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J. W. Fitts

H. F. Rhoades

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Commercial fertilizers
SUGGESTIONS FOR
USE IN NEBRASKA-1944
J. W. Fitts-H. F. Rhoades

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COMMERCIAL FERTILIZER SUGGESTIONS FOR USE

IN NEBRASKA, 1944

J. W. Fitts and H. F. Rhoades

No fertilizer containing inorganic nitrogen is recommended where the crops follow immediately after alfalfa or sweet clover such as potatoes following alfalfa, where 10 to 15 tons of barnyard manure is plowed under; or where moisture may be expected to be a limiting factor.

Suggestions for the rates of application of ammonium sulfate, 10-20-0, 6-30-0, and 4-16-0 fertilizers on various crops are given in the attached table. Superphosphate has been included because it is desirable to have superphosphate with ammonium sulfate on most crops. Seldom (except on grasses) would ammonium sulfate be recommended by itself. It is not the purpose of this table to recommend equivalent amounts of any element in each fertilizer. The fertilizer selected should conform to the condition existent in the field upon which it will be used; for example:

(1) Crops growing on fields on which sweet clover or alfalfa were plowed under two years previously or which were manured two years previously would probably respond better to a 6-30-0 or 4-16-0 fertilizer than a 10-20-0 since phosphorus would be the more important limiting element.

(2) Some farms may have only enough manure for a light application per acre (5 tons). In that case better results may be obtained from a supplemental application of a 6-30-0 or 4-16-0 fertilizer than from a 10-20-0.

(3) Farmers having fields which are low in available nitrogen because of inherent characteristics, lack of legumes in the rotation, insufficient use of manure, or other poor management practices should use fertilizer having a higher proportion of nitrogen than the 6-30-0 or 4-16-0. The 10-20-0 fertilizer or a combination of ammonium sulfate and superphosphate is recommended where these conditions exist.

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RATES OF APPLICATION

Crop	Superphosphate			Ammonium			Mixed Fertilizers		
				sulfate			or		
	20%			45%			20%		
	P ₂ O ₅			P ₂ O ₅			Nitrogen		
Sugar beets	225-275	100-125	200*	200-250	150-200	250-350			
Potatoes	225-275	100-125	200	200-250	150-200	250-350			
Field corn-irrigated	160-200	70-100	100-200	150-200	100-150	200-250			
Field beans	---	---	---	200	250	350			
Alfalfa-irrigated	450	150-200	---	---	---	---			
Tomatoes	450	150-200	---	---	200-250	350			
Cabbage	---	---	---	250	250	350			
Carrots	---	---	100	200	250	350			
Sweet corn	160	70	---	200	200	350			
Spinach	---	---	100-200	200	---	---			
Onions	---	---	100	200	200	350			
Peas	---	---	---	200	250	350			
Snap beans	---	---	---	200	250	350			
Vegetable seeds	225-275	100-125	---	---	200	350			
Oats	90-135	40-60	---	---	---	---			
Barley	90-135	40-60	---	---	---	---			
Wheat	90-135	40-60	---	---	---	---			
Brome grass for seed or forage	---	---	200	---	---	---			
Bluegrass for seed	---	---	200	---	---	---			

* It is recommended that about 2/3 be used as side dressing immediately following thinning.

Ammonium nitrate may be used wherever ammonium sulfate is listed in the table above. About 60 to 75 pounds of the ammonium nitrate should be applied where 100 pounds of ammonium sulfate is recommended. The ammonium nitrate readily removes water from the air and some difficulty may be encountered in application. It probably will give best results when applied as a side dressing to crops other than grasses.

No recommendations are made for complete fertilizers registered for sale in Nebraska since few, if any, soils are deficient in potassium. The rate of application of those fertilizers can be determined by comparing the percentage of nitrogen and phosphorus in the complete fertilizers with the recommended amounts shown in the table above.

METHODS OF APPLICATION

Sugar beets, corn, and field beans. Mixed fertilizers or superphosphate should be applied in bands about 2 inches away from and slightly below the seed at planting time. Nitrogen fertilizers (nitrogen as ammonium sulfate or ammonium nitrate) may be placed in bands upon the bottom of the plow furrow when the field is plowed. They may also be applied as a side dressing at the last cultivation.

Potatoes. Mixed fertilizers or superphosphate should be applied in bands about 2 inches away from and on a level with the lower part of the seed. Nitrogen fertilizers may be applied later as a side dressing but care must be taken not to cut the roots of the plant.

