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What Is Liquid Fertilizer?

M. D. Weldon and W. E. Ringler

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There are two kinds of liquid fertilizers.

Anhydrous ammonia is a pure liquid under pressure. The other kind of so-called liquid fertilizer is really a water solution of fertilizer materials.

Anhydrous ammonia is a pure substance consisting of 82 per cent nitrogen combined with 18 per cent hydrogen. At ordinary temperature and atmospheric pressure, ammonia is a gas. If enough pressure is put on it, depending on the temperature, it becomes a liquid. Ammonia can therefore be stored and handled as a liquid in pressure tanks. When released from the tanks into the air, it immediately evaporates, forming a gas which is lighter than air. When ammonia is used as a nitrogen fertilizer, it is therefore necessary to inject it into the soil. When ammonia is released under the surface, it combines with the soil and does not evaporate into the air. A special machine is used for this purpose. It consists of narrow, chisel-like shanks, with a tube along the rear of each shank to deliver the ammonia under the soil at a depth of 3 to 6 inches.

Fifty pounds of anhydrous ammonia supplies 41 pounds of nitrogen, which is the amount often recommended per acre for corn and small grains. One ton of anhydrous ammonia contains 1640 pounds of nitrogen. At 12 cents per pound, this amount of nitrogen is worth \$196.80. At 15 cents per pound of nitrogen, one ton of ammonia is worth \$246.00. Additional information about ammonia is given in E. C. 193.

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Fertilizer solutions consist of ordinary fertilizer materials dissolved in water. The state fertilizer law applies to fertilizer solutions as well as to dry fertilizers. According to state law, every package of fertilizer sold in Nebraska must carry a label stating the net weight and the guaranteed percentage of nitrogen, available phosphate (P_2O_5), and soluble potash. Thus if a fertilizer, whether liquid or solid, has a 10-20-0 formula, 100 pounds of it contains 10 pounds of nitrogen, 20 pounds of available phosphate, and no potash. To supply the 30 to 40 pounds of nitrogen usually recommended for small grains would require 300 to 400 pounds of 10-20-0 fertilizer, whether it is solid or liquid. This amount would also contain 60 to 80 pounds of available phosphate along with the 30 to 40 pounds of nitrogen.

A pound of nitrogen in a fertilizer solution is about as effective as a pound of nitrogen in any of the dry nitrogen fertilizers such as ammonium nitrate, ammonium sulfate, urea, or anhydrous ammonia. Numerous experiments show that when these fertilizers are properly used on corn or bromegrass, the increased yield of the crop contains 75 to 100 per cent of the applied nitrogen-- and it is pretty hard to improve on 75 to 100 per cent efficiency. Fertilizer solutions are therefore equal to dry fertilizers in results per pound of nitrogen applied.

Some experiments indicate that the phosphorous in fertilizer solutions is more effective per pound than in the dry fertilizers. This is because the phosphate in solution is different from that in superphosphate. Superphosphate is a calcium phosphate, and the calcium phosphates are soluble enough to supply crop needs, but not soluble enough to make a concentrated solution such as 0-20-0 or 10-10-5. The phosphate in the fertilizer solutions consists of phosphoric acid or the more soluble phosphate salts such as potassium phosphate or ammonium phosphate. This accounts for the greater effectiveness of phosphate solutions compared with superphosphate or dry mixed fertilizers containing phosphate.

Fertilizer solutions are good fertilizers, if the formula fits the needs of the soil and crop. The cost of making and shipping barrels rather than paper bags, and the cost of shipping the water in the solution, may make the fertilizer solutions rather expensive per pound of nitrogen and phosphorus, compared with the dry fertilizers. Every farmer must decide for himself whether 100 pounds of 20-0-0 solution, for example, is worth more than 100 pounds of ammonium sulfate (which also contains 20 pounds of nitrogen), or 60 pounds of ammonium nitrate, 50 pounds of urea, or 25 pounds of anhydrous ammonia, also containing 20 pounds of nitrogen.

On the other hand, 100 pounds of a solution of 0-20-0 formula, when properly applied, may be more effective and produce a bigger increase in crop yield than 100 pounds of 0-20-0 superphosphate or 45 pounds of 0-45-0 superphosphate, even though these fertilizers contain the same amounts (20 pounds) of available phosphate. Therefore it is probably worth while to experiment with phosphate solutions, or mixed fertilizer solutions containing phosphate, in order to compare them with superphosphate or dry mixed fertilizers and find out whether the phosphate solution will pay for its extra cost.