

## Oat Variety Trial 2021

### In a Nutshell:

- 18 oat varieties were screened at four Iowa State University research farms.

### Key Findings:

- Across varieties and sites, average oat yield was 116 bu/ac.
- Streaker (hulless variety) scored a test weight >40 lb/bu at each location; though, it was also the lowest yielding variety at each location. Sumo and Shelby 427 (hulled varieties) made food grade test weight specifications at two of the four research farms.



Oat variety trial at Boone on July 2, 2021.

### BACKGROUND

Careful management and proper choice of variety can make oats a profitable crop due to their low input requirements and beneficial effects on succeeding crops in a rotation. Oats can be used for grain and straw production, as a companion crop to establish hay and pastures, or for early-season forage as hay or haylage. Because oats are harvested in late July to early August, field management options for the remainder of the season are numerous. These include establishment of a perennial forage or summer cover crop, as well as an opportunity for mid-season manure application. Planting oats before April 15 is recommended for optimal yields in Iowa. This helps avoid exposure to warmer weather during grain fill. Test weight is the most commonly used indicator of grain quality. High test-weight varieties should be chosen by growers who intend to market oat grain to food-grade buyers. Oat growth is regularly affected by rust and barley yellow dwarf virus. Variety resistance to these

diseases should be considered. Another option is the use of a foliar fungicide applied at Feekes 9 growth stage, defined as flag leaf emerged with ligule visible.

In 2021, 180,000 acres of oats were planted in Iowa according to the USDA-National Agricultural Statistics Service. The state average yield for the year was 77 bu/ac; the five-year average yield is 71 bu/ac.<sup>[1]</sup>

### METHODS

Variety trials were conducted at four locations in 2021: 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. These variety trials build on previous trials conducted at Kanawha, Charles City, Boone, Nashua and Lewis from 2015–2020.<sup>[2–7]</sup> Information about each of the varieties trialed in 2021 can be found in **Table 1**.

### 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)

### Funding

Walton Family Foundation,  
Albert Lea Seed House,  
General Mills, Welter Seed and  
Honey Co., Meridian Seeds,  
Sponheim Seed, SDSU Seed  
Foundation, Zabel Seeds

TABLE 1. Origin, PVP and disease ratings for oat varieties screened in 2021.

| VARIETY    | ORIGIN <sup>a</sup> | YEAR RELEASED | PVP <sup>b</sup> | MATURITY | DISEASE RATINGS <sup>c</sup> |           |                   |      |
|------------|---------------------|---------------|------------------|----------|------------------------------|-----------|-------------------|------|
|            |                     |               |                  |          | CROWN RUST                   | STEM RUST | BYDV <sup>d</sup> | 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   |
| MN Pearl   | MN                  | 2018          | PVP              | Late     | MS                           | --        | MS                | R    |
| Morton     | ND                  | 2001          | PVP              | Late     | MS                           | --        | MS                | R    |
| Natty      | SD                  | 2015          | PVP              | Medium   | MR                           | MS        | MR                | R    |
| Reins      | IL                  | 2016          | PVP              | Early    | MR                           | MR        | R                 | R    |
| Rushmore   | SD                  | 2019          | Pending          | Medium   | MR                           | --        | MR                | MR   |
| Saber      | IL                  | 2010          | PVP              | Early    | MS                           | S         | MR                | S    |
| Saddle     | SD                  | 2018          | Pending          | Early    | MR                           | S         | MR                | --   |
| Shelby 427 | SD                  | 2011          | PVP              | Medium   | MS                           | MS        | MR                | MR   |
| Streakere  | SD                  | 2016          | PVP              | Medium   | MS                           | --        | MR                | R    |
| Sumo       | SD                  | 2017          | PVP              | Early    | MR                           | R         | MS                | R    |
| Warrior    | SD                  | 2019          | Pending          | Med-Late | R                            | --        | MS                | R    |

<sup>a</sup> 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.

<sup>b</sup> 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.

<sup>c</sup> Disease Ratings: S = susceptible; MS = moderately susceptible; MR = moderately resistant; R = resistant.

<sup>d</sup> Disease: BYDV = Barley Yellow Dwarf Virus.

<sup>e</sup> Hulless variety.

Oat management information is provided with the results from each location. No herbicides or insecticides were applied at any location.

Data were analyzed using JMP Pro 15 (SAS Institute Inc., Cary, NC). Statistical significance is determined at  $P \leq 0.10$  level (unless otherwise noted) and means separations are reported using Tukey's least significant difference (LSD).

