

DO NOT SPREAD FARMYARD MANURE TO FIELDS AT HIGH RISK TIMES - UK34

first DRAFT

author: M. Garnier

Description

Do not spread farmyard manure to fields at times when there is a high risk of runoff or leaching, unless there is a specific crop requirement.

Avoid applying farmyard manure when crop uptake is scarce.

Rationale, mechanism of action

Since animals do not utilize N and P compounds in feeding efficiently, a large % of these substances end up in manure [1]. In particular, animal products sold account for about 30% of both N and P in feed, the remainder is excreted in manure and is available for land application as fertilizer [2].

In addition to its fertilizing properties, manure application presents the advantage to improve soil structure.

Not all of the N and P applied with manure is taken up by crops; it has been estimated that for typical rain-fed farming systems in the USA, roughly 15% of field applied N is volatilized to the atmosphere as ammonia and N oxide [3]. The fraction of N lost with percolation is even larger (10-40% for clay and loam soils and 25-80% for sandy soils [4].

P losses represent a minor proportion of manure P (generally < 5 %) [2]. Nevertheless, manure is historically applied to meet crop N requirement, if possible avoiding nitrate leaching. This results in a build up of soil P beyond levels required for crop production and a consequent increase in P losses, mainly via surface runoff [5].

Solid manures do not have a high enough moisture content to initiate surface runoff or leaching themselves. This is the reason why the risk of water pollution (both surface and groundwater) from manure N and P only occurs when heavy rainfall follows the application.

Applicability

The method is applicable to both livestock farms producing manure, and to farms that spread imported fresh manure directly on fields.

Nevertheless, because livestock continually generate manure, while the option requires not to dispose manure in certain periods, to be applied this BMP requires the presence of storage facilities (e.g. constructed lagoons, ponds and pits) on, or very close to the farm.

With reference to this option, high risk times are when soil is wet (in Italy in autumn, but also in spring); this last period, in particular, might create the need for a strong advisory activity to persuade farmers not to apply manure, as they usually do, to promote crop growth at the beginning of the growing season.

Effectiveness, including certainty

Manure application timing relative to rainfall influences the amount of manure nutrient loss. In particular, reductions in N and P losses with an increase in the length of time between manure application and runoff have been shown [2]. For example, in field-based simulation studies, it was observed that the dissolved P concentration in runoff from a silt loam soil declined from 2.75 to 0.40 mg/l when rainfall occurred 35 days, rather than 2 days after a surface broadcast application of 100 kg P/ha as dairy

manure. These reductions can mainly be attributed to the reaction of manure P with soil [6].

Apart from the exam of historical series of rainfall data that can provide general info on the most and/or the least rainy months in a particular area, in the short term (few days) the effectiveness of this option is strongly related to the ability to make reliable weather forecasting and to have the possibility to quickly communicate them to farmers (e.g. via email).

Time frame

The time necessary for N and P in manure to be mobilized from soil depends on how long before the occurrence of an intense rainfall event the manure has been disposed on the soil.

In case manure has been stocked in storage facilities, also the storing time has an (indirect) effect.

The time interval necessary to appreciate some beneficial effect on water bodies is much more variable and strongly dependent on the travel time needed by N and P compounds in manure to reach surface and groundwater.

Environmental side-effects / pollution swapping

Storing fresh manure for some time before disposal has the side advantage from the point of view of water quality protection, that old manure has a lower content of readily available N and faecal organisms [7].

No negative environmental side-effects are envisaged

Relevance, potential for targeting, administrative handling, control

The option can be relevant for all fields where manure fertilizers are applied; control from local agricultural offices is almost impossible.

Since the method decreases fertilizer losses, it will allow to reduce the amount of fertilizer applied; this reduction has been estimated in some cases [2].

What is much more difficult to estimate is the effect in quantitative terms on surface and groundwater quality.

Costs: investment, labor

Apart from the possibility to leave solid manure in the animal house until the meteorological conditions improve [7], a wide range of storage methods are available to farmers. They include constructed lagoons, ponds, open or closed pits. Depending on the kind of facility and on its size, the costs greatly vary from relatively inexpensive plastic sheeting (that perform well for solid manures) to much more costly constructed lagoons or pits. These costs have been estimated, e.g. for the UK [7].

Other costs are represented by the subscription to the agro-meteo service, in case it is not provided for free, to receive reliable weather forecasting necessary to be informed on the periods when significant rainfall events are not expected..

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