Tomatoes. Mixed fertilizers or superphosphate may be applied in bands 3 to 5 inches away from the plant and on a level with the bottom of the roots at transplanting. Some of the new type plant setting machines have fertilizer attachments for this purpose. The fertilizers may also be applied in bands upon the bottom of the furrow at the time of plowing.

Mixed fertilizers containing considerable nitrogen should not be used early in the season on the large vined varieties of tomatoes. The nitrogen usually causes a rank growth which may delay blooming. Small vined determinate varieties of tomatoes usually are not affected in this way and on soils low in organic matter good results may be obtained from an early application of nitrogen. Nitrogen fertilizers may be applied to tomatoes as a side dressing late in the season.

Starter solutions are sometimes used with good results when transplanting the tomatoes. This is especially true when the tomato plants are wilted and are otherwise in poor condition from shipment or handling. Good results are less likely to be obtained when sturdy vigorous plants are used or when the soil is very high in fertility, especially nitrate. The solution may be prepared by mixing the following ingredients.

sodium nitrate or ammonium nitrate 5 $\frac{1}{2}$ ounces

superphosphate (45%) 4 ounces

potassium chloride 1 $\frac{1}{2}$ ounces

5 gallons water

If potassium chloride is not available it can be omitted as the nitrate and phosphorus are the most important. The rate of application is about $\frac{1}{4}$ pint ($\frac{1}{2}$ cup) per plant applied when the plant is transplanted.

Small grains. Superphosphate should be drilled in the row with the seed at the time of planting. Fertilizer attachments on a grain drill are most satisfactory, but if none are available, the granular phosphate can be mixed with the grain and applied with the drill. Instructions for doing this are as follows.

Thoroughly lubricate all moving parts of the grain drill, particularly the feed cups, with old crankcase oil or a mixture of kerosene and crankcase oil. During drilling operations, frequently lubricate all moving parts and feed cups.

Take enough seed for two acres and pour over it 100 pounds (one bag) of granular superphosphate (45% available P_2O_5). Mix thoroughly as you would sand and cement. Place the mixture in an ordinary grain drill in the field at the time seeding is started to avoid separation of grain and fertilizer.

Open the drill to sow half again as much as usual. For example, if you sow one bushel of wheat per acre without fertilizer, with the fertilizer mixture set the drill to one and one-half bushels per acre. This may vary slightly with some drills and should be checked when an acre is seeded.

After the field is seeded, clean the drill thoroughly, washing the parts which have come in contact with the phosphate with kerosene or a mixture of kerosene and crankcase oil.

Alfalfa. Superphosphate may be applied broadcast or with a grain drill. It is best to have fertilizer attachments on the drill. The discs on the drill can be adjusted to run about $\frac{1}{2}$ inch deep. Best results on alfalfa will be obtained when

applied at time of seeding. Disease and lack of moisture may off-set any benefits from the superphosphate applied to an old stand.

Grasses. Only nitrogen fertilizer should be applied to grasses for forage or seed. As yet no beneficial results have been obtained on grasses in Nebraska from the application of phosphorus. To obtain the greatest benefit on grasses for seed, the nitrogen fertilizer should be applied early in the spring, slightly before or at the time the grass begins growth. Applications later in the season may increase the per cent protein but will not be as beneficial in seed production.

SOIL MOISTURE

Before applying fertilizers to the soil it must be remembered that moisture is usually the greatest limiting factor in crop production in Nebraska except where irrigation is practiced. Unless there is 3 to 5 feet of moisture stored in the soil at the time of planting it would be hazardous to apply fertilizers. This is especially true of crops growing during the warm part of the season such as corn. Stimulation received from the fertilizer may result in quicker "burning" of the crop during hot periods.

CULTURAL PRACTICES

Results obtained from tests with fertilizers in Nebraska indicate that if a fairly good yield can be obtained without fertilizers, then cultural practices may be more influential on the yield than the fertilizer applied. Uniformity of stand, uniformity in distributing irrigation water, and timeliness of application of irrigation water frequently are greater limiting factors in crop yields than lack of fertility.

FERTILIZER MACHINERY

The best results and most efficient use of fertilizer is obtained by use of good fertilizer attachments. This is especially true of row crops. Superphosphate may be applied broadcast before plowing but the rate of application must be increased 2 or 3 times.