

RESPONSE TO NITROGEN OF THE OILSEED RAPE PROTECTED AND UNPROTECTED AGAINST INSECTS

K. JANKOWSKI, T. OJCZYK

Olsztyn University of Agriculture and Technology, Poland

CZ. MUŚNICKI

Poznań University of Agriculture, Poland

A. KOTECKI

Wrocław University of Agriculture, Poland

ABSTRACT

Results of the research carried out in three regions of Poland (Wrocław, Poznań, Olsztyn) have been presented in the paper. Yields of 00 - oilseed rape under doses of 40, 80, 120, 160, 200 kg of N, and with protection and no protection against insects were compared. Damages caused by insects (unprotected oilseed rape) resulted in lower seed yield by 1.05 t at the low dose of N and by 1.43 at the highest dose. Response to nitrogen of the unprotected oilseed rape dropped by 36% no matter about the level of nitrogen fertilization. A high fertilization did not compensate a yield reduction resulted from the damages caused by insects.

INTRODUCTION

Response to 1 kg of nitrogen is the highest in the range of lower and medium doses and then lowers very considerably when exceeding 150 kg per 1 ha. Some Polish research showed response of 0.9-8.0 kg of seeds to 1 kg of nitrogen used in higher doses than 150 kg of N (Budzyński 1986, Muśnicki 1989). In investigations conducted by Bilborrow (1993) and Harris (1980) it was much higher and accounted for 6.8-13.6 kg of seeds per 1 kg of N.

Response to nitrogen seems to be highly influenced by pests (Budzyński et al., 1994). Lack of protection caused a decrease in the efficiency by as much as 41%. Nevertheless, Starzyński and Dmoch (1989) presented their own and others authors results, where nitrogen compensated damages done by *Meligetes aeneus* without losses in yields. Practical recommendations emphasise that good supply of nitrogen increases prospects for compensation of damages caused by pests.

RESULTS

Results come from 6 field experiments established according to split-plot method (1993-1994) in experimental stations of the Agricultural Universities in Olsztyn, Poznań and Wrocław (300 and 500 km away from each other). Doses of 40, 80, 120, 160 and

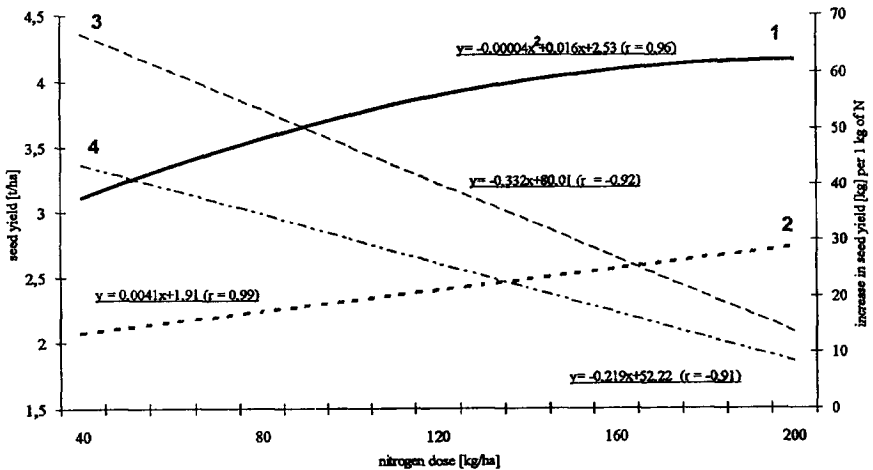
200 kg of N per ha were applied. Protected plots were treated 4-5 times against insects including, *Ceutorhynchus napi* and *Ceutorhynchus quadridens* - 1, *Meligetes aeneus* - 2-3, *Ceutorhynchus assimilis* and *Dasineurea brassicae* - 1 according to the intensity of occurrence. Stalk pests infested as many as 93% of the stalks of the plants not protected by insecticides, and caused damages to the stalk core along 52 cm of its length (53% the total plant length). Application of pesticides against *Meligetes aeneus* reduced its presence by 35%. The percentage of siliquae affected by *Ceutorhynchus assimilis* and *Dasineurea brassicae* was declining almost three times after application of pyrethroid during the florescence.

TABLE 1. Oilseed rape yields in t/ha (1993,1994)

Treatment	Nitrogen doses [kg/ha]					
	40	80	120	160	200	average
protected	3.10	3.60	3.84	4.11	4.15	3.76
unprotected	2.05	2.28	2.39	2.58	2.72	2.40
average	2.58	2.94	3.12	3.35	3.44	

The degree of damage done by *Ceutorhynchus napi* and *Ceutorhynchus quadridens* increased with the level of the N dose. Number of flower buds destroyed by *Meligetes aeneus* and number of siliquae destroyed by the siliquae pests was not related to the dose of nitrogen. An aggregated effect of damages done by insects resulted in decrease in the seed yield by 36% on average i.e. by 1.36 t per ha (Table 1).

FIGURE 1. Relationship between seed yield and level of nitrogen fertilization of the oilseed rape protected [1] against insects and unprotected one [2]. Response to 1 kg of nitrogen in protected [3] and unprotected [4] oilseed rape showed in kg of seeds.



Decline in seed yields in unprotected plots supplied with dose of 40 kg of N accounted for 1.05 t, while in those supplied with dose 200 kg of N as much as 1.49 t. Therefore, increase in nitrogen fertilization did not compensate effects of damages to the yield caused by insects. It is important to notice that in the unprotected plots the highest seed yield at

the 200 kg dose of N did not reach the yield level of the protected ones at the 40 kg dose of N. The increase in the seed yield of the protected oilseed rape followed the second-degree curve till the 160 kg dose of N (Fig. 1).

TABLE 2. Response to 1 kg of nitrogen in kg of seeds of the oilseed rape

Treatment	Dose ranges			
	>40-80	>80-120	>120-160	>160-200
protected	12.5	6.0	6.8	1.0
unprotected	5.8	2.7	4.8	3.5
average	9.1	4.4	5.8	2.3

Increase in seed yield of the unprotected oilseed rape was linear as far as till the highest dose. However, this took place at a very low level of yield. Response to nitrogen measured by seed yield per 1 kg of N was declining linearly along all levels of the examined doses (Fig.1). A tendency to the smallest decline in response (in 120-160 and 160-200 kg intervals doses of N) in unprotected oilseed rape can not be positively evaluated since it takes place at a generally lower (by 34-35%) yield level (Table 2).

Therefore, it has not been proven that high nitrogen fertilization compensated significantly effects of damages caused by insects. Desistance from an insect control in oilseed rape supplied with the 40 kg dose of N resulted in decline in yield by 1.05 t/ha. Desistance from an insect control in oilseed rape supplied with the 200 kg of N resulted in decline in yield by 1.43 t. Complete protection against insects increased response to the nitrogen by 34-36% no matter about the level of N.

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