Valorization of some resources wastes in the benefits of organic farmers

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ABSTRACT.

The aim of this paper is to present one example for capitalization of three biomasses resources which are made waste: one is a natural waste, who is formed along the Black Sea Coast in an unusually large amount in summer (as algae biomass) the second is sludge from water treatment stations and third is manure.

The valorization of this three wastes was conceived as a result of scientific studies and research carried out on both their nutritional potential of biomasses for soil. So it was establish a way to be used as raw materials in the technology of obtaining organic polycomposite fertilizer

The researches is based on the need to protect and to improve the natural resource of soil in the exploitation context of a sustainable agriculture system generating safe and profitable production. Complementary conceptual pillar is represented by the necessity for recycling and recovering some organic wastes such as sludge from waste water treatment plants, manure and marine algae biomass

The originality and novelty in a scientific research contribution of this project was the proposal for capitalization of the natural or anthropogenic resources that generating important environmental issues both by excessive production and storage, for which Romania has not yet found a systematic and beneficial use, sewage sludge and seaweed respectively.

A unique feature is the Romanian Black Sea Coast is the presence of an enormous quantities of algae biomass , by tens of thousands tones magnitude order, that through pestilential odors and aspect, year by year, affects the Black Sea beaches with serious consequences for tourism and regional economy,

The objectives of our research t responds to the need for integrating environmental objectives into agricultural policy of Romania in accordance with the objectives of the EU's agricultural policy, which is supporting the agriculture for the safe food production; biodiversity protection and improving the environment quality.

Figure 1. Macro-algae deposit from the shore area of the southern Romanian littoral of the Black Sea.

Aboutof the three wastes resources for organic farmers

1. Sewage sludge.

Sludge is a generic term for solids separated from suspension in a liquid. Sludge usually contains significant quantities of water. Commonly sludge refers to the residual, semi-solid material, fromindustrial wastewater or sewage treatment processes. It can also refer to the settled suspensionobtained from conventional drinking water treatment, and numerous other industrial processes.

The sewage sludge comes from sewage treatment plants from urban, industrial wastewater treatment and water treatment. They are retained and collected from primary and secondary decanters by mechanical and biological purification technologies. This collection of solids is known as raw sludge or primary sludge. The sludge will become putrescent in a short time once anaerobic bacteria take over.

Excess solids from biological processes such as activated sludge or biofilm processes are oftenreferred to as biological sludge or secondary sludge, which mainly consists of biomass produced inbiological treatment.

Sewage sludge is here referred to as sludge produced during wastewater treatment processes, including primary sludge from the primary sedimentation tank, and biological sludge from secondary treatment using micro-organisms.
Figure 2. Sewage sludge production.

Technologically defined, sludge is considered as the final stage of water purification, which includes products of metabolic activity, raw materials and other intermediate products.

The main options for capitalizing the sewage sludge are as follows:

- direct use in agriculture;
- aerobic fermentation - composting;
- anaerobic fermentation;
- coincinerare;
- incineration with energy recovery.

Currently, Integrated Waste Management System, issued in 2016, although the most efficient processing process is aerobic treatment (composting), it does not focus on its use, but recommends other processing methods such as: coincineration in cement plants of an "alternative fuel with a Low caloric power ".

The sewage sludge can be used directly in agriculture only if the legal provisions of the Joint Order of the Ministry of Environment and Waters and the Ministry of Agriculture no. 344/2004 for the approval of technical norms regarding the protection of the environment and especially the soil when the sludge is used in agriculture.

Thus, according to this order, for the sewage sludge to be used in agriculture, the maximum admissible values for: heavy metal concentrations in sludge soils, heavy metal sludge concentrations, the maximum annual quantities of heavy metals that can Be introduced into agricultural soils. The use of sludge energy can only be justified if these requirements are not met.

The Sewage Sludge Directive 86/278/EEC seeks to encourage the use of sewage sludge in agriculture and to regulate its use in such a way as to prevent harmful effects on soil, vegetation, animals and man. To this end, it prohibits the use of untreated sludge on agricultural land unless it is injected or incorporated into the soil. Treated sludge is defined as having undergone *"biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use"*.

The Directive 86/278/EEC transposed into Romanian legislation through the MMGA order no 344/708/2004 for approving the technical rules regarding the protection of the environment and in particular of the soil, when sewage

sludge is used in agriculture, aims to “capitalize the agrochemical potential of the sewage sludge, preventing and reducing the harmful effect on soils, water, vegetation, animals and human, so that to ensure the correct use of this sewage sludge.
Our studies proposes to apply the composting process together with the other studied wastes (**algal biomass and manure**) as the most efficient from the investment point of view, solving in addition the processing of another waste (algae residues), which raises great problems both for storage and tourism.

