IPNI Stewardship SPECIFICS

No. 18

Managing Manure to Protect the Environment from Contaminants—an Emerging Issue

http://en.academic.ru

Surface application of manures risks the loss of their nutrients and other potential pollutants.

Animal manure application to agricultural land is so far a win–win situation. Animal manures can be used either alone or in combination with inorganic fertilizers on agricultural fields. Manure can improve soil fertility and enhance soil physical and biological qualities. The use of manures provides an important outlet to reuse and recycle byproducts generated by the animal industry, such as from poultry, pig, beef or dairy animal feeding operations.

Contaminants present in the manure may create environmental issues. Recent studies suggest that manure may also contain antibiotics and naturally occurring steroidal hormones that may pose a threat to the environment. These antibiotics and hormones are also referred to as endocrine disrupting chemicals (EDCs) because they can cause physiological and reproductive damage in aquatic and wildlife species.

Agricultural management practices determine to a large extent the fate and transport of these contaminants. Contaminants such as EDCs in manure can enter the aquatic environment along with surface runoff as a result of manure application on agricultural landscapes. Surface runoff is the major pathway for transport of emerging contaminants. Agricultural management practices and manure application methods such as incorporation into the soil rather than surface application are important in determining the fate of these contaminants. Rainfall, time of manure application, and tillage practices can also affect the fate and transport of EDCs. This is because these management factors influence the amount and nature of runoff. If applied manure is incorporated by subsurface placement or inversion tillage, surface runoff risks of the applied components (e.g., nutrients, EDCs) may be reduced. However, those runoff risks also need to be weighed along with the risks of any increased soil and nutrient erosion that may result from soil surface disturbance or tillage.

Contaminants such as EDCs are a concern where high rates of animal manures are used as a nutrient source. Therefore, it is important to understand the potential for the export of contaminants such as antibiotics and estrogens in runoff from fields, before considering use of manure in large quantities. Careful management allows this resource to be used without excessive loss. With appropriate attention to 4R Nutrient Stewardship—right source at the right rate, time and place—manure in combination with inorganic fertilizers can improve soil properties and crop productivity.

http://www.tubeline.ca

http://www.nrcs.usda.gov

http://bambauerequipment.com

Raw solid (top) and liquid (left) manure applied to the soil surface. Direct injection of liquid manure into the soil (right).

FOR FURTHER READING:

Lee et al. 2007. Adv. Agron. 93: 1-68.

Dutta et al. 2010. Journal of Environmental Quality 39 (5): 1688-1698.

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