

Diseases

It is important to monitor for disease pressure. There are several fungal diseases including Crown and Stem Rust, Septoria, and Fusarium Head Blight. They can be treated with application of fungicides at the first sign of infection. Another potential disease is Barley Yellow Dwarf Virus. One of the best defenses against disease is genetic resistance and reinforces the importance of variety selection.

Weed/Pest Management

Small grains tend to have lower weed and pest pressures because they help break up standard weed and pest cycles. The best weed control is early planting. However, traditional herbicides/pesticides can be used to control issues. Herbicide carryover from previous crops may prevent successful establishment of small grains. It is important that you follow the label restrictions for your herbicides. Being aware of the crop rotation restrictions ahead of time can impact the success entire rotation.

Harvest/Storage

Swathing: Can be started with grain moisture below 35% but better to wait until mid -20s. Swathing is suggested when high levels of weeds present and/or harvest maturity is uneven.

Direct Combining: More common method of harvest. Grain moisture should be less than 16%. Many soybean combine heads can be used to harvest small grains.

Storage: Bin aeration is important because small grains tend to “sweat”. Food grade grains cannot have live insects. Use a grain vacuum to increase test weights and remove insects or other unwanted material.

Additional Resources

Hanson, W. *Small Grain Production for Iowa—Winter*. Iowa State University Extension. August 1994.

Hanson, W. *Small Grain Production for Iowa—Spring*. Iowa State University Extension. August 1992.

Grain Millers. *The Growth of Oats—A Production Handbook*. January 2016.

Gibson, L et al. *Intercropping Winter Cereal Grains and Red Clover*. Iowa State University Extension. May 2006. <https://store.extension.iastate.edu/Product/pm2025-pdf>

Wiersma, J. et al. *Chapter 11: Small Grains. In: Risk Management for Organic Producers*. University of Minnesota. 2010. http://www.organicriskmanagement.umn.edu/small_grains11.html



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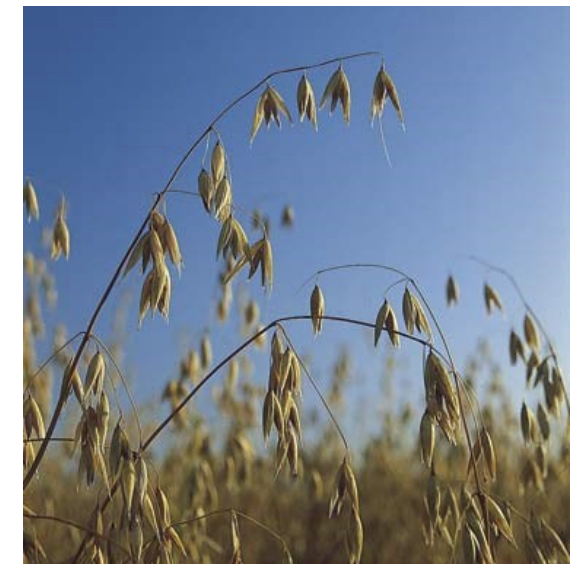
Oat photo on cover courtesy of Iowa State University.
Wheat harvest photo courtesy of Dr. Ron Berges.



LEOPOLD CENTER

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Growing Small Grains



Why grow small grains?

There are many benefits to adding small grains to a rotation. They have lower input costs due to reduced fertilizer, herbicide, and pesticide costs when compared to corn or soybeans. Planting small grains also helps to diversify farm income and spread out labor throughout the year. By adding diversity to the cropping system, there is also the potential to increase soil health.

Seed selection & seeding

It is important to determine the end market for the small grain before deciding planting rate, fertilization requirements, and fungicide use. It is recommended to use certified seed to ensure germination and quality, especially for food-grade grains.

When selecting a grain variety to plant, there are many characteristics to consider including disease resistance, test weight, yield, lodging resistance and maturity. Later maturing varieties of spring-seeded small grains are often suggested for northern Iowa to allow more time for grain filling and increased test weights.

The recommended seeding date for winter cereal grains is between **September 20 and October 5** to achieve maximum grain yields. Yields will be about 20% less if planting is delayed to October 15. Spring cereal grains should be planted **late March to mid-April**. Planting after April 15 may result in a 10% yield reduction per week and a 15% reduction if planted after May 1. Spring grains will start germinating when soil temperatures reach 40-

45°F. However, if **soil temperatures** fall into the 20's after plants have germinated, significant damage can occur.

Seeding rate

The seeding rate should be calculated using the formula below because individual kernel size varies greatly between varieties. This method requires weighing out 500 seeds to get an idea of the number of seeds per pound.

$$\text{Seeding Rate (lbs/ac)} = \frac{\text{Desired Stand in plants/acre}}{[(\text{Seeds/Pound}) \times (\% \text{ Germination})]} \times (1 - \text{Expected Stand Loss})$$

There is also a seeding calculator on the Alberta Agriculture and Forestry website (<http://www.agric.gov.ab.ca>) that will do this calculation for several varieties.

Desired Stand at Harvest

Crop	Plants/Acre (x1 million)	Plants/ft ² *
Oats	1.10-1.30	25-30
Barley	1.25-1.30	28-30
Rye	1.00-1.20	24-28
Winter Wheat	0.90-1.00	21-23
Spring Wheat	1.30-1.40	30-32

*Based on recommendations from University of Minnesota Extension and Grain Millers. Later seedings will require heavier seeding rates.

Fertility

Small grains generally have lower nutrient requirements than other crops but still may need fertilizer to reach yield goals. However, producers should also refer to soil test results and preceding crop credits when determining fertilizer needs. Refer to ISU Extension publication PM1688—"Crop Nutrient and Limestone Recommendations in Iowa" as well as the University of Minnesota publication "Fertilizer Guidelines for Agronomic Crops in Minnesota" for specific fertilizer recommendations and crop removal rates.

Oats have a crop removal rate for N-P-K of 0.73-.29-0.19 pounds per bushel. Excessive nitrogen application increases the likelihood of lodging. Potassium is important to help prevent lodging. For oats, it is suggested to put on 15-30 lbs. potassium banded or 30-60 lbs. broadcast.

Red Clover as a Green Manure

Red clover can be seeded with a spring cereal grain or frost-seeded into winter cereals to reduce fertilizer needs for the following crop and help to suppress weeds and pests. The fertilizer nitrogen replacement value of red clover for a subsequent corn crop is estimated at up to 80 lbs/acre. Seeds should be inoculated with Rhizobium bacteria to facilitate nitrogen fixation. Red clover should be seeded at a rate of 5-15 lbs with spring cereals or frost-seeded at 15-20 lbs into winter cereals. Red clover can also provide fall grazing opportunities after small grain harvest.