

Fertilizing Watermelons with Poultry Litter

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Oklahoma's poultry industry has expanded rapidly in the last several years. A potentially beneficial by-product of the industry is spent litter mixed with manure. Poultry litter is known to be an excellent soil amendment which can stimulate plant growth when used properly.

In eastern Oklahoma approximately 1760 broiler houses each generate about 150 tons of litter per year which total over 12,700 tons of nitrogen and over 4,000 tons of phosphorous. Even though litter is a potentially valuable resource, the sheer volume of the product coupled with cost and logistics of its distribution present significant problems. Excess application rates lead to pollution and nutrient imbalance, particularly P, K and trace elements, and possibly negative effects on crops. Unincorporated poultry litter loses 50-70% of its total N through volatilization. Excess N in soil has been shown to leach into ground water or run off causing contamination of surface water.

Phosphorous and potash offer no serious hazard if they remain in place. However, both move with eroding soil and present a potential pollution hazard. Current Soil Conservation Service guidelines limit P_2O_5 equivalent from dry unincorporated litter to 200 lbs/acre/year.

The purpose of this project is to determine effects of repeated application of poultry litter on soil nutrient buildup and yield of vegetables and forages in a spring and fall rotation. The initial planting in this three-year project evaluated effects of litter on watermelon yield.

Plots 32' X 26' were established in April 1992 at the Oklahoma State University Vegetable Research Station, Bixby, Oklahoma. The spring rotation of this three-year project is watermelon, sweet corn and pepper followed by wheat. The fall rotation is spinach, turnip and collard followed by sudax. An initial soil sample was collect and tested by the OSU Soil Test Lab.

Litter was procured from a vacant broiler house near Stilwell in Adair County. A sample was collected and sent to the University of Arkansas Agriculture Diagnostic Services Laboratory for analysis (table 1).

OSU extension facts FS 6000, "Fertilizing Commercial Vegetables", was used as a basis for comparing test results and crop needs to determine initial fertilizer treatments of 84 lbs/acre 34-0-0, 1200 lbs/acre litter and 2400 lbs/acre litter.

The treatments were randomized in four replications and applied in a split plot design and incorporated with a power tiller. 'Crimson Sweet' watermelon was transplanted into the plots 6 May 92. Extension recommended cultural practices were followed. Watermelon fruits were harvested, graded into marketable and cull class and weighed as they matured.

Prior to termination of harvest in August six soil samples 12" deep were taken from each plot and combined into a composite for analysis by the Oklahoma State University Soil Testing Laboratory.

After termination of harvest, the plots were disked and half were planted to winter wheat in September 1992.

Chicken litter at the rate of 1200 lbs/acre increased marketable weight and average fruit weight but not cull weight of watermelon compared to an equivalent amount of nitrogen from ammonium nitrate. Application of litter at 2400 lbs/acre resulted in a reduction in yield by the same comparison (table 2). The increase in cull weight at the high litter rate is unexplained. The predominant cull classes were splits and animal damage.

Growers considering use of poultry litter on watermelons should use care to test both the soil and the litter and apply no more than is necessary to meet the nitrogen requirement. The ideal quantity in this case was between 1200 and 2400 lbs per acre. About 2000 lbs is suggested as a maximum for watermelon on Arkansas River bottom soils.

Table 1. Poultry litter source analysis* of nutrient content on an "as is" basis. Spring, 1992.

<u>Component</u>	<u>Content</u>
Moisture	13.1%
pH	7.0
N	97.2 lbs/ton (4.86%)
P ₂ O ₅	70.7 lbs/ton (1.55% P)
K ₂ O	69.4 lbs/ton (2.88% K)
Ca	40.7 lbs/ton (2.03%)

*Source: Agricultural Diagnostic Services Laboratory, University of Arkansas

Table 2. Effect of poultry litter on yield of 'Crimson Sweet' watermelon, Bixby, OK. Spring 1992.

TRMT	MKT. WT. (CWT/AC)	FRUIT AVG. WT. (LB.)	CULL WT. (CWT/AC)	TOT. WT. (CWT/AC)
*84 lbs/A 33-0-0	201.7	15.96	18.1	219.8
*1200 lbs/A litter	211.7	16.75	20.0	231.7
*2400 lbs/A litter	166.6	16.61	24.7	199.3
84 lbs/A 33-0-0	217.3	17.20	4.7	222.0
1200 lbs litter	225.4	17.39	3.7	229.1
2400 lbs/A litter	174.3	16.91	23.2	197.5
MEAN	199.5	16.74	15.73	216.6
LSD _{.05}	NS	NS	NS	--

*Vegetable crop to be followed by wheat prior to 1993 season.