PLANTS, SOURCE FOR BIOFUELS

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Abstract: *The most affordable alternative energy sources to fossil plants with hydropower are some oils that accumulate in different organs other accumulating carbohydrates with high energy value. They are known worldwide and cultivated a number of plant species entering the oilseeds, which provides significant production of edible oil (soybean, sunflower, etc.) Vegetable oils or their product derived biodiesel fuels are potential diesel engines, representing an alternative to fuels. The most promising suitable for the production of oil crops "with short circuit "or biodiesel are fruits and seeds, both herbaceous and tree.*

Key words: plants, biofuel, vegetable oils

1. INTRODUCTION

For mankind there are not too many solutions now, at the beginning of the third millennium, in terms of energy alternatives to fossil. Remain accessible in terms of cost, just:

- The plants, which store their growth and development in large amounts of energy;
- Solar energy (light and heat);
- Wind (given by currents and winds);
- Soil and thermal energy.

Of all these forms, the most affordable alternative energy sources to fossil plants with hydropower are some oils that accumulate in different organs other accumulating carbohydrates with high energy value.

In the first group oilseeds may fall almost in their entirety, and the second group, those producing carbohydrates (corn, sweet sorghum, cane and beet sugar), which can be obtained from biofuels.

Alongside these groups of plants, usually grown, there are a number of species of annual or perennial plants that can be used for energy production (species of willow, poplar wood waste and scrap).

2. PLANT CROPS FOR OBTAINING VEGETABLE OIL

Choice of species for the production of vegetable oil is essential for the development of agro-energy project. The choice is based on the characteristics of that species on climatic requirements, local conditions and logistics aspects of the production cycle. The inherent characteristics of the plant species, however, is the determining factor.

It can be considered and cultivation of several species (2-3) as an optimal combination for the area in order to compensate specific disadvantages of either species.

It's about providing vegetable plant group. These fats can be used equally in human nutrition, in industries to achieve a wide variety of products and the production of biofuels. Oilseeds known to man for thousands of years. They acquire to accumulate in various tissues (seeds, fruits, tubers) fats, which are the most energy products produced in complex processes of photosynthesis.

It should be noted that vegetable fats have a higher caloric value of 9000 cal / molgr, almost double that produced by carbohydrates (4000 cal / molgr). In nature are very many plants that accumulate fats (oils) in various organs. They are still not enough known or, if known, not used: oil from the fruit of beech, the acorns. Do not use any oils known higher potential that could be extracted from the nut kernels of the grape-vine, from wild hazelnuts, the rose seeds etc.

This is another reason to assert that widening of the use of the oils known for the production of biofuels or other forms of energy will not put humanity in a crisis situation in terms of food needs.

In addition, the need to find solutions research and biotechnical achievement of genetic forms to determine:

- Increases in biomass production
- Increases in the content of substances and active ingredients needed both for human consumption and production of energy or other products, such as medicines.

There is a need to find ways to break the correlations that regulate the proportion of the groups of substances synthesized and accumulated in specific organs of the plant (e.g., a lesser amount of soy bean oil, the predominant nitrogenous substances). It could be made of soybean varieties in which the proportion of oil in the seed to be higher than the protein, thus soybean varieties typical for oil, as is the case of sunflower. It could increase the oil content of seed cotton. It is necessary in this case financial sources.

They are known worldwide and cultivated a number of plant species entering the oilseeds group (table 1), which provides significant production of edible oil (soybean, sunflower, etc.).

Some of these plants are grown on large areas: sunflower, ground peanuts, castor, olive, palm and coconut oil, linseed oil, sesame, mustard, cotton etc. They are essential elements of the global economic system (oil exchange, oil seeds, cotton etc.)