## RESULTS AND DISCUSSION

Data were analyzed by location, and varieties are listed in order of yield performance at each location. Reported yields are corrected for 13% moisture. A "percentage of test average" calculation is included to aid in comparing varieties at each location. Rainfall and temperature data were accessed from the nearest weather station.<sup>[8]</sup> Rainfall in 2021 was well below historical averages, particularly at Boone and Nashua.

Streaker, a hulless variety, routinely yielded least but always scored the highest test weight at each location (>40 lb/bu). Five varieties at Kanawha and six varieties at Boone made a test weight of 38 lb/bu – the standard minimum that many food companies require before dockage is applied. A test weight of 36 lb/bu is a minimum processing facilities can use for food-grade milling and several varieties at each location made this test weight. The low number of varieties reaching food grade thresholds (38 lb/bu) in 2021 is likely, in part, due to the hot and dry June conditions at each site.

Lodging was highest at Greenfield which was harvested at least a week later than the rest of the sites. Across the three sites reporting incidence of lodging, Streaker appeared to be the most susceptible variety.

## ISU NORTHERN RESEARCH FARM, KANAWHA

Previous crop: Soybeans  
 Replications: 3  
 Harvested plot size: 5 ft × 46 ft  
 Fertilizer applied: 79 lb N/ac as urea on March 31  
 Tillage: Soil finisher on March 31  
 Planting date: Apr. 1, followed by cultipacker  
 Row spacing: 7.5 in.  
 Seeding rate: 4 bu/ac  
 Seeding depth: 1 in.  
 Harvest date: July 21

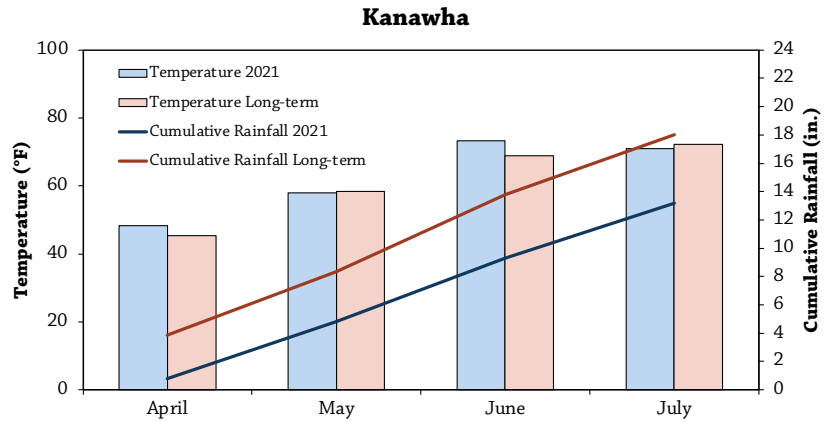


TABLE 2. Results for the 2021 Oat Variety Trial at Kanawha in north-central Iowa. Varieties with a test weight that meets food grade specification ( $\geq 38$  lb/bu) are highlighted.

| VARIETY    | YIELD   |                  |                   | TEST WEIGHT (lb/bu) | PLANT HT AT HARVEST (in.) | LODGING (%) |
|------------|---------|------------------|-------------------|---------------------|---------------------------|-------------|
|            | (bu/ac) | (% of site avg.) | 7-yr avg. (bu/ac) |                     |                           |             |
| Warrior    | 149     | 114              | 116               | 35.0                | 38                        | 0           |
| Saddle     | 145     | 111              | 111               | 35.5                | 37                        | 0           |
| MN Pearl   | 142     | 109              | 111               | 35.1                | 38                        | 2           |
| Esker2020  | 142     | 108              | 110               | 33.4                | 37                        | 0           |
| Saber      | 141     | 108              | 109               | 35.5                | 36                        | 0           |
| Rushmore   | 141     | 108              | 135               | 37.0                | 39                        | 0           |
| Natty      | 139     | 107              | 99                | 37.5                | 39                        | 0           |
| Deon       | 139     | 107              | 96                | 37.2                | 39                        | 0           |
| CS Camden  | 139     | 106              | 91                | 34.6                | 38                        | 0           |
| Hayden     | 137     | 105              | 95                | 37.1                | 38                        | 2           |
| Reins      | 135     | 104              | 92                | 37.7                | 31                        | 0           |
| Jerry      | 132     | 101              | 75                | 37.6                | 39                        | 0           |
| Shelby 427 | 131     | 100              | 88                | 38.7                | 40                        | 0           |
| Antigo     | 128     | 98               | 85                | 38.8                | 37                        | 27          |
| Goliath    | 116     | 89               | 86                | 38.0                | 44                        | 38          |
| Morton     | 110     | 85               | 107               | 35.9                | 40                        | 0           |
| Sumo       | 109     | 83               | 82                | 38.2                | 37                        | 8           |
| Streaker   | 74      | 57               | 81                | 45.1                | 38                        | 35          |
| MEAN       | 131     | --               | --                | 37.1                | 38                        | --          |
| LSD (90%)  | 32      | --               | --                | 1.5                 | 3                         | --          |

<sup>a</sup> 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.