2. Marine Biomass of Black Sea coast.

The diversity of Black Sea phytoplankton and zooplankton represent an enormous and unique source for the natural products with potential in the development of the:
- Biofuel industry (biodiesel)
- The pharmaceutical industriya,
- Cosmetics and nutritional supplements industries,
- Medicine
- Agro-Chemicals Industry
- **Sustainable agriculture**.

The variation of the macro - algae diversity in the past three years, due to the climate changes, the proliferation of algal blooms occurred and shows the clear dominance of the green algae (Chlorophyta sp.) Closely followed by red algae (Rhodophyta sp.) , these groups being represented by nine and seven species respectively on average. The most frequently found species belong to Phylum Chlorophyta and Rhodophyta, so they realize significant biomass at depths between 0 and 5 meters: Chladophora serum, Enteromorphaintestinalis, UlvaLactuca, Cystoseirabarbata and Ceramiumrubrum.

Figure 3.Marine biomass on the beach.

The use of marine biomass in agriculture.
Even if there is one such industry, large amounts of algae would remain unused daily and would still be considered waste. The total length of Romanian Black Sea coast is 245 km. The total length of only the southern part between city and town Navodari Old customs house form the Romanian seaside tourism. Beaches in this area are continuing,

and if he had collected do not exceed 30 km long. Thus, in 2015 23,500 tons and in 2016 40,000 tons of algae were collected. Nobody knows exactly what is the actual quantity of algae produced Romanian Black Sea shore on the entire 245 km throughout the year, but we estimate an average amount of 40,000 tons. In Romania as in other developing countries biomass is used ineffective, resulting in, as a rule, 5-15% of total need. In addition, marine biomass is not so convenient to use and fossil fuel.

Towards this situation and face the undevelopment an industry to produce biodiesel from algae of the Black Sea coast, Romanian researchers develop this fundamental research on the possibility of using algae and marine biomass in general and in other areas than the industry Biodiesel: pharmaceuticals, agricultural chemicals, agriculture.

One of the major projects developed at this time investigating the possibility that marine algae and biomass can become a good fertilizer, organic, for agriculture to support sustainable development.

We study the possibility of a new compound, innovative, polycomposite form of marine biomass and other residual biomass. Use of algae in agriculture contributes to sustainable development which integrates an environmental, an economic and a social dimension.

This new dimension of using algae can be considered as a key element for sustainable development and improve environmental quality as using eco-efficiency ", that can empower us to use nature for economic activities (agriculture) required to meet human needs (welfare) and to maintain the capacity and support to ensure fair access to environmental use by present and future generations. The thousands of tons of algae collected is stored as waste. The researchers aim to transform these elements of waste into resources for improving soil quality. It will reduce the environmental impact that we have dumps of algae (eg infiltration)

To respect the principles of preventive action and to prevent the land application of harmful substances will be studied it deeply parameters and biomass of marine algae.

Tackling climate change, one of the objective of the EU on this issue is the planning of the agriculture and land-use in the benefit of the environment. And by using marine biomass in agriculture could support sustainable use of soils and especially commissioning of land which are now unsuitable for agriculture.

