PROCEEEDINGS
BOOK OF ABSTRACTS
FIRST WORLD OILSEEDS CONGRESS

NOVEMBER 6-7, 2019

LVIV, UKRAINE

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In

Lviv, Ukraine

Organized by

Trakya University

ISBN # :
Trakya University Publisher No: 222

WELCOME NOTES

We would like to welcome you to the First World Oilseeds Congress (WOS) organized by Trakya University with supports of BYSD, MUMSAD, YABITED, TURKTOB, TSUAB, BISAB and other related associations. This congress is a premier international science, bringing together with producers, trade, industry, technology and business focusing on oilseeds. The program will include a plenary session on oilseed production, markets, economics and the policies and regulations governing oil trade. The technical sessions will highlight invited and volunteer oral presentations on congress topics.

The congress will also give an opportunity to the scientists to present their research results expanding the current knowledge in the field and the industry personnel to introduce new products which may be interest to the global oilseeds and vegetable oil community. The attendees will have ample opportunities for learning, reconnecting, engaging, networking and meeting with producers, academia, industry, marketing and trade with exhibitors. We hope that this congress will facilitate a lively dialog between the scientific community and the industry. The congress will be green congress basis so as much as less papers will be used and with carrying out our environment. Abstract book will be published as electronic book in PDF format that will be distributed during the congress.

In November 2019, it will be held the first edition of the WOS Congress, with ambition of the organizers to make it a periodical event. We are proud to announce that in the WOS 2019 will take part more than 100 scientists and researchers from all over the world. There were submitted 70 scientific papers, of which 50 will be presented as oral talks and 20 as poster presentations. The full author list of all submitted papers comprises 184.

Congress topics will cover all oilseeds (sunflower, canola, peanut, flax, sesame, cottonseed, castor, palm, olive and other oilseeds) production, breeding, agronomy, biotechnology, etc. world oilseed and oil trade, oilseed and oil chemistry, oilseed and oil industry and sector, oilseed and oil equipment, nutrition and lipids, processing and industrial applications, food applications and products and methods and standards.

Lviv is a beatiful, lovely and historic city at the eastern edge of Europe. We are thrilled to host you all in Lviv, Ukraine and hope that you will take this opportunity to discover city and around with enjoyable time. We would like to thank you for joining to this congress. We extend our special thanks and gratitude to our sponsors and collaborators for supporting this event.

We wish you a nice stay in Lviv, Ukraine.

Prof Dr Yalcin KAYA

Head of the Organizing Committee

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Content

VARIABILITY OF QUANTITATIVE PROPERTIES IN OILSEED RAPE - *BRASSICA NAPUS* L., AND EFFICIENCY FROM APPLICATION OF CERTAIN MACRO AND MICROELEMENTS

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ABSTRACT

Determination of quantitative characteristics by using macro and microelements that have great importance on the development of oilseed rape - Brassica napus L. started by setting the experiment (2014), and applying Mg and Mn as elements corresponding for the purpose. The trials were set in order to see the impact of magnesium and manganese on the quantitative properties of winter oilseed rape genotypes - Brassica napus L.. For this purpose, certain concentrations of magnesium sulphate and manganese chelate by foliar fertilizer application was applied on 3 genotype winter oilseed rape (Hybrirock, Petrol and Speed) in 5 variants, as follows: Variant 1 Control Ø NPK, Variant 2 NPK+$MgSO_4$ 25%, Variant 3 NPK+$MgSO_4$ 35%, Variant 4 NPK+Mn chelate 20%, and Variant 5 NPK+Mn chelate 30%. By specifying the appropriate fertilizers with Mg and Mn (their concentrations), except for quantitative properties, the adaptability of the tested genotypes of specific agro-climatic and soil conditions was observed and the following parameters were monitored: plant height (cm), the number of branches/plant, number of pods/plant, pod length (cm), the number of seeds in the pod and seed yield (t/ha). According to the results of the preliminary experiment can be concluded that higher concentrations of magnesium sulphate (35%) and manganese chelate (30%) leads to increased the components of yield and seed in tested genotypes. Efficiency of variants, generated by certain concentrations of fertilizers has also confirmed impact of higher concentrations; in terms of dosages and prices of yields (NPK+Mn chelate 30% and NPK+Mg SO_4 35%).