Increased production of vegetable oil in the world is related to four factors:
1. Increase of oil plants cultivated areas, such as:
   - Soy in South America South America, Australia, India;
   - Sunflower, Europe and Asia;
   - Rape, in Canada, Europe and India;
   - Peanuts in West Africa.
2. Increase in the production and content into useful substances, made by:
   - Obtaining varieties with genetic potential, to support productions both quantitatively and qualitatively;
   - Improvement of technologies of cultivation, storage and processing of raw materials obtained from oilseeds.

Entering into productive crop varieties and hybrids with a higher content of useful substances, undertakes to improve the technologies of cultivation and recovery.
3. Introduction of new species in crop plants which carry out high yields of biomass in a short time (hemp, sweet sorghum, maize hybrids).
4. Extending the area of cultivation of crops for the production of oils, creating farms with a high degree of adaptability to different environmental conditions.

Table 1 The main species of oleaginous plants grown on Earth

Botanical family	Cultivated species	Organ used	The fat content (%)
COMPOSITAE	*Helianthus annus L.* (Floarea-soarelui)	the fruit	30-57
	Carthamus tinctorius L. (Șofrănelul)	the fruit	43-52
CRUCIFERAE	*Brassica napus L. ssp. oleifera* (Rapița)	seeds	33-49
	Sinapis alba L. (Muștarul alb)	seeds	30-40
	Sinapis nigra L (Muștarul negru)	seeds	28-38
	Camelina sativa L. (Camelina)	seeds	26-46
CYPERACEAE	*Cyperus esculentus* (Migdalele de pământ)	tubers	22-28
EUPHORBIACEAE	*Ricinus communis L. (Ricinul)*	seeds	52-58
LABIATAE	*Lalemantia iberica Fischer Mez* Lalemanția	the fruit	38-40
LINACEAE	*Linus sp. L.* (Inul)	seeds	39-47
PALMACEAE	*Cocos nucifera L. (* Cocotierul de ulei)	the fruit	40-42
	Elacis giunensis L. (Palmierul de ulei)	the fruit	40-45
MALVACEAE	*Gosypium hirsutum L.* (Bumbacul)	seeds	20-27
PAPILONACEAE	*Arachis hypogea L.* (Alunele de pământ)	seeds	42-59
	Glycine hispida (Soia)	seeds	19-24
PAPAVERACEAE	*Papaver somniferum L.* (Macul)	seeds	40-48
PEDALIACEAE	*Sesamum indicum L.* (Susanul)	seeds	50-60
OLEACEAE	*Olea europaea L.* (Măslinul)	the fruit	20-57

Plants shown in table 1 annually produce approx. 90-100 mln. tons of oil. After use, made from plant oils are divided into three groups significant oil - edible oils: sesame, sunflowers, safflower, etc; palm oils; industrial oils, such as castor oil, linseed oil etc.

The largest quantities of vegetable oil is made from a few crops: soy, palm, rapeseed, sunflower, peanut, cotton etc. Of the oil made from oilseeds, globally, the majority was several species: 28% of soybeans, 22% of palm, 14% of rapeseed, sunflower 10.5%, 5.2% of peanuts land and 4.7% of cotton.

The six species of cultivated plants provide 86.1% of the entire production of vegetable oil produced worldwide. The formation and accumulation of reserve substances in various organs of the plant is closely related to: the intensity and frequency of light and the ability of plants to harness light energy given by the sun through their leaves (leaf index).

After using their oil accumulating plants are divided into:

1. Typical for the production of oil plants, such as: Canola, olive, sesame, safflower, castor, sunflower, camelina etc.
2. Plants with mixed use: Soybeans, cotton, poppy, flax, cereals (maize, sorghum), walnuts, ground peanuts, pumpkin, fruit trees (rosacea), hemp, grape-vine and some plants, oil ether.

Vegetable fats usually accumulate in:

- Seed at: sesame, rapeseed, mustard, castor, poppy, cotton, watermelon, grape vines, fruit trees;
- Fruit: olive, coconut, palm, sunflower, safflower, corn, sorghum etc .;

- Tubers: ground almonds

The largest amount of biofuel is produced from vegetable oils such as sunflower, rapeseed (canola), soy or palm. (Figure 1, 2,3,4,5). Jatropha (*Jatropha curcas L.)* is also considered a promising feedstock for biodiesel production, particularly in tropical regions.

