

MSU/MAES Solid-Stemmed Winter Wheat Varieties

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 Small Grain QuickFacts: <http://plantsciences.montana.edu/FoundationSeed> (Updated 12/2017)

Description of selected varieties developed by MSU/MAES Winter Wheat Breeding Program:

Bearpaw – hard red winter wheat developed by the Montana Agricultural Experiment Station in 2011. Bearpaw is a white-glumed, solid-stem, semi-dwarf (*Rht1*) wheat with medium maturity. Bearpaw has average yield, test weight, and protein, and below average winter hardiness. Bearpaw is resistant to prevalent races of stem rust but susceptible to stripe and leaf rust. Stem-solidness of Bearpaw is most similar to Rampart. Bearpaw is a high PPO variety with above average milling and average baking properties. PVP, Title V option has been issued (Certificate #201200407).

Judee – hard red winter wheat developed by the Montana Agricultural Experiment Station in 2011. Judee is a white-glumed, solid-stem, semi-dwarf (*Rht1*) wheat with medium maturity. Judee has average yield, test weight, and protein, and below average winter hardiness. Judee is susceptible to prevalent races of stem and leaf rust but resistant to stripe rust. Stem-solidness of Judee is most similar to Genou. Judee is a high PPO variety with average mill and above average bake properties. PVP, Title V has been issued (Certificate #201200161).

Table 1. Yield of Solid-Stemmed Winter Wheat varieties, 2012-2017^{1/}

Shaded entries are MSU/MAES released varieties

Variety	Districts							All Locations
	1 Kalispell	2 Bozeman	3 Huntley ^{2/}	4 Moccasin ^{3/}	5 Conrad ^{4/}	5 Havre ^{5/}	6- Sidney & Williston	
location-years	3	10	21	22	16	25	5	102
Loma	137.5	88.4	63.0	56.2	76.7	51.3	45.5	65.1
Warhorse	129.5	81.3	59.8	54.5	66.6	50.7	39.4	61.1
Judee	126.9	77.4	57.5	50.9	72.8	52.0	34.7	60.5
WB-Quake	122.5	78.5	54.7	49.9	66.0	51.9	43.1	59.0
Bearpaw	72.2	63.9	56.9	52.8	69.1	47.4	41.5	56.4
LSD (0.05)	40.2	8.0	3.0	3.0	4.7	3.4	ns	2.3

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD ($p=0.05$)

1/ = includes 2012-17 Sawfly, 2014-17 Intrastate and 2015-17 Off Station tests

2/ includes data from Billings, Fort Smith, Hardin area, Hysham, Molt, Rapelje

3/ includes data from Belt, Denton, Geraldine, Highwood, Winifred

4/ includes data from Choteau, Cut Bank, The Knees, Shelby

5/ includes data from Carter, Gildford, Loma, Turner

Table 2. 'Solid' Varieties: Yield Performance under Sawfly Pressure (test average cutting >10%) and % Sawfly Cutting (2012-2017)

Variety	Yield bu/a	Sawfly Cutting (%)
location-years	10	10
Judee	55.5	20
Loma	55.3	21
WB-Quake	53.1	14
Warhorse	51.9	4
Bearpaw	48.3	15
LSD (0.05)	ns	14

ns = non significant

Loma is a semi-solid stemmed hard red winter wheat with improved yield potential relative to other solid stemmed varieties. Loma was developed by the Montana Agricultural Experiment Station and released to seed growers in 2016. Loma (Yellowstone//MTS0112/MTS0125) was a cross between Yellowstone and 2 unreleased solid-stemmed experimental lines. Loma is an awned, white-glumed, medium short wheat with medium to late maturity. Loma performs well in locations where sawfly cutting has occurred. Stem solidness

is less than to Judee and WB Quake. Loma has average test weight and protein, and average winter hardiness (Table 4). Loma is resistant to prevalent races of stripe and stem rust, but susceptible to leaf rust. Loma is a medium low PPO variety with above average mill and bake properties. To be sold by variety name only as a class of certified seed. Montana State University Research Fees due on seed sold. PVP, Title V is pending (Certificate# 201700021).

