

**Response of canola grain and oil yields, oil and protein contents to different levels  
of nitrogen and boron fertilizers in Ahvaz region**

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(Malhi *et al.*, 2003)

(Stangoulis *et al.*, 2000)

(Anderson & Wilent, 1993)

(Noorullah Khan *et al.*, 2002)

(Porter, 1993)

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(Myers *et al.*, 1983)

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(Nuttal *et al.*, 1987)

(Malhi *et al.*, 2003)

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$$\begin{aligned} & \left( \quad \quad \quad \right) N_3 = \quad N_2 = \quad N_1 = \\ B_4 = \quad B_3 = \quad B_2 = / \quad B_1 = & \quad \quad \quad \left( \quad \quad \quad \right) \end{aligned}$$

(Porter, 1993)

(Nuttal *et al.*, 1987)

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(Anthony and Woodward, 2003)

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.(Anthony and Woodward, 2003)

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(Porter, 1993)

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(Noorulla Kahn *et al.*, 2002)

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(Nuttal *et al.*, 1987)

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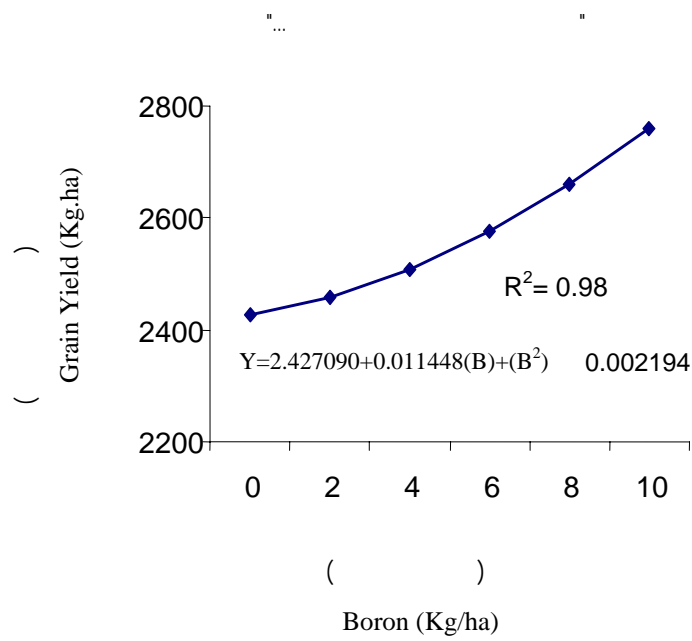


Fig.1. Response of canola grain yield to application of boron

Table 1. Analysis of variance for grain yield, oil yield, grain oil and protein contents.

S. O. V.	Mean squares				
	df.	Grain yield	Oil yield	Grain oil content	Grain protein content
Replication	3	0.48**	96316.896**	0.0000563 <sup>ns</sup>	0.0002 <sup>ns</sup>
Nitrogen (N)	3	2.25**	265986.15**	0.0041**	0.0158**
Boron (B)	2	0.27**	53833.112**	0.0000076 <sup>ns</sup>	0.0008 <sup>ns</sup>
N × B	6	0.460 <sup>ns</sup>	10170.602 <sup>ns</sup>	0.000016 <sup>ns</sup>	0.0002 <sup>ns</sup>
Contrast B					
linear	1	0.2085*	42747.22*	0.08314 <sup>ns</sup>	0.001534 <sup>ns</sup>
Error	33	0.03	5841.5112	0.0000112	0.0004
CV (%)	(%)	6.67	6.67	0.45	3.76

\* and \*\*: Significant at 5 and 1 % levels of probability, respectively

\*\* \*

ns: Nonsignificant

:ns

Table 2. Mean comparison of grain yield, oil yield, and grain oil and protein content as affected by different levels of nitrogen and boron

Treatment	Grain yield (Kg/ha)	Oil yield (Kg/ha)	Grain oil content (%)	Grain protein content (%)
<b>Nitrogen (Kg/ha)</b>				
150	2148 c	1003.97 c	46.74 a	24.56 c
200	2608 b	1175.85 b	45.13 b	26.63 b
250	2891 a	1256.11 a	43.44 c	30.02 a
<b>Boron (Kg/ha)</b>				
0.0	2435 b	1093.95 b	45.04 a	26.16 a
2.5	2448 b	1101.78 b	45.22 a	27.62 a
5.0	2550 b	1147.06 b	45.08 a	26.82 a
10.0	2760 a	1239.77 a	45.09 a	27.69 a

Means, in each column and for each treatment, followed by similar letters are not significantly different at the 5% of probability level-using Duncan's Multiple Range Test.

