

Oat Variety Trial

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Introduction

Oats are a major spring-sown, small grain crop in Iowa. 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 mature in late July to early August, it allows for cropping options for the remainder of the season, including establishment of a perennial forage or cover crop, and timely window for a mid-season animal manure application.

Careful management and proper choice of variety can make oats a profitable crop due to their low input requirements and favorable effects on succeeding crops in a rotation. 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. Grain quality components such as beta glucans and fat also are gaining importance by food processors. Beta glucans are noteworthy for positive effects on human health. Lower fat concentration in grain tends to store better, reducing the potential for grain rancidity.

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. A separate oat trial was conducted this season at the ISU Northeast Research and Demonstration Farm, Nashua, to compare the use of a foliar fungicide.

Materials and Methods

Sixteen oat varieties were tested in 2015. The soils at the site consist of 55 Nicollet clay loam and 507 Canisteo clay loam. The site was in soybeans the previous year and has been in a corn-soybean crop rotation for over 20 years. The site was fertilized with 18 lb N/acre and 35 lb K₂O/acre to meet optimal soil test levels based on ISU soil fertility recommendations.

The site was field cultivated twice before planting on April 4 to distribute crop residue. The planter was a John Deere BD1108 drill with 7.5-in. row spacing planting at a rate of four bushels/acre followed by one pass with a cultipacker. Each plot of a variety occupied 325 sq ft and there were three replications. The trial was sufficiently weed-free to not require the use of herbicides or hand weeding.

The trial was harvested July 30 with a Wintersteiger plot combine. No straw yields were determined. Subsamples of grain were analyzed by General Mills for percent groats, plump groats, beta glucans, and fat.

The 2015 season provided normal growing degree days and precipitation (Table 1).

Results and Discussion

Variety trial results for 2015 are presented in Table 2. Yields reported are on a 32 lb/bushel basis. Test weight is the most important indicator of grain milling quality. Minimum

test weights are 36 lb/bushel for U.S. No. 1 oats, and 33 lb/bushel for U.S. No. 2 oats.

Some of the grain quality components are included in Table 3. Higher concentrations of groats, plump groats, and beta glucans, and lower concentrations of fat are more favorable to the oat food processing companies.

Yield results from a single year are not reliable predictors of next year's yield. Environment and disease conditions can fluctuate greatly from year to year, so it is important to consider yields averaged over multiple years.

Table 1. Rainfall and oat growing degree days (GDD) for 2015 and the long-term normal.

| Month | Rainfall, in. | | GDD, base 32°F | |
|-------|---------------|--------|----------------|--------|
| | 2015 | Normal | 2015 | Normal |
| April | 3.7 | 3.2 | 497 | 498 |
| May | 4.3 | 3.8 | 833 | 823 |
| June | 5.7 | 4.8 | 1,103 | 1,098 |
| July | 3.2 | 4.0 | 1,192 | 1,250 |
| Total | 16.9 | 15.8 | 3,625 | 3,669 |

Table 2. State of origin, PVP^a and disease ratings^b for oat varieties included in the 2015 variety trial at the ISU Northern Research and Demonstration Farm, Kanawha.

| Variety | State of origin ^a | PVP ^b | Maturity | Disease name and disease ratings ^c by variety | | | |
|------------|------------------------------|------------------|----------|--|-----------|-------------------|------|
| | | | | Crown rust | Stem rust | BYDV ^d | Smut |
| Badger | WI | PVP | Early | MR | MS | MR | R |
| BetaGene | WI | PVP | Mid-Late | MR | MR | R | R |
| Deon | MN | PVP | Late | MR | MS | MR | R |
| Excel | IN | PVP | Early | MS | S | R | MR |
| GM423 | GM | PVP | Late | MS | MS | MR | -- |
| Goliath | SD | PVP | Late | MS | R | MR | MR |
| Hayden | SD | PVP | Mid-Late | MS | MS | MR | R |
| Horsepower | SD | PVP | Medium | MS | MS | MS | MR |
| Jerry | ND | PVP | Medium | MS | MS | MS | MS |
| Leggett | AAFC | PVP | Early | MR | MR | S | R |
| Natty | SD | PVP | Medium | MR | MS | MR | R |
| Rockford | ND | PVP | Late | MS | MS | MR | MR |
| Saber | IL | PVP | Early | MS | S | R | MS |
| Shelby 427 | SD | PVP | Medium | MS | MS | MR | MR |
| Souris | ND | PVP | Medium | S | MS | MS | MR |
| Tack | IL | PVP | Early | R | S | R | S |

^aOrigin: AAFC-Agriculture and Agri-Food Canada; GM-General Mills; IL-University of Illinois, IN-Purdue University; MN-University of Minnesota; ND-North Dakota State University; SD-South Dakota State University; WI-University of Wisconsin.