<sup>b</sup> 7-yr. average yields are listed for varieties trialed at least twice in the past seven years at this location.

## ISU AG ENGINEERING AND AGRONOMY FARM, BOONE

Previous crop: Soybeans  
 Replications: 3  
 Harvested plot size: 5 ft × 51 ft  
 Fertilizer applied: 30 lb N/ac; 100 lb P/ac; 25 lb S/ac on Apr. 3  
 Tillage: Field cultivator on Apr. 5  
 Planting date: Apr. 5  
 Row spacing: 7.5 in.  
 Seeding rate: 4 bu/ac (3.5 bu/ac for Streaker only)  
 Seeding depth: 1 in.  
 Harvest date: July 22

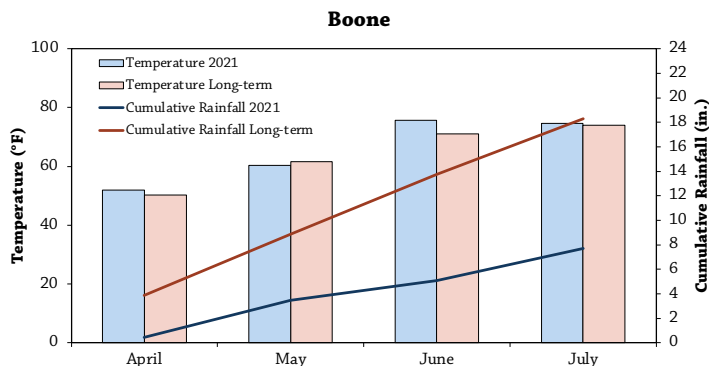


TABLE 3. Results for the 2021 Oat Variety Trial at Boone in central Iowa.  
*Varieties with a test weight that meets food grade specification ( $\geq 38$  lb/bu) are highlighted.*

| VARIETY    | YIELD   |                  |                      | TEST WEIGHT<br>(lb/bu) | PLANT HT AT<br>HARVEST (in.) | LODGING (%) |
|------------|---------|------------------|----------------------|------------------------|------------------------------|-------------|
|            | (bu/ac) | (% of site avg.) | 4-yr avg.<br>(bu/ac) |                        |                              |             |
| Goliath    | 116     | 112              | 88                   | 35.8                   | 36                           | 77          |
| Jerry      | 114     | 110              | 77                   | 37.1                   | 33                           | 28          |
| Reins      | 113     | 108              | 96                   | 38.1                   | 25                           | 0           |
| Saddle     | 111     | 107              | 100                  | 35.9                   | 30                           | 0           |
| Warrior    | 111     | 107              | 104                  | 36.3                   | 30                           | 0           |
| CS Camden  | 111     | 107              | 89                   | 31.4                   | 30                           | 2           |
| Esker2020  | 110     | 106              | 104                  | 34.2                   | 31                           | 3           |
| Rushmore   | 110     | 106              | 121                  | 38.3                   | 33                           | 8           |
| Saber      | 107     | 103              | 94                   | 35.1                   | 31                           | 13          |
| Natty      | 106     | 102              | 86                   | 37.4                   | 23                           | 15          |
| MN Pearl   | 106     | 102              | 97                   | 36.0                   | 30                           | 8           |
| Shelby 427 | 103     | 99               | 81                   | 38.2                   | 33                           | 2           |
| Deon       | 103     | 99               | 90                   | 36.7                   | 32                           | 7           |
| Hayden     | 102     | 98               | 87                   | 37.7                   | 32                           | 5           |
| Morton     | 96      | 93               | 98                   | 34.7                   | 32                           | 7           |
| Sumo       | 92      | 88               | 82                   | 38.1                   | 30                           | 7           |
| Antigo     | 86      | 82               | 81                   | 39.5                   | 31                           | 15          |
| Streaker   | 72      | 69               | 79                   | 45.9                   | 33                           | 50          |
| MEAN       | 104     | --               | --                   | 37.0                   | 31                           | --          |
| LSD (90%)  | 27      | --               | --                   | 3.7                    | 12                           | --          |

<sup>a</sup> 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.

