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STABILISATION OF A WIND ERODIBLE SURFACE BY HYDRO-SEEDING (TOWN REFUSE COMPOST)

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ABSTRACT

Hydro-seeding is a method to sow large surfaces quickly by spout-ejection of a mixture of a liquid and seed(s). It may be possible to spout the necessary amount of fertilizers at the same time as well, which is economically attractive. The method can also be used for sowing the large wind erodible surfaces. In that case it is necessary to spout crust-forming agents if there are no other alternatives. The crust must protect the soil long enough for a sufficient crop cover to develop to take over the protective function.

Many industries supply soil stabilizers which are ready to hand. However it is important that the agents do not unfavourably influence the seeds and the soil. In The Netherlands the agents may be applied on a practical scale only if the manufacturer has obtained permission in accordance with the "Fertilizer Regulations".

Town refuse compost is one of the soil stabilizers which is already used on a large scale. The Institute of Soil Fertility - Haren (The Netherlands) has carried out considerable research on hydro-seeding by using specimens of town refuse composts.

INTRODUCTION

Hydro-seeding is a method of spout-ejecting a mixture of a liquid and seeds, making it possible to sow (large) soil surface areas quickly. Generally this liquid is water or a diluted fertilizer solution. The latter is economically attractive. Instead of fertilizers also other materials can be used dissolved or suspended in water or in another liquid.

If hydro-seeding is used to protect large surfaces from wind erosion, an agent has to be added to the liquid which can stabilize the soil surface after the liquid has evaporated or moved downwards. The crust formed in this way should fix the soil long enough for a sufficient crop cover to take over the protective function. This may take some months and depends on the time of seeding, the weather, soil factors and the type of seed.

Many industries try to make effective soil stabilizers. These agents are often crust forming and can be spouted onto the soil. It is important that a soil stabilizer does not affect unfavourably the seed(s) and, later, the plants, the soil and the environment. Therefore, these agents may be offered for sale in The Netherlands only if the manufacturer has obtained from the Minister of Agriculture a consent in accordance with the "Fertilizer Regulations". These regulations also require a positive effect of the agent.

TOWN REFUSE COMPOST "VAM" AND ITS USE AS SOIL STABILIZER

For many years the household refuse from a number of cities and towns in The Netherlands has been collected and transported by a specialized company ("VAM" = Refuse Removal Company) to a processing installation and there transformed into various kinds of town refuse compost. The processing installation is managed by the same company. One of these composts ("horticultural grade") has been used for fertilizing purposes by the bulb growers on the dune-sand soils on the west coast of the country. As the protection from blowing of these easily erodible soils by means of a straw or a reed cover was becoming more and more expensive, we tried to use this compost as a mulch to provide temporary protection of the soil surface and after that, as a fertilizer by mixing it with the topsoil.

We found from our experiments that the compost should be added in a very moist but still crumbly state -at a level of 70-100 tons/ha- and that it was necessary to moisten the mulch as soon as possible after spreading by sprinkling water, unless it rained. The result was very effective as experiments, both in our windtunnel and in actual practice, have shown. A protective cover -at a level of 70 tons/ha- treated in the way just mentioned, could resist wind velocities higher than 25 m/s⁽¹⁾ (Beaufort scale: more than 10). There were no problems with destructive forces due to the scouring effect of jumping sand grains: the rough surface of the compost mulch could resist these forces easily. The effect of the mulch was long-lasting and even improved with time. Experiments showed that a mulch of this "horticultural" compost was still effective after two years.

The costs of the labour needed for spreading the compost and sprinkling water, however, was found to be the greatest drawback for general application in practice. We then tried to decrease these costs by adding the compost by means of hydro-seeding. We found that the horticultural type of "VAM"-compost could be mixed with water (weight ratio 1 compost : 2 water) and spouted on the soil if the mixture was stirred slowly and continuously. By adding 30 tons compost per ha in this way a sufficiently protective mulch was obtained. Stirring the compost-water mixture firmly, however, resulted in cracks in the mulch upon drying and gave insufficient protection against wind erosion.

Unfortunately the economic situation has changed again in such a way that practical application of hydro-seeding "VAM"-compost (horticultural grade) is not attractive in horticulture, let alone agriculture.

However, the method did gain ground for civil engineering projects. For technical reasons the finest type of town refuse compost (Edelcompost "VAM") is used in the same quantities here. A series of trials with different materials on the flanks of large sand dikes, under construction for road building, showed that many types of cover were totally ruined by strong winds and the scouring effect of jumping sand grains during blowing. The cover of this fine type of town refuse compost, however, could resist these destructive mechanical forces very well.

The method is attractive because it is possible to mix the compost with seeds and fertilizers.

The Institute for Soil Fertility has also carried out further research on the application of this type of compost.

During spout-ejection the mixture of this fine type of compost with water must be stirred firmly to obtain a homogeneous product, this in contrast with the "horticultural" town refuse compost mentioned before. During

(1) Wind speeds given in this paper are all calculated for a standard height of 10 m.

investigations in the windtunnel of the institute it was found that the rather rough crust could resist high wind velocities -at least up to 21 m/s (Beaufort units : up to 9)- as well as the scouring effect of jumping sand-grains during blowing. The destructive mechanical forces of falling rain-drops were also resisted very well, provided the crust had been allowed to dry -at least once- after the treatment.

The mean chemical composition of this fine type of compost (Edelcompost "VAM") is as follows :

Organic matter (total)	18.0
Organic matter (effective)	16.0
Nitrogen (total)	0.6
Phosphorus (P_2O_5)	0.5
Potassium (K_2O)	0.2
Calcium (CaO)	2.2
Magnesium (MgO)	0.4
Copper	0.07
Manganese	0.05
Borium	0.003
Cobalt	0.001
Molybdenum	0.006
Water	30.0
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pH_{H_2O}	7.2

To be sure that no complications can occur the composition of the composts is checked regularly.

For the "VAM", spout-ejection in civil engineering projects is carried out by the company "Cebeco-Handelsraad", Section Sports and Recreation, Diepenveen, The Netherlands.

QUESTIONS AND ANSWERS

W. Flaig : Are the composts in The Netherlands investigated for polycyclic aromatic hydrocarbons ?

D. Knottnerus : As far as I know the composts are not investigated in this respect in The Netherlands.