THE EFFECT OF NITROGEN AND PHOSPHORUS ON OIL CONTENT OF WINTER RAPE

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Abstract : *The quality and production of winter rape are strongly influenced by fertilizer dosages.. The varieties and hybrids cultivated in our country have an oil content between 37% - 60%. In this paper it is shown the effect of nitrogen and phosphorous fertilizers on the rapeseed oil content, hybrid Impression. The variant fertilized with 90 kg / ha nitrogen and 120 kg / ha phosphorus show the highest oil content - 56.91% to 24.78% more than the unfertilized control (32.13%).*

Keywords*: fertilization, Nitrogen (N), Phosphorus (P), rapessed oil.*

INTRODUCTION

The rape is currently the world one of the most important species grown for oil. The culture is in actuality as a result of the advantages that this crop plant offers both grower and consumer products resulting from its processing (BATAGA, 2002; BURNETE, 2005; BURNETE 2008).

The rapeseeds oil contains a low levels of saturated fatty acids, a high level of monounsaturated fatty acids and an average level of polyunsaturated fatty acids , with a good balance between Omega 3 and Omega 6 . Because of this, this oil is considered to have the best combination of fatty acids in its composition and therefore is recommended for human consumption (ENASCUTA, 2006; BUZDUGAN, 2013).

Mineral fertilization is considered by most experts to be the main technological key in the culture of rape (Saicu, 2013). Studies have also shown that it is in first place among the factors on which the production and quality depend, and implicitly,it affects the economic efficiency of the rape crop (LÄNISTE, 2004, SAICU, 2013).

The researchs conducted over time, in terms of fertilization rape, highlight the importance of fertilizers applied both on the production, and the oil content of the winter rape.

MATERIAL AND METHODS

The experiment was located on the land of ARDS Lovrin on a semicarbonatic, weakly-glezated chernozem, between 2014 and 2016. The previous plant was winter wheat.

The research was conducted in a stationary experienced, established in 1967, with the following graduations of the experimental factors:

- the factor A- phosphorus fertilizers $P_{0,40,80,120,160.}$
- the factor B- nitrogen fertilizers $N_{0,30,60,90,120.}$

In the field, the technical dimensions of the experience were the following: plots area of 36 m2 (9 x 4), harvested area of 24 m 2 (8 x 3), four replications.

Phosphorus (superphosphate 46%) was administered during the base plowing. The nitrogen (ammonium nitrate 33.5%) was applied fractionated: one-third of the dose during sowing and the other two thirds in the spring, after the resumption of the vegetation period.

The data was statistically analyzed using the variance analysis procedure for two factors, using a split plot design, with four replications.

RESULTS AND DISCUSSIONS

The temperatures recorded in Lovrin in the years 2014-2016 are shown in Figure 1.

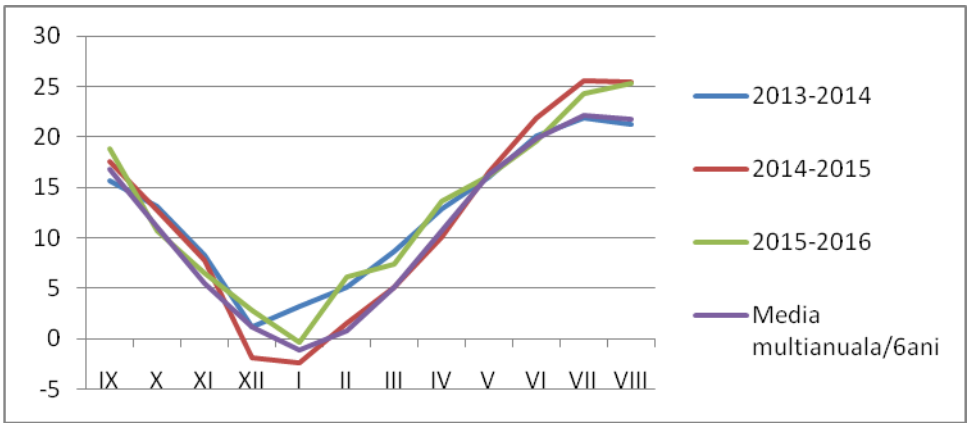

Fig . 1 The average temperature recorded at Lovrin, in the period 2014-2016

In the spring and summer, the temperatures recorded significant deviations from the multiannual average in 2015 and 2016, and is situated in the multiannual average in 2014.

