

RESEARCH REGARDING THE INFLUENCE OF ROW SOWING DISTANCE ON YIELD AND YIELD QUALITY IN *PERILLA OCYMOIDES* L.

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Abstract. *The study was carried out using as a biological material five types of perilla from Romania, Italy, Turkey and Serbia. The experiments were carried out on a vertic preluvosoil deeply stagno-gleyed in the hill area of Western Romania. The paper refers to fruit yield, oil content and oil yield depending on row sowing distance. Fruit yield depending on row sowing distance increased, on the average, in the five biotypes, with 23% (from 25 to 50 cm) and with 24% (from 25 to 75 cm). Oil content depending on biotype and row sowing distance ranged between 46.9% and 48.8%, and oil yield ranged between 402 kg/ha and 698 kg/ha.*

Key words: *Perilla ocymoides, distance, phenotype*

INTRODUCTION

The species studied, *Perilla ocymoides* L., is not currently cultivated in Romania and it is little studied, but in Asia it is cultivated on large areas.

The species is cultivated for the fat oil of its fruits (N. ZAMFIRESCU ET AL., 1965; C. COJOCARU, 1961), for its leaf volatile oil (L. BUMBLAUSKIENE et al., 2009), and for its uses as food and in Asian traditional medicine. The seeds contain 45-50% very siccative oil, with an iodine index of 181-206 (N. ZAMFIRESCU et al., 1965).

Due to its siccativity, the oil is preferred in the manufacture of higher lacquers, in the impregnation of fabrics, of paper and of typo inks.

MATERIAL AND METHODS

To optimise row sowing distance, we conducted bifactorial experiments with three replicates in which the factor A was represented by row sowing distance (a1 – 25 cm; a2 – 50 cm; a3 – 75 cm), and factor B was the phenotype (b1 – Romania; b2 – Italy 1; b3 – Italy 2; b4 – Serbia; b5 – Turkey).

The pre-emergent crop was winter wheat, dominant in the area.

Fertilisation was even, with rates of N50P50K50.

Sowing was done in the last decade of April, with a plant density of 130,000 plants/ha in all three variants.

To reach this density, we increased the amount of seeds with 10%. Sowing depth was 2 cm. During vegetation, we weeded the crop with three mechanical weedings.

Harvesting was done upon maturity of fruits, on the variant plots, and we sampled for analysis.

RESULTS AND DISCUSSION

A synthesis of the yield results in the years 2013-2014 is shown in Table 1 below.

Results point out that row distance is a technological element that differentiates fruit yield of the studied species at significance level.

On the average for the three experimental years, depending on biotype and row distance, the yield ranged between 859 kg/ha in the USAMVB Timișoara cultivar sowed at a row distance of 25 cm and 1,436 kg/ha in the Italia 2 cultivar sowed at a 75 cm row distance.

On the average for the five biotypes, the yield reached 954 kg/ha in the variant sowed at a row distance of 25 cm. Increasing row distance from 25 to 50 cm increased the yield with 23%, i.e. to 1,176 kg/ha.

The difference in yield of 222 kg/ha is significant. Increasing row distance to 75 cm resulted in a mean yield of 1,186 kg/ha, 24% more than in the variant sowed at a row distance of 25 cm.

To note that increasing row distance from 50 to 75 cm did not increase yield considerably (only 10 kg/ha), a difference within experimental errors.

Table 1.

Synthesis of yield results depending on the distance between rows in five genotypes of *Perilla ocymoides* L.

Factor A	Factor B – Cultivar					Averages of the Factor A			
	Romania	Italy 1	Italy 2	Serbia	Turkey	Yield (kg/ha)	%	Difference (kg/ha)	Significance
25 cm	859	861	1167	886	998	954	100		
50 cm	1103	1199	1432	1018	1121	1176	123	222	X
75 cm	1082	1200	1436	1050	1163	1186	124	232	X

DL 5% = 177 kg/ha DL 1% = 252 kg/ha DL 0.1% = 365 kg/ha

Averages of the Factor B

Specification	Romania	Italy 1	Italy 2	Serbia	Turkey
Yield kg/ha	1012	1086	1345	984	1094
%	100	107	132	97	108
Difference kg/ha		74	333	-28	81
Signification			XXX		

DL 5% = 169 kg/ha DL 1% = 230 kg/ha DL 0.1% = 309 kg/ha

As for the behaviour of the five cultivars sowed under experimental conditions, we can see that, on the average for the three row distances, the highest yield of 1,345 kg/ha was in the cultivar Italy 2, i.e. 32% more than in the control variant (USAMVB Timișoara), a very significant difference of 333 kg/ha.

Yields in the cultivar Italy 1 (1,086 kg/ha) and Turkey (1,094 kg/ha) were higher than that of the control variant, the cultivar from the USAMVB Timișoara (1,012 kg/ha): 8% (Turkey) and 7% (Italy 1), with small, insignificant differences in yield.

The mean yield in the cultivar from Serbia (984 kg/ha) was 3% below the yield of the control variant: the negative difference of 28 kg/ha is within the limits of experimental error, i.e. insignificant.

Results of the two research years pointed out that, in the studied area, the best results were in the cultivar Italy 2.

Mean results in the other four cultivars are almost equal.

Among sowing distances, the best results were in the variants sowed at 50 and 75 cm, variants in which the yields were close; therefore, cultivators can choose any of these cultivars depending on the tillage equipment they can rely on.

