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STUDIES REGARDING EFFICIENCY OF BIOLOGICAL FERTILIZATION WITH ALGAFIX ON WINTER RAPE AND SPRING BARLEY PRODUCTION

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Abstract

Foliar microbiological fertilizer Algafix is represented by a mixture of living green algae species Scenedesmus obtisausculus who are able to assimilate different hormones and antioxidants that are transmitted through the leaves of the plant, stimulating growth and resistance to biotic and abiotic stress, and having an important influence for increased production. This paper presents an experience of establishing optimal Algafix dosage of winter rape and spring barley, with four graduations or doses of 1.5 l/ha, 2 l/ha, 2.5 l/ha and 3 l/ha, which were compared with the control - untreated variant. We watched both morphological and physiological differences on the characteristics of plants in the experimental variants, and production quality indexes obtained, and the correlations established between doses of biofertilizers and measured parameters. In the same time, we studied how the doses of biofertilizers influence the water and mineral elements root absorption by plants grown in the two species, as well as economic efficiency calculation. Compared with untreated control, all variants have obtained positive differences, most production being registered variant V4 (dose of 2.5 l/ha), both in winter rape and spring barley cultures.

Key words*: microbiological fertilizers, spring barley, rape.*

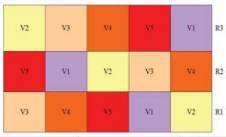
INTRODUCTION

Currently, put increasing emphasis on the transition to a sustainable organic agriculture, especially when the products are used directly in human nutrition. On the other hand, it is very important to avoid environmental pollution, to use less fertilizers and gradually to proceed with both biological products for crop fertilization and for phytosanitarytreats (Leopa, 2013). Also, farmers can easily use the remaining waste for composting farm and obtain organic fertilizer, using various design patterns, depending on the size of farms (Trifan, 2013; Anghelache, 2012). Rape culture is autumn consuming nutrients, increase production is directly proportional to the applied fertilizers. Due to the short period of vegetation, spring barley is not pretentious for fertilization using the residual effect of previous crop, apply fertilizers. To see how to behave crop to biological fertilizer treatments compared with chemical fertilization was achieved with various doses of biofertilizers experience. Algafix is a foliar fertilizer microbiological green alga of the genus Scenedesmus living in water suspension obtained by photofermentation technology, macro and trace elements, plant hormones culture removed from algae. Fractional application of chemical fertilizers provide plant supply throughout the growing season, enabling increased production of grains and based by algae fertilizer application, ensure soil nutrient absorption increase in the critical stages of plant nutrition (Trifan, 2014).

MATERIALS AND METHODS

Experience with chemical and biological fertilization (with Algafix) winter rape has been set according to the method in Latin rectangle in three repetitions (Figure 1).

Each experimental plot has an area of 17.5 m^2 (5m x 3.5m) paths had a width of 1 m, and the whole experience was a total area of 446.5 m^2.



Variant	Tratment	Dose / variant 17,5m^2	Water for solution preparation
V1	Without tratment	-	-
V2	Algafix 1.5 l / ha	2.625ml	525ml
V3	Algafix 2 l/ha	3.5ml	700ml
V4	Algafix 2.5 l/ha	4.375ml	875ml
V5	Algafix 3 l/ha	5.25ml	1050ml

Figure 1. Scheme of experience with chemical and biological fertilization on winter rape in the agricultural year 2013-2014

Biometric measurements were performed: plant size, the diameter of the stem, no. branches / plant, average length of capsule, no. a capsule / plant, no. seeds / capsule, MMB, MH, average production (Figure 2). For statistical interpretation by analysis of variance (ANOVA and Correlation) was used at harvest, the results compared with the average of experience (Trifan, 2014).

Figure 2. Images from the biometric measurements to rapeseed plants in different stages of vegetation, from the experience with different doses of Algafix

RESULTS AND DISCUSSIONS

Average height of rape plants - was between 168 and 183 cm values (Figure 3 a), while the package stem diameter was between 1.4 and 2 cm, the lowest being the untreated variant, and the highest value was recorded in variant V3 (treated with Algafix 2l / ha). It turned out that the variants treated with high doses tend Algafix thickening of the stem at the expense of increase in plant height (Figure 4 a).

