

YIELD AND OIL CONTENT OF WINTER RAPE IN CONDITION OF PHOSPHORUS AND BORON FOLIAR APPLICATION.

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ABSTRACT

In 1992-1994 (north Poland) the rape 00 was grown on sandy loam, pH KCl = 6.4 – 6.6, with a good or medium content of available P, K and Mg and with a medium content of B. Before sowing 40-50 kg of N, 44 kg of P and 149 kg of K/ha were applied. In early spring two split applications of N (60 kg and 40 kg N/ha) were given to the soil. At the beginning of flowering 2.6 kg of P as 2% H₃PO₄ solution and boron as 0.4 % or 1.2% solution of acid boric were used as a foliar application.

The yield obtained was high, 4.3 to 5.9 tons of seeds per ha. Foliar application of P and B increased seed yield by 0.2 to 0.8 t/ha as well as crude oil production of good quality. The content of fatty acids, C_{16:0} and C_{18:1, 2, 3} and C_{22:1} was at a normal level.

A better effect of the fertilizers applied was obtained when the distribution of the precipitation from March throughout May was optimal. The rape was found to have a higher need for boron in dry years.

INTRODUCTION

The winter oilseed rape crop has a high requirement for phosphorus (30–55 kg of P), particularly during flowering (Andersson et al., 1958). It also requires much boron (Holmes, 1980). These elements have a significant effect on seed yield and the content and quality of oil (Krauze et al., 1991).

The uptake of phosphorus and boron by plants from the soil solution depends on soil reaction and soil moisture. Deficit of precipitation during flowering and pod formation hinders the phosphorus and boron uptake by the rape.

These elements also undergo chemical sorption which reduces their availability to the plants. That is why soil-applied phosphorus is little effective.

Boron as a micronutrient is not commonly used in rape nutrition because the crop following the rape is most frequently wheat which is susceptible to higher boron concentrations in the soil (Holmes, 1980).

The objective of this experiment was to determine the effect of foliar boron and phosphorus application at the stage of flowering on the yield and quality of the winter oilseed rape.

EXPERIMENTAL

Table 1 shows that the foliar application of phosphorus and boron to winter rape at the stage of flowering significantly increased seed yields (by 0.36 to 0.75 t/ha) as well as oil production (by 0.2 t/ha).

Table 1. Yields of winter rape seeds and crude oil in relation to fertilization (t/ha)

Treatments	Seed oil	1992	1993	1994	mean
NPK	s	5.14	4.30	4.72	4.72
	o	2.36	1.80	2.10	1.60
NPK + P* _{2.6}	s	5.39	4.86	5.14	5.13
	o	2.42	1.91	2.30	2.21
NPK + B* _{0.4}	s	5.33	4.69	5.31	5.11
	o	2.45	1.74	2.35	2.18
NPK + B* _{1.2}	s	5.90	4.66	5.36	5.30
	o	2.46	1.96	2.25	2.22
LSD _{0.05} for seeds		0.39	0.30	0.36	0.35

*- foliar application

In 1993 there was a decrease in seed and oil yields as compared with 1992 and 1994. This no doubt was due to an unfavourable distribution of precipitation (Table 2). The phosphorus content of seeds also was lower in that particular year (Table 3).

Table 2. Monthly temperatures (°C) and precipitation (mm).

Month	1992		1993		1994	
	mm	°C	mm	°C	mm	°C
March	53.2	3.1	0.0	0.4	58.5	2.7
April	38.4	7.2	19.3	9.4	46.1	9.0
May	34.1	13.8	30.9	17.4	90.7	12.8
June	13.3	18.6	87.6	15.7	43.0	15.7
yearly sum	473.3		451.0		688.0	

Table 3. Phosphorus (% d.m.) and boron (ppm d.m.) content of rape flowers and seeds

Treatment	Element	1992		1993		1994	
		f	s	f	s	f	s
NPK	P	0.99	0.67	0.60	0.48	1.00	0.90
	B	37.5	9.10	31.6	13.4	34.0	12.7
NPK+P* _{2.6}	P	1.30	0.65	0.56	0.43	1.20	0.91
	B	39.7	10.2	32.5	14.5	55.0	16.0
NPK+B* _{0.4}	P	1.30	0.65	0.63	0.46	1.54	0.83
	B	41.2	10.9	33.7	15.5	61.0	15.7
NPK+B* _{1.2}	P	1.38	0.68	0.62	0.47	1.20	0.91
	B	56.2	12.4	35.6	15.8	73.0	18.1

* - foliar application

With regard to the quality, the oil obtained contained fatty acids (C 18:1.2.3 - 88-91%) of a high nutritional value corresponding with high parameters.

CONCLUSION

A foliar application of phosphorus and boron to the winter oilseed rape crops at the stage of flowering significantly increased the yield and quality of seeds. It, therefore, indicates at the need of using that technology in agronomical practice.

REFERENCES

- Andersson, G., Olered, R. and Olsson, G. (1958). The uptake of nutrients by winter rape. *Zeitschrift für Acker und Pflanzenbau*, 107, 171-9.
- Holmes, M.R.J. (1980). Nutrition of the oilseed rape crop. *Applied Science Publishers LTD London*.
- Krauze, A., Bowszys, T., Bobrzecka, D. and Rotkiewicz, D. (1991). Effect of foliar boron fertilization on yield and quality of winter rape. *Eighth International Rapeseed Congress*. Vol.2, p. 547-561, Saskatoon, Canada.