The evolution of the oil content and of mean oil yield in 2013 and 2014 is shown in Figure 1 and Table 2 below.

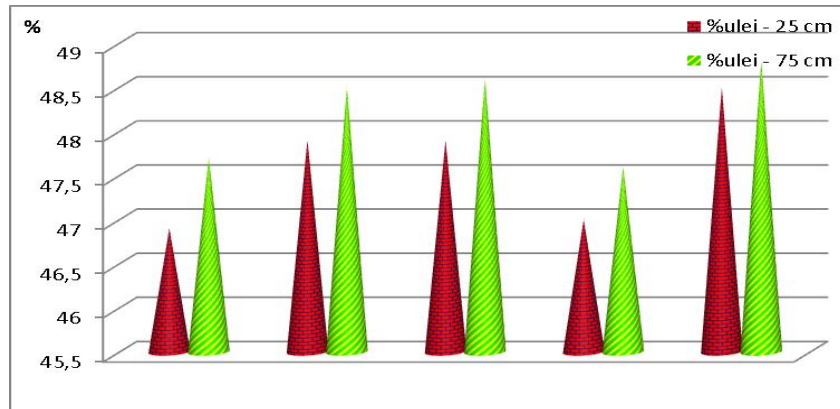


Figure 1. Mean oil content in the cultivars of *Perilla ocymoides L.* depending on row distance (cm) in 2013 and 2014

Table 2.

Mean oil content in the cultivars of *Perilla ocymoides L.* depending on row distance (cm) in 2013 and 2014

Specification		USAMVB Timișoara	Italy 1	Italy 2	Serbia	Turkey
% oil	25 cm	46.9	47.9	47.9	47.0	48,5
	75 cm	47.7	48.5	48.6	47.6	48,8
"X"		47.30	48.30	48.25	47.30	48.65

Synthesis results in the two experimental years show a variation of the oil content between 46.9% (Romania) and 48.5% (Turkey) in the variant sowed at a row distance of 25 cm and between 47.7% (Romania) and 48.8% (Turkey) in the variant sowed at a row distance of 75 cm.

On the average for the two row distances and experimental years, the highest oil content (48.80%) was in the cultivar from Turkey, followed, with very close values in the cultivars Italy 1 (48.7%) and Italy 2 (48.6%). In the cultivars from Romania and Serbia, oil content was close, i.e. 47.7% and 47.6%, respectively.

Synthesis data regarding oil yield depending on row distance are shown in Figure 2 and Table 3 below.

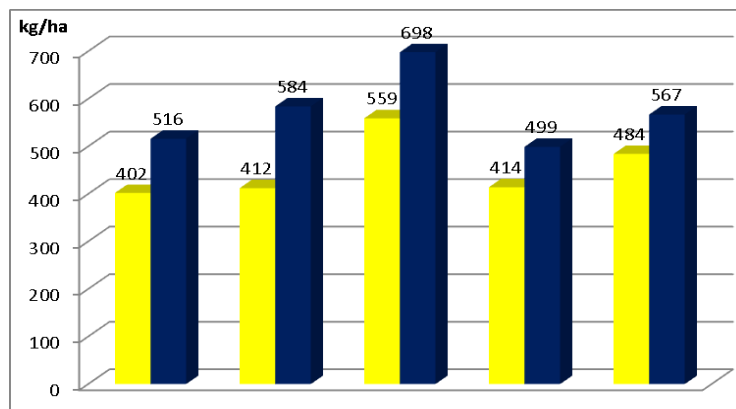


Figure 2. Oil yield (kg/ha) in 2013 and 2014 depending on row distance in five *Perilla ocymoides L.* Cultivars

Specification		Cultivar					Mean of sowing time		
		Romania	Italy 1	Italy 2	Serbia	Turkey	-X-	%	Difference (kg/ha)
Variant	25 cm	402	412	559	414	484	454	100	
	75 cm	516	584	698	499	567	573	119	119
-X-		570	498	628	456	525	535		
%		100	87	110	80	92			
Dif. kg/ha			-72	58	-114	-45			

Row distance had a favourable influence on oil yield. Thus, increasing sowing distance from 25 to 75 cm increased oil yield with 19%, i.e. an increase of 119 kg/ha.

Among studied cultivars, on the average for the two sowing distances, the highest yield was in the cultivar Italy 2 (628 kg/ha), 10% more than in the control variant (Romania) with an oil yield of 570 kg/ha.

This increase in yield was due to the higher fruit yield in the cultivar Italy 2.

CONCLUSIONS

Research carried out in 2013 and 2014 in Topolovățul Mare, Timiș County, Romania, lead to the following conclusions:

- Row distance influenced significantly fruit yield that increased, on the average for the five biotypes, and after increasing sowing distance from 25 to 50 cm, with 23% (222 kg/ha), and from 25 cm to 75 cm, with 24%.
- Between the sowing variants at a row distance of 50 and 75 cm, the differences in yield are small, within experimental error limits, of only 10 kg/ha.
- Oil content was influenced favourably by increasing row distance from 25 to 75 cm. The highest oil content in the variant sowed at 25 cm and 75 cm was in the Turkey cultivar (48.5% and 48.8%, respectively).
- Mean oil yield in the two years was 573 kg/ha, when sowing at a row distance of 75 cm, compared to 454 kg/ha in the experimental variants, when sowing was done at a row distance of 25 cm.

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