

Oat Variety Trial 2023

In a Nutshell:

- 16 oat varieties were screened at four Iowa State University research farms and four oat varieties were trialed by Neil Peterson on his commercial farm.

Key Findings:

- Across varieties and sites, average oat yield was 130 bu/ac and average test weight was 36 lb/bu.
- Antigo was the only variety to score a test weight \geq 38 lb/bu (food grade) at each location where it was trialed. Reins, Rushmore, Shelby 427 and Sumo also scored test weights \geq 38 lb/bu at Kanawha.

BACKGROUND

In 2023, 200,000 acres of oats were planted in Iowa according to the USDA-National Agricultural Statistics Service; up from 130,000 acres in 2022 and 180,000 acres in 2021. The state average yield for the year was 80 bu/ac; the five-year average yield is 74.6 bu/ac ^[1]. Oat grain and straw yield and attributes like lodging propensity can vary by variety and growing conditions. This means that oat variety trials at sites across the state are important tools for farmers who grow oats. Since 2015, PFI has helped organize oat and other small grains variety trials at Iowa State research extension offices around the state, and four sites participated this year. A commercial farmer, Neil Peterson, also joined the variety trial this year and tested four oat varieties on his farm. At the beginning of the trial, Peterson reported that “I would like to figure out which oat varieties best fit my farm and my goals for growing oats. I also hope that the variety trial would give me some experience in conducting a more official trial and provide something of interest that I could show to visitors to our farm.”

METHODS

Variety trials were conducted at five locations in 2023: ISU Northern Research Farm in Kanawha; ISU Ag Engineering and Agronomy Farm in Boone; ISU Northeast

Research Farm in Nashua; ISU Southwest Research Farm in Greenfield; Neil Peterson’s farm near Fonda in northwest Iowa. These variety trials build on previous trials conducted at Kanawha, Charles City, Boone, Nashua and Greenfield from 2015–2022 ^{[2]–[9]}. Information about each of the varieties trialed in 2023 can be found in **Table 1**.



Oats at Neil Peterson’s farm near Fonda in northwest Iowa on July 7, 2023.

Cooperators

ISU Northern Research Farm
– Kanawha (Matt Schnabel)

ISU Ag Engineering and
Agronomy Farm – Boone
(Matt Schnabel)

ISU Northeast Research
Farm – Nashua (Ken
Pecinovsky)

ISU Southwest Research
Farm – Greenfield (Matt
Schnabel)

Neil Peterson – Fonda

Funding

USDA-NIFA, Walton Family
Foundation, Albert Lea
Seed House, Green Cover,
Welter Seed and Honey Co.,
SDSU Seed Foundation, UW
Foundation Seeds, Zabel
Seeds

Oat management information is provided with the results from each location. No herbicides or insecticides were applied at any location during the oat growing season. Statistical significance is determined at 90% confidence level and means separations are reported using Tukey's least significant difference (LSD). Data were analyzed by location, and varieties are listed in alphabetical order at each location. Reported yields are corrected for 13% moisture. Rainfall and temperature data were accessed from the nearest weather station ^[10]

TABLE 1. Origin, PVP and disease ratings for oat varieties trialed in 2023.

