UTILITY OF DDGS AS A FERTILIZER SOURCE AND FOR WEED
SUPPRESSION

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Increased production of ethanol may create a surplus of dried distiller’s grains (DDGs). DDGs are a co-product of converting corn into ethanol. DDGs are commonly fed to livestock in the dry form as a yellow meal. Corn gluten meal (CGM) is a by-product of processing corn to make corn starch and syrup. DDGs and CGM have been used as natural fertilizers and pre-emergence weed control in turfgrass and vegetable production (McDade and Christians, 2000). These products have been determined to be minimum risk pesticides exempt from registration requirements. The DDG mulch may contribute nitrogen, phosphorus, and other nutrients through the decay process. Increased use of corn for ethanol production may also lead to use of corn contaminated with aflatoxin (Aspergillus flavus). Aflatoxins are not affected by fermentation, but are concentrated in the DDGs. This may be particularly important to ethanol plants located near drought-prone soils (Blanco-Canqui et al., 2002). Disposal of aflatoxin-contaminated DDGs as fertilizer grade material may also provide ethanol facilities with an alternative use for a product with no animal feed value. No research has evaluated the impact of DDGs on crop and weed response as a fertilizer source or a possible preemergence herbicide in crop production systems.

This research was initiated to evaluate corn response to DDG application rates as a nitrogen fertilizer source in an organic corn production system; however, there may be a threshold price that allows this fertilizer source to be economically feasible in other production systems as conventional fertilizer prices continue to rise. The objective of this research was to evaluate the effect of DDGs on weed suppression and corn grain yield response.

Materials and Methods:
Field research was conducted at the University of Missouri Greenley Research Center near Novelty (40º 01’ N, 92º 11’ W) on a Putnam silt loam (fine, smectitic, mesic Vertic Albaqualfs) from 2003 to 2007 in organic crop production site. The experiments were arranged in randomized complete block designs with four replications. Locally produced DDGs (POET Biorefining, Macon, MO) were collected from three of the four replications each year and analyzed for chemical and mineral properties using recommended manure analysis methods for total N, ammonium-N, P, K, Ca, Zn, Fe, Mn, Cu, pH, and electrical conductivity (Peters et al., 2003). A 1:2 solid:water solution was used for determining pH, electrical conductivity, and ammonium-N. DDGs were broadcast-applied using a hand spreader following planting.

The experiments were conducted on previously untreated areas of the same field following soybeans each year. Grain yield was determined using a Massey Ferguson 10 small plot harvester (Kincaid Equipment Manufacturing, Haven, KS) and grain moisture adjusted to 15%. The plot area had been in an organic production system for six years prior to the initiation of this research. Plots were 10 by 50 ft. DDGs were applied preemergence at 1,090, 2,170, and 3,260 lbs/acre. ‘NC+ 112E1’ organic corn hybrid was planted at 24-26,000 seeds/acre. All plots were
rotary hoed twice and cultivated up to three times following planting for supplemental weed control. In-row weed control with DDGs was evaluated approximately 8 weeks after planting. Weed control was based on the effects of DDGs on a combined visual score (0 = no visual injury to 100 = complete plant death) of weed stunting and reduction in population density. The primary weed species present were common cocklebur (*Xanthium strumarium* L.) and jimsonweed (*Datura stramonium* L.). Soil was sampled in the fall or early the following spring using a stainless steel push probe to a depth of 15 cm to evaluate the effects of DDGs on selected soil properties (data not presented).

**Results:**
The organic production system has selected for large seeded broadleaf weeds including common cocklebur and jimsonweed (data not presented). Other research has indicated suppression of primarily small seeded broadleaf and grass weeds. However, there was no detectable difference in weed suppression between the non-treated control and the DDG treatments in 2003, 2004, 2005, 2006, or 2007 (data not presented).

No grain yield response to DDG treatments was observed in 2003 and 2005 (Figure 1) since rainfall was limiting. Corn grain yield increased 0.24 to 0.27 bu/acre for every pound of N equivalent DDGs that were applied in medium (2007) and high (2004 and 2006) yield environments. However, there was no significant impact of the DDG treatment on soil P, K, and organic matter levels (data not presented).

**References:**
Figure 1. Grain yield response to application of different rates of dried distiller grains (DDGs) in low (2003 and 2005), medium (2007) and high (2004 and 2006) yield environments at the organic site.

\[ y = 0.2389x + 154.55 \]

\[ y = 0.2738x + 79.873 \]