FERPODE Project

ORGANIC FERTILIZER. Project for the disposal of manure surplus with added plant extracts (PAV - natural product with enzymatic activity), creating a new high quality organic fertilizer to be marketed in the agri-food sector

eco-innovation | circular economy | production process | reducing environment impact | chemicals | environmental sustainability

PROJECT DESCRIPTION

FERPODE project relates to the organic fertilizer market sector, having produced a high quality fertilizer obtained by the combination of poultry manure (laying hens' droppings) and a mixture of active principles (natural product with enzymatic activity called PAV, covered by the European patent EP 1314710 A1 granted to the AMEK cooperative of Ferrara) for the partial replacement of mineral fertilizers.

OBJECTIVES

The goal of the FERPODE project was the production of an NSF (Non-Synthetic Fertilizer) with the advantages of transforming the poultry byproduct into a hygienically safe, commercial material of quality, characterized by a slow release of nitrogen.

In the frame of the FERPODE project herbal active ingredients have been added to a byproduct of the farm, the droppings of laying hens, so as to obtain an **organic fertilizer for the soil and for the plants, characterized by reduced salinity and slowly released nitrogen (N), which allows to save water and energy**. In fact, the poultry droppings have always been used in agriculture for plant nutrition (fertilizer) and are composed of organic substances, (macro, meso and micro) nutrients and microorganisms.

The special mixture of poultry droppings and PAV combines:

1. A protective action by supplying the soil with organic substances (C);
2. A fertilizing action thanks to its content of nitrogen (N) and nutrients;
3. A water retention action of the soil to which it is added, allowing to absorb water during even intense rain phenomena and to release it slowly.

These characteristics mean that it can also be used for soils that are poor in organic matter and allows to reduce water consumption. In addition, the product has an added value compared to other organic fertilizers, since it enhances a material considered poor, such as poultry manure, which in reality is more rich in nutrients than manures of other origin and other wastes /

byproducts of the agri-food industry, and its organic substances are useful for the structure of the agricultural land.

PROJECT PHASES

In poultry farms, environmental impact problems must be addressed and resolved with integrated interventions that allow good environmental management practices and, in the same time, beneficial effects also on the animal welfare. Breeding activities, in general, have a direct impact on the external environment in terms of emissions into the air (mainly of ammonia and odors), and to surface and underground water bodies. The air emissions are generated by the transformations of the organic substance excreted by the animals during the production cycle and by the operations of storage and distribution in the field of these excretions.

According to ISTAT data (Census of agriculture - data referring to the farm center - farms - Number of heads by altimetric area, class of agricultural area, type of livestock (bees, other livestock), class of total farm working day), in 2010, 167.512.019 poultry were recorded in Italy, of which approximately 71,5% in the North of the country, 12,5% in the center and the remaining 16% distributed between the South (12,6%) and the islands (3,4%). The Italian regions with the largest number of poultry were Veneto and Lombardy where it was the concentration of about the 43% of the national level poultry farming, and the 60,7% of the Northern Italian poultry farming. In 2008, experts in the poultry sector estimated a poultry manure production of 1.454.000 tons. (Data taken from G. Comati, Poultry Farmers Union, 2008, "The poultry sector: problems and perspectives", proceedings of the conference "Valorisation of poultry for energy and environmental purposes").

The number of laying hens raised at national level was also significant: 44.096.000 heads, 26% of the total number of poultry, while the number of laying hens raised in the EU in 2013 was equal to approximately 500.596.000 (source: FAOSTAT). The first-ranking countries in laying hens farming are in order: Italy (14,18%), France (11,72%), Spain (8,92%) and Germany (8,68%).

Specifically, as regards the gaseous emissions into the atmosphere, to date the conveyor belts in the poultry farms are ventilated and able to reduce the humidity of the manure to around 30-35%, which is an optimal range to reduce any elements of nuisance (rats, flies, unpleasant odors). But still can exist conditions in which this humidity value is widely exceeded, causing the above mentioned annoyances.

The places and situations in which potentially polluting gas emissions mainly occur (in particular ammonia) are: the shelters that house the animals, the storage of animal manure and the agronomic spreading of manure.

The factors that influence ammonia emissions on farms are attributable to: the type of animal bred, the characteristics of the shelters and the manure storage containers, the methods of removal and agronomic spreading of the manure and their characteristics, climate, soil conditions and the overall management methods of the farm.

The environmental impact of the poultry farms is essentially linked to the management of manure, both during the poultry's stationing in farms for long periods, and at the level of the manure's use for agricultural purposes.

