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Anhydrous Ammonia Fertilizer

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Anhydrous Ammonia Fertilizer



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Anhydrous Ammonia Fertilizer

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Today's lowest-cost nitrogen fertilizer is equal to all other forms of nitrogen in promoting plant growth. That fertilizer is anhydrous ammonia.

Application

Method. Anhydrous ammonia can be applied separately or in combination with tillage operations. An increasing number of farmers have equipped chisel plows, sweep-type implements, and other tillage equipment with anhydrous ammonia attachments that combine tillage and fertilizer application into one field operation.

Anhydrous ammonia can be applied in combination with other fertilizers. Applications of this type are often called dual injection, deep banding, or dual banding. The second fertilizer is usually phosphorus, and is applied through a separate tube attached to the anhydrous ammonia knife. A few studies, especially on low fertility soils, have shown this combination results in higher small grain yields than separate applications of the two materials.

Timing. Anhydrous ammonia can be effectively applied in the fall, in the spring (prior to planting), or as a sidedress for row crops.

Anhydrous ammonia can cause delayed emergence and reduction in stands. This happens if seeds are placed too near the application zone right after the fertilizer is applied. Some crops are more likely to be injured than others.

Corn planting must be delayed 10 days to eliminate any risk of seed damage. This delay can be shortened by up to 5 days, however, if the ammonia is placed 6-7 inches below the seeding depth, and if application rates of less than 100 lb N/A are used and/or knife spacings are less than 20 inches.

Small grains usually can be seeded immediately after anhydrous application with very little risk of seed damage if the fertilizer is applied at least 3 inches below the seeding depth and nitrogen rates are less than 100 lb/A. Anhydrous knife spacings should not be wider than 20 inches for small grains.

Injury to seedlings is more likely to occur on coarse textured (sandy) soils and under dry conditions. Applying the ammonia diagonally to the row will reduce potential injury.

Sidedress applications on row crops should be made soon after seedling rows can be seen and before plants are 10 to 12 inches high. After this point, any delay may allow the crop to become too tall for the application equipment.

Farmers in North and South Dakota do not need to worry about soil temperatures above 50°F or nitrate leaching over winter, as do farmers in states east of the Dakotas. Farmers in those states are discouraged from making fall applications of anhydrous ammonia until surface soil temperatures drop to 50°F or below. Soil temperatures warmer than this hasten the rate at which ammonium is converted to nitrate, a form which can be leached from the soil.

Losses from overwinter leaching in North and South Dakota, however, are normally insignificant because of limited rainfall. Anhydrous and other nitrogen fertilizers can be applied anytime in late summer or fall on most medium and fine textured soils regardless of soil temperature.

Deep tillage (such as moldboard or chisel plowing) within 5 days of anhydrous application may cause some volatilization losses of ammonia, especially on sandy soils, on high pH soils, or under very dry conditions. Till first, and then apply the anhydrous to avoid this problem.

Depth. Serious loss of anhydrous ammonia can occur if depth of application is too shallow, or if the soil does not seal off to trap the gaseous fertilizer. Soils can be both too dry or too wet. Poor sealing behind the injection knife, in either instance, permits vapors to escape. In general, soil moisture levels considered ideal for tillage are also best for applying anhydrous ammonia.

If sealing is adequate, depth of placement should be 5-6 inches below the soil surface. Deeper application may be necessary when soils are cloddy, wet, or very sandy.

Shallow applications of anhydrous ammonia (3-4 inches) can be achieved with cold flow equipment or with injection of anhydrous ammonia under the wings of large V-blade tillage tools.

The cold flow technique uses a canister to chill anhydrous ammonia so that about 80% of the product reaches the soil as a liquid. The remaining product is injected as a gas along with the liquid. Both liquid and gas must be covered with soil to prevent loss. When compared with regular anhydrous ammonia applications, the volume of gas that needs to be trapped is small; in easily tilled soil, a 3-4 inch placement depth is adequate.

Rates. Application rates should be based on soil test levels and yield goals. Recommended nitrogen rates can be found in South Dakota fact sheets and North Dakota circulars listed at the end of this fact sheet.

Effect of anhydrous on soil

There has been some concern among farmers that long-term use of anhydrous ammonia will make soils "hard." Studies show this concern is unfounded.

A 10-year field study in Kansas is an example. Four nitrogen sources (anhydrous ammonia, ammonium nitrate, urea, and UAN solution) were tested at four locations. Nitrogen rates were at least 150 lb N/A per year. Corn and sorghum were grown, depending on the location.

An evaluation of physical properties of the soils after the 10-year period revealed no significant difference in soil structure, bulk density, or compactability.

