MODERN CULTIVATION TECHNOLOGIES FOR RAPESEED ON A STAGNI – VERTIC LUVISOLS

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Abstract. *Today, among oilseeds, rapeseed is on the 5th place in the ranking of edible oil production, rapeseed oil having wide uses in industry and food, but also in medicine. Rapeseed is an excellent crop plant. Rapeseed oil is the edible oil whose fatty acid profile is ideal in relation to our daily needs. It is extremely interesting especially because of the amount of alpha-linolenic acid, also called essential fatty acid, because it is indispensable for health, given that our body cannot synthesize it alone. This is a precursor to Omega-3. Rapeseed oil is a source of vitamin E, which gives it antioxidant and regenerating qualities, as it fights free radicals, neutralizing them. The research carried out in 2019-2020 led to obtaining important results both theoretically and practically related to this culture. The type of soil on which the experiment was placed is the vertical-stagnant preluvosol, medium loam / clay loam, on medium-fine swelling clays. The soil reaction is moderately acidic and weakly alkaline with pH values increasing from 5.45 in the A horizon to 8.19 in the C horizon. To make a contribution to the topic under study, the development of an intensive technology the following aspects were studied:*

- contributions on the structure of hybrids, leading to high yields,
- Oil content of rapeseed hybrids
- Oil production in cultivated hybrids

Keywords: *technology, oil content, rapeseed*

INTRODUCTION

Oilseeds (oleifers) are species in the seeds of which are found large amounts of liquid fats, commonly called oils, which are easily extracted industrially. The accumulation in the form of reserve substances of important amounts of fats can occur in various organs of the plant, in addition to seeds and fruits, so we can list the rhizomes, spores, mycelial filaments, etc. [2,3,9,13].

Vegetable oils are used in the human body in a proportion of 94.5% being surpassed from this point of view only by cow's butter [6,14,15,16,12].

Vegetable fats are used in many branches of industry, but their main use is, directly or indirectly, in human nutrition [12,21,22].

The most valuable edible oils are those in which oleic acid predominates, especially linoleic acid. These oils have a high stability and do not lead to accumulations of cholesterol in the blood of consumers [5].

Raps oil importance. Quality raps oil can improve the taste of many foods, and in the kitchen it is very popular because of its high breakdown temperature (ca 220-240 ° C), which is the usual temperature where usual oils start burning. [18]

Taking into account its beneficial health effect, raps oil is recommended for daily consumption by various health organizations [19,20].

Claims that research regarding raps and its industrial use is focused on four main directions [7]

The importance of this crop has increased considerably in recent times, due to the fact that it provides the raw material for the production of an oil, which is an unconventional

alternative to fossil energy sources, as well as in the production of high quality oils used in human nutrition [1] .

MATERIALS AND METHODS

The research that is the object of the paper aims to test some rapeseed hybrids in order to introduce them in the culture and to optimize some technological links in order to obtain economic and high quality harvests.

In this sense, for the introduction of new varieties and hybrids, comparative crops were organized in the territory of Giera.

The varieties studied are: UNBERTO; EXPANSION; EXCEPTION; PT275 and PT264

The researches carried out in the agricultural year 2019-2020 regarding the specification of the particularities of some technology links, important for rapeseed, specific for the Giera area, aim at the following:

- establishing the variety structure in the Giera area;
- research on cultivation technology.

Research has been done on single-factor experiments.

The previous crop was wheat and we did not need other operations for chopping or plowing the land.

Fertilization was done with complex fertilizers such as NPK: 8: 24: 24 which were spread evenly and in a quantity of 250 kg / ha, to be subsequently incorporated with a surface combine that also helps to level and loosen the soil [10] .

Sowing was carried out with a KHUN EXPROO 600 seed drill at a density of 60,000 germinating grains / ha, at a distance of 15 cm between rows and a distance of about 11 cm between plants / row, at a depth of 1.5-2 cm.

After sowing we applied a pre-emergent herbicide SUTAN + KALIF which are two systemic herbicides, with a broad spectrum of control of dicotyledonous and monocotyledonous weeds.

After the emergence of rapeseed we had the first problems with pests, these were the fleas Psylliodes chrysocephala.

Rapeseed in winter entered the stage of 8-10 leaves, the diameter of the package was between 6-8 mm and the depth of root in the soil was between 5-9 cm.