Keywords: *Oilseed rape, Magnesium, Manganese, Yield, Efficiency, DEA*

INTRODUCTION

In terms of the annual oilseed crops, oilseed rape is the second source of edible oil in the world with oil content in the seed between 40-45% (Sovero, 1993). Regarding the needs of mineral elements in order to increase the yield of seed, it is a crop with high nutritional needs receives mainly from soil, but foliar fertilization can be also used. These applications do not only apply nitrogen, potassium and magnesium, but also other mineral nutrients (Kwiatkowski, 2012).

The plant has great needs for nutrients during intense growth of aboveground biomass, and that 3 to 4 weeks before the flowering stage, and during the formation of the pods and seed (Czuba et al., 1995). Application of different concentrations of foliar fertilizers have different impact on seed yield. According to Kwiatkowski (2012), application of foliar fertilizers have a positive effect on the productivity of winter oilseed rape genotypes, improving qualitative features of culture, even if the doses of soil applications of mineral NPK fertilizers are reduced by 1/4. Foliar fertilization with $MgSO_4$ in similar surveys in Germany, showed an increase in the yield to 1,40 t/ha, depending on soil conditions, ie deficit of sulfur (Orlovius., 2003). Proper fertilization affects the quality of the yield and helps to strengthen the plant, especially the provision and supply of magnesium (Czuba et al., 1995). The role of secondary macro element magnesium (Mg) in the physiological development of plants is important because it is present in the central atom in the molecule of chlorophyll and is essential for the absorption of light energy. Magnesium deficiency first appears on lower leaves, which turn yellow and turn white, while the stem remains dark green. Manganese as trace elements, affect plant enzymes in order to reduce nitrates before the creation of protein. The deficit of manganese usually appears at the top of the sheet in the form of necrotic and yellow spots (Omidi, 2011), and in cases where oilseed rape is grown in many limestone and sandy soils (Orlovius., 2003). Using of the respective framework data analysis (DEA - Data envelopment analysis), as a technique to measure the effectiveness of the given doses with relatively homogene set, of which compares values from multiple inputs and outputs. The measurements of performance where there are multiple inputs and outputs focus on creating efficient hypothetical number as a certain average of effective units, to allow comparison of inefficient units (Farrell and Fieldhouse., 1962). In survey of DEA applications with methodological use of DEA for analyze results, in 20 years of development, five industries dominated in the use: banking, health, agriculture, transport and education (Liu J.S. at all, 2012).

MATERIAL AND METHODS

For accurate determination of the effect of foliar application of Mg and Mn, in 2014 field experiment was set in the surroundings of Skopje (the village Stajkovci - 42 7 ° 02'08 "N; 21 ° 30'42 0" E), on 3 genotypes of winter oilseed rape - Hybrirock, Petrol и Speed. Total area was 600 m², separated in 45 plots set up in four randomized blocks. The plots measuring 10 m² (5mx2m) each, with 5 rows and 40 cm between. Sowing was perform on 10th September with sowing rate of 0.005 t/ha (5 g per plot = 1g in row). From total amount of mineral fertilizer - NPK (8:16:24) only 2/3 were used by the autumn before sowing, and 1/3 used at spring. Different concentrations of foliar fertilizers made the following variants:

Variant 1 Control ∅, NPK	(0.42 t/ha)
Variant 2 NPK+$MgSO_4$ - 25%	(5,6 l/ha)
Variant 3 NPK+$MgSO_4$ - 35%	(7,8 l/ha)
Variant 4 NPK+Mn chelate - 20%	(4,4 l/ha)
Variant 5 NPK+Mn chelate - 30%	(6,6 l/ha)

Foliar applications were carried out on two occasions, over a period of 15 days (according to BBCH *) as follows:

I. phase of formation of flower bud (when individual bubs are formed, but still closed) and
II. phase of full bloom, or when 50% of the bubs are open and the old flowers have fallen (Weber and Bleiholder, 1990; Lancashire et al., 1991).

