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Test cornfields for nitrate if manure was not incorporated

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Test cornfields for nitrate if manure was not incorporated

Abstract

Research during the past few years has shown that severe deficiencies of nitrogen (N) are common in fields where manure was applied without immediate incorporation. Data gathered in 2001 continue to support this conclusion and emphasize the need to use the late-spring test to check nitrate levels in such fields. Immediate incorporation of manure into soil is an effective way to reduce odor and losses of N soon after application. Incorporation reduces volatilization of ammonia, which can be a serious problem if manure is spread after it has been stored in pits or piles.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

INTEGRATED CROP MANAGEMENT

The image shows a person in a field, possibly a farmer or researcher, with large, stylized text overlaid. The text reads "INTEGRATED CROP MANAGEMENT". The background is a photograph of a field with tall grasses and a person in the distance.

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Research during the past few years has shown that severe deficiencies of nitrogen (N) are common in fields where manure was applied without immediate incorporation. Data gathered in 2001 continue to support this conclusion and emphasize the need to use the late-spring test to check nitrate levels in such fields.

Immediate incorporation of manure into soil is an effective way to reduce odor and losses of N soon after application. Incorporation reduces volatilization of ammonia, which can be a serious problem if manure is spread after it has been stored in pits or piles. Much of the N in manure is converted to the ammonium form during such storage, and this ammonium-N can be rapidly volatilized as ammonia when the manure is dispersed into small pieces or drops and exposed to wind.

Research in 1995-1996

Studies in fall 1995 unexpectedly showed that most of the N as ammonium (or ammonia) was lost during application of liquid swine manure when a "fan-tail" spreader pumped the manure more than 8 feet into the air. The manure was incorporated within 5 minutes of application on some plots but not others.

Soil samples collected within a few days revealed that the manure had negligible effects on concentrations of nitrate or exchangeable ammonium in the soil. It seems that most of the ammonium was lost from the manure before it hit the ground.

Remote sensing of the crop canopy in August 1996 showed minimal effects of the immediate incorporation. Deficiencies of N were greater than could be corrected by sidedressing fertilizer N at 90 pounds of N/acre.

Research in 1989-1999

Large losses of N were detected again when this type of spreader was used in precision farming trials. Liquid swine manure was applied on a no-till field at a uniform rate of 150 pounds of N/acre in fall 1998. Additional fertilizer N was sidedressed at various rates in strips as shown in the figure, where rates and average yields are imposed on an aerial photograph of the field.

Aerial photographs during the summer showed that each additional increment of fertilizer N increased the greenness of the corn and, therefore, reduced deficiencies of N. Data from yield monitors on combines showed that each increment of added N increased yields. The

County	Type of Manure	Time of Application	Manure N Rate ^a	Fertilizer N Rate	Manure	Manure + Fertilizer N
			pounds N/acre	pounds N/acre	----- bushels/acre -- ---	
Boone	Turkey	Fall	100	50	152	161
Buchanan	Swine	Fall	200	75	153	165
Washington	Swine	Fall	130	114	189	211
Black Hawk	Swine	Fall	95	50	130	146
Buchanan	Swine	Spring	140	50	193	193
Mean			133	68	163	175

^a Total N by analysis.

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