

# ON THE IMPACT OF FERTILISATION ON WINTER RAPE IN THE SOIL AND CLIMATE CONDITIONS OF THE EDS TIMIȘOARA

**Prof. dr. ing. Georgeta POP**

Universitatea de Științe Agricole și Medicină Veterinară a Banatului, Timișoara

Profesor universitar la Departamentul 1: Tehnologii agricole din cadrul, Facultății de Agricultură. A publicat 2 cărți ca unic autor, 3 cărți în calitate de coautor, 96 articole și studii în reviste de specialitate din țară și din străinătate. Membru în 36 de contracte de cercetare științifică și 5 contracte de cercetare științifică ca director de proiect. Titular al disciplinei Tehnologii agricole vegetale și plante medicinale. Membru al AGIR și al SIRAR.



**Prof. dr. ing. Valeriu TABĂRĂ**

Universitatea de Științe Agricole și Medicină Veterinară a Banatului, Timișoara

Profesor universitar la Departamentul 1: Tehnologii Agricole din cadrul Universității de Științe Agricole și Medicină Veterinară a Banatului din Timișoara. A publicat 11 cărți, peste 200 de articole și studii în reviste de specialitate din țară și străinătate, în volumele editate cu ocazia diferitelor manifestări științifice, rezolvând peste 60 de contracte de cercetare științifică. Titular al disciplinelor: Fitotehnie: plante tehnice oleaginoase și textile, Tehnologii nepoluante pentru plantele aromatice, narcotice și medicinale. Coordonator de activități de cercetare de la Laboratoarele de ameliorare a grâului și cânepii de la SCDA Lovrin. Conducător științific de doctorate în științe agricole. Este președinte al Secției de Cultura Plantelor din ASAS, președintele filialei Timișoara ASAS, vicepreședintele Asociației pentru Consultanță și Agricultură Montană și al Comisiei Zonei Montane, membru al unor asociații și societăți științifice (AGIR, ASAS, Academia Oamenilor de Știință).

**Dr. Dorin Augustin POP**

**Stud. Crina SÎRB**

**REZUMAT.** Lucrarea își propune studiul unor factori tehnologici care influențează calitatea producției. Nivelul producției este determinat de interacțiunea limitelor biologice ale plantelor și influența elementelor tehnologice aplicate. În experiență s-a urmărit testarea cultivarelor de rapiță pentru ulei în vederea certificării problemei legate de comportarea acestora în condițiile Banatului și de a determina capacitatea de a produce și a conținutul de ulei care poate fi folosit ca biodiesel.

**Cuvinte cheie:** rapiță, fertilizare, conținut de ulei.

**ABSTRACT.** The study of influence of some technological elements on yield quality. The level of production is determined by the interaction between plants biological limits and by the influence of technological elements applied. The purpose of the experiment was to test winter rape cultivars from the point of view of their oil content, aiming at monitoring their behaviour in the Banat's Plain and at establishing winter rape yielding potential and oil content that can be used as bio-diesel.

**Keywords:** rape seed, fertilizer, oil content.

## 1. INTRODUCTION

Introducing winter rape in Romania to meet high requirements on the foreign market is sometimes hindered by results much below the productive potential of this crop. In this paper we present the impact of applying fertilisers on yield and oil content, results that are critical to promoting winter rape cultivation. Winter rape production and quality are main factors in establishing market value.

FAO data show that 40-60% of the increase in yield is due to fertilisers, the differences being determined by the production systems and by the biological factor (Hălmăjan 2006).

But fertilising is not a warranty for high yields. Provided the other technological steps are observed, the impact of fertilisation is much diminished. Due to the high valorising price in winter rape lately, in many cases it is worth investing in fertilisation to get high yields that generate high profit for winter rape producers.

## 2. MATERIAL AND METHOD

The experiments whose results are presented in this paper focused on four cultivars developed by S.C. Limagrain România. To carry out the research, we conducted an experiment of the bi-factorial type in which the experimental factors were as follows:

Factor A – agro - fund with four graduations:

- a<sub>0</sub> – not fertilised;
- a<sub>1</sub> – N<sub>60</sub> active substance;
- a<sub>2</sub> – N<sub>100</sub> active substance;
- a<sub>3</sub> – N<sub>140</sub> active substance.

