

# MSU/MAES Solid-Stemmed Winter Wheat Varieties

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Small Grain QuickFacts: <http://plantsciences.montana.edu/FoundationSeed> (Updated 10/2021)

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

**Bobcat** is a solid stemmed hard red winter wheat with improved yield potential (Tables 1, 2) relative to other solid stemmed varieties. Bobcat was developed by the Montana Agricultural Experiment Station and will be released to certified seed growers in fall 2019. Bobcat is a selection from a composite cross of 2 unreleased MT solid-stemmed experimental lines with an unreleased MT hollow-stemmed line. Bobcat is an awned, white-glumed, semi-dwarf wheat with medium to late maturity. Bobcat is the top performing line in locations where sawfly cutting has occurred (Table 2). Stem solidness is excellent, significantly higher than to Warhorse (Table 3). Bobcat has above average test weight and average protein, and average winter hardiness (Table 4). Bobcat is resistant to prevalent races of stripe and stem rust, but susceptible to leaf rust. Bobcat is a medium high PPO variety with above average mill and bake properties (Table 5). PVP, Title V has been issued (Certificate# 202000177).

**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).

**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. PVP, Title V is issued (Certificate# 201700021).

**StandClear CLP** – hard red winter wheat developed by the Montana Agricultural Experiment Station for exclusive license to Nutrien Ag Solutions (Loveland Products Inc., Loveland, CO) with a full partnership agreement with BASF Chemical Company. StandClear CLP will be available to certified seed growers in fall 2020. StandClear CLP is a medium maturing, semisolid-stemmed, medium height wheat with white chaff. StandClear CLP has average yield, above average test weight, and average protein, with good winter survival. StandClear CLP has high PPO and average milling and baking characteristics. PVP, Title V has been issued (Certificate# 202000183). Additionally, the CLEARFIELD genes are patented.

**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).

**Table 1. Yield of Solid-stemmed varieties, 2016-2021<sup>1/</sup>**

Variety	Districts							All Locations
	1 Kalispell	2 Bozeman	3 Huntley <sup>2/</sup>	4 Moccasin <sup>3/</sup>	5 Conrad <sup>4/</sup>	5 Havre <sup>5/</sup>	6- Sidney & Williston	
location-years	5	10	24	16	13	35	8	111
<b>Loma</b>	135.6	<b>100.8</b>	<b>68.7</b>	58.7	<b>70.4</b>	53.1	54.5	<b>67.5</b>
<b>Bobcat</b>	118.5	<b>96.9</b>	<b>67.8</b>	56.2	<b>71.2</b>	<b>57.1</b>	51.9	<b>67.0</b>
<b>StandClear CLP</b>	117.1	<b>100.8</b>	<b>70.2</b>	58.4	67.6	53.2	51.5	<b>66.5</b>
<b>Judee</b>	119.1	94.7	65.4	56.3	61.7	50.9	47.5	63.0
<b>Warhorse</b>	120.0	89.2	<b>69.3</b>	55.4	60.2	50.0	47.3	62.7
<b>LSD (0.05)</b>	ns	<b>4.7</b>	<b>2.9</b>	ns	<b>3.4</b>	<b>2.5</b>	ns	<b>1.5</b>

**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 2018-2021 Intrastate, 2018-2021 Off Station, and 2016-2021 Sawfly tests

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

3/ includes data from Belt, Denton, Geraldine, Highwood, Judith Gap

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

5/ includes data from Big Sandy, Fort Benton, Hingham, Gildford, Kremlin, Loma, Turner

**Table 2. Solid-stemmed Varieties: Yield Performance under Sawfly Pressure (test average cutting  $\geq$ 10%) and % Sawfly Cutting (2016-2021)**

Variety	Yield bu/a	Sawfly Cutting (%)
location-years	31	31
<b>Bobcat</b>	<b>60.4</b>	<b>9</b>
<b>Loma</b>	57.3	30
<b>StandClear CLP</b>	56.3	39
<b>Judee</b>	53.2	35
<b>Warhorse</b>	52.5	<b>12</b>
<b>LSD (0.05)</b>	<b>2.4</b>	<b>6</b>

**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 3. Stem solidness ratings of solid-stemmed varieties, (2016-2020)**