Table 3. Mean comparison of grain and oil yields of canola as affected by different treatments

Treatments	Grain yield (Kg/ha)	Oil yield (Kg/ha)
B <sub>1</sub> N <sub>1</sub>	2100 g	978.84 fg
B <sub>1</sub> N <sub>2</sub>	2560 de	1159.99 bcd
B <sub>1</sub> N <sub>3</sub>	2640 de	1143.02 cde
B <sub>2</sub> N <sub>1</sub>	1932 g	902.21 g
B <sub>2</sub> N <sub>2</sub>	2460 e	1119.08 ed
B <sub>2</sub> N <sub>3</sub>	2940 ab	1284.06 a
B <sub>3</sub> N <sub>1</sub>	2180 fg	1026.33 ef
B <sub>3</sub> N <sub>2</sub>	2600 de	1163.20 bcd
B <sub>3</sub> N <sub>3</sub>	2880 abc	1251.64 abc
B <sub>4</sub> N <sub>1</sub>	2380 ef	1108.49 ed
B <sub>4</sub> N <sub>2</sub>	2800 bcd	1265.13 ab
B <sub>4</sub> N <sub>3</sub>	3100 a	1345.71 a

Means, in each column and for each treatment, followed by similar letters are not significantly different at the 5% of probability level-using Duncan's Multiple Range Test.

(Nuttal *et al.*, 1987) (Anderson and Wilent, 1993)  
(Nuttal *et al.*, 1987)  
(Mason & Brennan, 1998)  
(Karamanos *et al.*, 2003)  
(Malhi *et al.*, 2003)

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Table 4. Correlation coefficients between grain yield, oil yield, oil and protein contents of canola

Traits	Grain yield	Oil yield	Grain protein	Grain oil
Grain yield	1			
Oil yield	0.988**	1		
Grain protein contents	0.602**	0.518**	1	
Grain oil contents	-0.759**	-0.655**	-0.794**	1

\*\* : Significant at the 1 % levels of probability.

ns : Non-significant

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ns

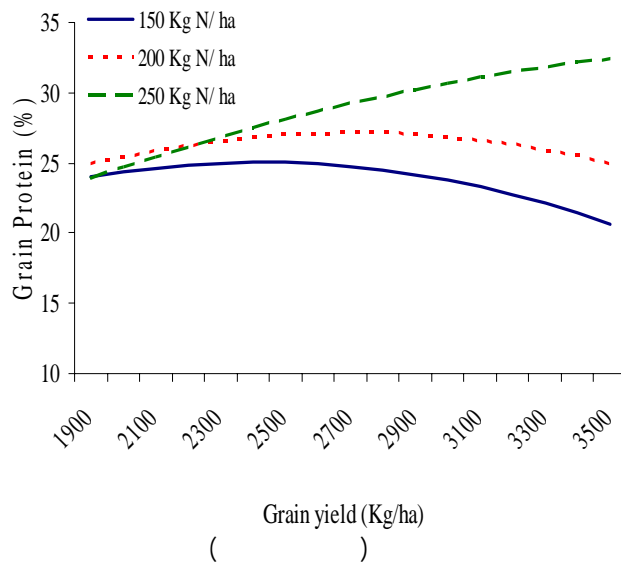


Fig. 2. Grain yield and protein relationship of canola in different levels of nitrogen

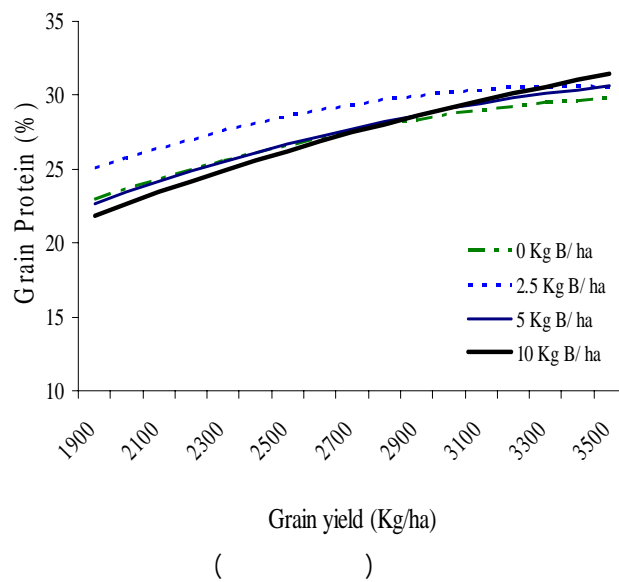


Fig. 3. Relationship between grain yield and protein of canola in different levels of boron