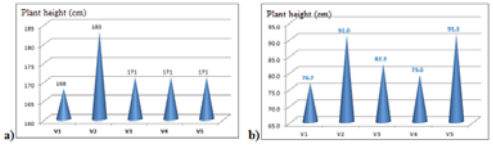


Figure3. The graph for the average size of the plants of oilseed rape (a) and barley (b)

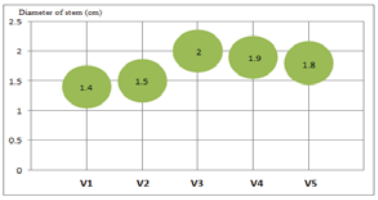


Figure 4. The graph for the stem diameter of rape in experience with Algafix different doses

Number of branches per plant for rape crops - was higher in variant V3 (2 l/ha) - 14 branches/pl., V4 and V5 variants followed by 10 branches/pl., while the average length of capsule had higher values V4 variant (2.5 l/ha) 7.5 cm, followed by variant V3 (2 l/ha), with a length of 6.7 cm (Figure 5).

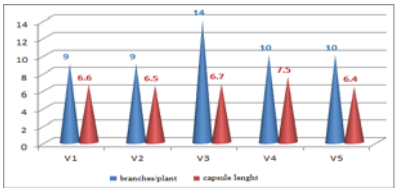


Figure 5. The graph for the average number of branches per plant and average capsule length of rape

For spring barley, the average length of the ear was equal to variants V3, V4 and V5 (11.3 cm), followed by V2 (10.2 cm), with a difference of 2.5 cm and 1.4 cm, respectively (Figure 6).

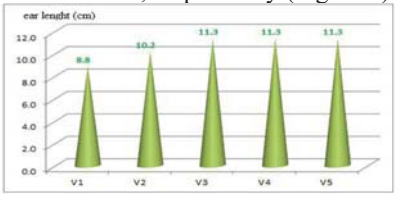


Figure 6. Graph the average values of ear length in spring barley experience with different doses of Algafix fertilization

Number of capsules/plant - was between 252 capsules/plant in untreated variant and 417 capsules/plant in variant V3 (Algafix 2 l/ha), followed by V5 (Algafix 3 l/ha) with 323 capsules/plant and 321 capsules/plant in V4 (Algafix 2.5 l/ha) (Figure 7).

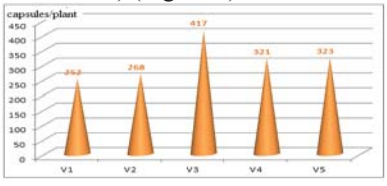


Figure 7. The graph for the average number of a capsules/plant in rape experience

No. seeds/capsule for rape was most increased in variant V4 (Algafix 2.5l/ha) with a value of 30seeds /capsule, representing an increase of 15.38% compared to untreated variant (Fig. 8a), and no. seeds/ear for spring barley was highest in variant V4 (32 seeds/ear), followed by variants V5 and V2 (27 seeds/ear) and V3 (26 seeds/ear) (Figure 8 b).

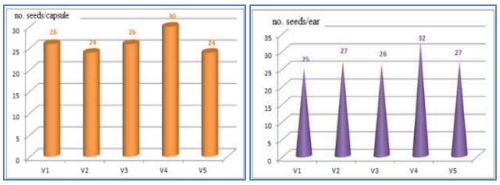


Figure 8. The graph for the average number of seeds per capsule for rape and per ear for spring barley

The mass of a thousand grains for rape, superior to untreated control values were obtained in all variants fertilized with Algafix, the highest value of this element of productivity is obtained V4 version (2.5 l/ha) - 3.36 g, followed by variant V3 (2l/ha) - 3.32 g, V5(3l/ha) - 3.3 g and V2 (1.5 l/ha) - 3.29 g (Figure 9a). The higher values of hectolitre mass in rape experience were obtained by variant V4 (2.5 l/ha) - 66.5 kg/hl, followed by V3 (2 l/ha) - 66.45 kg/hl and V5 (3 l/ha) 66.2 kg/hl (Figure 9b).

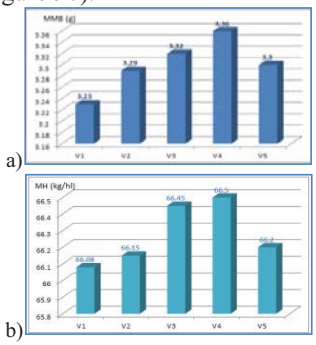


Figure 9. The graph of a thousand grains mass values (MMB) and hectolitre mass (MH) in rape

The mass of grains per ear in spring barley had the highest value compared to the untreated control variant V4 - Algafix 2.5 l/ha (1.2 g), followed by V5 - Algafix 3 l/ha (1.1 g) and V3 (Algafix 2 l/ha) (Figure 10 a). Mass of thousand mass and hectolitre mass in spring barley were differed significantly only variants V4 (Algafix 2.5 l/ha), followed in descending order of variants V5 (Algafix 3 l/ha) and V3 (Algafix 2 l/ha) (Figure 10b).