| VARIETY | ORIGIN ^a | YEAR RELEASED | PVP ^b | MATURITY | DISEASE RATINGS ^c | | | |
|------------|---------------------|---------------|------------------|----------|------------------------------|-----------|-------------------|------|
| | | | | | CROWN RUST | STEM RUST | BYDV ^d | SMUT |
| Antigo | WI | 2017 | PVP | Early | MR | S | MR | MR |
| CS Camden | SW | 2013 | PVP | Medium | MS | S | -- | MR |
| Deon | MN | 2014 | PVP | Late | MR | MS | MR | R |
| Esker 2020 | WI | 2020 | PVP | Medium | MR | MR | MR | R |
| Goliath | SD | 2013 | PVP | Late | MS | R | MR | MR |
| Hayden | SD | 2015 | PVP | Med-Late | MS | MS | MR | R |
| Jerry | ND | 1994 | PVP | Medium | MS | MS | MS | MS |
| Mink | WI | 2022 | PVP | Late | MR | R | R | -- |
| MN Pearl | MN | 2018 | PVP | Late | MS | -- | MS | R |
| Morton | ND | 2001 | PVP | Late | MS | -- | MS | R |
| Natty | SD | 2014 | PVP | Early | MS/S | -- | MR | R |
| Reins | IL | 2016 | PVP | Early | MR | MR | R | R |
| Rushmore | SD | 2019 | PVP | Medium | MR | -- | MR | MR |
| Saddle | SD | 2018 | PVP | Early | MR | S | MR | -- |
| Shelby 427 | SD | 2011 | PVP | Medium | MS | MS | MR | MR |
| SD Buffalo | SD | 2022 | PVP | Medium | -- | -- | -- | -- |
| Sumo | SD | 2017 | PVP | Early | MR | R | MS | R |
| Warrior | SD | 2019 | PVP | Med-Late | R | -- | MS | R |

^a Origin: IL-University of Illinois; MN-University of Minnesota; ND-North Dakota State University; SD-South Dakota State University; SW-Lantmannen Seed, Sweden; WI-University of Wisconsin.

^b PVP = Plant Variety Protection. The PVP Act provides a certificate to the developer of a variety granting exclusive rights for reproducing and marketing the seed.

^c Disease Ratings: S = susceptible; MS = moderately susceptible; MR = moderately resistant; R = resistant.

^d Disease: BYDV = Barley Yellow Dwarf Virus.

RESULTS AND DISCUSSION

Rainfall in 2023 was generally at or below 10-year averages at all sites during all months of the oat growing season. At the time of oat harvest, all sites were impacted by abnormally dry to severe drought according to the U.S. Drought Monitor ^[11].

Yields at Boone, Greenfield and Kanawha were generally higher in 2023 than the 4 or 8-year yield averages from these sites (Tables 2-5). Yields at Nashua were similar to the 8-year average for each variety. Across sites, four oat varieties were significantly higher yielding; Rushmore (142 bu/ac), SD Buffalo (142 bu/ac), Saddle (141 bu/ac) and Esker 2020 (140 bu/ac). At individual sites, these varieties tended to be among the highest yielding varieties, but this difference was not consistently

statistically significant. At Peterson's, SD Buffalo was higher yielding in both grain and straw than the other three trialed varieties, and Peterson reports that he will definitely start growing this variety instead of the Saddle oats he has grown in the past. He explains that he was very satisfied with the trial because "I knew there were different oat varieties and they have different strengths/weaknesses but it was really fun to see those differences in the field. I did the planting management system that I want to use and got to see which variety did best under that system. I learned a lot doing this."

Test weights at all sites were similar to averaged test weights from previous years at the ISU sites. The standard minimum test weight that many companies require for food grade oats is 38 lb/bu. One variety

(Antigo) made food-grade test weight at all four sites where it was trialed (Boone, Greenfield, Kanawha and Nashua). Four additional varieties at Kanawha made food-grade test weight, while none did at Peterson's farm. Four additional varieties at Kanawha and three at Greenfield made food-grade test weight, while none did at Peterson's farm.

PFI plans to continue oat variety trials in future years and ISU research farms. Peterson reports that there is more for him to learn about growing oats that extends beyond variety trials, and he is interested in conducting issues on those questions. "Some issues I had this year that I want to address are residue management from the previous crop, reducing herbicide carryover injury, and getting a better stand of red clover underseeding."

ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft × 47 ft
 Fertilizer applied: 60 lb/ac K as potash, 11 lb/ac N as MAP and 52 lb/ac P as MAP on Oct. 24, 2022
 46 lb/ac N as urea on April 11, 2023
 Planting date: Apr. 11, 2023
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: July 27, 2023

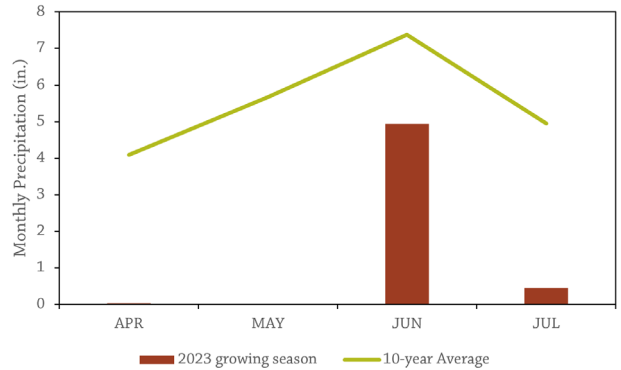
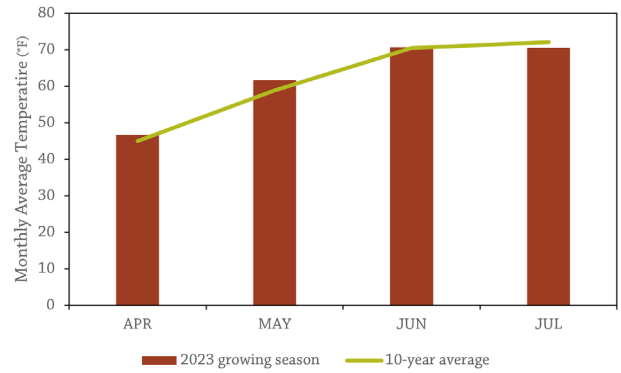


TABLE 2. 2023 Oat Variety Trial at Kanawha in north-central Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

| VARIETY | YIELD | | | TEST WEIGHT (lb/bu) | PLANT HT at HARVEST (in.) | LODGING (%) |
|------------------------|---------|------------------|-------------------|---------------------|---------------------------|-------------|
| | (bu/ac) | (% of site avg.) | 9-yr avg. (bu/ac) | | | |
| Antigo | 139 | 88 | 98 | 39 | 33 | 5 |
| Deon | 156 | 98 | 105 | 36 | 35 | 3 |
| Esker 2020 | 161 | 102 | 121 | 34 | 32 | 2 |
| Goliath | 153 | 97 | 97 | 36 | 42 | 25 |
| Hayden | 174 | 110 | 108 | 37 | 35 | 3 |
| Jerry | 144 | 91 | 88 | 37 | 31 | 0 |
| Mink | 160 | 101 | 160 | 37 | 28 | 0 |
| MN-Pearl | 181 | 114 | 127 | 36 | 36 | 3 |
| Morton | 154 | 97 | 115 | 34 | 39 | 0 |
| Reins | 165 | 104 | 106 | 38 | 28 | 0 |
| Rushmore | 188 | 118 | 146 | 38 | 38 | 2 |
| Saddle | 167 | 105 | 123 | 37 | 33 | 0 |
| SD Buffalo | 175 | 110 | 149 | 36 | 37 | 0 |
| Shelby 427 | 146 | 92 | 97 | 38 | 35 | 0 |
| Sumo | 129 | 81 | 91 | 39 | 32 | 5 |
| Warrior | 148 | 93 | 121 | 34 | 32 | 0 |
| Mean | 159 | -- | -- | 37 | 34 | 3 |
| LSD (90%) ^a | 21 | -- | -- | 1 | 3 | 10 |

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 9-yr. average yields are listed for varieties trialed at least twice in the past nine years at this location.

ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 5 ft × 49 ft
 Fertilizer applied: 30 lb N/ac; 100 lb P/ac; 40 lb K/ac; 37 lb S/ac on Apr. 10, 2023
 Planting date: Apr. 14, 2023
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1 in.
 Harvest date: July 26, 2023

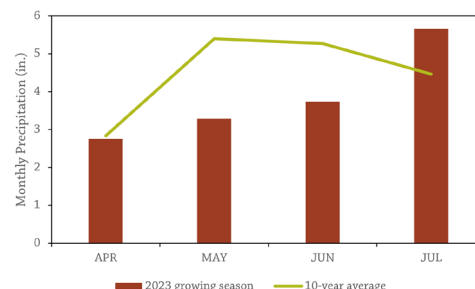
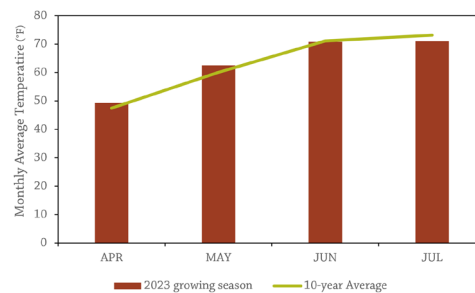


TABLE 3. 2023 Oat Variety Trial at Boone in central Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

| VARIETY | YIELD | | | TEST WEIGHT (lb/bu) | PLANT HT at HARVEST (in.) | LODGING (%) |
|------------------------|---------|------------------|----------------------|------------------------|------------------------------|-------------|
| | (bu/ac) | (% of site avg.) | 6-yr avg. (bu/ac) | | | |
| Antigo | 168 | 98 | 98 | 38 | 34 | 77 |
| Deon | 169 | 98 | 103 | 34 | 36 | 50 |
| Esker 2020 | 181 | 106 | 117 | 32 | 32 | 25 |
| Goliath | 170 | 99 | 107 | 35 | 44 | 92 |
| Hayden | 169 | 98 | 100 | 34 | 35 | 52 |
| Jerry | 174 | 101 | 97 | 35 | 32 | 52 |
| Mink | 169 | 98 | 169 | 37 | 28 | 3 |
| MN-Pearl | 173 | 101 | 110 | 34 | 35 | 30 |
| Morton | 158 | 92 | 110 | 32 | 40 | 18 |
| Reins | 173 | 101 | 111 | 36 | 28 | 2 |
| Rushmore | 187 | 109 | 132 | 36 | 37 | 53 |
| Saddle | 189 | 110 | 114 | 35 | 33 | 8 |
| SD Buffalo | 188 | 110 | 146 | 35 | 36 | 53 |
| Shelby 427 | 158 | 92 | 95 | 35 | 35 | 22 |
| Sumo | 155 | 90 | 94 | 36 | 33 | 52 |
| Warrior | 166 | 97 | 116 | 33 | 32 | 15 |
| Mean | 172 | -- | -- | 35 | 34 | 38 |
| LSD (90%) ^a | 14 | -- | -- | 1 | 2 | 29 |

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 6-yr. average yields are listed for varieties trialed at least twice in the past six years at this location..

ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 8.125 ft x 127 ft
 Fertilizer applied: 30 lb N/ac as urea on April 3, 2023
 Tillage: Field cultivator to incorporate urea on April 3, 2023
 Planting date: Apr. 4, 2023 followed by cultipacking
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1.5 in.
 Harvest date: July 17, 2023 (grain) followed by July 18, 2023 (straw)

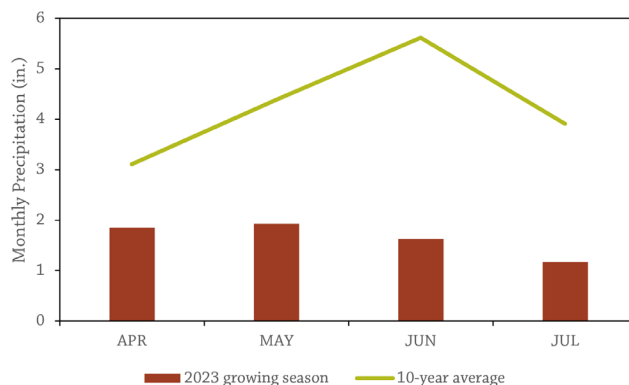
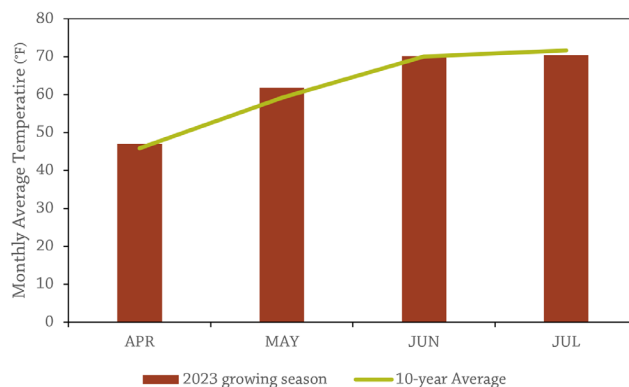


