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Fertilizing Oats

Cooperative Extension South Dakota State University

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Cooperative Extension Service
South Dakota State University
U.S. Department of Agriculture

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At least 13 mineral elements are known to be essential for obtaining high yields of quality oats. They include nitrogen, phosphorus, and potassium, referred to as primary plant foods; calcium, magnesium, and sulfur, termed secondary elements; and boron, chlorine, copper, iron, manganese, molybdenum and zinc, called trace elements.

Oat crops will remove from the soil approximately 1.3 lbs of N, .4 lb of P_2O_5, and 1.2 lbs of K_2O in the grain and straw for every bushel of grain produced.

Equally important are adequate quantities of the secondary and trace elements; however, they are required in somewhat smaller amounts. To date South Dakota soils appear able to provide the necessary amounts of secondary and trace elements for optimum yields. Seldom, if ever, has use of fertilizers containing these nutrients significantly and profitably increased oat yields.

Many South Dakota soils, however, cannot provide the necessary amounts of nitrogen, phosphorus, and in some cases potassium required by today's high yielding quality oats. Recommended rates of fertilizer plant food (Tables 1, 2 and 3) will vary among fields depending on yields desired and existing soil fertility reserves.

Nitrogen

Most of today's oat acreage is seeded on fields that are continuously cropped. Additional nitrogen from fertilizer, manure, or legumes will nearly always increase oat yields, except where previous production practices have created high soil nitrogen reserves.

Adequate nitrogen is essential for high yields of quality oats; nevertheless this crop is one of the most susceptible to lodging where excessive nitrogen exists. This makes management important if you want high oat yields.

Oats seeded in fallowed soil may require little or no additional nitrogen. Above normal levels of nitrate nitrogen will usually be found in fallowed soil following the non crop year. The deep nitrate soil test can measure such reserves. Fallowed soil containing 2.0% organic matter or less may, however, require some additional nitrogen to meet needs of high crop yields. High soil nitrogen reserves are essential for optimum protein levels in any non-legume crop, including oats.

Phosphorus

Additional phosphorus, along with nitrogen and in some instances potassium, are the fertilizer plant foods most often needed for optimum yields. Seldom will phosphorus fertilizer recommendations vary for a field whether it was cropped or fallowed the previous year.

Fallowing does not increase available soil phosphorus reserves as it does nitrogen levels. Available soil phosphorus will not vary from low to high levels in 1 or 2 years, unless fertilizer rates well in excess of crop needs have previously been applied. Phosphorus soil tests thus need only be taken every 3 or 4 years.

Phosphorus is easily converted to forms less available to plants when it is mixed extensively with soil. This is one reason why phosphorus fertilizer will be more effective when applied with the seed in a band with a drill attachment than when broadcast and worked in.

Potassium

Potassium requirements of oats greatly exceed those of all other essential elements with the exception of nitrogen. Luckily, most South Dakota soils still contain very large reserves of available potassium; thus only small amounts (if any) will be recommended as fertilizer on most fields. However, there are some fields, particularly in eastern South Dakota, which are borderline or deficient in potassium according to soil tests. Additions of potassium will be necessary to reach optimum yields on these fields.

Secondary and trace elements

Smaller amounts of secondary and trace elements are taken up by oats. It appears South Dakota soils can usually provide crop needs for these nutrients, since research does not yet show significant profitable oat yield increases from fertilizer containing these elements.

Table 1. Nitrogen recommendations, lbs/A

Yield goal, bu/A	Nitrate nitrogen: Nitrogen needed, lbs N/A*	Nitrogen soil tests: % Organic Matter: Non-fallow Low 2.0	Non-fallow Medium 3.0	Non-fallow High 4.0	Fallow Low 2.0	Fallow Medium 3.0	Fallow High 4.0
		Nitrogen recommended, lbs N/A					
40	52	30	20	0	0	0	0
60	78	40	30	20	20	0	0
80	104	60	45	20	30	0	0
100	130	70	55	30	40	25	0
120	156	85	65	45	60	35	20

*Values for determining nitrogen recommendations based on nitrate tests at 2-foot level.
Example for 80 bu/A yield: **104** (N needed) - **40** (nitrate soil test) = **60** lbs N recommended.

Table 2. Phosphorus recommendations, lbs P_2O_5/A

Yield goal, bu/A	Phosphorus soil test, lbs P/A: Low 6-15	Medium 16-25	High 26-35
	P_2O_5 recommended, lbs /A		
40	20	20	0
60	30	20	0
80	40	30	15
100	45	40	15
120	50	45	15

Table 3. Potassium recommendations, lbs K_2O/A

Yield goal, bu/A	Potassium soil test, lbs K/A: Low 51-120	Medium 121-210	High 211-300
	K_2O recommended, lbs/A		
40	25	0	0
60	30	15	15
80	40	20	15
100	50	25	15
120	60	30	15

Fertilizer application

Application practices can affect fertilizer results. Recommended rates of nitrogen can be applied before, during, or after seeding. Broadcast nitrogen should be worked in right after application to reduce any possible loss. Nitrogen can be applied with a grain drill attachment at seeding, but excessive rates can cause seedling injury.

Total amounts of actual nitrogen plus potash (K_2O) should not exceed 25 lbs per acre when applied in the seed band with a drill attachment on dry sandy soils. That amount should be reduced by at least 50% (only 10 to 12 lbs/A of N+ K_2O) if urea or any other ammonium form of nitrogen fertilizer is used. If 10- to 14-inch rows are used, the amount of drill applied nitrogen and/or potash should be divided by 2.

Nitrogen can also be topdressed after the crop is growing, but this should be done well before flowering and heading begin. Inadequate rainfall after application can make this method less effective than others. Other acceptable topdress methods of nitrogen application include the use of nonpressure nitrogen solutions. Severe crop burning and reduced yield potential can occur if liquid nitrogen solution rates exceed 25 lbs/A actual nitrogen. Very low volume foliar feeding fertilizer practices (2 to 3 gal/A appear to be very questionable practices, according to midwest research.

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