Stationing can cause emissions of bad odors, polluting substances (including ammonia) and the possible presence of insects and rodents.

Inadequate spreading and use of droppings on soils can become a source of pollution, causing:

- Contamination of groundwater by nitrates;
- Emissions of odors and polluting substances, including ammonia, into the atmosphere;
- Eutrophication of surface waters from runoff of nitrogen and phosphorus compounds;
- Long-term pollution of soils by heavy metals and recalcitrant molecules deriving from the feeding of chickens, which can enter the food chain;
- Pollution of drinking water by pathogens.

To solve the encountered problems and achieve the project objective, three parallel paths were followed:

Path 1: based on the comparison between the economic / environmental impact and the potential of this type of byproduct and the Vegetable Biomass Fertilizers (VBF), often used together, as well as on the relative legislative restrictions (Legislative Decree n. 152 of 3 April 2006 - Environmental standards). In this context the acceptance strategies, logistics and process technology of the new product - obtained from the combined use of poultry droppings, laying hens manure and PAVs - were assessed.

Route 2: aimed at creating a demonstration "pilot" system capable of creating an environment-friendly and cost-effective process, which allows the production of a new high-quality organic fertilizer.

Path 3: aimed at marketing this new quality organic fertilizer characterized by reduced salinity and nitrogen, whose specific properties (combination of prompt release ammonia component, with another component having a scheduled release) distinguish it from other products already available on the market.

PROJECT RESULTS

The organic fertilizer obtained from the enhancement of waste, and which can partially replace mineral fertilizers (for example, urea and superphosphate), is used in an innovative process based also on the use of mixtures of natural products (PAV-AMEK EP 1314710 A1) with enzymatic activity, added at the beginning of the maturation process (in static accumulation process), that requires few energy and water. The result is the activation of a sustainable process (recovery and enhancement of the manure byproduct, reduced environmental impact) and the production of a more environment-friendly fertilizer.

To date, farms manage hens' manure delivering it, free of charge, to affiliated farmers, in compliance with the norms in force. Therefore, this activity does not yet represent a business for breeders, but even entails costs (transporting the droppings to the farmer).

With the production of quality fertilizer, this practice will be completely abandoned, to adopt that of transforming all manure into fertilizer that can be marketed at the same farm with the aim of achievieng an economic return.

The goal is the search for a solution that, with a minimum economic investment by the breeder, allows the production of the new product. Later, if the breeder will find economicly convenient the production and marketing of PAV droppings, he may decide to make further investments, even more substantial, to expand the product's market and automate the production process. Therefore, a "step by step" growth of the business at the farm is expected, with different phases that will progressively evolve over time, each characterized by different investments.

To ensure the economic convenience of the project, the transport of the PAV poultry product was foreseen not beyond the range of a maximum 100-150 km distance from the production centre, in order to maintain transport costs reduced.

The production process of the PAV + manure mixture does not affect the normal activity of the breeder and requires minimal investments for the realization of the product. In fact, it is important to emphasize that the plant is already provided within each farm, as the conveyor belts of poultry manure form heaps, which when they reach 2 meters in height, can be treated with PAV enzymes while remaining in static form for 90-120 days without turning.

This process allows a reduction in:

- energy consumption by 80%;
- water consumption by 15.100 m3;
- CO2 of emissions by 530 t,

and ensures the production of a mature, dry and biostabilized poultry manure, without consequences in case of overdose.

The introduction of these advanced work procedures can allow the creation and consolidation of new jobs in the agricultural sector in Europe, creating new skills in the farmer's production cycle, new interests in research and innovations for this specific sector and a new market linked to the commercialization of the product created with the low-cost FERPODE method.

This brings benefits to a market made up of end users, such as farmers, intended both as small owners and as large farms, through savings, greater soil fertility and, in particular, recovery of a material that from waste becomes a quality product.

Following various marketing and communication actions undertaken within the project, contacts were established to introduce the product in European and non-European countries (Spain, China, Brazil, ...).

The project results have been used in two LIFE projects:

- LIFE10 ENV/IT/365 PODEBA – Use of poultry dejection for the bathing phase in the tanning cycle https://www.podeba.eu/index.php?lang=it;
- LIFE12 ENV/IT/356 RESAFE (Innovative fertilizer from urban waste, bio-char and farm residues as substitute of chemical fertilizers) www.liferesafe.com.

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Acronym
FERPODE

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Reference Programme
COMPETITIVENESS AND INNOVATION FRAMEWORK PROGRAMME (CIP) ECOINNOVATION

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472.276,60

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2008

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