Ten randomly selected plants per variant were taken to separate biometric measurements such as: plant height (cm), number of branches/plant, number of pods/plant, length of the pod (cm), and number of seeds in the pod. Collecting the seed in the stage of technical maturity, was done by hand, in the period from June 27 to July 10, by collecting medium 3 rows (eliminating the first and last row of variants).

Calculations and statistical evaluation

The yield was recorded, calculated and represented in t/ha for each of the variants. The results were statistically processed using analysis of variance and LSD test through SPSS program (PSAW 18). The calculations for determining the efficiency are set as a relation among the variants (of predetermined concentrations of fertilizers) presented as inputs, as the contributions received and the prices thereof. Results for reviewing efficiency are processed through the Framework Data Analysis (DEA), using the platform framework for data analysis DEAFrontierFree (DEAFrontierFree_SolverPlatform, DEAFrontierFree OpenSolver).

RESULTS AND DISCUSSION

The differences among genotypes basically due to the genetic potential as of the effect of the external environment. El-Nakhlawy and Bakhashwain (2009), concluded that oil seed rape varieties differ significantly in terms of the height of the plants. Certain varieties can be sensitive to environmental factors, while others may be tolerant (Sana et al., 2003). Through the analysis of the variants, analyzed morphological characteristics and yield are identified, while significant differences were determined by LSD test. The average values of morphological characteristics and yield of oilseed rape seeds, tested in four variants compared with the Control ∅ - NPK, are presented in Table 1.

Table 1. Differences in morphological characteristics and yield

Variant	Height of plant (cm)	Number of branches / plant	Length of pod (cm)	Number of pods / plant	Number of seed / pod	Yield t/ha
V1 Control ∅ (NPK)	160,44	4,42	7,10	121,64	34,36	3,31
V2 NPK+Mg SO_4 25%	163,11	4,18	7,04	94,24	32,53	3,84*
V3 NPK+Mg SO_4	160,67	4,62	6,96	101,96	32,18	4,04**
V4 NPK+Mn chelate	168,56*	3,98	6,68	89,44	31,60	3,80*
V5 NPK+Mn chelate	172,78**	4,89*	6,86	113,20	34,04	4,20**
$LSD_{0,05}$	0,06	0,41	0,64	33,93	5,34	0,37
$LSD_{0,01}$	0,09	0,58	0,92	48,05	7,60	0,53

The results of the plant height confirm highly significant difference by applying the manganese chelate on level 0.05 of statistical significance (for Variant 4) and level 0.01 (for Variant 5). Differences in plant height compared to the controls was 8.11 cm Variant 4 (NPK + Mn chelate 20%) and 12.33 cm Variant 5 (NPK + Mn chelate 30%). According number of branches / plant there is a reasonable statistical difference at the level of 0.05% in the Variant 5 (NPK + Mn chelate 30%) compared to the control. In other morphological characteristics - length of pod and number of pods/plant, a statistical significance was not recorded.

Analyzing the yield of seed, all variants had higher yield in comparison with the control (3,31 t/ha) at both levels of significance (0.05 and 0.01). The highest yield was obtained in the Variant 5 (Mn chelate - 30%) - 4,20 t/ha, the second highest yield in Variant 3 (Mn chelate - 20%) - 4,04 t/ha, followed by Variant 2 (MgSO4 - 35 %) - 3,84 t/ha, and the lowest yield was obtained in the Variant 4 (MgSO4 25%) with 3,80 t/ha. The variants with a lower concentration of fertilizer (Variant 2 and Variant 4) had statistically significant differences at the level of 0.05 compared to control, while Variant 3 and Variant 5 had increased yield of 0.72 and 0,89 t/ha compared to control or statistical justification of 0.01%.