Fig.1. *Brassica napus L. ssp. oleifera*

Fig.2 *Cocos nucifera L.*

Fig. 3*. Glycine hispida*

Fig.4 *Ricinus communis L*

Fig. 5 *Helianthus annuus L.*

Vegetable oils and their derived product, biodiesel, are potential fuel for diesel engines, representing an alternative to fossil fuels. In the world there are over 200 species of plants used to produce oils, many of which are used either for the extraction of essential oils (aromatic and medicinal use), or to obtain technical oils.(table 2)

The rest are used for edible oils and fats and more recently for the production of biodiesel. The most promising crop oils suitable for the production of "short circuit" or biodiesel are fruits and seeds, both herbaceous and woody (perennial). Among the herbaceous best suited - both in terms of productivity and in terms of the properties of oils obtained from them - are sunflower, rapeseed and soybeans (in this species the oil is a byproduct of cakes).

Table 2 Production potential per ha and characteristics of oils used for the production of biodiesel

Culture	Yield (L/ha)	Melting point (^{0} C)	Calorific value (MJ/kg)	Iodine n.(g/100 g)	Octane
Elacis giunensis L. (Palmierul de ulei)	5950	9	37,6	51	42
Cocos nucifera L. (Cocotierul de ulei)	2689	22	40,5	9	-
*Jatropha curcas L. (*Jatropha)	1892	- 5	37,5	102	23
Helianthus annus L. (Floarea-soarelui)	952	7,2	39,6	130	37
Ricinus communis L. (Ricinul)	1413	- 13	39,5	85	-
Glycine hispida (Soia)	446	- 4	39,6	132	38
Brassica napus L. ssp. oleifera (Rapiţa)	1190	- 4	39,7	112	38
Gosypium hirsutum L. (Bumbacul)	325	2	39,5	107	42

3. TECHNOLOGY FOR THE PRODUCTION OF VEGETABLE OILS

The production of the plant oil and the stability depends on the type of raw material. Oil seeds can be stored long term without being affected significantly the composition. In contrast, cellulosic materials must be processed immediately after harvest, which means that this process should take place close to the culture.

3.1 The seed oil

Because it can be kept longer term, seed processing can be done in areas where that oil is used. Oil seed processing has four steps:

- Cleansing and preparing seeds
- Oil production by pressing or extraction
- Treatment / refining oil
- Treatment cakes results

The seeds are cleaned of impurities (weed, sand, stones, etc.) and treated with steam to deactivate enzymes. By pressing oil content of the cake is reduced to 15-25%.

The remaining oil was extracted with the aid pomace extractors, using a solvent. After filtration, the crude oil can be processed by refining. Residual solvents and toxic compounds pomace are removed by steaming and drying.

3.2 Fats and vegetable oils

The most common vegetable oil used for biofuel production is palm oil. Due to enzymatic decomposition, crude vegetable fats are less stable in comparison with oil from seeds. Traditional technology has six stages:

1. Fermentation fruit
2. Separation shell, core and pips
3. Sterilization
4. Crushing
5. By pressing oil production
6. Purification of the oil

After fermentation, the core and the seeds are separated and sterilized by boiling large pots in order to enzymatic and microbiological deactivation. After removing the oil, the foam on the surface of the water and oil mixture is decanted and is clarified by boiling.

3.3. Refining crude vegetable oil

After extraction, crude oil is refined. Complete refining consists of degumming and neutralization of oil - to separate mucilage and free fatty acids - followed by bleaching and deodorizing process.

CONCLUSIONS

Vegetable oils or their product derived biodiesel fuels are potential diesel engines, representing an alternative to fuels. The most promising suitable for the production of oil crops "with short circuit "or biodiesel are fruits and seeds, both herbaceous and tree.

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