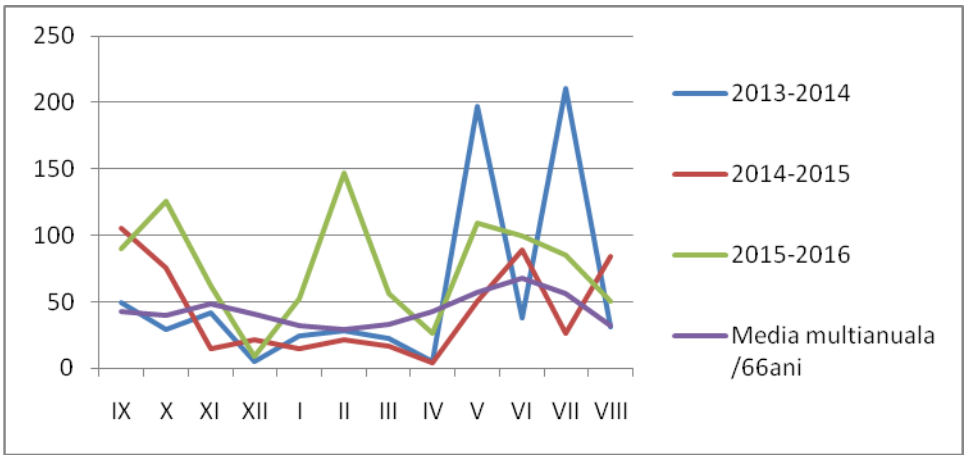

Fig.2 The rainfall recorded in Lovrin (2014-2016)

In terms of rainfall (Figure 2), the largest deviations were recorded in 2016, a year with rainfall surplus, exceeded with 400 mm the multi-annual average (66 years).

The table below shows the percentage of oil in each experimental variant and the obtained production per hectare.

Table 1

The percentage and production of oil

Nr crt	Variant NP	Ulei %	Productia ulei		Diferentata	semnif
			(kg/ha)	%		
1	**N0P0**	26.75	685.335	**100**	**mt**	
2	N50P0	35.59	1077.576	157.2	0.392	***
3	N100P0	36.21	1227.519	179.1	0.542	***
4	N150Po	36.98	1207.674	176.2	0.522	***
5	N200P0	32.13	1088.484	158.8	0.403	***
6	NoP40	30.6	951.813	138.9	0.266	***
7	N50P40	32.42	1114.032	162.6	0.429	***
8	N100P40	35.89	1069.343	156.0	0.384	***
9	N150P40	38.49	1325.596	193.4	0.640	***
10	N200P40	30.38	1032.54	150.7	0.347	***
11	NoP80	33.58	906.744	132.3	0.221	**
12	N50P80	36.86	1240.339	181.0	0.555	***
13	N100 P80	39.04	1326.97	193.6	0.642	***
14	N150P80	42.4	1509.016	220.2	0.824	***
15	N200P80	36.05	1341.511	195.7	0.656	***
16	N0P120	28.53	833.647	121.6	0.148	*
17	N50P120	33.25	962.338	140.4	0.277	***
18	N100P120	48.88	1663.997	242.8	0.979	**
19	N150P120	56.91	2070.101	302.1	1.385	***
20	N200P120	40.56	1538.137	224.4	0.853	**

21	N0P160	32.12	977.09	142.6	0.292	***
22	N50P160	34.3	1034.488	150.9	0.349	***
23	N100P160	39.03	1344.096	196.1	0.659	***
24	N150P160	40.55	1571.163	233.0	0.912	***
25	N200P160	31.96	1211.124	176.7	0.526	***

DL 5% = 124 kg/ha ; DL 1% = 168 kg/ha ; DL = 0.1% = 224 kg/ha

All combinations give very significant increases compared to control, exception N_0P_{120} - that gives a significant increase.

By unilateral application of nitrogen, the proportion of oil increased by 10.23% in the variant fertilized with 150 kg active substance / ha, compared to the control unfertilized. From the analysis of the above table, we can notice that the version fertilized with 200 kg nitrogen / ha, percentage of oil and oil production per hectare are significantly reduced.

With the application of the phosphor occurs and increasing the production of oil, from 685 kg / ha, in unfertilized control, to 977 kg / ha, in the variant fertilized with 160 kg phosphorus active substance / ha.

By combined application of the two types of fertilizer, so the proportion of oil and its production are the highest values in the variant N150 P120 (56.9%, 2070 kg / ha).

