CASTOR CULTURE - PROFITABLE BUSINESS ON SMALL AREAS

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ABSTRACT: Castor oil cultivation has significant agricultural, industrial, economic and strategic importance, due to the unique properties of the plant and its derived products. Castor oil is a product of high economic value, used in a variety of industries (pharmaceutical, chemical, cosmetic, automotive, textile). The business is represented by the establishment of a castor oil cultivation on an area of 1 ha in the town of Bălești, Gorj County. With a low initial investment and efficient exploitation, castor oil can become a profitable and sustainable crop in the medium term and on small areas.

KEY WORDS: castor, culture, business, profitable

1. INTRODUCTION

Castor oil is an annual or perennial oil plant and is part of the *Euphorbiaceae* family, genus *Ricinus L.,* species *Ricinus communis* (fig.1.)

Figure 1. *Ricinus communis*

Castor oil is of significant agricultural, industrial, economic and strategic importance, due to the unique properties of the plant and its derived products.

Castor oil is a product of high economic value, used in a variety of industries (pharmaceutical, chemical, cosmetic, automotive, textile). It is widely exported, being considered a strategic industrial product, especially for countries that do not produce similar oils.

The economic yield is high per hectare due to the high oil content of the seeds (40–60%).

In addition to its economic benefits, castor oil also has a positive impact on the environment. This plant can improve soil health, and its leaves and stems can be used as a natural fertilizer, reducing the need for chemicals.

Thus, growing castor oil not only supports the local economy, but also contributes to more sustainable agriculture. [1]

Castor oil is a viscous, almost colorless, slightly yellowish liquid with a specific odor and pungent taste. It has the ability to be stored very well for a long time (even 3-4 years), without oxidizing (the oxidation process occurs only under conditions of excessively high temperatures).

Castor seeds are rich in oil, the content of which varies between 44 and 55% (sometimes even up to 58-60%) (Fig. 2 and Table 1).

Figure 2. Castor seed shapes and variations

Table 1 Chemical composition of castor seeds

Compound	Approximate percentage (% of dry mass)	Observations
Castor oil	40–60%	Rich in ricinoleic acid (~85–90% of fatty acids)
Protein	15–20%	Including ricin (very potent toxin)
Fiber	10–20%	Most in the shell
Carbohydrates	5–10%	Complex carbohydrates
Ash (minerals)	3–5%	It includes calcium, phosphorus, potassium, etc.
Water	5–7% (fresh)	It is reduced by drying

2. MATERIAL AND METHOD

The business is represented by the establishment of a castor oil crop on an area of 1 ha in the town of Bălești, Gorj County. The commune of Bălești offers favorable conditions for castor oil cultivation, both from a climatic and pedological point of view:

• temperate-continental climate specific to the area of hills and plateaus

• average annual temperature: between 8°C and 10°C

• annual precipitation: between 700 and 800 mm, unevenly distributed throughout the year

• prevailing winds: from the northwest and north, with moderate gusts

• chernozem-type soils predominate, characterized by high fertility, being suitable for the cultivation of oilseed plants

• crossed by several watercourses, tributaries of the Jiu River, which contribute to the recharge of the groundwater.

• river flows vary significantly depending on precipitation and topography, with average specific discharges between 3–5 l/s·km² in plateau areas.

Castor oil cultivation in the commune of Bălești, Gorj, represents a promising opportunity that can revitalize the local economy and promote sustainable agriculture.

Castor oil (*Ricinus communis*) is an adaptable crop, able to withstand various climatic conditions.

Castor oil cultivation presents numerous advantages from an economic and agronomic point of view: the production cycle is short, good precursor for wheat, barley, peas, beans, soybeans, sugar beet, alfalfa and corn, high ecological plasticity, resistant to atmospheric and pedological drought, well supporting soils with a higher degree of salinity and alkalinity. It can also be cultivated in more intensely polluted areas. When cultivated in crop rotation, castor oil increases soil fertility and protects the soil from soil pests (wireworms, beetle larvae, etc.).

Another important aspect is the increased demand for castor oil in the cosmetic and pharmaceutical industries. This offers entrepreneurs from Bălești an opportunity to obtain additional income, contributing to the economic development of the area. [2]

In addition to its economic benefits, castor oil also has a positive impact on the environment. This plant can improve soil health, and its leaves and stems can be used as a natural fertilizer, reducing the need for chemicals.

Thus, castor oil cultivation not only supports the local economy, but also contributes to a more sustainable agriculture.

