PennState Extension

MANURE INJECTION AND ITS BENEFITS

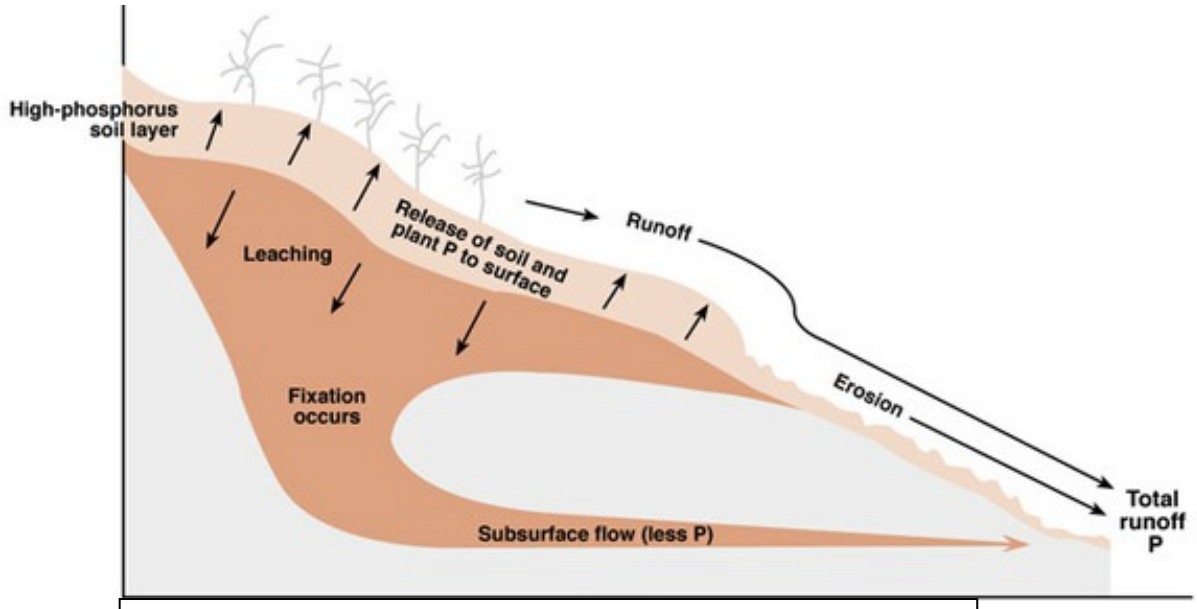
In order to understand the need for manure injection, we need to start by talking about no-till farming. No-till practices have increased significantly over the past thirty years and many benefits have been realized in our agricultural production.





The improvements in no-till equipment has reduced early failures and greatly enabled wide adoption of the practice. Adoption of no-till planting has resulted in benefits including:

- time savings
- improved soil structure and decreased soil erosion
- reduced sediment loss and attached phosphorus loss to surface water
- increased water infiltration
- reduced runoff, increasing groundwater supplies



Phosphorus can be lost by erosion or released from soil and plant material to surface and subsurface runoff water. (Penn State University)

On livestock farms with significant manure production, long term surface application of manure resulted in a concentration of phosphorus in the top inch or two of soils. Recent research has shown that with a very concentrated band of phosphorus on the surface of our soils, phosphorus can dissolve into surface water and leave the fields in clear run off. This creates a dilemma. While conventional tillage practices mixed in the manure across the plough layer and prevented a concentrated buildup of phosphorus in the top inch or two, it caused significant erosion. We can't go back to the old tillage methods since there are many disadvantages.

The compromise solution seems to be manure incorporation. Just as no-till planting equipment has improved greatly, manure incorporation equipment has made great strides. New equipment today enables injection of manure 3 or 4 inches below the surface with very minimal surface disturbance. Important benefits include:

- placing the manure deeper in the soil eliminates concentrated bands of phosphorus near the soil surface
- reducing nitrogen losses from ammonia volatilization saving fertilizer dollars where manure is not enough to meet all crop needs. This savings may be enough to pay the additional cost of injection.
- a reduction of odor! In places where odor is a contentious issue this alone would be worth the cost of injection
- this can also be combined with a dragline to reduce compaction by eliminating the heavy manure tanker.

As mentioned above one of the benefits of incorporation is the capture of more nitrogen compared to surface applied manure. Incorporation prevents the loss of ammonia nitrogen which can be lost off the surface in as little as one hour. With very high nitrogen prices in 2022 this represents a major savings. The following calculations demonstrate the savings with dairy manure and nitrogen at 92 cents per pound. In this example manure incorporation saved $69.92 per acre in fertilizer value.

- **Liquid Dairy Manure 28-13-25 per 1000 gallons**
- **9,000 gallons = 252 lbs of Nitrogen**
- **0.50 availability for incorporated manure = 126 units of nitrogen**
- **0.20 availability factor for surface applied manure = 50 lbs of nitrogen**
- **Additional 76 lbs of nitrogen with incorporation X 0.92 = $69.92**

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