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## Laboratory Testing of Fluted Wheels as A Metering System for Poultry Litter

C. Mathis<sup>1</sup>, W. Porter<sup>1</sup>, S. Virk<sup>1</sup>

<sup>1</sup>Crop and Soil Sciences Department, University of Georgia, Athens, GA, USA.

\*Corresponding author: cody.mathis@uga.edu

### Abstract

Poultry litter is a mixture of chicken manure and a variety of bedding material (rice hulls, peanut hulls, wood shavings, etc.) Land application of litter as a fertilizer has been the most common method for the management of poultry litter supplies. Traditionally, poultry litter applications are performed using a spinner disk spreader attached to either a truck or tractor and broadcast to the soil surface. However, there are other methods of litter applications. The objective of this project is to develop a metering system for the injection of poultry litter as to apply a controlled amount of litter into the soil profile. The incorporation of litter into the soil allows for more precise nutrient uptake by the crop, reduced input costs from fertilizers, as well as improved social acceptance from reduced odor commonly associated with poultry litter. Additionally, injection of poultry litter reduces the potential of nutrient runoff most commonly associated with land application of litter. Studies have been conducted centered around litter injection into the soil profile and have proven the effectiveness and necessity of this type of litter application. However, there are no current litter injection methods which incorporate a precise metering system. The development of a metering system is critical in precision application efforts to optimize the utilization of poultry litter as a fertilizer. Currently an average injection application rate of poultry litter is between 2241.7 to 4483.4 kg ha<sup>-1</sup> into a 7.62-cm wide band. Fluted wheels are currently used for applying granular fertilizers at a metered rate in the seed trench. An analysis of fluted wheels as a suitable metering system for poultry litter was performed to measure the efficiency and effectiveness of the transfer of milled style, refined particle size and density, litter from an accumulation hopper into a collection hopper at calculated rates. The analysis was performed utilizing a modified planter meter

test stand, driven by an electric motor capable of generating equivalent revolutions per minute to achieve in-field application rates of litter. The effectiveness and metering capabilities of fluted wheels was evaluated by determining an adequate amount of litter to be applied for a standardized amount of time, as to mimic rates to be applied in field, and collecting and weighing the amount of dispersed litter through the fluted wheels. Results from the analyses will determine if fluted wheels should be utilized in the further development of metering poultry litter.

**Keywords:** Fertilizer, Precision, Metered, Chicken Manure