3. Farm livestock manure

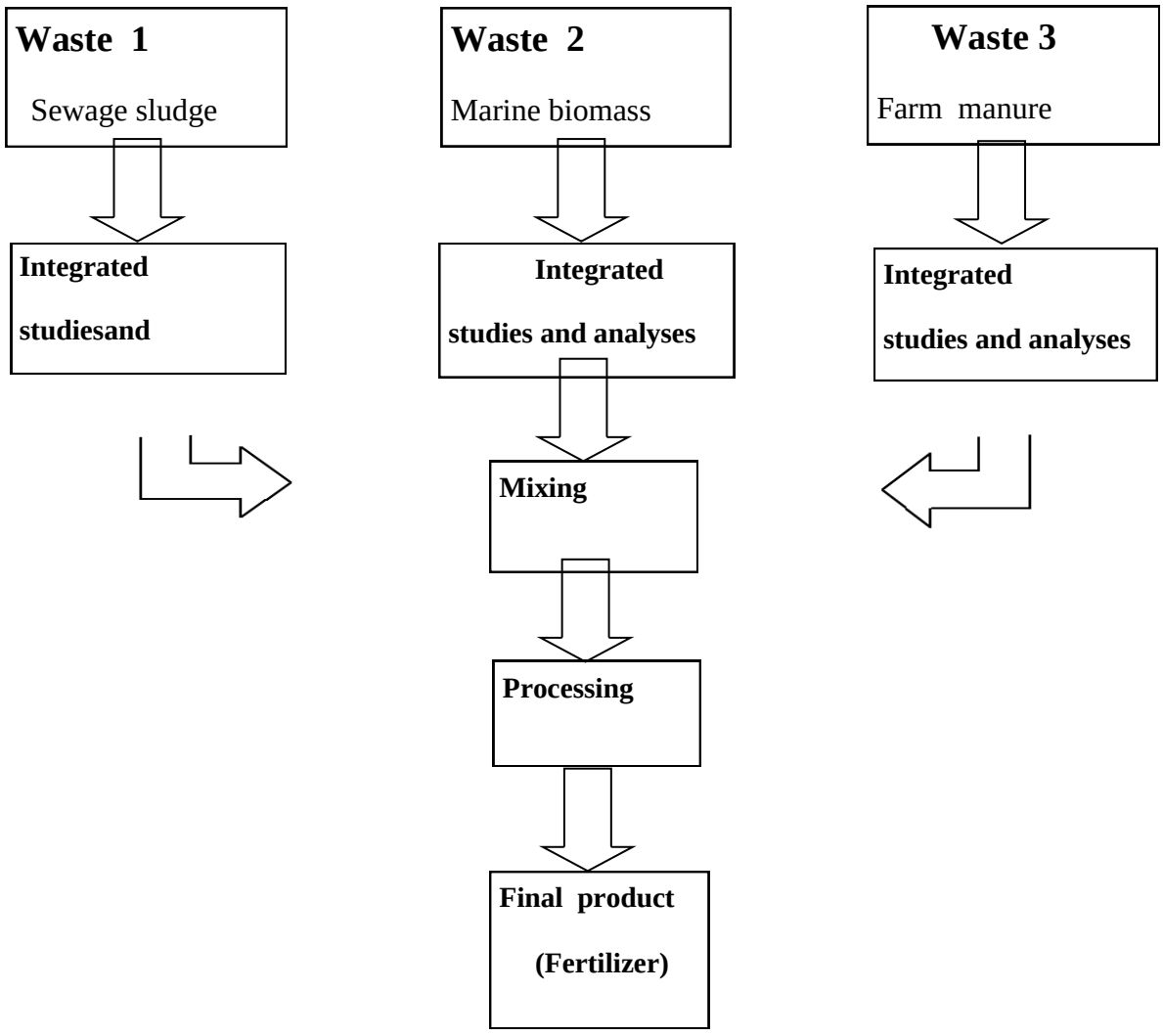
Farm livestock manure is an organic matter, mostly derived from animal feces, which can be used as organic fertilizer in agriculture. This contributes to the fertility of the soil by adding organic matter and nutrients, such as nitrogen, that are trapped by bacteria in the soil. Higher organisms then feed on the fungi and bacteria in a chain of life that comprises the soil food web.

Animal manure, has been used for centuries as a fertilizer for farming. It can improve the soil structure (aggregation) so that the soil holds more nutrients and water, and therefore becomes more fertile. Animal manure also encourages soil microbial activity which promotes the soil's trace mineral supply, improving plant nutrition. It also contains some nitrogen and other nutrients that assist the growth of plants. Due to the relatively lower level of proteins in vegetable matter, herbivore manure has a milder smell than the dung of carnivores or omnivores.

Figure 4. Farm livestock manure.

Manure generates heat as it decomposes, and it is possible for manure to ignite spontaneously if stored in a very large pile. Once such a large pile of manure is burning, it will foul the air over a wide area and require considerable effort to extinguish. Therefore, large feedlots must take care to ensure that piles of fresh manure do not get excessively large. There is no serious risk of spontaneous combustion in smaller operations. There is also a risk of insects carrying feces to food and water supplies, making them unsuitable for human consumption.

Figure 5. Valorization Schema of the three wastes



Conclusion

The novelty of these studies consists in using for the first time together these three organic wastes of which two wastes are natural resources (marine biomass and manure) and the third is an industrial waste (industrial resource) Each of these resources has potential for soil fertilization, so the effect of mixing them is synergistic.
The studies was result from the necessity to find an efficient method to solve difficult problems of the waste storage, and from the legal compulsoriness for waste processing .

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