

Pushing Nitrogen Rates in Oats

Speakers:

Jason Voogt
Ingrid Kristanson
Ramona Mohr

*Field to Field Ag
Manitoba Agriculture and Resource Development
Agriculture and Agri-Food Canada*

Objectives:

To demonstrate the effect of different fertility rates on plant stand and yield of oats.

Collaborator: Field to Field Ag

Demonstration Treatments:

1. No Nitrogen
2. N = 120 lb/A
3. N = 160 lb/A
4. N = 200 lb/A

Demonstration Summary:

Oats grow best in black and grey wooded soil zones that have higher moisture, but can grow on sandy loam to heavy clay soils as long as they have good drainage. To reduce disease pressure and optimize yields, oats should not be grown after cereals. The best rotational crops include canola, hay, soybeans and other legumes. Research has shown that canola grown on oat stubble has 24 per cent more yield, while canola on wheat and barley stubble increased yield by only 18 and 19 per cent, respectively. Corn isn't the best choice in rotation with oats because it increases the risk of some diseases and ties up N early in the growing season. That said, U.S. research has shown that sandwiching a year of oats between a corn/soybean rotation almost eliminates corn rootworm issues.

Earlier-seeded oats generally give increased yields and quality. In general, seeding by the middle of May in Western Canada gives optimum yield and quality. Ideal soil temperature for oats is above 5 °C. Seed treatments can be used to help prevent seed- and soil-borne diseases. In cool, wet growing conditions they can help prevent root rot. Seed treatments are recommended for hulless oats because they are more susceptible to seed diseases. The recommended seeding rate for oats in Western Canada is to achieve 20 to 30 plants per sq./ft. Growers should use the higher seeding rate of this range in high-moisture, high-fertility, late seeding and high wild-oat competition situations. Seeding rates can be calculated using thousand kernel weights (TKW) times survival percentage (the percentage of seeds expected to germinate and produce vigorous seedlings). Under normal growing conditions growers should expect 95 per cent germination, but in cold, wet soil, germination could be 90 to 93 per cent. Growers should increase seeding rate of hulless oats because their fragile, thin seed covering can reduce germination.

The optimum seeding depth for oats is one to two inches — deep enough to reach soil moisture — and should not exceed three inches. Oats are usually seeded with a row spacing of 7.5 to 12 inches but research has shown that in no-till systems wider row spacing up to 14 inches does not affect plant numbers or tillering. Wider row spacing may result in increased wild oats and, in dry conditions, may cause harvest issues if there is not enough stubble to hold the swath off the ground.

Some research suggests that oat seed size may be important for competition with wild oats. A 2005 greenhouse study at the University of Saskatchewan showed that oats derived from large seed produced 17 per cent more biomass and 15 per cent more panicles (flower clusters) than plants derived from smaller seed regardless of genotype or wild oat competition.

Oats in a no-till situation remove fewer nutrients from the soil — except sulphur — than barley, wheat or canola. Nitrogen (N) is the most yield-limiting nutrient in oats and a soil test is recommended to determine the amount of N growers need to apply. Too much N reduces test weight and the percentage of plump kernels, and also increases lodging. Too little N reduces tillering and yield.

N requirement depends on moisture availability. Yield potential is higher with more moisture, and so a higher N rate is required to achieve optimum yield. A 100 bu./ac. oat crop generally requires 97 to 117 lbs./ac. N. Agriculture & Agri-Food Canada (AAFC) researchers at Brandon and Indian Head confirmed that under normal conditions optimal yields were achieved when soil plus applied N was at 89 lbs./ac., which is around 36 to 71 lbs./ac. of applied N, depending on the residual.