In March we applied a nitrogen + sulfur fertilizer (Dasamag) at an amount of 300kg / ha containing 24% nitrogen and 10% sulfur. (N -72 kg / ha, So3-30kg / ha).

Rapeseed was harvested mechanically at a maximum moisture content of 10%.

The territory of Banloc commune falls in the Timiş Plain, a plain limited by the Mureş Plain, north of the high field of the Deliblat, south of Yugoslavia, east of the Banat pre-mountain hills and west of the Tisa meadow.

The type of soil on which the experiment was placed is the vertical-stagnant preluvosol, medium clayey / clayey clay, on medium-fine swelling clays [4, 5, 8,11].

Following the calculation of the participation percentages of the granulometric fractions and based on these values, consulting the triangular texture diagram, the texture of this type of soil was determined, which is clayey to a depth of 53 cm, then becomes clayey up to 89 cm and then becomes clayey.

The soil reaction is moderately acidic and weakly alkaline with pH values increasing from 5.45 in the A horizon to 8.19 in the C horizon.

RESULTS AND DISCUSSIONS

The synthesis data from the experimental cycle are presented in Table 1. and Figure 1.

The results show that under the conditions of experimentation, within the limits of the factors studied with average yields between 2700 kg / ha and 3470 kg / ha there were two hybrids: EXCEPTION with an average yield of 3470 kg / ha, 15% higher compared to the control hybrid and with a harvest difference of 470 kg / ha ensured statistically as very significant.

The EXPANSION hybrid achieved a production of 3250 kg / ha, with a harvest difference of 250 kg / ha, 8% higher than the control hybrid, statistically assured as very significant. The other two hybrids of the company Corteva registered with close productions (2950 kg / ha-PT264 and 2700 kg / ha-PT275) of the production of the control hybrid UMBERTO.

It should be noted that compared to the control hybrid UMBERTO (3000 kg / ha), the five hybrids tested in the two experimental years, registered with small differences in yield.

The results obtained in the Giera territory in the comparative culture with five autumn rapeseed hybrids for oil from three companies lead to the conclusion that all can be grown in the reference area, but it is also necessary to test other varieties or hybrids, with higher production potential. high, which would better capitalize on the pedoclimatic potential of the area.

Table 1.

Synthesis of rapid harvesting results 2019-2020

Alternative	Yield kg/ha	%	Difference kg/ha	Significance
UNBERTO	3000	100	Mt	
EXPANSION	3250	108	250	xxx
EXCEPTION	3470	116	470	xxx
PT275	2700	90	-300	000
PT264	2950	98	-150	000

DL 5%= 56 kg/ha DL 1%= 81 kg/ha DL 0,1%= 121 kg/ha

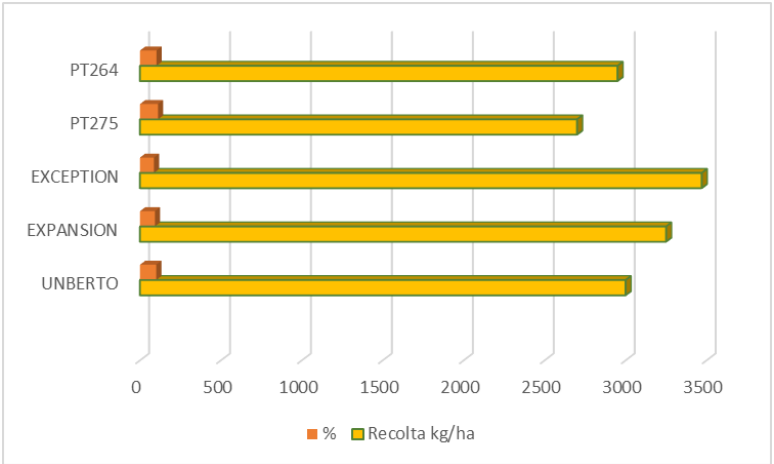


Fig. 1. Synthesis of rapid harvesting results 2019-2020

The synthesis data regarding the value of the hectoliter mass from the experimental cycle are presented in figure 2.

It results that values over 63 kg / hl were registered for the hybrids UNBERTO -63.2 kg / hl, PT264-63.2 kg / hl and EXPANSION 63.85 kg / hl.

