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UNCONVENTIONAL NON-FOOD RESOURCES from
ROMANIAN BLACK SEA COAST

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***Abstract:** There is a huge potential of biomass, which can be included in the flow when dealing with improving the usage of the existing resources and increasing the productivity. The production of bio-fuels from algae is considered as the most efficient method for fuels production from vegetable substances. The marine biomass (plankton and algae) is an unexploited source until now. We are developing fundamental researches over the possibilities of marine biomass usage in agriculture as an eco-fertilizer. The usage of marine biomass in agriculture contributes to sustainable development which integrates an environmental, an economic and a social dimension.*

A. Introduction

Definition: Biomass is the biodegradable part of the products, dump goods and agriculture wastes, including the plant and animal substances, forestry and related industries, and also the biodegradable part of industrial and urban wastes.

Biomass is the most abundant renewable resource from the Earth, including all the organic substance metabolically produced by the living organisms.

Biomass represents the vegetable compound of the nature. As manner of Sun saving energy in chemical form, the biomass is one of the most popular and universal resource from Earth.

Biomass is the first type of energy that human started to use, once with fire discovering. It assures not only the food, but also energy, construction materials, paper, textiles, medicaments and chemical substances.

There is a huge potential of biomass, which can be included in the flow when dealing with improving the usage of the existing resources and increasing the productivity. Bioenergetics might be improved, due to the modern technologies of transforming the initial biomass in moderns and cozy energy carriers (electrical energy, liquid and gas fuels, solid compound).

The actual resources of biomass are:

- Wood
- Crops for energy purposes:
 - ❖ Trees at high speed growth : poplar, willow, eucalyptus
 - ❖ Crops (agriculture) : cane, rapeseed, sugar beet
 - ❖ Perennial crops : Miscanthus
 - ❖ herbaceous plants with high growth rate: Switchgrass (*Panicum virgatum*), Miscanthus, or elephant grass (grass Uganda)
- Wastes and by-products:
 - ❖ wood from cutting trees branches and from constructions

- ❖ grains' straws and stalks
- ❖ other wastes resulted from some food products processing (cane, tea, coffee, nuts, olives)
- wastes and sub-products:
 - ❖ wastes from wood processing: Wood chips, sawdust
 - ❖ paper wastes
 - ❖ the organic part of urban wastes
 - ❖ waste vegetable oils and animal fats
- methane capture from landfills, from wastewater treatment plants and the manure;
- Marine biomass (plankton and algae) – an unexploited source until now.

Biomass is used with energetic purposes since human discovered fire. Today, the fuel from biomass may be utilized for different purposes – from heating the rooms to electrical energy production and auto vehicles' fuels.

The marine biomass on the 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

- Bio fuel industry (bio diesel),
- the pharmaceutical industry ,
- cosmetics and nutritive supplements industries,
- medicine
- agro-chemicals industry
- Sustainable agriculture.

The variation of the macro – algae diversity in the past three years, due to the climatic changes, a proliferation of algal blooms occurred and shows a clear dominance of the green algae (*Chlorophyta* sp.) closely followed by red algae (*Rhodophyta* sp.), these groups being represented by nine and respectively seven species in 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 sericea*, *Enteromorpha intestinalis*, *Ulva lactuca*, *Cystoseira barbata* and *Ceramium rubrum*.

B. Production of bio-diesel from algae

The production of bio-fuels from algae is considered as the most efficient method for fuels production from vegetable substances. The studies have demonstrated that the algae may produce 30 times more bio-diesel than the agriculture crops used until now. The bio-diesel from algae does not contain sulfur; it is not toxic and is totally biodegradable. Some algae species contain 50% oils and have a very high speed of growth.

But, any benefic might seem the production of algae bio-diesel, from economical and industrial point of view there are still high restraints as regards such production.

Reactor algae are more efficient but the costs of the reactors are much higher. For fuel manufacturing the light has to be natural. Algae to be efficient must have rest periods, darkness, at a frequency much higher than a day period. Need to concentrate light and switch it on an off is not simple. To do this by flow, controlled turbulence is not simply. A lot of equipment is needed to control light concentration, flow, food, and cooling.

Considering the existing conditions of Black Sea and of the seaside lakes from Dobrogea, there is certain sufficient algae mass at the moment enough to assure the efficiency of the technology for bio-diesel production of marine algae and freshwater macrophytes.

Given these conditions, a region as Black Sea Coast, where the algae grow without needing special crops, represents a strategic objective for developing the production of bio-diesel from algae; on the Black Sea Coast the algae are in huge quantities, which, at the moment, not only they are not exploited but they are thrown away, hindering some other activities from the Black Sea shore, like tourist and recreational activities.

Although the algae from the Romanian Black Sea Coast could be an important raw material for bio-diesel production, such industry is not yet developed in Romania.

C. Usage of marine biomass in agriculture

Even if such industry already exist, huge quantities of algae would still remain daily unused and considered waste.

The total length of the Romanian Black Sea Shore is 245 kilometers. Of this, only the southern part between Navodari city and Vama Veche resort form the touristic Romanian Seaside. Even from this area the touristic (organized) beaches are not continuously connected one with each other, and, if measured, they wouldn't be together of a bigger length then 30 kilometers.

The algae mass that is collected is collected only from these beaches, only during the summer season - June - August and only the algae that come to the shore are collected. This is how in 2006 there have been collected 23.500 tones of algae and in 2007 40.000 tones.

The exact quantity of the algae which are produced by Black Sea on the Romanian shore throughout the year is unknown.

We can only imagine how easy huge quantities of marine biomass are waste!