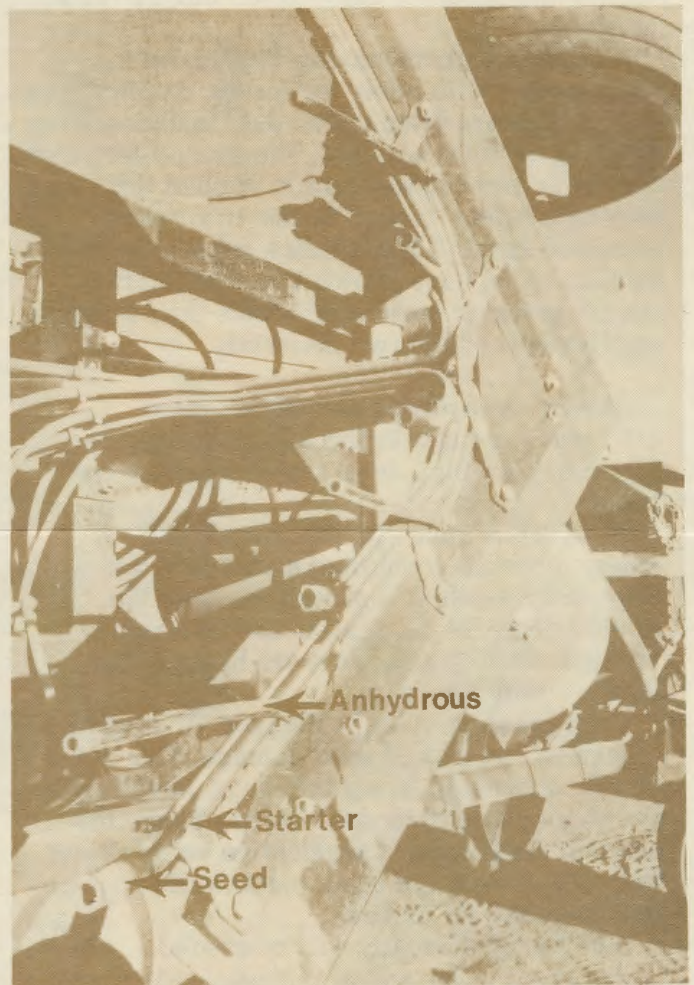
Properties of anhydrous ammonia

Anhydrous ammonia is colorless in the gaseous form. The white cloud you see when anhydrous is released to the air is actually a water vapor cloud resulting from the cooling effect of the liquid changing to a gas. Anhydrous is stored and transported in liquid form.

Anhydrous ammonia boils at -28°F under atmospheric conditions, meaning it changes from a liquid to a gas at the temperatures you are using it. The liquid expands to 846 times its original volume as it changes to a gas, so very high pressures develop inside tanks as anhydrous temperatures increase. This emphasizes the need to use safe operating procedures and equipment.



Common Anhydrous applicators are available from many fertilizer dealers.



Anhydrous and other fertilizers can be applied with a wide blade. (TVFA Photo)

Safe handling of anhydrous ammonia

Accidental exposure to high concentrations of anhydrous ammonia is dangerous. High concentrations are caustic to exposed tissue and should be washed off or diluted with large volumes of water immediately.

A 2% concentration of ammonia gas is generally the maximum tolerated by bare skin for more than a few seconds. Upon direct contact with the evaporating liquid, skin will freeze and burn.

The pungent odor of anhydrous is unpleasant. It is a warning. Operators cannot remain in areas of even moderate concentrations or suffocation could occur.

Protective clothing, safety gear, and proper transfer technique can eliminate accidental exposure. The following safety guidelines are recommended:

1. Use goggles and rubber gloves, etc., when transferring material.
2. Operate upwind, if possible.
3. Have water readily available.
4. Wash exposed victims thoroughly with water for 15-20 minutes.
5. Do not apply burn salve to exposed tissue.
6. Evacuate downwind residents.
7. Do not spray water on puddles of liquid ammonia.
8. Use a water shield (hose) to gain access to victims, valves, etc.
9. Check maintenance needs of equipment before heavy use period.



Various tillage tools such as this narrow sweep equipment can be adapted to apply anhydrous ammonia.

Remember:

1. Anhydrous ammonia is caustic to exposed body tissue.
2. It dissolves readily in water (including perspiration).
3. The gas vapor is colorless, slightly lighter than air.
4. Anhydrous odor is strongly pungent.
5. Suffocation may occur if exposure is more than a few minutes to gas concentrations over 5,000 parts per million.

Vapor pressure of anhydrous ammonia varies with temperature.

<i>NH₃ temperature (degrees Fahrenheit)</i>	<i>Pressure (PSI)</i>
-28	0
0	16
32	48
60*	93
100	197
125	293
130	316

*Weight/gallon at 60°F is 5.15 lb.

Use of tradename does not imply endorsement of a brand or product.



Anhydrous ammonia application and chisel plow tillage can be combined into one operation.

South Dakota fact sheets

- FS 432, Fertilizing corn
- FS 677, Fertilizing wheat
- FS 678, Fertilizing oats
- FS 679, Fertilizing barley
- FS 680, Fertilizing flax
- FS 425, Fertilizing pasture and hayland
- FS 748, Fertilizing soybeans
- FS 821, Fertilizing sunflowers
- FS 752, Nitrogen management
- FS 250, Fertilizer facts

North Dakota circulars

- SF 712, Fertilizing wheat, durum and rye
- SF 713, Fertilizing sunflowers
- SF 714, Fertilizing sugarbeets
- SF 715, Fertilizing potatoes
- SF 716, Fertilizing oats
- SF 717, Fertilizing flax
- SF 718, Fertilizing mustard and rape seed
- SF 719, Fertilizing soybeans
- SF 720, Fertilizing edible beans (pinto & navy)
- SF 721, Fertilizing established grass
- SF 722, Fertilizing corn and silage
- SF 723, Fertilizing malting and feed barley
- SF 724, Fertilizing buckwheat
- SF 725, Fertilizing lentils and field peas
- SF 726, Fertilizing millet and canary seed
- SF 728, Fertilizing established alfalfa and sweet clover
- SF 730, Application of nitrogen and phosphorus fertilizer products

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