Of note is the high value of the hectolitre mass for the EXCEPTION hybrid of 64.5 kg / ha. The lowest value of the hectoliter mass was achieved for the PT275 hybrid of 62.5 kg / ha.

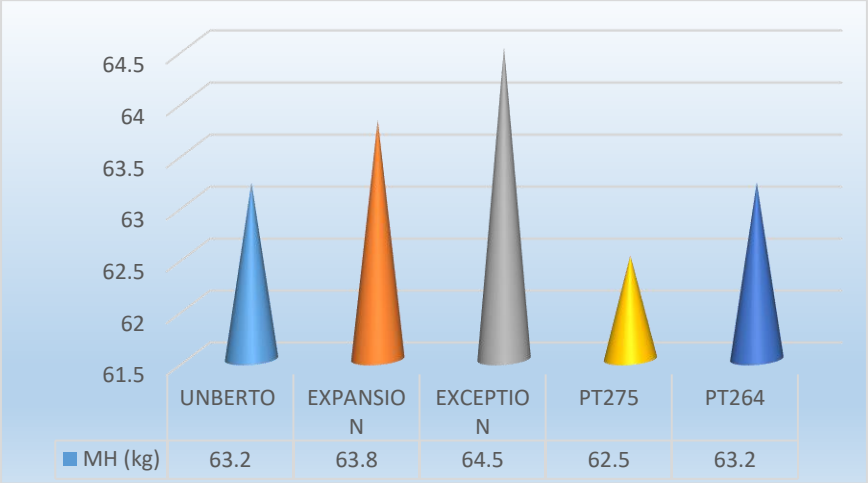


Fig. 2. Synthesis of the hectolitre mass registered in 2019-2020

The results of the determinations regarding the oil content from the experimental year 2019-2020 are presented in figure 3.

Keeps an eye on the high field average for the five rapeseed hybrids studied over 44%, which highlights the obvious progress made by breeders.

The highest content was determined for the hybrid PT 275 of 45.6% and PT 246 of 45.1%. The lowest content was determined for the 38.5% Exception hybrid.

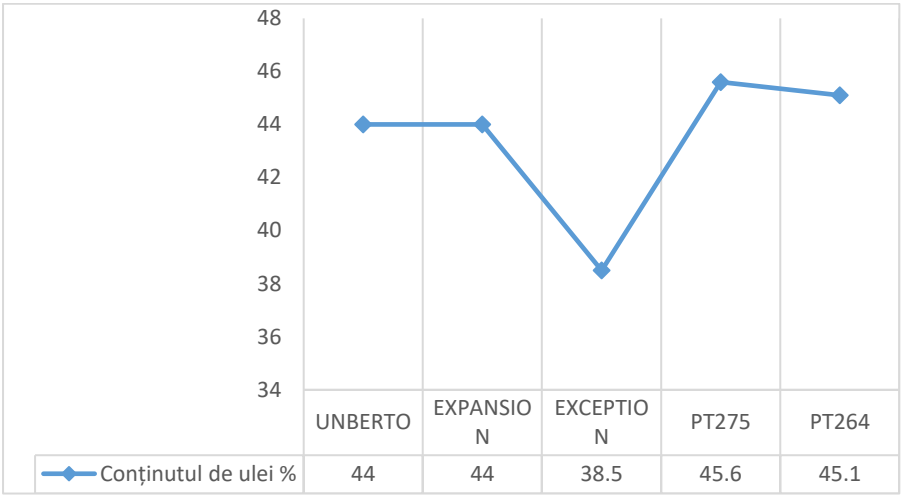


Fig. 3. Synthesis of oil content obtained from rapeseed in the period 2019-2020

CALCULATION OF THE MAIN INDICATORS OF ECONOMIC EFFICIENCY

In order to highlight the profitability of oilseed rape cultivation, we considered it necessary to calculate the main indicators of economic efficiency.

The analyzed indicators are the following: main production (kg / ha); the value of the main production (lei / ha); production costs (lei / ha); production cost (lei / kg); total profit (lei / ha); profit rate (%).