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

## ISU NORTHEAST RESEARCH FARM, NASHUA

Previous crop: Soybeans  
 Replications: 3  
 Harvested plot size: 8 ft × 127 ft  
 Fertilizer applied: 14 lb N/ac, 66 lb P/ac as MAP on Nov. 13, 2020  
 30 lb N/ac as urea on March 22, 2021  
 Tillage: Field cultivator on March 22 and 29  
 Planting date: March 30, followed by cultipacker  
 Row spacing: 7.5 in.  
 Seeding rate: 4 bu/ac  
 Seeding depth: 1 in.  
 Harvest date: July 13

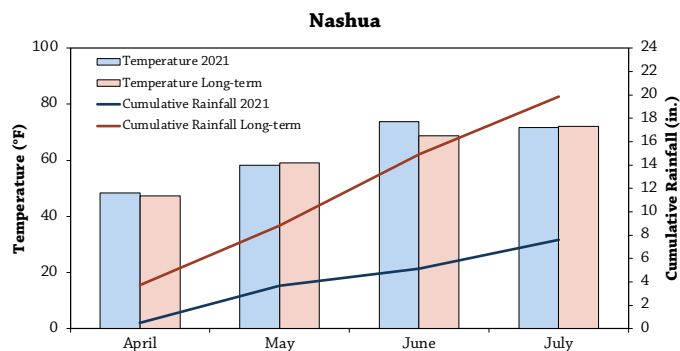


TABLE 4. Results for the 2021 Oat Variety Trial at Nashua in northeast Iowa. Varieties with a test weight that meets food grade specification ( $\geq 38$  lb/bu) are highlighted.

| VARIETY         | YIELD     |                  |                   | TEST WEIGHT (lb/bu) | PLANT HT AT HARVEST (in.) | STRAW YIELD (ton/ac) |
|-----------------|-----------|------------------|-------------------|---------------------|---------------------------|----------------------|
|                 | (bu/ac)   | (% of site avg.) | 7-yr avg. (bu/ac) |                     |                           |                      |
| Saddle          | 131       | 108              | 127               | 33.4                | 31                        | 1.46                 |
| Warrior         | 129       | 106              | 123               | 32.8                | 30                        | 1.58                 |
| Shelby 427      | 129       | 106              | 115               | 36.3                | 33                        | 1.60                 |
| Natty           | 127       | 105              | 124               | 34.8                | 34                        | 1.36                 |
| Reins           | 127       | 105              | 118               | 34.8                | 26                        | 1.16                 |
| Goliath         | 127       | 105              | 127               | 33.3                | 36                        | 1.57                 |
| Saber           | 126       | 104              | 124               | 33.2                | 30                        | 1.27                 |
| Hayden          | 125       | 103              | 129               | 34.6                | 31                        | 1.57                 |
| Deon            | 124       | 102              | 124               | 34.2                | 32                        | 1.57                 |
| Esker2020       | 123       | 102              | 131               | 30.3                | 31                        | 1.36                 |
| Rushmore        | 121       | 100              | 132               | 33.7                | 32                        | 1.44                 |
| CS Camden       | 121       | 100              | 109               | 30.8                | 29                        | 1.44                 |
| Antigo          | 120       | 99               | 109               | 36.3                | 32                        | 1.26                 |
| Morton          | 117       | 96               | 112               | 31.5                | 34                        | 1.56                 |
| Jerry           | 117       | 96               | 109               | 34.4                | 33                        | 1.43                 |
| MN Pearl        | 116       | 96               | 132               | 31.1                | 30                        | 1.53                 |
| Sumo            | 114       | 94               | 110               | 36.1                | 32                        | 1.16                 |
| <b>Streaker</b> | <b>87</b> | <b>72</b>        | <b>84</b>         | <b>44.1</b>         | <b>34</b>                 | <b>1.51</b>          |
| MEAN            | 121       | --               | --                | 34.2                | 32                        | 1.43                 |
| LSD (90%)       | 12        | --               | --                | 0.4                 | 2                         | 0.03                 |

<sup>a</sup> 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.

<sup>b</sup> 7-yr. average yields are listed for varieties trialed at least twice in the past seven years at this location.

