



Original Article

Study on the Use Sheep Wool, in Soil and Fertilization as the Mixture into Cubes Nutrients

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Abstract

Economic reasons and environment issues require a proper management and use of fertilizers at every exploitation. The Nitrates Directive (1991) encourages farmers to become more involved in regard to environment safety, particularly in terms of exploitation of new techniques. Throughout the minimization of fertilizers consumption biodiversity can be assured. The majority of European Union's members consider sheep wool a waste. Despite its physical and biochemical characteristic and availability in large quantities, the wool remains almost unused. By being a 100% natural, durable, recyclable and biodegradable material, the sheep wool represents a non-toxic substance. Therefore it is not able to seep into surface or underground waters, minimizing the level of heavy metals or water eutrophication.

Keywords: soil, sheep's wool, fertilizer, biodiversity, environment protection.

1. Introduction

Removal of nutrients from the soil through plants, through leaching, or other processes related to the natural dynamics of soils, determine the reduction of mobile nutrients and gradual decline the soil production capacity.

For these reasons, compensation is required, by applying mineral and organic fertilizer, both in consumption and a decrease of nutrients movement through natural processes (adsorption, fixation etc.).

A thematic strategy for soil protection made by the European Council alerts that soil degradation is a serious problem for Europe.

That document states that soil management practices such as organic farming can maintain and enhance the chemical substances and prevent landslides.

Nitrates Directive (1991) encourages farmers to become more positive in terms of protecting the environment, exploring new techniques.

Important objectives of the Directive are to reduce water pollution caused or induced by nitrates from agricultural sources and to prevent, further pollution [4].

By minimizing the use of fertilizers, biodiversity is assured. European Directive regarding the protection of water and soil, draw the guidelines of using wool blocks and granules.

Using biodegradable natural sheep wool does not cause any of the problems mentioned before. Hence, natural fertilizers are optimal for ensuring biodiversity for flora and fauna.

In many European countries, sheep wool is considered as waste, although it is a rich treasure.

Despite the great characteristics (physical and biochemical) and its availability in large quantities, wool from sheep remains almost entirely unused [2]. Sheep wool is 100 % natural and biodegradable materials that do not contain any chemical materials or other environmental pollutants.

For this fact, no toxic substances can infiltrate in groundwater or surface ones.

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Unlike synthetic fertilizers, sheep wool does not destroy the soil, which maximizes the maintenance of biodiversity [3].

2. Objectives

The project aims to develop innovative strategies in regard to fertilization, by using raw wool sheep.

The following objectives should be considered: the development of a technological process that enables the grouping of sheep wool into blocks to be used in greenhouses and a technological process that facilitates the distribution into granules; the development of a sensor that allows the quantification of soil humidity; it should also allow the monitoring and measurement of the effectiveness fertilizer granules have. A sensor for the release of nutrients will help farmers save time and money, otherwise allocated to laboratory tests of soil, and also optimize the fertilization process; the development of a concept: *Sheep wool* from farm to field.

3. The general concept

For many years, sheep wool has been known for its potential use as raw material in the production

of fertilizers. Sheep wool compressed into pellets provides physical and biochemical properties such as (figure 1):

Sheep wool contains: 50% Carbon, 25% Oxygen bound, 17% Nitrogen bound, 6% Sulphid [1].

Sheep wool represents an 100% natural, biodegradable material. Therefore it is not able to seep any toxic substances into surface or underground waters.

Unlike synthetic fertilizers, sheep wool doesn't influence the soil's properties, maintaining the biodiversity.

Wool fibres expand under the influence of humidity, aerating the soil and thus working in the benefit of the roots.

The release of nutrients is efficient over time, which minimizes the re-fertilization efforts throughout the season.

The sheep's wool has a superior absorption capacity and water retention which prevents the drying of the soil and therefore minimizes the erosion.

The only reason to explain why sheep wool hasn't reached large-scale production throughout Europe (currently, only small amounts are available for gardeners) is that sheep wool granules are two to three times more expensive than ordinary fertilizers [3].



Figure 1. Possibilities of use of wool

4. Materials and Methods

Fertilization strategy is based on the use of a raw material: 100% biodegradable sheep wool.

The production process of cultivation blocks and fertilizer granules consists of the following steps: expansion and cleaning of sheep wool, shaping of cultivation blocks, compression of fertilizer granules.

The technological process used to compress wool sheep into pellets is already available, but unfortunately allows only low-scale manufacturing.

However, it is certain that piece originally

coming from cultivable blocks differ from the point of view of the composition from natural wool [3].

The production of sheep wool bales and fertilizer granules are summarized in figure 2.



Figure 2. Process strategy of project DINUGY

5. Expected Results

Expected results are: improving the quality of surface water and groundwater; reduce soil with toxic contaminants and heavy metals; biodiversity and wildlife; improving human health by reducing the release of pollutants and greenhouse gases, reduce soil erosion and improve soil quality and structure; increasing competitiveness of European farmers by reducing production costs [3].

6. Conclusion

Fertilization strategy is based on a raw material, 100% biodegradable sheep wool. Using sheep wool granules equals no negative impacts on the environment: no soil pollution or water contamination, no soil degradation, maintaining biodiversity. Sheep wool is 100% natural and biodegradable, which does not contain any chemical material or any other environmental pollutant. Thus no toxic substances can appear in groundwater or surface ones. Unlike synthetic fertilizers, sheep wool does not destroy the soil, which maximizes and maintains biodiversity

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