

ENVIRONMENT

Title: Swine Manure Applications for Soybean Production – Environmental and Pathological Implications – **NPB #08-052**

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ABSTRACT

Recent environmental pressure has been placed on the practice of applying animal manures to fields going into soybean production because of the perceived over-application of nitrogen to a legume crop that does not require nitrogen fertilization. The objective of this study was to evaluate the impact of manure application to soybean fields on soil nitrate accumulation and soybean crop productivity. Additionally, this work was conducted to determine the impact of manure application on soilborne pathogens specifically soybean cyst nematode. A single field experiment was established at the Western Research Station near South Charleston, OH in the spring of 2007. Liquid swine manure was applied at three different nitrogen (N) rates (based upon manure analysis and estimated availability) using two application methods (surface application or injection). The surface application treatments were either incorporated by tillage or left on the soil surface. Commercial fertilizer treatments (same N rates) were also included as positive controls. After soybean planting, soil samples were collected to measure soil nitrate to a depth of 2 feet at three different times during the growing season and after crop harvest. At two different growth stages (V4 and R1) soybean roots were collected and analyzed to determine soybean cyst nematode infection levels. Even though N application did result in higher soil nitrate levels for some treatments, applications rates that were lower (less than or equal to 120 lb N/acre) represent a lower risk of possible nitrate loss. This is especially true later in the growing season. Early in the growing season application of N supplying fertilizers did result in higher nitrate levels. This is expected when plant growth is progressing slowly and nutrient demand from the soil is low. Nitrogen supplied via manure and commercial fertilizer resulted in larger N uptake than the controls at the later stages of growth. This reveals that despite the fact that soybeans can fix their own N, soybeans will absorb soil inorganic N if it is available. This work also reveals that fertilization may decrease soybean cyst nematode infection although at this point the mechanism is not fully understood.

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