Factor B – cultivar with four graduations:

- b<sub>1</sub> – Ontario;
- b<sub>2</sub> – Manitoba;
- b<sub>3</sub> – Champlain;
- b<sub>4</sub> – Apollo.

The purpose of the experiment was to test winter rape cultivars from the point of view of their oil content, aiming at monitoring their behaviour in the Banat's Plain and at establishing winter rape yielding potential and oil content that can be used as bio-diesel.

Result calculus and interpretation was done through the variance analysis method. Spring fertilisation completed basic fertilisation in which we used: N -16 active substance; P – 20 active substance and soluble substances. In the basic agro-fund we also included micro-stimulants with sulphur in rates of: S – 12, B – 0.02. Both in autumn and in spring we also fertilised foliar with Terra Sorb 2 l/ha. In autumn we fertilised foliar with Terra Sorb 1 l/ha and in spring we fertilised foliar with Terra Sorb 1 l/ha, applied together with the herbicide.

Winter rape is one of the crops with the highest specific consumptions, but also with a high capacity of using nitrogen and phosphorus from the soil. Most species use only a small part of the total phosphorus fertilisers applied (between 10 and 30%). Rape is an exception, since the root system of this plant has a large chemical fertiliser phosphorus absorption capacity. Hălmăjan (2006) cites Muntean (1997) who found that winter rape extracted between 41% and 58% of the primary and secondary phosphate applied, compared to 13-20% in wheat.

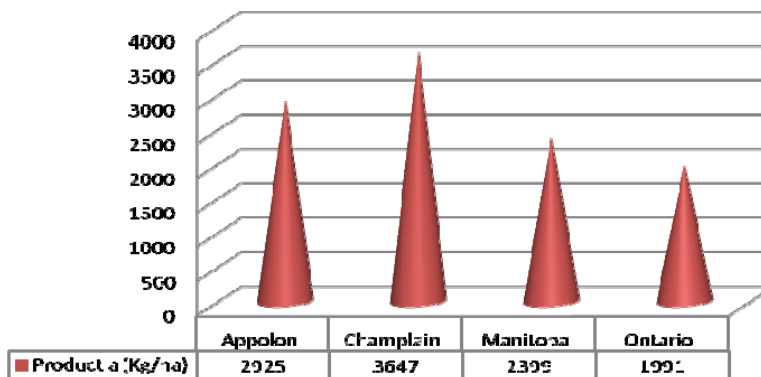


Fig. 1. Impact of cultivars on yield.

Table 1. Yield results (kg/ha) in the agricultural year 2006-2007 at the DES Timișoara

Factor A: agro-fund	Factor B: cultivar (kg/ha)				Averages of Factor A			
	Apollo	Champlain	Manitoba	Ontario	Yield (kg/ha)	%	Difference	Significance
a <sub>1</sub>	3080	4232	2589	2217	3030	100	-	
a <sub>2</sub> – 60	3468	3980	2432	2088	2742	90	-288	000
a <sub>1</sub> – 100	2401	3815	2363	1963	2636	86	-394	000
a <sub>0</sub> – 140	2752	2560	2213	1696	2306	76	-724	000

DL 5% = 32.20 kg/ha; DL 1% = 42.93 kg/ha; DL 0.1% = 56.39 kg/ha.

### Averages of Factor B

Yield (kg/ha)	2925	3647	2399	1991
%	100	118	82	68
Difference	-	722	-526	-934
Significance		XXX	000	000

DL 5% = 64.40 kg/ha; DL 1% = 85.86 kg/ha; DL 0.1% = 112.78 kg/ha.

