Fertilizing Oat

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Oat is a small grain crop that should be grown in regions with generally cool temperatures and adequate moisture. Oat requires more growing season moisture for good kernel development than other small grains.

Yield Goals:

The most efficient fertilizer rate for each field will depend on the residual soil nutrient level, as determined by a soil test, and the yield goal. Yield is influenced by: 1) local climate; 2) soil type; and 3) management (timeliness of planting, plant population, variety, weed control, etc.). Yield goals should be realistic and usually based on long-time averages and on the management ability of the grower but adjusted to conditions expected for the upcoming year (see Circular SF-822).

Excessive fertilizer use, especially nitrogen and phosphorus, has potential to degrade ground and surface water quality and can also promote lodging. Establishing realistic yield goals, carefully soil sampling fields and fertilizing crops according to soil tests will help preserve water quality.

Fertilizer Recommendations:

Table 1 shows the amount of soil nitrate-nitrogen in the top 2 feet of soil plus nitrogen fertilizer needed to meet the crop requirements for various yield goals. Table 1 is based on nitrate-nitrogen levels in soil samples taken between September 15 and April 1. If soil samples are taken between July 1 and September 15 subtract 0.5 pounds of nitrogen from the recommendation for each day that the soil was sampled prior to September 15. The adjustments are automatically included in recommendations received from the North Dakota State University Soil Testing Laboratory.

The phosphate (P_2O_5) and potash (K_2O) recommendations in Table 1 are for **broadcast application**. Band and drill row applications can be reduced by one third on **very low testing** soils. Drill-row applications of N + K_2O should not exceed 30 pounds per acre. When using urea as the N source, drill-row applications of N + K_2O should not exceed 15 pounds per acre with a 6-7 inch row spacing. When using a wider row spacing do not apply urea with the seed.

Since phosphorus and potassium move very little in the soil, it is possible to "build up" or increase the available level of these nutrients in the soil. The application of approximately 20 pounds of P_2O_5 per acre will increase the phosphorus soil test level by 1. In other words, if your phosphorus soil test level is 5 and you prefer to operate at test level of 12, the application of 140 pounds of P_2O_5 (305 pounds of 18-46-0) per acre thoroughly mixed in the top 6 inches of soil will raise the soil test level by 7. Likewise, the application of 10 pounds of K_2O per acre will increase the potassium soil test by 1. Nitrogen requirements should be applied each year as needed.

Nutrient recommendations for oat.

	Soil Test Phosphorus, ppm				
Soil N plus	VL	L	M	H	VH

Yield goal	fertilizer N required	Bray-I Olsen	0-5 0-3	6-10 4-7	11-15 8-11	16-20 12-15	21+ 16+
bu/a	lb/acre-2'	- - - - - -	lb P2O5/acre	- - -	- - -	- - -	- -
50	65		30	20	15	0	0
70	90		40	30	20	0	0
90	115		50	40	25	10	0
110	145		65	45	30	10	0

		Soil Test Potassium, ppm				
Yield goal	Soil N plus fertilizer N required	VL 0-40	L 41-80	M 81-120	H 121-160	VH 161+
bu/a	lb/acre-2'	- - - - - - -	-lb K2O/acre	- - -	- - -	- -
50	65	55	40	25	10	0
70	90	80	55	35	10	0
90	115	100	70	40	15	0
110	145	125	90	50	15	0

Nitrogen recommendation = 1.3 YG - STN + SDA - PCC
Bray-I P recommendation = (0.644-0.032 STP)YG
Olsen P recommendation = (0.644-0.041 STP)YG
Potassium recommendation = (1.2777-0.0086 STK)YG

The abbreviations used in the equations are as follows:
YG = yield goal
STN = soil test nitrogen
STP = soil test phosphorus
STK = soil test potassium
SDA = sampling date adjustment
PCC = previous crop credit

Methods of Application:

The best method of nitrogen application will depend on the nitrogen source used. For example, anhydrous ammonia should be applied 4-6 inches beneath the soil surface, while nitrogen solutions, urea and other dry nitrogen fertilizer products should be worked into the soil shortly after broadcast application. Applying nitrogen fertilizer on well drained sandy soils in the fall is not recommended because of possible loss by leaching.

Crops growing on soils that test very low in P and/or K depend heavily on applied fertilizer. On soils testing medium or above, the crop is much less dependent on applied fertilizer for its current needs. Fertilizer is applied on these soils to replace that removed by the crop and/or as a starter to get the crop off to a fast start. On low testing soils where the plants largely depend on the fertilizer for their needs the method of application will influence the amount of fertilizer plants can recover.

Broadcast fertilizer is thoroughly mixed with the soil and as a result some is positionally unavailable to plant roots. **Band or drill row** fertilizer is applied closer to the seed and can be recovered by the crop more efficiently. To convert the broadcast recommendations for P and K on very low testing soil (Table 1) to band rates, reduce the broadcast rate by one third. Broadcast applications of phosphate and potash can be made more efficient when applied before a deep tillage operation. Data indicate that a band application of P at a depth of 4 or 6 inches is sometimes more effective than drill row application. This method of application will also prevent a buildup of nutrients at the soil surface under minimum tillage.

Secondary and Micronutrients:

Sulfur deficiencies are not common in North Dakota, but may occur early in the growing season on sandy soils. If a crop appears to be deficient in nitrogen but does not respond to nitrogen applications, test for sulfur. Responses to application of iron, zinc, copper and manganese by small grains are rare in North Dakota. Oat has not responded to chloride fertilization in South Dakota studies.