## ISU SOUTHWEST RESEARCH FARM, GREENFIELD

Previous crop: Soybeans  
 Replications: 3  
 Harvested plot size: 5 ft × 56 ft  
 Fertilizer applied: 70 lb N/ac as urea on Apr. 1  
 Tillage: Disked on Apr. 1  
 Planting date: Apr. 5 followed by cultipacker  
 Row spacing: 7.5 in.  
 Seeding rate: 4 bu/ac (3.5 bu/ac for Streaker only)  
 Seeding depth: 1 in.  
 Harvest date: July 28

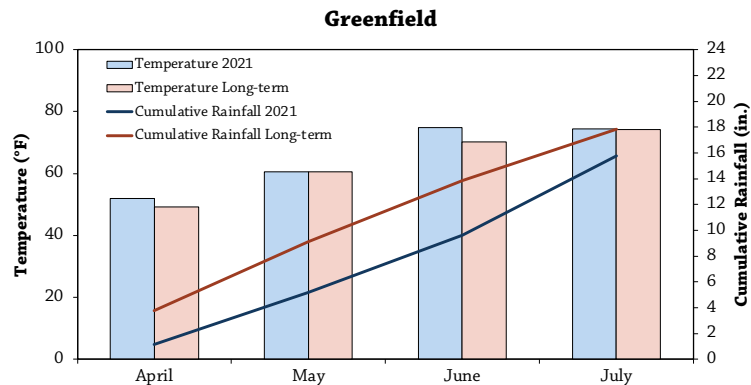


TABLE 5. Results for the 2021 Oat Variety Trial at Greenfield in southwest Iowa. Varieties with a test weight that meets food grade specification ( $\geq 38$  lb/bu) are highlighted.

| VARIETY         | YIELD     |                  |                   | TEST WEIGHT (lb/bu) | PLANT HT AT HARVEST (in.) | LODGING (%) |
|-----------------|-----------|------------------|-------------------|---------------------|---------------------------|-------------|
|                 | (bu/ac)   | (% of site avg.) | 2-yr avg. (bu/ac) |                     |                           |             |
| Reins           | 145       | 136              | 134               | 35.8                | 30                        | 22          |
| Rushmore        | 134       | 125              | 141               | 35.3                | 36                        | 37          |
| Saddle          | 131       | 122              | 131               | 34.2                | 34                        | 10          |
| MN Pearl        | 128       | 120              | 135               | 33.8                | 35                        | 33          |
| Hayden          | 127       | 119              | 119               | 35.9                | 37                        | 35          |
| Saber           | 122       | 114              | 137               | 34.5                | 34                        | 25          |
| Esker2020       | 117       | 110              | 129               | 32.7                | 34                        | 40          |
| Warrior         | 113       | 106              | 117               | 32.0                | 35                        | 17          |
| Shelby 427      | 112       | 105              | 137               | 36.4                | 36                        | 38          |
| Sumo            | 105       | 98               | 61                | 34.9                | 35                        | 30          |
| Deon            | 102       | 96               | 113               | 32.8                | 36                        | 42          |
| Natty           | 99        | 93               | 121               | 34.2                | 37                        | 30          |
| CS Camden       | 96        | 90               | 96                | 30.5                | 36                        | 28          |
| Antigo          | 92        | 87               | 109               | 37.6                | 33                        | 68          |
| Morton          | 81        | 76               | 99                | 32.0                | 39                        | 35          |
| Goliath         | 77        | 73               | 83                | 34.5                | 41                        | 77          |
| Jerry           | 73        | 69               | 80                | 33.0                | 36                        | 33          |
| <b>Streaker</b> | <b>64</b> | <b>60</b>        | <b>126</b>        | <b>45.4</b>         | <b>34</b>                 | <b>43</b>   |
| MEAN            | 107       | --               | --                | 34.7                | 35                        | 36          |
| LSD (90%)       | 33        | --               | --                | 2.1                 | 4                         | 42          |

<sup>a</sup> 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.

<sup>b</sup> 2-yr. average yields are listed for varieties trialed in the past two years at this location.



## REFERENCES

1. US Department of Agriculture-National Agricultural Statistics Service. Quick stats. USDA-National Agricultural Statistics Service. <https://quickstats.nass.usda.gov/> (accessed October 2021).
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### PFI COOPERATORS' PROGRAM

PFI's Cooperators' Program helps farmers find practical answers and make informed decisions through on-farm research projects.

The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs.

If you are interested in conducting an on-farm trial contact Stefan Gailans @ 515-232-5661 or [stefan@practicalfarmers.org](mailto:stefan@practicalfarmers.org).