TABLE 4. 2023 Oat Variety Trial at Nashua in northeast Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

| VARIETY | YIELD | | TEST WEIGHT (lb/bu) | PLANT HT at HARVEST (in.) | LODGING (%) | STRAW YIELD (ton/ac) |
|------------------------|---------|------------------|---------------------|---------------------------|-------------|----------------------|
| | (bu/ac) | (% of site avg.) | | | | |
| Antigo | 115 | 95 | 112 | 38 | 0 | 1.2 |
| Deon | 121 | 100 | 125 | 35 | 0 | 1.4 |
| Esker 2020 | 133 | 110 | 135 | 33 | 0 | 1.2 |
| Goliath | 132 | 109 | 129 | 36 | 0 | 1.5 |
| Hayden | 130 | 107 | 129 | 36 | 0 | 1.5 |
| Jerry | 109 | 90 | 110 | 36 | 0 | 1.4 |
| Mink | 110 | 94 | 129 | 37 | 0 | 1.3 |
| MN Pearl | 114 | 91 | 110 | 35 | 0 | 1.3 |
| Morton | 125 | 103 | 117 | 33 | 0 | 1.7 |
| Natty | 130 | 107 | 127 | 36 | 2 | 1.2 |
| Reins | 125 | 103 | 122 | 37 | 0 | 1.3 |
| Rushmore | 121 | 100 | 134 | 37 | 0 | 1.5 |
| SD Buffalo | 115 | 94 | 128 | 34 | 0 | 1.5 |
| Saddle | 123 | 101 | 128 | 36 | 0 | 1.5 |
| Shelby 427 | 120 | 99 | 117 | 37 | 0 | 1.6 |
| Sumo | 114 | 94 | 113 | 36 | 2 | 1.1 |
| Warrior | 123 | 102 | 124 | 35 | 0 | 1.4 |
| Mean | 121 | -- | -- | 36 | 0 | 1.4 |
| LSD (90%) ^a | 12 | -- | -- | 0.5 | < 0.1 | 0.2 |

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 9-yr. average yields are listed for varieties trialed at least twice in the past nine years at this location.

ISU SOUTHWEST RESEARCH FARM, GREENFIELD

Previous crop: Soybeans
 Replications: 3
 Harvested plot size: 8 ft × 50 ft
 Fertilizer applied: 11 lb N/ac as MAP; 52 lb P/ac as MAP; 60 lb K/ac; 150 lb gypsum/ac on March 29, 2023
 46 lb N/ac as Urea on April 3, 2023
 Tillage: Field cultivator
 Planting date: Apr. 4, 2023
 Row spacing: 7.5 in.
 Seeding rate: 4 bu/ac
 Seeding depth: 1.5 in.
 Harvest date: July 21