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

^cDisease ratings: S = susceptible; MS = moderately susceptible; MR = moderately resistant; R = resistant.

^dDisease: BYDV = barley yellow dwarf virus.

A similar oat variety trial also was conducted this season at the ISU Northeast Research and Demonstration Farm, Nashua. Summaries of yield and test weight results for variety trials in 2011-2014 at the ISU Northeast Research Farm can be found in that report.

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Table 3. Performance of 16 oat varieties tested in 2015 at the ISU Northern Research and Demonstration Farm, Kanawha.

| Variety | Grain yield ^a July 30 (bu/ac) | Grain moisture (%) | Test weight (lb/bu) | Heading June 12 (%) | Mature July 10 (%) | Plant height July 30 (in.) | Lodging July 30 (%) | Groats (%) | Plump groats (%) | Beta glucans (%) | Fat (%) |
|-----------------------|--|--------------------------|---------------------------|---------------------------|--------------------------|----------------------------------|---------------------------|---------------|------------------------|------------------------|------------|
| Badger | 141 | 11.6 | 33 | 67 | 50 | 41 | 80 | 69 | 39 | 5.0 | 7.2 |
| BetaGene | 170 | 11.5 | 33 | 50 | 42 | 43 | 42 | 71 | 54 | 5.0 | 6.8 |
| Deon | 148 | 11.5 | 33 | 7 | 32 | 49 | 28 | 68 | 30 | 4.6 | 8.2 |
| Excel | 131 | 10.9 | 32 | 33 | 48 | 44 | 67 | 66 | 28 | 4.9 | 7.2 |
| GM423 | 105 | 10.6 | 27 | 0 | 45 | 48 | 75 | 69 | 34 | 6.2 | 7.9 |
| Goliath | 107 | 10.7 | 32 | 0 | 47 | 49 | 70 | 70 | 32 | 4.9 | 7.2 |
| Hayden | 131 | 10.8 | 35 | 27 | 45 | 46 | 80 | 70 | 37 | 5.0 | 8.3 |
| Horsepower | 113 | 10.6 | 29 | 37 | 47 | 44 | 80 | 66 | 15 | 5.3 | 7.5 |
| Jerry | 105 | 10.3 | 29 | 40 | 45 | 49 | 87 | 67 | 20 | 5.0 | 7.1 |
| Leggett | 97 | 10.6 | 29 | 27 | 45 | 47 | 78 | 66 | 17 | 5.0 | 7.6 |
| Natty | 141 | 10.9 | 34 | 73 | 50 | 48 | 62 | 65 | 29 | 4.8 | 6.4 |
| Rockford | 89 | 11.2 | 32 | 3 | 40 | 48 | 62 | 67 | 15 | 5.0 | 9.5 |
| Saber | 133 | 11.6 | 34 | 67 | 45 | 43 | 43 | 74 | 32 | 4.6 | 6.7 |
| Shelby 427 | 123 | 10.5 | 34 | 73 | 57 | 44 | 82 | 71 | 27 | 5.0 | 7.7 |
| Souris | 103 | 10.5 | 30 | 17 | 43 | 44 | 60 | 68 | 11 | 5.1 | 7.4 |
| Tack | 125 | 10.4 | 35 | 60 | 57 | 41 | 92 | 72 | 24 | 4.8 | 8.7 |
| Average | 123 | 10.9 | 32 | -- | -- | 46 | 68 | 69 | 28 | 5.0 | 7.6 |
| LSD ^b 0.05 | 36 | 1.0 | 2 | -- | -- | 9 | 25 | 5 | 13 | 0.8 | 0.6 |

^aGrain yields are based on 32 lb/bushel test weight.

^bLSD = least significant difference. Entries that differ by one LSD or more are considered to be in different classes with 95% certainty.