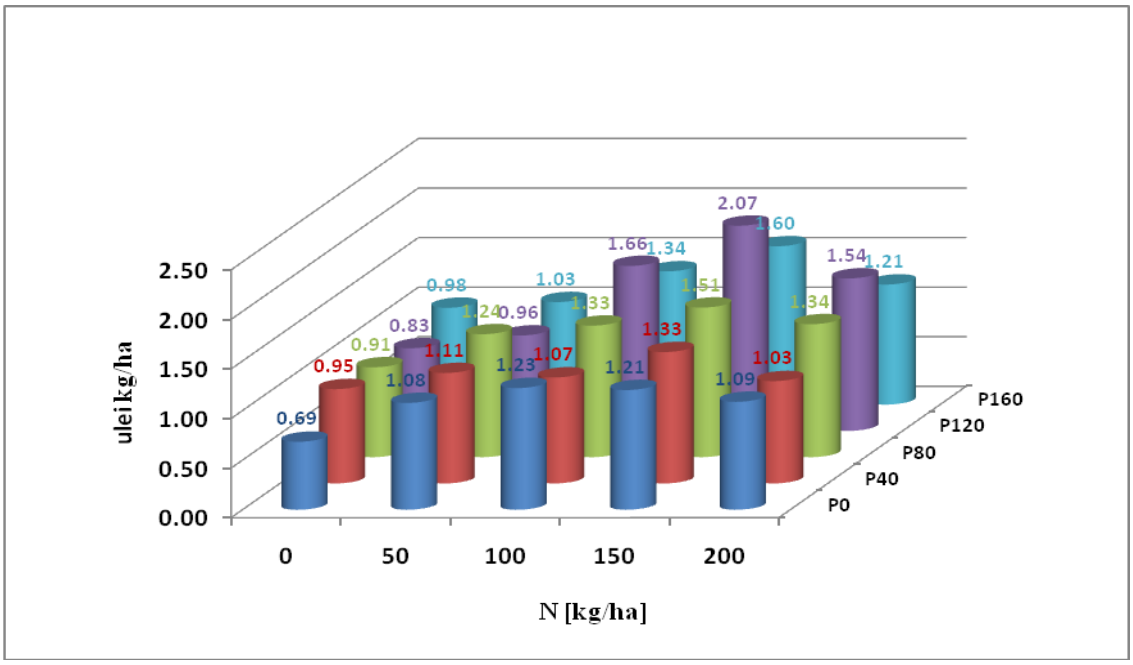

Fig. 3. The production of oil per hectare in various combinations nitrogen - phosphorus

When applying the dose of nitrogen of 200 kg / ha, both in the variant in which is applied the nitrogen-sided, and in various combinations with phosphorus, oil production decreases significantly, up to 360 kg / ha to variant fertilized with 150 kg / ha nitrogen.

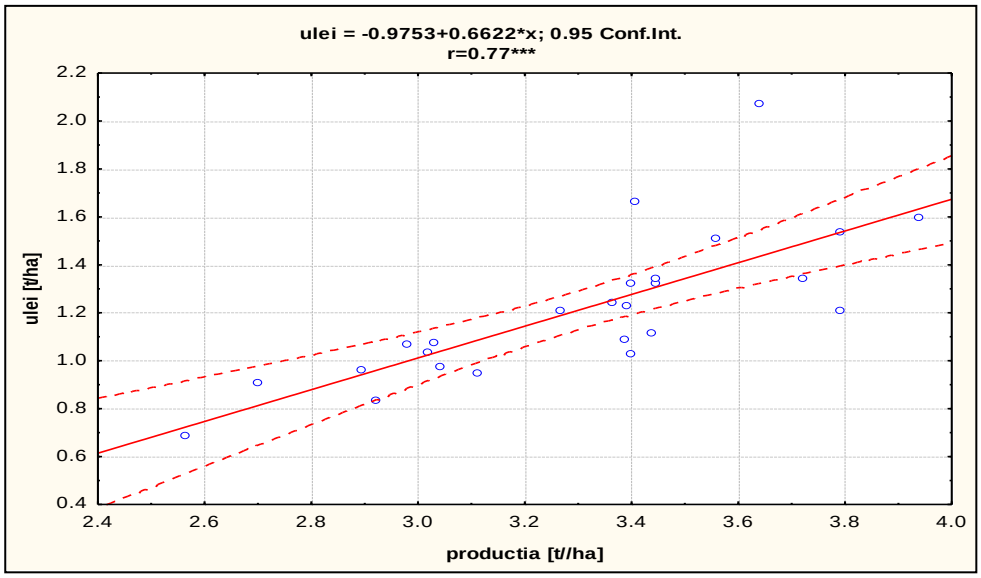

Fig. 4 The correlation between oil production and seed production per hectare

Route ascending regression indicates positive correlation is established between the oil production and the production of rapeseed per hectare.

CONCLUSION

- At the unilateral application of nitrogen, the proportion of oil increased from 26.75% (in unfertilized control), to 36.89% in the variant fertilized with 150 kg active ingredient / ha In an amount of 200 kg nitrogen / ha, the percentage of oil decreases by 4.85%, compared to the variant N 150. This trend of decrease in the percentage of oil in variant N 200 is maintained in all combinations nitrogen-phosphorus;
- The application of phosphorus causes an increase in oil content of 6.83% in the variant fertilized with 80 kg phosphorus/ ha (33.58%) compared with control (26.75%). The application of high doses of phosphorus 120kg / ha to 160 kg / ha cause a decrease in the percentage of oil.
- By combining the two types of fertilizers increases the percentage of oil, the highest value recorded in the variant fertilized with 150 kg / ha nitrogen and phosphorus 120 kg / ha - 56.91%;

- Between the production of oil and seed production per hectare is recorded a significant positive correlation.

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