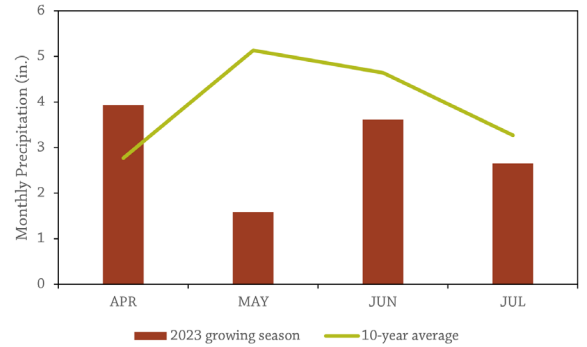
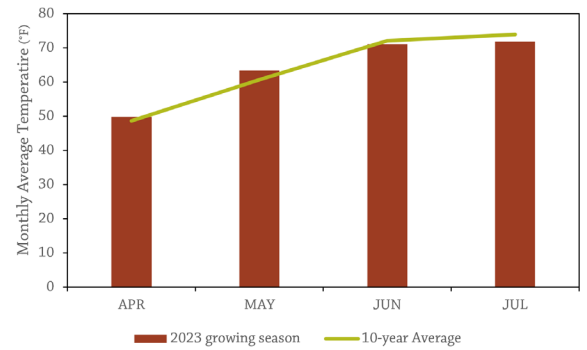


TABLE 5. 2023 Oat Variety Trial at Greenfield in southwest Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

| VARIETY | YIELD | | | TEST WEIGHT (lb/bu) | PLANT HT at HARVEST (in.) | LODGING (%) |
|------------------------|---------|------------------|-------------------|---------------------|---------------------------|-------------|
| | (bu/ac) | (% of site avg.) | 4-yr avg. (bu/ac) | | | |
| Antigo | 72 | 109 | 102 | 40 | 35 | 68 |
| Deon | 79 | 120 | 106 | 35 | 35 | 15 |
| Esker 2020 | 85 | 130 | 114 | 35 | 36 | 37 |
| Goliath | 55 | 84 | 82 | 36 | 41 | 63 |
| Hayden | 81 | 123 | 114 | 36 | 37 | 43 |
| Jerry | 45 | 69 | 80 | 36 | 36 | 40 |
| Mink | 59 | 97 | 113 | 39 | 29 | 10 |
| MN-Pearl | 64 | 90 | 59 | 35 | 33 | 15 |
| Morton | 57 | 86 | 90 | 33 | 39 | 8 |
| Reins | 47 | 71 | 117 | 37 | 33 | 5 |
| Rushmore | 72 | 109 | 118 | 38 | 38 | 58 |
| Saddle | 84 | 128 | 110 | 35 | 37 | 17 |
| SD Buffalo | 98 | 149 | 126 | 36 | 34 | 25 |
| Shelby 427 | 50 | 77 | 109 | 37 | 37 | 12 |
| Sumo | 44 | 67 | 96 | 38 | 35 | 48 |
| Warrior | 59 | 90 | 108 | 35 | 33 | 5 |
| Mean | 66 | -- | -- | 36 | 35 | 29 |
| LSD (90%) ^a | 10 | -- | -- | 1 | 4 | 31 |

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

^b 4-yr. average yields are listed for varieties trialed at least twice in the past four years at this location.

NEIL PETERSON'S FARM, FONDA

Previous crop: Soybeans
 Replications: 4
 Harvested plot size: 5 ft × 50 ft
 Fertilizer applied: 1.5 ton/ac cattle manure on Nov. 1, 2022
 Tillage: None
 Planting date: Apr. 3, 2023
 Row spacing: 7.5 in.
 Seeding rate: 110 lb/ac
 Seeding depth: 1 in.
 Harvest date: Swathed on July 20; Combined July 24; Straw baled July 28, 2023.

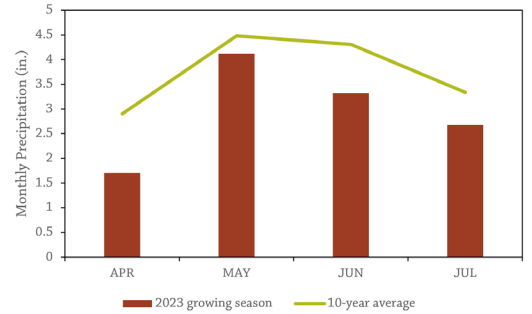
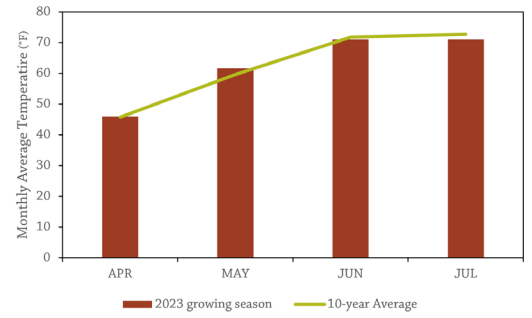