	Stem Solidness Rating (scale 5-25, higher =							Stem Solidness by location, 2016-2020				
	2021	2020	2019	2018	2017	2016	2016-19	Billings	Bozeman	Conrad	Havre <sup>1/</sup>	Moccasin
location-years	9	9	9	9	6	6	48	2	10	7	27	2
<b>Bobcat</b>	<b>22.8</b>	<b>24.1</b>	<b>23.9</b>	<b>23.8</b>	<b>23.2</b>	<b>22.3</b>	<b>23.4</b>	23.0	<b>23.1</b>	<b>23.6</b>	<b>23.5</b>	23.6
<b>Judee</b>	17.9	21.0	20.7	22.3	19.1	20.0	20.3	22.0	18.8	21.5	20.1	23.3
<b>Loma</b>	17.3	21.3	21.0	22.5	20.1	17.9	20.1	22.8	18.1	20.7	20.5	21.2
<b>StandClear</b>	17.6	21.7	20.0	20.1	18.4	19.0	19.6	18.4	18.6	19.6	20.0	19.1
<b>Warhorse</b>	20.0	22.7	22.3	22.5	<b>21.3</b>	<b>21.4</b>	21.8	22.6	20.6	22.2	21.9	22.8
<b>LSD (0.05)</b>	<b>1.2</b>	<b>1.1</b>	<b>1.0</b>	<b>1.2</b>	<b>2.2</b>	<b>1.7</b>	<b>0.6</b>	ns	<b>1.4</b>	<b>1.2</b>	<b>0.7</b>	ns

**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 Big Sandy, Carter, Gildford, Hingham, Kremlin, and Loma

**Table 4. Agronomic characteristics of Solid Stemmed Varieties, 2016-2021<sup>1/</sup>**

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	106	6	43		104	6	105	35	2	1
<b>Bobcat</b>	60.8	54	165.0	14-Jun	27.6	<b>8</b>	13.0	<b>9</b>	7	2.9
<b>Judee</b>	<b>61.2</b>	48	163.8	13-Jun	29.4	<b>14</b>	<b>13.5</b>	31	7	3.7
<b>Loma</b>	60.1	62	166.7	16-Jun	28.0	<b>13</b>	13.1	27	9	2.8
<b>StandClear CLP</b>	<b>61.2</b>	64	164.0	13-Jun	29.3	20	13.0	35	10	-
<b>Warhorse</b>	60.2	59	164.9	14-Jun	28.9	<b>10</b>	<b>13.6</b>	<b>10</b>	4	3.2
<b>LSD (0.05)</b>	<b>0.2</b>	<b>ns</b>	<b>0.3</b>		<b>0.3</b>	<b>6</b>	<b>0.1</b>	<b>6</b>	<b>ns</b>	<b>0.2</b>

1/ = includes 2018-2021 Intrastate, 2018-2021 Off Station, and 2016-2021 Sawfly tests

**bold** = indicates highest (or most desirable) 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, 2016-2020**

Variety	PPO <sup>1/</sup>	Kernel hardness	Flour			Mixograph			Baking		
			yield %	protein %	Ash %	tolerance (1-6)	mix time min	absorption %	mix time min	absorption %	volume cc
location-years	27	20	27	27	27	27	27	27	27	27	27
<b>Bobcat</b>	0.284	69.6	<b>72.4</b>	12.3	<b>0.39</b>	<b>3.2</b>	5.6	<b>66.5</b>	13.4	<b>77.2</b>	1080
<b>Judee</b>	0.241	77.2	71.0	<b>12.7</b>	0.40	<b>3.4</b>	5.6	66.3	9.5	76.2	<b>1174</b>
<b>Loma</b>	<b>0.141</b>	78.8	<b>72.5</b>	12.3	<b>0.40</b>	<b>3.1</b>	6.5	<b>67.5</b>	15.4	<b>78.1</b>	1138
<b>StandClear CLP</b>	0.291	70.4	<b>72.6</b>	12.3	<b>0.39</b>	<b>3.3</b>	4.5	65.3	9.2	76.0	1061
<b>Warhorse</b>	0.244	84.9	70.3	<b>12.8</b>	0.42	2.1	4.7	<b>67.2</b>	8.0	<b>77.4</b>	1132
<b>LSD (0.05)</b>	<b>0.019</b>	<b>3.5</b>	<b>0.4</b>	<b>0.275</b>	<b>0.009</b>	<b>0.37</b>	<b>0.4</b>	<b>1.1</b>	<b>1.2</b>	<b>1.1</b>	<b>26</b>

**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)

<sup>1/</sup> low is best for noodles