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Equipment considerations: anhydrous ammonia

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Abstract

Because of abnormal nitrogen fertilizer production, import, and supply this year and with perhaps a short spring application season, some crop producers may use a form of nitrogen fertilizer with which they are unaccustomed. A review of application equipment considerations can help ensure that your nitrogen fertilizer is properly applied. This article focuses on anhydrous ammonia and is the second in a series of three articles about nitrogen fertilizer application and equipment.

Keywords

Agricultural and Biosystems Engineering, Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences | Bioresource and Agricultural Engineering

INTEGRATED CROP MANAGEMENT

Equipment considerations: anhydrous ammonia

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Anhydrous ammonia contained in a field application tank is a high-pressure liquid that converts to a liquid-gas mixture as pressure drops while traveling to the knife outlet.

Safety when using anhydrous ammonia is a primary consideration. Direct exposure to skin can cause caustic burns because ammonia bonds with water. Long sleeves and pants, lined rubber gloves, and unvented goggles are standard personal protective gear. Exposure to eyes can result in blindness, and inhalation that damages lung tissue can be fatal. A properly fitted respirator with ammonia cartridges is recommended for operators who frequently work with valves and other connections. Because ammonia is under pressure inside hose lines, fittings, and knives it is important to inspect equipment and keep it in good repair. A 5-gallon water supply should be readily available and a 6-ounce plastic squeeze bottle carried on the operator for immediate treatment of an accidental exposure.



Know wind direction and stay upwind when operating valves. When working with hoses, minimize exposure to a hose filled with ammonia. When connecting hoses, first make all connections, tighten bleeder valves, and then open valves beginning with the furthest downstream and work upstream. The last valve opened should be the one releasing ammonia into the hose. When disconnecting a hose, first close the valve supplying ammonia to the line and then successive valves downstream to the disconnect. This approach should help avoid trapping a large amount of ammonia in the line. Next open bleeder valves in the same order valves were closed before finally disconnecting the line.

Ammonia should be injected deeply enough to avoid surface vapor losses, and below the crop seed zone to reduce the potential of seedling injury. Application direction that is diagonal to subsequently planted crop rows is common to avoid toxicity to seed. Telltale ammonia odor or the white vapor trail of water condensing in air that is cooled by escaping ammonia gas indicates deeper placement or more aggressive sealing with covering discs or "beaver-

tail" tabs is required. Hoses from the distribution manifold to injection knives should be of equal length. Hoses that need to be coiled, such as those stretching a short distance from the manifold to a nearby knife, should be coiled in a horizontal plane.

Recent research at Iowa State University indicates that hoses from adjacent applicator shanks should be connected to different regions around the manifold outlet ring to improve rate distribution across the swath. Plan to adjust the regulator setting if tank pressure varies through the day. A heat-exchanger flow controller can be used instead of a regulator to improve rate control of total flow through the applicator.

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