Comparing the values of the higher and lower concentrations of $MgSO_4$ and Mn chelate, statistical justification is not recorded. Generally, higher yields are achieved with the use of higher concentrations of applied fertilizers ($MgSO_4$ - 35% Mn chelate - 30%).

From the ascertained efficiency of the quantities of specified concentrations of foliar fertilizer applied and achieved yields shown in Table 2, it can be noted that the variant 5 (NPK+Mn chelate 30%), provides the highest efficiency in comparison to all other variants.

Table 2. Determination of efficiency between the quantity of doses and yields

Inputs	Outputs	Variant	Efficiency (%)	Sum of Lambdas (λ)	*RTS*	Compared to achieved efficiency
Doses	Yield	V1 -control (NPK)	80	0,79	Increasing	V5 -NPK +Mn chelate 30%
		V2 -NPK+Mg SO_4 25%	92	0,91	Increasing	V5 -NPK +Mn chelate 30%
		V3 -NPK+Mg SO_4 35%	95	0,96	Increasing	V5 -NPK +Mn chelate 30%
		V4 -NPK+Mn chelate 20%	91	0,90	Increasing	V5 -NPK +Mn chelate 30%
		V5 -NPK+Mn chelate 30%	100	1,00	Constant	V5 -NPK +Mn chelate 30%

Effectiveness of the relevant doses corresponds to previous statistical analysis of the obtained the highest yield (Table 1). Remarkably high efficiency is obtained in version 3, when applying concentrations of NPK + $MgSO_4$ - 35%, while the lowest efficiency is obtained in the Variant 1 (NPK). Efficiency of applied doses (kg ha^{-1}) as input, in relation with realized yield as output, it is efficient in V5, while the yields of V1(3,31 t ha^{-1}), V2 (3,84 t ha^{-1}), V3 (4,04 t ha^{-1}) and V4 (3,80 t ha^{-1}) can be achieved with a smaller dose (V1, 83,5 kg, V2 35,4 kg, V3 17,8 kg, V4 38,7 kg). In Table 3, the performance between the cost (price) for the purchase of fertilizers that are applied in five variants and yields has been determined, according to the price of the market in Republic of Macedonia, in the year of research.

Table 3. Determination of efficiency between the prices of applied doses and prices by obtained yields

Inputs	Outputs	Variant	Efficiency (%)	Sum of Lambdas (λ)	*RTS*	Compared to achieved efficiency
Doses price	Yields price	V1 -control (NPK)	87	0,82	Increasing	V3 -NPK +Mg SO_4 35%
		V2 -NPK +Mg SO_4 25%	96	0,95	Increasing	V3 -NPK +Mg SO_4 35%
		V3 -NPK +Mg SO_4 35%	100	1,00	Constant	V3 -NPK +Mg SO_4 35%
		V4 -NPK +Mn chelate 20%	86	0,94	Increasing	V3 -NPK +Mg SO_4 35%
		V5 -NPK +Mn chelate 30%	89	1,04	Decreasing	V3 -NPK +Mg SO_4 35%

The costs made for the purchase of quantities of fertilizer and yield (expressed in MKD), showed the best efficiency in variant 3, where NPK fertilizer (0.42 t) and Mg SO_4 (7,8 l/ha) were used. In variant 5 (Table 3), have been made excessive costs fertilizer applied to the given dose compared to the yield obtained, thus reducing efficiency (4%). Although variant 1 control (NPK) apply only basic fertilizer thus costs are lower, however efficiency is lowest compared to the yield obtained in all variants.

Conclusion

The research with respect to the applied foliar fertilizer with magnesium and manganese have shown that there is a statistical significance for two of four concentration used $MgSO_4$ 35% and Mn helat 30% (variant 3 and variant 5). Efficiency of variants, generated by certain concentrations of fertilizers confirmed impact of higher concentrations; in terms of dosages and prices of yields (NPK+Mn chelate 30% and NPK+Mg SO_4 35%).

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