Canola response to zinc, sulfur and boron fertilization

Maryam Habibi[1], Majid Majidian[1*], Mohammad Rabiee[2]

1. Department of Agronomy and Plant Breeding, Faculty of Agricultural Sciences, University of Guilan, Rasht, Iran

2. Rice Researcher Institute of Iran, Agricultural Research Education and Extension Organization, Tehran, Iran

INTRODUCTION

Rapeseed (*Brassica napus* L. ssp. *napus*) is grown in different agro-climatic zones of the world, differing in soil nutrient status (Bybordi & Mamedov, 2010). Canola is an important agricultural crop, grown primarily for oil production, but also as a valuable break-crop in cereal crop rotations (Gammelvind et al., 1996).

OBJECTIVE

Most researchers have studied the effect of a single element fertilizer on the crop yield, whereas few have payed attention on the function of the combined applications of nutrients in improving the yield. In this present study, the effects of Zn, B, S and their interactions on the quality and seed yield rapeseed were examined.

MATERIALS AND METHODS

❖In order to evaluate the effect of boron, zinc and sulfur application on quantitative and qualitative agronomic characteristics of rapeseed (Hayola 401) in Rasht region, a field experiment was conducted at Rice Research Institute of Iran (Rasht) in a complete randomized block design with eight treatments in three replications. Treatment consisted control, B, Zn, S, B + Zn, B + S, Zn + S and 8- B + Zn + S. Sulfur treatment added at the rate 100 kg ha^{-1} before of sowing, and boron was added as Borax ($Na_2B_4O_7$, $10H_2O$) at the rate of 1.5 kg ha^{-1}, zinc was added as Zn 15% EDTA at the rate of 1.5 kg ha^{-1} were applied to the soil.

RESULTS AND DISCUSSION

There were signification differences among treatments on traits, seed yield, oil yield, protein content, siliques number at plant, seed number at silique, thousand-seed weight, boron, zinc and sulfur contents at seed, oleic, linoleic, linolenic, palmitic, stearic, erusic fatty acids content at oil seed rapeseed. Highest seed yield (4157.6 kg ha^{-1}), oil yield (1770.2 kg ha^{-1}), siliques number at plant (195.92 number), seed number at silique (34.31 number) and thousand- seed weigh (3.7 gr) were obtained with B + Zn + S treatments. Maximum protein content in seed of rapeseed (24.62%) was observed with Zn treatment. Maximum seed boron, zinc and sulfur concentration were recorded in B+ Zn + S treatment which was 15.7, 26.38 and 577.42 mg g^{-1} respectively.

Highest percentage oleic (234.8 mg g-1) and linolenic (26.98 mg g^{-1}) acid in oil seed were obtained from B + Zn + S treatments. Among the different treatments the highest linoleic acid (55.98 mg g^{-1}) in oil was recorded in B + Zn treatment. Maximum stearic and erusic acid were obtained from control treatment which was 6.5 mg g^{-1} and 1.01mg g^{-1} respectively. S + Zn treatment produced the highest palmitic acid (15.53mg g^{-1}).

Table 1. Effects of boron, sulfur, zinc and their interaction on the yield and fatty acid composition rapeseed

Treatment	Seed yield (kg ha^{-1})	Oil content (%)	stearic acid (mg g^{-1})	palmitic acid (mg g^{-1})	oleic acid (mg g^{-1})	linoleic acid (mg g^{-1})	linolenic acid (mg g^{-1})	erucic acid (mg g^{-1})
control	2795.3f	38.37e	6.5a	12.69c	172.115f	43.51e	19.75d	1.01a
B	3229.8ab	40.6dc	3.48c	12.77c	195.7de	48.35bcd	23.32bcd	0.76bc
Zn	3098.5e	40.4d	6.49a	13.1c	187.95e	45.75de	21.6bc	0.77bc
S	3403.03d	41.13bcd	4.7bc	12.89c	195.25de	47.9cd	23.05bcd	0.82ab
B+S	3951.6ab	41.92ab	4.71bc	13.65bc	212.05bc	51.15b	24.28abc	0.58de
B+Zn	3656.4c	41.69abc	6ab	14.55ab	224.55ab	55.98a	26.25ab	0.41e
S+Zn	3840.9bc	41.71abc	4.87bc	15.53a	202.65cd	48.67bcd	23.85abc	0.69bcd
B+S+Zn	4157.6a	42.58a	4.8bc	14.77a	234.81a	49.7bc	26.98a	0.61cd

Means followed by the same letter(s) within a column are not significantly different at $P < 0.05$

CONCLUSIONS

Therefore this research showed that application of B, Zn and S fertilizers additional increase quantitative and qualitative yield seed case improvement fatty acids composition in oil. Regarding to the results, fatty acids composition of rapeseed are influenced by nutrient and since quality of edible oils depends on unsaturated fatty acids, especially linoleic and linolenic acids and these acids are essential fatty acids for the human body that must be supplied through diet. There for this research showed that we are not only able to increase oil yield with can also increase oil quality with increasing fatty acid composition

http://www.Guilan.ac.ir
ma_majidian@guilan.ac.ir

09/2018