

**RESEARCH ON MORPHOLOGICAL AND BIOLOGICAL
PECULIARITIES OF CAMELINA SATIVA (L.) CRANTZ SPECIES UNDER
THE CONDITIONS OF THE CENTRAL PART OF ROUMANIAN PLAIN**

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Abstract

*The main objective of the research was to study the morphology, biology and productivity of a less common species of agricultural crops - camelina (*Camelina sativa*), with the aim to evaluate the adaptability of the species on natural conditions in the Southern part of Romania and to the organic agriculture conditions.*

The experiment was organized in the Moara Domnească Experimental Field, situated in reddish preluvosoil area from central part of Romanian Plain; it was organized based on the multi-stage block method with randomised variants in 4 replications.

Sowing took place on 10th of April 2008 and the sowing parameters were: 25 cm spacing between rows, with a density of 250 plants/m²; the sowing depth was of 1-2 cm.

Camelina sativa plants emerged 6 days after sowing, the beginning of inflorescences apparition was at 22nd of May, after 37 days from emergence, and the first seeds formed 57 days after emergence, and full maturity was attainig at 80 days after emergence.

Upon harvest, the plants had a height of 51.4 cm and a number of 121 fruits per plants which contained around 793.25 seeds, which means an average of 6.55 seeds/fruit. The average value of the 1000-seed weight was of 1.21 g and the yield was of 1534.9 kg/ha.

INTRODUCTION

Camelina sativa has been grown in Europe for centuries and in the Iron and Bronze ages was an important agricultural crop. From the Roman Empire to the discovery of gas and electricity, this oil was the favorite one used in oil lamps and also a common edible product. *Camelina sativa* belongs to the same family as oilseed rape, the *Cruciferae*, but is a different genus. Named in the past "Gold of Pleasure", *Camelina sativa* is an annual or over wintering herb originating in the Mediterranean to Central Asia. It has branched smooth or hairy stems that become woody at maturity and range from 25 to 100 cm high. Leaves are arrow-shaped, 5 to 8 cm long with smooth edges. Each stem bears many small yellow flowers each with 4 sepals and petals. The seeds, borne in pear shaped, are of 0.7-2.5 mm in diameter, orange to brown in colour, and result from self-pollination, although they can be cross pollinated by visiting insects. The plant is native to Eastern Europe and Southwest Asia where wild weedy forms survive. The plant appears very

adaptable to climate and soil type, and it has been shown to be allelopathic. The crop is now being researched due to its exceptionally high levels (up to 45%) of omega-3 fatty acids, which is uncommon in vegetal sources. Over 50% of the fatty acids in cold pressed camelina oil are polyunsaturated. The major components are alpha-linolenic acid - C18:3 (omega-3-fatty acid, approx. 35-45%) and linoleic acid - C18:2 (omega-6 fatty acid, approx. 15-20%). The oil is also very rich in natural antioxidants, such as tocopherols, making this highly stable oil very resistant to oxidation and rancidity. It has 1-3% erucic acid. The vitamin E content of camelina oil is approximately 110 mg/100 g. It is well suited for use as cooking oil. It has an almond-like flavor and aroma. It may become more commonly known and become important food oil for the future. Camelina is also of interest for its very low requirements for tillage and weed control. This could potentially allow vegetal oil to be produced more cheaply than from traditional oil crops, which would be particularly attractive to biodiesel producers looking for a feedstock cheap enough to allow them to compete with petroleum diesel and gasoline.

MATERIAL AND METHODS

The main objective of the research was to study the morphology, biology and productivity of a less common species of agricultural crops – camelina (*Camelina sativa*), with the aim to evaluate the adaptability of the species on natural conditions in Southern part of Romania and to the organic agriculture conditions.

The experiment was organized in the Moara Domnească Experimental Field, situated in reddish preluvosoil area from Central part of Romanian Plain; it was organized based on the multi-stage block method with randomised variants in 4 replications.

Sowing took place on 10th of April 2008, and the sowing parameters were: 25 cm spacing between rows, with a density of 250 plants/m²; the sowing depth was of 1-2 cm.

The cultural practices performed during the vegetation period concerned the manual weeding works, carried out as often as necessary.

During the vegetation period there were effected observations and measurements concerning: the emergence data; the dynamics of plants height; the dynamics of leaves, floral buds, flowers and seeds formation; the stages of maturity.

RESULTS AND DISCUSSION

Phenological observations. In our research, we sowed on 10th of April and plants reached the harvest maturity after 86 days of vegetation, more specific on 5th of July.

The inflorescence appeared across 22nd of May, corresponding to a number of 36 days after emergence, the formation of seeds began after 29th of May (43 days after

sowing), and seeds maturity stage was attended at 5th of July, after 80 days from emergence.

Dynamics of plants height. Regarding the dynamics of plants height, it could find that plants evolved relatively slowly at the beginning of the growing season (April 18-May 15), so that on 15th of May, by a corresponding number of 35 days from sowing, plants reached 13.2 cm height, resulting an average growth rate of 0.45 cm/day (figure 1).