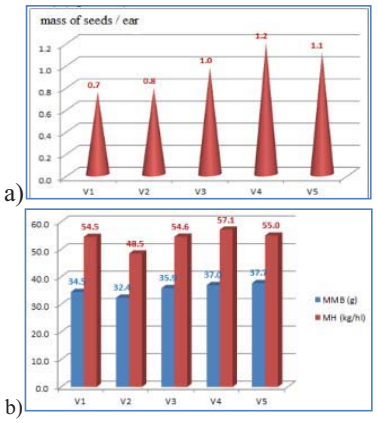


Figure 10. Graphs for the average weight of grain in the ear and the MMB and MH in spring barley experience

Average yield of rape (recalculated at 8% moisture STAS) shows that influence of fertilization was observed most in variant V3 (dose of 2 l/ha), with an increase of 31%, followed by V4 (dose 2.5 l/ha) with an increase of 30% and V5 (dose of 3 l/ha), with an increase of 3% compared to control represented by experience average (Figure 11).

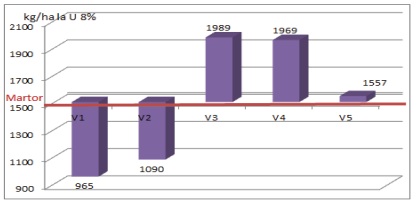


Figure 11. The graph of the average production for winter rape in Algafix experience

The highest average yields per hectare in spring barley experience were obtained on application Algafix dose of 2.5 l/ha (V4), with 60% more than average experience, followed in descending order by version V5 (3 l/ha), which obtained a production increase of 15% and V3 version (2 l/ha), with an increase of 1.18% (Figure 12).

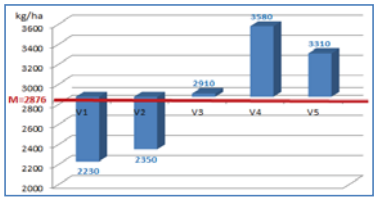


Figure 12. Graph the average production experience with Algafix in spring barley in crop year 2013-2014

Correlations established between Algafix doses and values of MMB, MH and average yield were significantly influenced by increasing the dose of biofertilizers Algafix, while ear length, number of grains per ear and ear weight had a negative correlation with increasing Algafix doses.

Therefore, we can say that by increasing the dose of Algafix can positively influence the grain dry matter accumulation, leading to increased MMB, MH and average production per hectare (Figure 13).

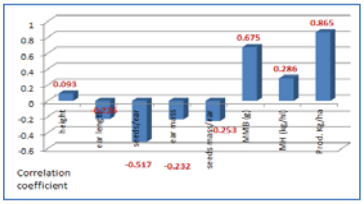


Figure 13. Graph correlations established between Algafix doses and productivity indices

Between increasing dose of Algafix and average production was a very significant positive correlation with a coefficient of 0.865 (Figure 14) and between increasing dose of Algafix and MMB and MH (Figure 15).

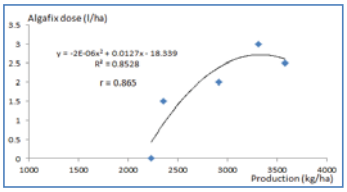


Figure 14. Graph of correlation between Algafix doses and average production

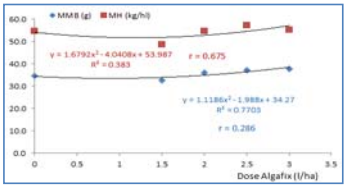


Figure 15. Graph of correlation between Algafix doses and thousand seeds mass, and hectolitre mass

Calculation of economic efficiency on Algafix doses applied in autumn rape culture revealed that the highest profit was achieved in variant V3 (Algafix 2 l/ha), followed by variant V4 (2.5 l/ha) and V5 (3 l/ha).

In spring barley, the highest profit per hectare was obtained from version V4 (2.5 l/ha), followed in descending order by version V5 (3l/ha) and V3 (2l/ha) (fig. 16).

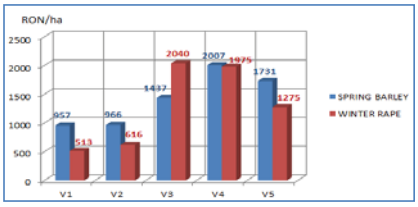


Figure 16. Profit per hectare calculated for each experimental variant of winter rape and spring barley

CONCLUSIONS

Algafix microbiological fertilizer used for winter rape and spring barley make a significant production by increasing of thousand grain weight and hectolitre mass.

Algafix doses recommended for these crops are 2.5l/ha and 2l/ha, which can increase the profit per hectare from two to four times compared to unfertilized variant.

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