In Romania, as in other developing countries the biomass is used inefficient: only 5-15% of it from the total mass. This is because using biomass is not yet a custom and not such comfortable as fossil fuel.

As a reaction towards this situation and towards the fact that an industry that should produce bio-diesel from the algae is not yet developed, we are developing at the moment fundamental researches over the possibilities of algae and marine biomass usage in other fields then bio-diesel production: pharmaceuticals, agro-chemical, and agriculture.

One of the important projects developed at this time is researching the possibility of making from algae and marine biomass an eco- fertilizer, for a agriculture which will support the sustainable development.

We are study the possibility of creating a new, innovative compound formed from marine biomass and other biomass waste.

The usage of algae in agriculture contributes to sustainable development which integrates an environmental, an economic and a social dimension.

This new dimension of algae usage can be considered as a key element for a sustainable development and for improving the environment quality because it uses "eco-efficiency" that can empower us to use nature for economical activities (agriculture) necessary for human needs (welfare), and to maintain an equitable access to environment utilization for the present and future generations.

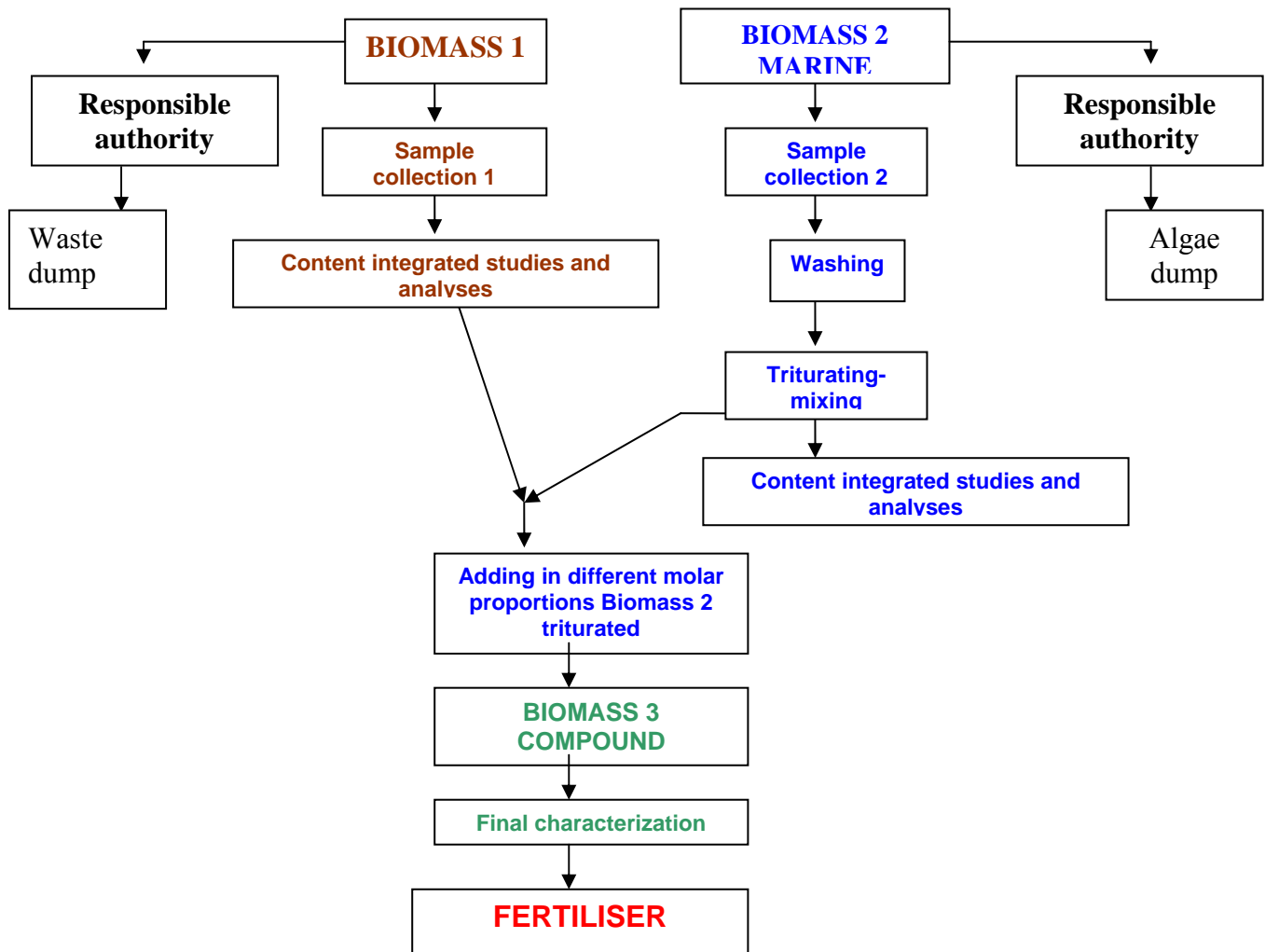
Thousands of tones of algae are collected and stored as wastes. The researchers aim to transform these elements from wastes to resources for improving soils quality. The negative impact that the dumps of algae (e.g. infiltrations) have over the environment will be reduced.

In order to respect the principles of preventive action and to prevent using noxious substances on the soils, the parameters of algae and of marine biomass will be deeply studied.

Tackling climate change, one of the objectives of the EU in this issue is planning of the agriculture and land-use in the benefit of the environment.

Using biomass in agriculture will support sustainable exploitation of soils and especially commissioning of land which are now unsuitable for agriculture.

Scheme for the organization of fundamental strategic experimental research activities



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