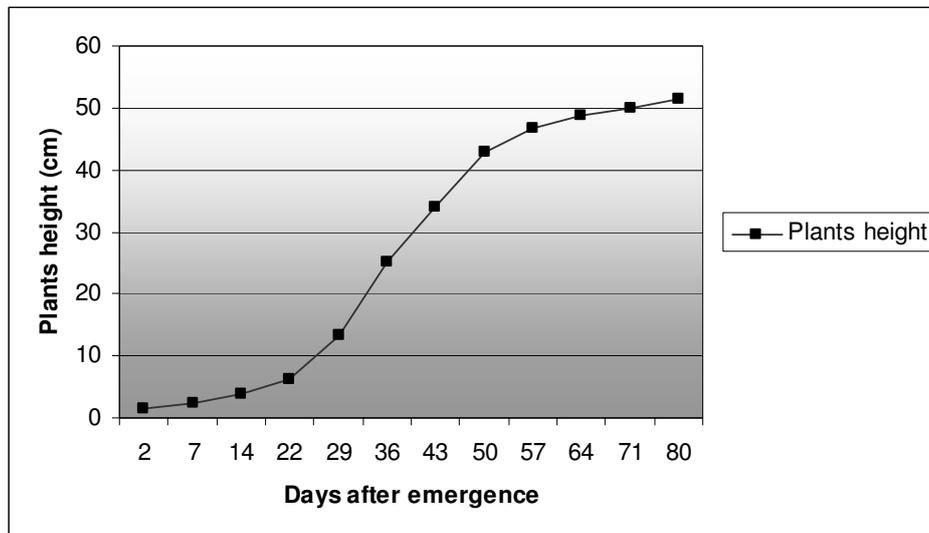


Fig. 1. Dynamics of plants height at *Camelina sativa*

In the second phase of the intense growth, carried out over a period of 29 days, between May 15 and June 12, camelina plants reached 46.8 cm height, therefore an increase of 33.6 cm, with an average of 1.15 cm/day. Finally, in the third stage, at the end of the vegetation, the increase was slower, so that over a period of 23 days, it was attended a height of 51.4 cm, with an increase of 4.6 cm over the entire period, and an average rate of 0.2 cm/day.

Dynamics of leaves growing. In the research conditions, the *Camelina sativa* plants formed on the main stem around 37 leaves. Leaves formation was conducted over a period of 72 days of vegetation, resulting an average rate of 2.11 days/leaf. The rate of leaves formation was slower in the first 14 days of growing season (April 18-April 30); at this stage were formed 8 leaves, with an average rate of 1.75 days/leaf. In the next phase of the intense height growth of the stem (April 30-May 29), leaves formation was more alert, so that over a period of 29 days were formed 26 leaves, with an average rate of 1.11 days/leaf (table 1).

Table 1

Dynamics of leaves growing at *Camelina sativa* species

Date	Number of leaves		Days	
	After emergence	From the apparition of the previous leaf	After emergence	From the apparition of the previous leaf
18.04.2008	2	0	2	0
23.04.2008	5	2	7	7
30.04.2008	8	3	14	7
08.05.2008	14	6	22	7
15.05.2008	22	8	29	7
22.05.2008	28	6	36	7
29.05.2008	34	6	43	7
05.06.2008	37	3	50	7
12.06.2008	32	0	57	0
19.06.2008	23	0	64	0
26.06.2008	13	0	71	0
05.07.2008	8	0	80	0

Dynamics of inflorescence, flowering and fruits formation. The inflorescence appeared at 36 days after emergence, the maximum flowering stage (50% flowered plants) being marked at 43 days after emergence; seeds formation began after the 12th of July and the maturity (considered at 8% humidity content) was attended at 37 days after flowering (table 2).

Table 2

Dynamics of inflorescence, flowers and fruits growing at *Camelina sativa* species

Date	Dimension of the main inflorescence (cm)	Phenophase	Days after emergence
22.05.2008	2.5	Apparition of inflorescence	36
27.05.2008	3.7	Beginning of flower opening	41
08.06.2008	5.1	Fruit apparition	53
12.06.2008	7.2	Beginning of seeds formation	57
19.06.2008	8.8		64
26.06.2008	9.1		71
05.07.2008	9.2	Full maturity	80

Upon harvest, plants had 51.4 cm height and a number of 121 fruits per plants which contained around 793.25 seeds, which means an average of 6.55 seeds/fruit. 1000 seeds weight had an average value of 1.21 g, and seed moisture was of 8.04% at harvesting (table 3). The seeds yield was evaluated of 1534.9 kg/ha.

Table 3

The moisture and 1000 seeds weight (TGW) at *Camelina sativa* seeds

Variant	TGW (g)	Moisture (%)	Dry matter (%)
V ₁	1.21	8.13	91.87
V ₂	1.19	7.92	92.08
V ₃	1.23	8.05	91.95
<i>Average</i>	<i>1.21</i>	<i>8.04</i>	<i>91.96</i>

CONCLUSIONS

1. In the reddish preluvosoil area from Romanian Plain, camelina plants had a vegetation period of 86 days from sowing, and at maturity stage camelina plants were 51.4 cm tall, having an average growth rate of 0.59 cm/day and a number of 37 leaves.
2. The inflorescence appeared at 36 days after emergence, the maximum flowering stage (50% flowered plants) being marked at 43 days after emergence and the maturity (considered at 8% humidity content) was attended at 37 days after flowering.
3. Upon harvest, the plants had 51.4 cm height and a number of 121 fruits per plants which contained around 793.25 seeds, which means an average of 6.55 seeds/fruit. The average value of the 1000 seed weight was 1.21 g and the yield was of 1534.9 kg/hectare.

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