

## ON CLAY AND ORGANIC SOILS - TILLAGE CONDITIONS TO AVOID SOIL COMPACTION

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### *Description*

Ploughing under wet conditions can destroy soil structure and reduce water infiltration, thereby increasing surface runoff. Soil compaction can be avoided by tilling the soil in dry conditions, avoiding traffic with heavy machinery and concentrating traffic to pre-determined tracks in the soil. In addition, larger tyres with reduced pressure can be used to avoid unnecessary soil compaction.

### *Rationale, mechanism of action*

Avoiding compaction maintains a satisfactory rate of water infiltration into the soil and reduces nutrient leaching. In addition, avoiding compaction improves crop development, which reduces nutrient leaching. Extreme soil compaction can arise from traffic with heavy vehicles, such as slurry spreaders and potato lifters. Compacted soil is a disaster for P leaching and may, in addition, reduce N uptake by the crop, thus increasing the risk of N leaching. Due to the increased denitrification in compacted soils filled with water, the net effect of reduced N uptake by the crop on N leaching is difficult to estimate. The effect of this measure in individual years may be very important for the risk of increased runoff and erosion, since soil moisture conditions during tillage operation have proven most important [1].

### *Applicability*

Avoiding compaction is highly important for clayey soils and mineral soils with a high content of organic matter.

### *Effectiveness, including certainty*

Nitrogen: Uncertain consequences.

Phosphorus: The actual effect is difficult to quantify but in some years the negative results are obvious [2]. In the south of Sweden, reduced soil erosion by avoiding tillage of wet soils might be expected [3].

### *Time frame*

Poor soil management may immediately be followed by high P losses. One year's mistake may take many years to repair.

### *Environmental side-effects*

No known side-effects.

### *Relevance, potential for targeting*

It is easy to encourage the avoidance of compaction or tillage in wet conditions but it is difficult for targeting since in practice damage may be unavoidable in very wet years.

### *Costs: Investment, labour*

There are no investment costs, but there may be a time-conflict for other necessary tasks for the farmer if the dry period is short.

### *References*

- [1] Withers, P.J.A., Hodgkinson, R.A., Bates, A. & Withers, C.L. 2007. Soil cultivation effects on sediment and phosphorus mobilization on surface runoff for three contrasting soil types in England. *Soil Till. Res.* 93, 438-451.
- [2] Ulén, B. & Jakobsson, C. 2005. Critical evaluations of measures to mitigate phosphorus losses from agricultural land to surface waters in Sweden. *Sci. Total Environ.* 344, 37-50.
- [3] Nätterlund, H. 2007. Countermeasures to Reduce Surface Water Erosion. Focus on Nutrients Team Offset & Media, Malmö, Sweden, 16 pp.