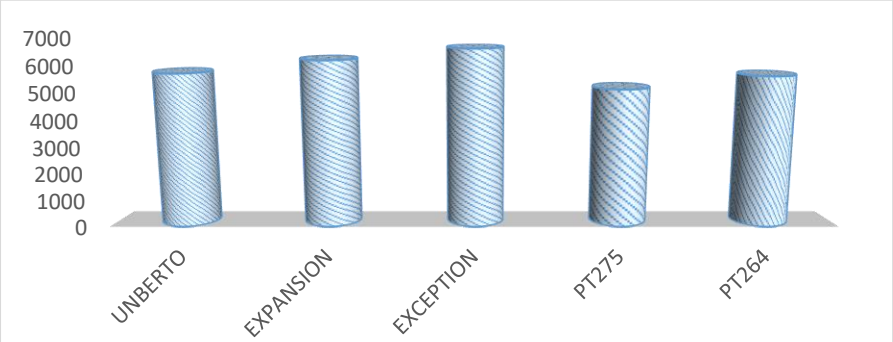
For the indicator "production costs" the cost estimate for each experimental variant was prepared. The average price from 2019-2020 corresponding to the agricultural year was used.

The average capitalization price of one kg of rapeseed was 1.9 lei / kg. The highest yield was obtained for the EXCEPTION hybrid, which was 3470 kg / ha, and the lowest yield was obtained for the PT275 hybrid, where only 2700 kg / ha were obtained.

The value of the main production is directly proportional to the capitalization price, falling between 6593 lei / ha and 5130 lei / ha, respectively.

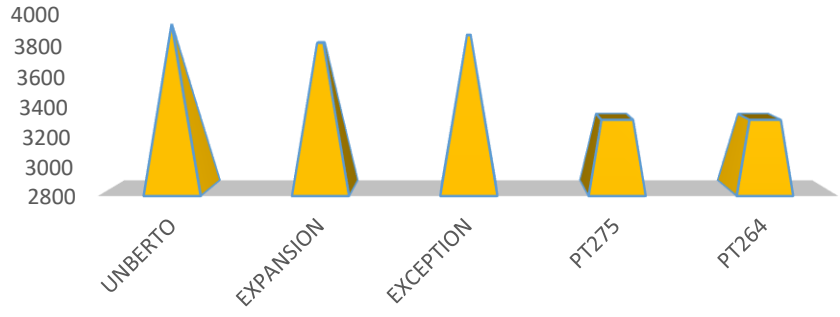
The production costs were depending on the hybrid, being between 3300 lei / ha for the hybrid PT 275 and PT 264 and 3923 lei / ha for the hybrid UNBERTO.

The total profit ranged between 1777 lei / ha in the case of the UNBERTO hybrid and 2743 lei / ha in the case of the EXCEPTION hybrid. The highest profit rate was recorded at the EXCEPTION hybrid of 71%.



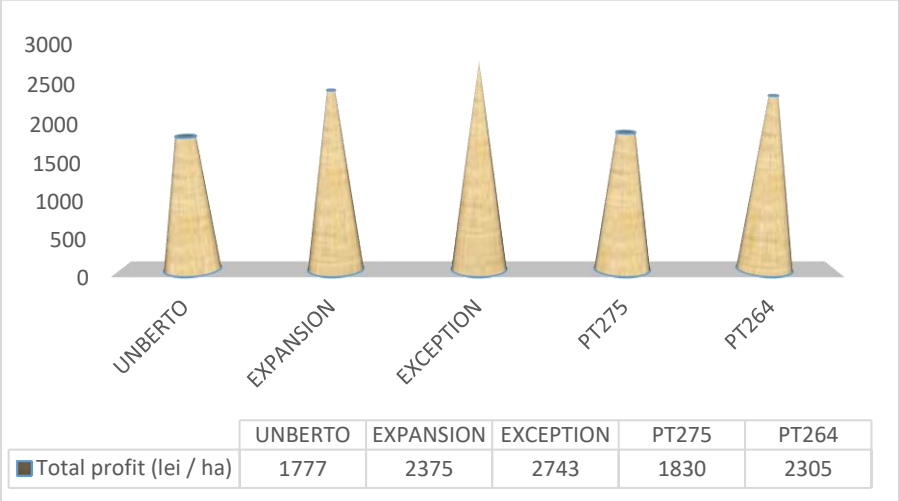
	UNBERTO	EXPANSION	EXCEPTION	PT275	PT264
The value of the main production (lei / ha)	5700	6175	6593	5130	5605