The cultivated area is 1 ha with a plant density of 31,250 plants/ha, row spacing 80 cm, and plant spacing 40 cm (fig.3.1).

$$\text{Number of plants /ha} = \frac{10.000\ \text{m}^2}{\text{row spacing x plant spacing}}$$

$$= \frac{10.000}{0,8 \times 0,4} = \frac{10.000}{0,32} \approx \boxed{31.250\ plante/ha}$$

Seed/plant required: 2 seeds/plant

31.250 plants x 2 seed = 62.500 seeds/ha

1,000 castor seeds weigh approximately 250g

250 g / 1.000 seeds

$$\frac{62.500}{1.000} \times 250\ g = 15.625\ g = 15,6\ \text{kg seeds/ha}$$

The elements of productivity in castor are as follows (fig. 3.2.):

- density, namely the number of plants/ha;
- the number of capsules per plant;
- the number of grains in the capsule;
- the mass of 1000 grains (MMB).

The density of castor is 60-80 thousand plants/ha.

The number of capsules per plant is determined by the number of inflorescences (racemes) per plant and the number of capsules per inflorescence. The number of inflorescences per plant is determined by the degree of branching of the plant. For the conditions of our country, it is desirable that only main inflorescences form on a plant. The number of capsules that form in the main inflorescence usually varies between 25 and 150. [5]

The number of grains in the capsule is usually three. The number of grains that form in the main inflorescence varies between 40 and 340, usually between 100 and 250, and the percentage of dry grains varies between 10 and 50%, sometimes even over 50%.
MMB varies within very wide limits, from 90 to 1000 g, usually between 200 and 350 g.

Castor bean cultivation technology

- **Rotation**

Castor is a less demanding weed than the preceding plant, obtaining good results after several plant species. The best preceding plants are wheat, winter barley and spring barley**.**

- **Fertilization**

The specific consumption of castor for the production of one ton of seeds plus the related biomass production is 40-65 kg N, 9 kg P2O5, 16 kg K2O, 6 kg MgO and 5 kg CaO.

- **Soil work**

Castor requires a well-prepared and deeply loosened land. Immediately after harvesting the previous plant, it is recommended to carry out the work of weeding or plowing**.** [3]

- **Sowing**

The seed used for sowing must belong to a variety recommended for the cultivation area, be certified, respectively have a physical purity of over 98% and a germination of over 85%. Also, the castor seed used for sowing must be large, whole (without broken skin) and shiny.

- **Care work**

The care work specific to the castor crop is the following: weed control, disease control, pest control and crop irrigation.

- **Harvesting**

Castor oil can be harvested manually or mechanically.

Manual harvesting is carried out in stages, as the racemes mature, a process that takes place in the order of their formation (first the main racemes and then the secondary racemes). [4]

Mechanized harvesting is carried out in a single pass, using castor oil harvesters.

Castor oil has many uses worldwide, which is why castor oil has an important market, with a price that is 2-3 times higher than that of soybean oil. (fig.4.)

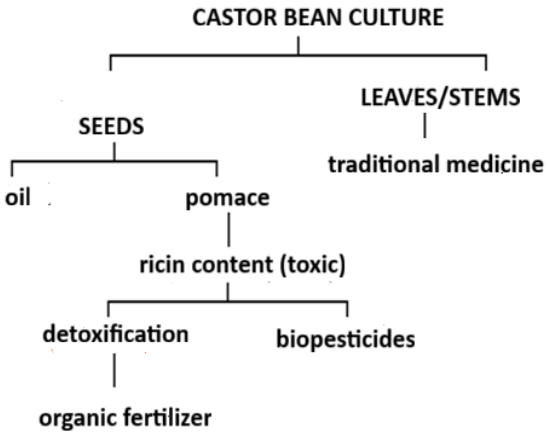

Figure 4. Possibilities for capitalizing on castor oil cultivation

3. RESULTS AND DISCUSSION

Investment costs are presented in tables 2-5, as follows: table 2. Land preparation and sowing, table 3. Agricultural work after planting, table 4. Cost calculation of raw and auxiliary materials, table 5. Evaluation of the cost of utilities and table 6. Evaluation of additional costs.

The calculation of economic profitability is presented in table 7. Fixed costs and table 8. Variable costs.