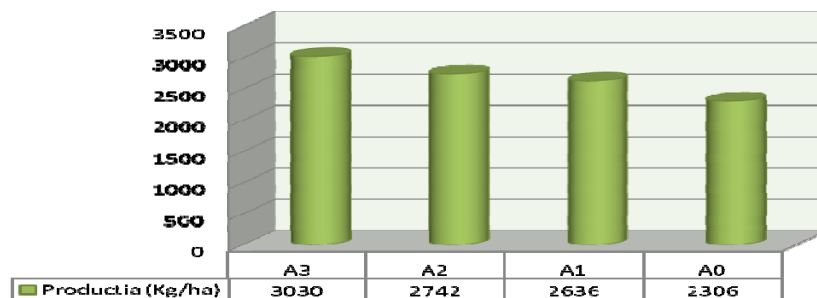


Fig. 2. Impact of agri-fund on yield.

Researchers with the INCD Fundulea recommend 80-160 N kg/ha, 50-80 P<sub>2</sub>O<sub>5</sub> kg/ha and 80 kg/ha K<sub>2</sub>O (Sin 2000).

Yield results obtained for a maximum level of nitrogen rate of 180 kg/ha were 3,030 kg/ha, compared to the not treated variant in which we obtained 2306 kg/ha with a difference of 724 kg/ha. Increasing nitrogen rates resulted in important yield increase, perfectly justified economically in years favourable to winter rape cultivation.

### 3. RESULTS AND DISCUSSION

Table 2 and Figure 3 present comparative oil analyses results in the years 2006 and 2007. Oil content in the studied cultivars varied between 30% in the Ladoga cultivar in the year 2007 and 38.33% in the Manitoba cultivar in the year 2006.

Table 2. Results of oil content analyses in winter rape cultivars in the years 2007 and 2008

Oil content (%)	Cultivar				Average of oil content per agro-fund
	Apollo	Champlain	Manitoba	Ontario	
A <sub>0</sub>	48.4	47.5	45.8	47.4	47.27
A <sub>1</sub> = 60	48.3	48.2	45.8	49.1	47.85
A <sub>2</sub> = 100	46.1	48.7	47.3	48.0	47.52
A <sub>3</sub> = 140	49.3	47.5	48.3	49.9	48.75
Average per cultivar	48.02	47.97	46.8	48.6	47.84

Analysing the data concerning winter rape seed oil content we can see that the highest oil contents were on the agro-fund fertilised with maximum nitrogen rates, i.e. 140 kg/ha in the Apollo (49.3%) and Ontario (49.9%) winter rape cultivars.

Table 2 presents results concerning oil yield in winter rape cultivars in the agricultural year 2007-2008.

### 4. CONCLUSIONS

Climate conditions in the reference years were particularly favourable to the cultivation of winter rape all during the vegetation period, strongly impacting cultivars' yielding capacity.

Yield results obtained in the experimental field are impacted by the fertilisation system since crop levels are also determined by the amount and quality of the inputs contributing to the development of the production.

Chemical composition and oil content are highly impacted by climate conditions and by genetic factors and cultivation technology. To also note the fact that nitrogen fertilisation leads to increases of the values at both yield and seed oil content levels.

This research contributes to the development and diversification of crop assortment in the Western Plain, which is extremely important to make it profitable for agriculturists.

### BIBLIOGRAPHY

1. **Bilteanu Gh.**, *Fitotehnie volumul II*, Editura Ceres, București, 2001.
2. **Borcean I., Tabără, V., David, Gh., Borcean Eugenia., Țărău, D., Borcean, A.**, *Zonarea cultivarea și protecția plantelor de câmp în Banat*, Editura Mirton, Timișoara, 1996.
3. **David Gh.**, *Tehnologia plantelor de câmp*, Editura Eurobit Timișoara, 2003.
4. **Diaconu, P., Mateiaș, P.M.**, *Cultura rapiței și muștarului*, Ed. Ceres, București, 2004.
5. **H.V. Hălmăjan** – *Ghidul cultivatorului de rapiță*, Editura Agris, București, 2006.
6. **Sin Gh. și colab.**, *Managementul tehnologic al plantelor de câmp*, Editura Ceres, București, 2005..
7. **Tabără, V.**, *Fitotehnie, volumul I*, Plante tehnice oleaginoase și textile, Editura Brumar, Timișoara, 2005.