Fig. 4. The value of the main production (lei / ha)



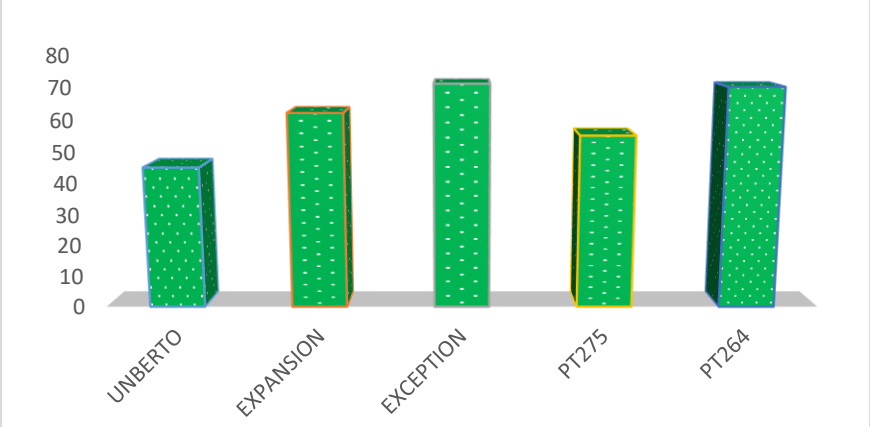
	UNBERTO	EXPANSION	EXCEPTION	PT275	PT264
Production costs (lei / ha)	3923	3800	3850	3300	3300

Fig. 5. Production costs (lei / ha)



	UNBERTO	EXPANSION	EXCEPTION	PT275	PT264
Total profit (lei / ha)	1777	2375	2743	1830	2305

Fig. 6. Total profit (lei/ha)



	UNBERTO	EXPANSION	EXCEPTION	PT275	PT264
Profit rate (lei / ha)	45	62	71	55	70

Fig. 7. Profit rate (lei/ha)

CONCLUSIONS

Autumn oilseed rape is one of the most important and efficient crops that should be found in all units, especially since it is also an excellent crop plant;

It is necessary to grow mainly rapeseed hybrids with a greater degree of adaptability to climatic conditions and certainly greater in ensuring high and stable yields;

The climatic conditions of the agricultural year 2019-2020 were favorable for rapeseed cultivation.

At the same time, it can be said that they provided the requirements for rapeseed cultivation in all phases of vegetation.

The soil on which the experiments were located provides nutritional support for good plant growth and development.

In the agricultural year 2019-2020, the EXPANSION hybrid was noted for its seed production, oil content and oil production.

Fertilization levels were well established, balanced, and their administration was performed at the optimal time, both in autumn and spring. Seed yields, with values between 3000 and 3400 kg / ha, are convincing arguments in this regard.

The production results obtained for the five rapeseed hybrids in the 2019-2020 production cycle show us that the best behavior is the EXCEPTION hybrid, whose average production over two years is 3470 kg / ha, 16% higher than that of the hybrid. UNBERTO, compared to a production increase of 470 kg / ha statistically significant.

Of note is the high value of the hectolitre mass for the EXCEPTION hybrid of 64.5 kg / ha. The lowest value of the hectoliter mass was achieved for the PT275 hybrid of 62.5 kg / ha.

The oil content as well as the oil production is in direct correlation with the seed production.

The highest oil content was determined in the hybrid PT 275 of 45.6% and PT 246 of 45.1%.

From the analysis of the obtained results, it is found that there is a strong interaction between: hybrids, the level of fertilization and the culture technology.

The value of the main production is directly proportional to the capitalization price, falling between 6593 lei / ha and 5130 lei / ha, respectively.

The production costs were depending on the hybrid, being between 3300 lei / ha for the hybrid PT 275 and PT 264 and 3923 lei / ha for the hybrid UNBERTO.

The total profit ranged between 1777 lei / ha in the case of the UNBERTO hybrid and 2743 lei / ha in the case of the EXCEPTION hybrid. The highest profit rate was recorded at the EXCEPTION hybrid of 71%.

Research shows that the success of fast food culture depends largely on the amount of water in the fall (for sunrise) and frost.

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