Table 3. Stem solidness ratings of solid-stemmed varieties, (2013-2017)

	Stem Solidness Rating (scale 5-25, higher = more solid)						Stem Solidness by location, 2013-2017				
	2017	2016	2015	2014	2013	2013-17	Billings	Bozeman	Conrad	Havre ^{1/}	Moccasin
location-years	11	11	7	8	4	41	2	9	6	17	7
Warhorse	21.1	21.4	22.0	22.1	21.4	21.6	22.6	19.6	21.7	22.1	22.5
Bearpaw	19.8	20.6	19.9	21.5	22.2	20.6	21.8	17.7	20.8	21.5	21.4
WBQuake	20.2	20.3	19.2	21.0	20.5	20.2	21.9	17.2	21.3	20.8	21.5
Judee	18.4	19.8	19.3	20.8	21.1	19.7	22.0	16.9	20.9	20.0	20.6
Loma	19.3	17.7	17.2	21.1	20.1	18.9	22.8	15.7	18.7	20.2	19.1
LSD (0.05)	1.1	0.8	1.8	1.1	ns	0.6	ns	1.4	1.3	0.9	0.9

bold = indicates highest value w ithin a column

bold = indicates varieties w ith values equal to highest variety w ithin a column based on Fisher's Protected LSD (p =0.05)

^{1/} includes Carter, Gildford, and Loma

Table 4. Agronomic characteristics of Solid-Stemmed Varieties, 2012-2017^{1/}

Variety	Test weight lb/bu	Winter survival %	Heading date		Plant height in	Lodging %	Protein %	Sawfly cutting %	Stripe rust %	Coleoptile length in
			Julian	Calendar						
location-years	100	3	53		99	14	100	15	10	1
Bearpaw	59.0	68	158.8	8-Jun	30.4	35	12.6	11	62	3.0
Judee	60.2	35	159.2	8-Jun	30.9	31	12.8	14	9	3.7
Loma	59.3	72	161.7	10-Jun	29.8	31	12.5	16	8	2.8
Warhorse	59.5	69	160.4	9-Jun	30.9	18	12.9	3	7	3.2
WB-Quake	59.6	65	161.2	10-Jun	31.1	28	12.6	12	18	2.6
LSD (0.05)	0.3	19	0.4		0.3	10	0.2	6	11	0.2

^{1/} = includes 2012-17 Sawfly , 2014-17 Intrastate and 2015-17 Off Station tests

bold = indicates highest value within a column

bold = indicates varieties with values equal to highest variety within a column based on Fisher's Protected LSD (p =0.05)

Table 5. Mill and bake characteristics of Solid-Stemmed Varieties, 2012-2016

Variety	PPO ^{1/}	Kernel hardness	Flour			Mixograph			Baking		
			yield %	protein %	ash %	tolerance (1-6)	mix time min	absorption %	mix time min	absorption %	volume cc
location-years	26	26	26	26	26	26	26	26	26	26	26
Bearpaw	0.266	79.0	70.0	11.9	0.41	2.9	4.4	62.4	8.7	72.4	1013
Judee	0.262	78.7	68.8	12.1	0.41	4.0	5.8	63.2	10.7	73.3	1153
Loma	0.163	79.6	70.9	11.7	0.41	4.1	6.8	64.8	17.3	75.7	1127
Warhorse	0.258	88.9	68.8	12.2	0.43	3.1	4.9	63.9	8.6	74.3	1083
LSD (0.05)	0.022	2.1	0.6	0.3	0.01	0.4	0.5	0.9	1.4	0.9	32

bold = indicates highest value w ithin a column

bold = indicates varieties w ith values equal to highest variety w ithin a column based on Fisher's Protected LSD (p =0.05)

^{1/} low is best for noodles

Warhorse - is an awned, white glumed, solid-stemmed hard red winter wheat released in 2013 by the Montana Agricultural Experiment Station. Warhorse has medium maturity and has medium short, semi-dwarf height. Warhorse's winter hardiness, rated at 4 on 0-5 scale, is an improvement over other solid stem varieties. Stem solidness is similar to that of Bearpaw and Rampart, while sawfly cutting of stems is very low (similar to Rampart). Warhorse yield is similar to Judee, while test weight and protein are above average. Warhorse is resistant to both stem and stripe rust. Warhorse has acceptable mill and bake qualities. PVP, Title V has been issued (Certificate# 201400131).