stem Sawfly Summary on Selected Entries from Dryland Advanced Spring Wheat Nursery. Northern Agricultural Research Center. Havre, Montana. 2014-2023. (Exp# 3102-SW)**

2/ VARIETY or SELECTION	3/ No. of YEARS TESTED	1/ PROTEIN % (Adjusted to 13% grain moisture)									SAWFLY RATING (% of Cut and Lodged Stems)						
							3/ AVE. for YEARS	4/ % CHECK	5/ 10-YR COMP. AVE.						3/ AVE. for YEARS	4/ % CHECK	5/ 10-YR COMP. AVE.
		2019	2020	2021	2022	2023	TESTED	PROTEIN	PROTEIN	2019	2020	2021	2022	2023	TESTED	SAWFLY	SAWFLY
BZ902-413R WB-GUNNISON (P+)	10	15.1	13.7	15.5	14.4	15.1	15.1	98.1	15.1	1.0	0.0	1.0	2.3	0.0	0.4	8.9	0.4
MS 211 AAC CONCORD	3			16.3	15.7	17.0	16.3	104.1	16.0			1.0	1.0	2.0	1.3	12.4	0.6
MT 1621 DAGMAR (++)	7	16.3	14.2	16.5	15.4	15.9	15.8	103.6	15.9	2.3	0.3	3.7	1.0	2.3	1.4	21.6	1.1
IMICHT-79 WB9879CLP (P+)	10	16.6	14.1	16.7	15.7	15.9	15.9	103.6	15.9	1.0	0.7	3.7	5.0	1.0	1.3	26.0	1.3
BZ 996-434 CORBIN (P+)(sawfly tol)	10	16.6	14.7	16.2	15.9	18.0	16.3	106.0	16.3	1.0	2.0	8.3	3.7	0.7	1.7	34.3	1.7
PI660981 DUCLAIR (+)	10	16.1	14.3	16.9	15.7	17.6	16.1	104.6	16.1	2.3	2.3	5.0	3.7	3.7	1.9	38.4	1.9
PI633974 CHOTEAU (+)(sawfly tol)	10	16.5	14.2	16.3	15.4	16.9	16.1	104.4	16.1	3.7	2.0	6.7	3.7	3.7	2.1	43.9	2.1
PI642366 VIDA (+)	10	15.4	13.7	15.6	14.8	16.6	15.4	100.0	15.4	10.0	2.0	15.0	15.0	2.3	4.9	100.0	4.9
SYN 182 SY LONGMIRE (P+)	6	16.5	13.6	16.5	15.6	18.2	16.2	106.6	16.4	13.3	3.7	11.7	18.3	3.7	8.5	114.2	5.6
MT 1809 MT DUTTON (++)	5	16.0	13.8	15.9	15.4	16.5	15.5	102.0	15.7	5.3	3.7	25.0	18.3	3.7	11.2	126.3	6.1
PI679964 NS PRESSER CL (P+)	8	15.6	14.8	15.2	15.0	18.0	15.6	102.1	15.7	8.3	10.0	23.3	20.0	0.7	7.8	140.3	6.8
MT 1716 MT SIDNEY (++)	6	15.8	14.3	16.5	15.8	16.5	15.8	103.8	16.0	18.3	8.7	25.0	8.3	2.3	10.6	141.8	6.9
MT 1939 MT CARLSON (++)	4		13.7	16.2	15.1	15.9	15.2	100.2	15.4		4.0	31.7	21.7	5.0	15.6	181.6	8.8
04S0258-12 SY INGMAR (P+)	10	16.2	14.3	16.7	15.1	16.9	16.0	103.9	16.0	20.0	8.3	45.0	30.0	2.3	11.0	226.2	11.0
MS 201 MS RANCHERO (P+)	4		14.2	15.6	14.7	17.0	15.4	101.2	15.6		12.0	50.0	18.3	0.7	20.3	235.9	11.5
MS 212 MS COBRA (P+)	3			16.6	15.2	15.1	15.6	99.8	15.4			46.7	26.7	3.0	25.4	236.1	11.5
ND695 REEDER (+)	10	15.8	13.9	16.0	15.3	16.9	15.8	102.5	15.8	16.7	5.3	46.7	41.7	3.7	12.1	248.8	12.1
SYN 211 AP SMITH (P+)	3			16.4	15.2	17.5	16.4	104.4	16.1			60.0	23.3	1.0	28.1	260.8	12.7
PI574642 McNEAL	10	15.6	14.3	15.8	15.3	16.9	15.8	102.6	15.8	18.3	13.3	48.3	26.7	10.0	12.7	261.8	12.7
SYN 183 SY 611 CL2 (P+)	6	16.1	14.2	16.2	15.3	15.7	15.6	102.5	15.8	15.0	2.0	68.3	33.3	1.0	20.6	276.1	13.4
PI676978 LANNING (++)	10	16.9	14.1	16.4	15.4	16.6	16.1	104.8	16.1	21.7	6.7	56.7	45.0	3.7	13.7	282.4	13.7
PI671855 EGAN (+)	8	17.1	15.1	17.1			17.1	111.5	17.2	26.7	6.7	58.3			12.1	309.9	15.1
SYN 212 AP GUNSMOKE CL2 (P+)	3			16.5	16.5	16.5	16.5	105.3	16.2			60.0	50.0	0.7	36.9	342.3	16.6
MEANS (For Entries Listed)		16.2	14.1	16.2	15.3	16.7			15.9	11.3	4.8	33.1	20.0	2.5			8.1
6/ Growing Season Precipitation (in.)		6.33	5.55	3.85	5.51	6.37	5.87										
Soil PAW (in.) to SD @ Planting		11.29	10.52	10.00	8.15	11.95	11.88										
Total Plant Available Water (in.)		n/a	8.66	8.30	8.30	5.72	8.21										
Soil NO3 (lbs.) to SD at Planting		n/a	14.2	12.2	13.8	12.1	14										
SD (Sampling Depth in Inches)		300	171	120	211	171	135										
Fertilizer Applied	(# N)	47	45	45	48	36	45										
	(# P <sub>2</sub> O <sub>5</sub> )	100	100	100	46	46	94										
	(# K <sub>2</sub> O)	20	20	20	9	9	18										
	(# S)	10	10	10	5	5	9										
		10	10	10	5	5	7										

Check variety is Vida.  
1/ See MCES Bulletin 1093 or the Plant Sciences & Plant Pathology website at <http://plantsciences.montana.edu/crops/index.html> for evaluation of other important variety performance characteristics to include protein, quality, disease resistance, etc. before making cultivar selection decisions.

2/ P = Private Variety, + = Protected Variety, ++ = PVP Title 5 Pending.

3/ Only the most recent 5 years shown, but summary calculations include all years noted.

4/ Percent of Vida protein or sawfly rating for the same data years as those in which a given entry was tested.

5/ 10-Yr Comparable Average = (x/y) \* z where x = average protein or sawfly rating of a given entry for years tested, y = average protein or sawfly rating for Vida for the same years, and z = 10-Yr average protein or sawfly rating for the check variety Vida.

6/ Seeding to 14 days prior to harvest maturity.