Table 2 Land preparation and sowing

Agricultural work	Description	Estimated cost (RON/ha)
Ploughing	Ploughing depth 25–30 cm, autumn	450
Discrowding/Harrowing	Crushing and leveling the soil, spring	350
Basic fertilization	Manure + chemical fertilizers (NPK)	1.300
Seeding	Manual or seed drill sowing	500
Additional fertilizers	Fertilization during sowing (NPK)	350
TOTAL (LEI)		2.950

Table 3 Agricultural work after planting

Agricultural work	Description	Estimated cost (RON/ha)
Thinning (manual/mechanical)	Ensuring optimal density	250
Mechanical weeding (2 passes)	Weed control, loosening the soil	400
Additional fertilization	Fertilizer application to vegetation (e.g. N)	150
Phytosanitary treatment	Spraying with insecticide/fungicide (if necessary)	150
Mechanized harvesting	By combine or other specialized equipment	400
Seed transport	Transport to storage or pressing space	300
TOTAL (LEI)		1.650

Table 4. Cost calculation of raw and auxiliary materials

Raw material / Auxiliary	Estimated quantity/ha	Estimated unit price (RON)	Total cost (RON)
Castor seed variety Cristian	20 kg	45 RON/kg	900
NPK fertilizers (15:15:15)	200 kg	4 RON/kg	800
Biostimulants / microelements	1 liter	70 RON/liter	70
Storage bags/sacks	10 buc	2 RON/buc	20
TOTAL (LEI)			1.790 RON

Table 5. Utility cost assessment

Utility type	Consumption details / unit	Estimated unit cost	Estimated total cost (RON)
Water for irrigation	400 m³/ha in drought conditions	4 RON/m³	1600
Electricity (pumps)	250 kWh/ha for irrigation pumping	1 RON/kWh	250
Diesel for machinery	60–80 liters/ha for all work	7.5 RON/liter	500
Oils/lubricants	1 shift/tractors + implements	100 RON/change	100
Other consumables	Filters, grease, fittings, minor parts	—	100
TOTAL (LEI)			2.550

Table 6. Assessment of additional costs

Expense Type	Details / justification	Estimated cost (RON)
Soil Analysis	pH, humus, nitrogen, phosphorus, potassium (1 set/ha)	150
Agronomic Consulting	Culture plan, input/treatment recommendations	200
Taxes and Permits	Possible APIA fee, subsidy file, local taxes	100
Crop Protection	Electric fence, security or surveillance (minimum)	300
Temporary Storage	Rental of space or seed storage bags	150
Estimated Losses	Approximately 2–3% technological and natural losses	200
Contingencies	Minor repairs, consumables, delays	300

TOTAL (LEI)	1.400 RON

Table 7. Fixed expenses

Expense	Estimated cost (RON)
Ploughing	450
Discrowding / Harrowing	350
Sowing	500
Mechanized harvesting	400
Seed transport	300
Certified castor seed – variety "Cristian"	900
Storage bags / sacks	20
Oils / lubricants	100
Soil analysis	150
Agronomic consulting	200
Taxes and permits	100
TOTAL (LEI)	**3.470 RON**

Table 8. Variable expenses

Expense	Estimated cost (RON)
Basic fertilization (manure + NPK)	1.300
Additional NPK fertilizers	350
Thinning	250
Mechanical weeding (2 passes)	400
Fertilization in vegetation	150
Phytosanitary treatments	150
NPK fertilizers (15:15:15)	800
Biostimulators / microelements	70
Diesel for machinery	500
Other consumables (filters, etc.)	100
Crop protection (fence, guard)	300
Temporary storage	150
Estimated losses (2–3%)	200
Unforeseen expenses	300
TOTAL (LEI)	**5.020 RON**

Total costs = Total fixed costs + Total variable costs = 3.470 RON + 5.020 RON = 8.490 RON

Total revenue:

Estimated harvest: 1.200 kg seeds/ha

Sale price castor oil: 80 lei/kg

Total revenue = 1200 kg × 80 RON = 96.000 RON

Profit = Total Revenue − Total Costs = 96.000 RON– 8.490 RON = 87.510 RON

Rata rentabilității =($\frac{Profit}{Total\ costs}$) ×100 = ($\frac{87.510\ RON}{8.490\ RON}$) ×100 ≈ 1,03%

Repayment period = $\frac{Fixed\ costs}{Annual\ profit} = \frac{3.470}{87.510} \approx$ 0,03

4. CONCLUSION

The economic analysis presented highlights an extremely profitable castor bean crop from a financial point of view, given an estimated harvest of 1,200 kg/ha and a market price of 80 RON/kg.

The total costs related to the establishment, maintenance and harvesting of the crop amount to 8,490 RON/ha, of which 3,470 RON represent fixed expenses and 5,020 RON are variable expenses.

The income generated by the market value of the production reaches 96,000 RON/ha, resulting in a net profit of 87,510 RON/ha. Thus, a rate of return of approximately 1.03% is recorded, which indicates a great economic efficiency of this crop.

The project has good economic potential and contributes to agricultural diversification in Gorj County. With a low initial investment and efficient exploitation, castor oil can become a profitable and sustainable crop in the medium term and on small areas.

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