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Guidelines For Topdressing Wheat In 1983

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The economic and environmental climate for the past several months has put Oklahoma's wheat producers in a difficult situation. The difficulties that have arisen are twofold. First of all, many growers have cut back on nitrogen fertilization. Their reasons for cutting back have been due to one or a combination of the following factors: 1) low wheat prices, 2) cash-flow and/or high interest rates, and 3) dry weather. On the surface, these cuts appear to be a justified way to reduce production costs. Secondly, the dry weather that prevailed during the fall of 1982 caused significant acreages to be sown late or dusted-in. The late seeding not only reduced the production potential for the 1983 grain harvest, but in many cases the potential wheat pasture during the winter was eliminated. In addition, the condition of the soil in some fields was unsuitable for anhydrous application.

Due to the abundant rainfall and high resultant production received in 1982, there is little residual soil nitrogen remaining in most fields. Depending on the fertilization history of a specific field, there is likely to be less than 40 lbs/A of available soil nitrogen left from last year which is insufficient for high yields for the 1983 harvest.

Nitrogen Used By Wheat

The nitrogen requirements throughout the growing season for a super, average and poor year are shown in Table 1. For 1983, we should look at the average and poor columns. The nitrogen removed by grazing is found in the fall and winter values and the amounts required for grain production (or graze-out) are the spring values. (These values are derived by knowing: 2 lbs N = 1 Bu grain and approximately 30 lbs N = 1000 lbs dry forage). So for the average year, approximately 1000 lbs of forage and 35 bushels of grain is produced, utilizing 100 lbs N/A. Of course, if the nitrogen were not available, these yields would not be achieved.

Profitability of Topdressing

Consider a situation where 15 lbs/A of residual soil nitrogen was found from a soil test. The grain yield goal is 30 bushels/A and forage yield goal is 500 lbs/A. The total nitrogen requirement would be 75 lbs N/A (500 lbs forage = 15 lbs N + 30 bu = 60 lbs N/A). Since there are 15 lbs N/A already in the soil, an additional 60 lbs N/A is all that is needed. The increase in production and profit achieved by applying the full 60 lbs N/A versus half that rate are shown in Table 2.

It is seen, that by applying the recommended rate, a net increase of $45.00 per acre was made. The added expense for the nitrogen to achieve this was only $7.50 per acre, so for each extra dollar spent six dollars were returned.

Reasons For Topdressing

The two main reasons a topdress of nitrogen may be necessary this year are: 1) not enough was applied preplant to take care of total needs and 2) to replace the nitrogen removed by grazing.

How to Determine Topdress Needs

There are four key factors that should be considered when determining topdress needs. They are: 1) residual soil N, 2) fall applied N, 3) N removed by grazing and 4) grain and forage yield goal.

Residual soil N is determined by a soil test in late summer or fall and the N applied and grain yield goal from farm records. The total amount of nitrogen needed to meet the yield goals is calculated by knowing it takes 2 lbs N to produce 1 bushel of grain and approximately 30 lbs of N to produce 1000 lbs of dry forage. The fertilizer nitrogen needed is determined by subtracting the residual N from the total requirement.

Since winter pasture production and utilization will be at a minimum in most areas this year, the above figures will serve to help determine the topdress needs where preplant or fall fertilization did not occur.

When a significant amount of forage has been removed (which includes the removal of nitrogen), determining topdress needs becomes somewhat more complicated. To help determine the amount of nitrogen removed by grazing we can use the relationship that exists between the nitrogen content of forage and the forage required to produce a pound of beef. In general, one pound of beef is produced from 10 lbs of dry forage which contains three tenths (0.3) of a pound of nitrogen.

A ball park figure for the nitrogen removed can be obtained by the formula: 15 lbs N/animal/month. This formula is derived from the assumption that the starting weight for stockers will be approximately 350 lbs and daily gain from December to March approximately 1.5 lbs. This is the easiest method we have for estimating nitrogen removal.

An effective and somewhat more precise method is to actually estimate the pounds of beef produced per acre and multiply this value by 0.3 (ie 50lbs beef/A x 0.3 = 15 lbs N/A). It is assumed in both cases that supplemental protein was not necessary.

Nitrogen Sources

No significant differences have been found between nitrogen sources and their ability to supply nitrogen to the plant. Commonly used nitrogen sources for topdressing wheat are: urea (45% N) ammonium nitrate (33% N), and nitrogen solutions (28% N). When making cost comparisons for nitrogen sources, be sure to do so on the basis of cost/lb of N and not cost/lb of material. These calculations are made by multiplying the percent nitrogen by the weight of a ton then dividing by the cost per ton:

$$\text{Cost per lb of N} = \frac{\%\ N \times 2{,}000\ \text{lbs}}{\text{cost/T}}$$

When To Topdress Wheat

For wheat to make the most effective use of topdress nitrogen, timing of application is important. Usually the most effective use of nitrogen is obtained if it is applied in January or February. Applying this early will give sufficient rainfall to dissolve and move the nitrogen into the root zone making it available to the plant. To be effective, topdress nitrogen must be in the root zone prior to the onset of jointing.

Table 1. Soil Nitrogen Required For Forage And Grain Production.

Production Period	Growing Conditions		
	Super	Average	Poor
Fall	80	20	10
Winter	20	10	5
Spring	100	70	35
Total N:	200	110	50

2 lbs N = 1 Bu grain
~30 lbs N = 1000 lbs dry matter

Table 2. Profit Comparisons For Fertilizer Nitrogen When Applied At Full and One-Half the Recommended Rate.

	Recommended Rate (60 lbs N/A) Crop Value		N Cost
Forage	$ 30.00	(¼ ton)	
Grain	105.00	(30 Bu)	
Total	$135.00		$15.00
	30 lbs N/A ½ Rate		
Forage	30.00	(¼ ton)	
Grain	52.50	(15 Bu)	
Total	$ 82.50		$ 7.50
Difference	52.50		

Profit From Extra N = $45.00/A

Assume: Wheat @ $3.50/Bu
Beef @ $0.60/lb
Nitrogen @ $0.25/lb

Additional OSU Fact Sheets concerning Wheat Fertilization

F-2217 Fertilizer Use on Wheat
F-2066 Winter Wheat Production Practices
F-2232 Available Nitrogen and Small Grain Production
F-2225 OSU Soil Test Calibrations

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