TABLE 6. 2023 Oat Variety Trial at Neil Peterson's in Fonda, Iowa.
 Varieties with a test weight that meets food grade specification (≥ 38 lb/bu) are highlighted.

| | YIELD (bu/ac) | TEST WEIGHT (lb/bu) | STRAW YIELD (bales/ac) |
|------------------------|---------------|---------------------|------------------------|
| MN Pearl | 130 | 36 | 53 |
| Reins | 132 | 37 | 50 |
| Saddle | 130 | 36 | 53 |
| SD Buffalo | 144 | 37 | 64 |
| Mean | 134 | 36 | 55 |
| LSD (90%) ^a | 5 | 1 | 4 |

^a By response variable, if the difference between any two entries is greater than the least significant difference (LSD) the entries are considered statistically different with 90% confidence.

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REFERENCES

- [1] US Department of Agriculture-National Agricultural Statistics Service, "Quick stats." <https://quickstats.nass.usda.gov/> (accessed Jun. 29, 2023).
- [2] S. Gailans, S. Carlson, K. Pecinovsky, and B. Lang, "Oat Variety and Fungicide Trials," 2015. <https://practicalfarmers.org/research/oat-variety-and-fungicide-trials/> (accessed Jun. 29, 2023).
- [3] S. Gailans, S. Carlson, M. Schnabel, K. Pecinovsky, B. Lang, and W. Johnson, "Oat Variety Trials 2016," 2016. <https://practicalfarmers.org/research/oat-variety-trials-2016/> (accessed Jun. 29, 2023).
- [4] S. Gailans, S. Carlson, M. Schnabel, K. Pecinovsky, B. Lang, and W. Koehler, "Oat Variety and Fungicide Trials 2017," 2017. <https://practicalfarmers.org/research/oat-variety-and-fungicide-trials-2017/> (accessed Jun. 29, 2023).
- [5] S. Gailans, S. Carlson, M. Schnabel, K. Pecinovsky, and W. Johnson, "Oat Variety Trial 2018," 2018. <https://practicalfarmers.org/research/oat-variety-trial-2018/> (accessed Jun. 29, 2023).
- [6] S. Gailans, S. Carlson, M. Schnabel, K. Pecinovsky, and W. Koehler, "Oat Variety Trial 2019," 2019. <https://practicalfarmers.org/research/oat-variety-trial-2019/> (accessed Jun. 29, 2023).
- [7] S. Gailans et al., "Oat Variety Trial 2020," 2020. <https://practicalfarmers.org/research/oat-variety-trial-2020/> (accessed Jun. 29, 2023).
- [8] S. Gailans and L. English, "Oat Variety Trial 2021," 2021. <https://practicalfarmers.org/research/oat-variety-trial-2021/> (accessed Jun. 29, 2023).
- [9] S. Gailans, "Oat Variety Trial 2022," Practical Farmers of Iowa, 2022. <https://practicalfarmers.org/research/oat-variety-trial-2022/> (accessed Jun. 29, 2023).
- [10] Iowa Environmental Mesonet, "Climodat Reports," 2023. <http://mesonet.agron.iastate.edu/climodat/> (accessed Jun. 12, 2023).
- [11] National Drought Mitigation Center (NDMC), U.S. Department of Agriculture (USDA), and National Oceanic and Atmospheric Administration (NOAA), "U.S. Drought Monitor." <https://droughtmonitor.unl.edu/maps/maparchive.aspx>, Jul. 08, 2023.



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