

## **Fall ammonia applications on dry soils**

With rapid crop maturity and harvest many farmers will be looking to the next job on their list - fall fertilization. Typically, fall nitrogen is applied by 34-46% of Manitoba farms, and the most popular source is still anhydrous ammonia.

Last year in SW Manitoba, an inadvertent application of ammonia to excessively dry soil caused distress to adjacent landowners, so let's review a few of the basics regarding N application.

### **Can soils be too dry for anhydrous ammonia?**

Although soil moisture is low, it doesn't take much moisture for the chemical reaction of ammonia ( $\text{NH}_3$ ) with  $\text{H}^+$  ions from water to convert to ammonium ( $\text{NH}_4^+$ ). This positively charged ammonium cation is then held on the exchange complex of clay and organic matter.

But dry soils do affect the physical closure of injection slots and may allow physical escape of ammonia gas. When soils are dry, big clods of soil may form and leave large channels for ammonia to move quickly and escape to the atmosphere. In those situations, ammonia loss can be substantial.

Clay soils that are very dry will be cloddy or lumpy and may permit too much gaseous ammonia to escape (Figure 1). The zone of ammonia dissipation from the injection point is larger in dry soil, so although the soil may be difficult to work, deeper injection may actually be required. However, deep tillage of dry clay soils may simply produce larger clods. Lighter textured soils will have better tilth than dry clay soils and will be more likely to produce a good seal to retain the ammonia.

### **What can one do if soils are dry?**

Slot closure may be better on previously worked than on uncultivated soils if the soil flows and seals better. Such is not the case if soils were cloddy.

Deeper application may help put the ammonia closer to moisture and prevent the dissipation zone from reaching the surface. In the cornbelt where high N rates are applied on 30" spaced shanks, recommendations for dry soils are to place ammonia 6-8" deep, whereas typical ammonia injection depths are 3-4" on the Prairies. Attempts to place ammonia so deep here on clay soils may just produce larger clods.

Modifications to injection knives may offer some help. In-crop ammonia application for corn often uses closing disks or sealing wings ("beaver tails") on the knives to aid coverage/closure of injection slots.

However, in most cases the farmer is best to wait for rainfall to improve soil tilth.

### **How do I know losses are unacceptable?**

The only way to assess your soil conditions is a test run with your applicator. An application pass without N will indicate whether soils are too cloddy and injection slot closure is inadequate.



If after making a round with N, you can still smell ammonia from the previous application, make adjustments in depth or closure modifications. Or wait for rainfall to improve soil structure.

The “white puffs of smoke” are not ammonia gas, but clouds of water vapour. As long as ammonia smells do not persist after application, these white clouds should not be a major concern.

### **Will fall ammonia banding make my soils drier?**

Fall banding can have contrasting effects of soil moisture. Under very dry conditions where snow-cover is limited, the loss of standing stubble through this banding tillage reduces snow trap on the field and may leave the field susceptible to evaporative losses.

However, in areas where snow cover is more reliable, fall banding may provide better moisture than a spring banded application. Spring banding can dry the seedbed, reducing available moisture and seedbed quality.

Additional information on fall N application is posted at: <https://www.gov.mb.ca/agriculture/crops/soil-fertility/pubs/fer01s01.pdf>



Figure 1. Typically “lumpy soil” resulting from tillage of dry, clay soils.