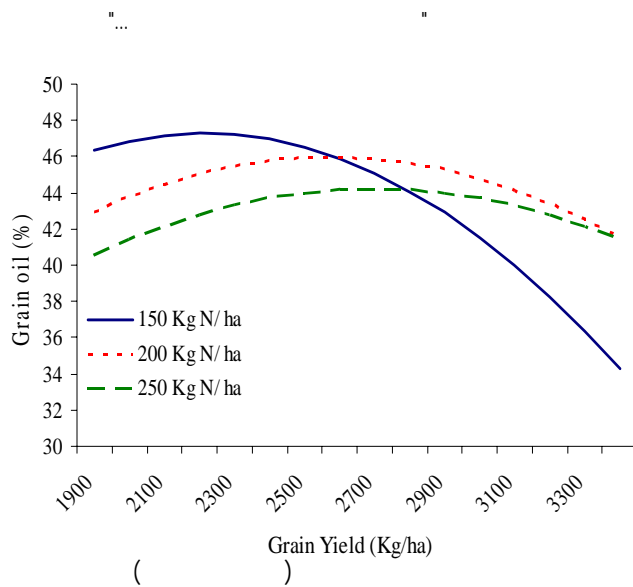


Fig. 4. Relationship between grain yield and grain oil content in canola in different levels of nitrogen

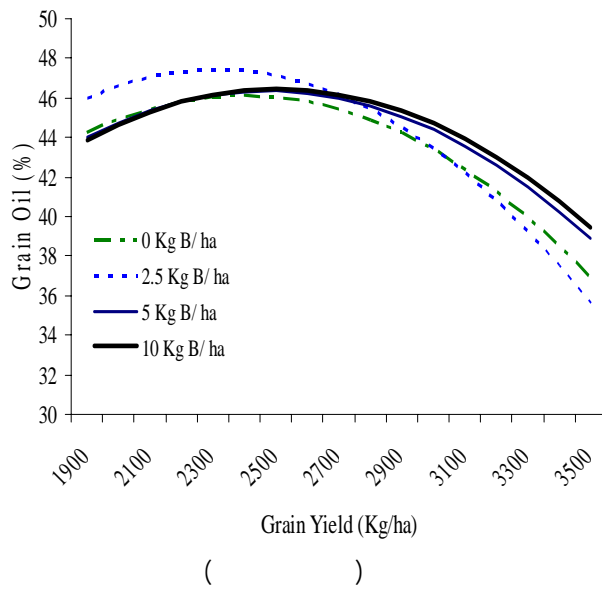


Fig. 4. Relationship between grain yield and grain oil content in canola in different levels of boron

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( (Anthony and Woodweed, 2003)

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## Response of canola grain and oil yields, oil and protein contents to different levels of nitrogen and boron fertilizers in Ahwaz region

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### ABSTRACT

**Moradi Telavat, M. R., S. A. Siadat, H. Nadian and G. Fathi. 2007.** Response of canola grain and oil yields, oil and protein contents to different levels of nitrogen and boron fertilizers in Ahwaz region. **Iranian Journal of Crop Sciences. 9(3):213-224.**

In order to investigate the effect of different levels of nitrogen and boron fertilizers on canola grain protein, oil and yield, in Ahwaz region, an experiment was conducted in 2005-2006 cropping season in Ramin Agriculture and Natural Resources University. The experimental design was a randomized complete blocks with three N rates (150, 200 and 250 kg/ha) and four B rates (0, 2.5, 5 and 10 kg/ha). All treatments were replicated four times. Result showed that with increasing nitrogen rates, grain and oil yield significantly increased. Application of boron also significantly influenced grain yield. Nitrogen  $\times$  boron, on grain and oil yield was not significant. However, highest grain and oil yield was obtained from 250 and 10 Kg/ha N and B, treatment. With comparison of treatments it was observed that 200 Kg N/ha with 10 Kg B/ha produced grain and oil yield higher than 250 Kg N/ha without Boron. Grain protein and oil contents with increasing of nitrogen levels were significantly increased and decreased, respectively. But boron application had no effect on grain protein and oil contents. Results also showed that relationship between grain yield and grain oil and protein contents can be showed with a logarithmic equation. These relationships was significantly affected by nitrogen levels. With increasing of nitrogen rates, reduction of grain oil and protein contents, were slower in higher levels of grain yield. Although, effect of boron were small on this traits, but grain oil and protein contents in higher levels of grain yield was less than lower yields.

**Key words:** Boron, Nitrogen, Canola, Grain oil, Grain protein, Grain yield

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