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THE INFLUENCE OF FOLIAR FERTILIZERS ON RAPE CROPS FROM SCDA CARACAL

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ABSTRACT

Rapeseed crop fertilization is one of the greatest technological elements that had the most significant impact on production.

The quantity and quality of the seed production are determined to a large extent also by the technological link fertilizatio, respectively the amount of fertilizers with macro and micronutrients, the report between the fertilising applied elements and the exact moment of fertilizing. Alongside a basic mineral fertilizer, which remains indispensable, foliar fertilization is a measure to increase both the amount of crop and its quality.

Given the importance of fertilization in the technology of rape culture and its requirements for secondary macronutrients and micronutrients, in the present study research had been made on the effect of foliar fertilizers on rape culture at SCDA Caracal.

The obtained results led to the conclusion that, when it comes to rape, performing more treatments, as well as combining several fertilizers or treatments, lead to obtaining vigorous plants with an increased number of branches and those of capsules on plants so production will be improved quantitatively and qualitatively.

INTRODUCTION

Rape is one of the crops with the highest specific consumption (quantities of nutrients in kilograms, conventional active substance, used to produce a ton of main crop and adequate amount of biomass). The recommended doses (with no chemical analyzes), varies between 80 - 180 kg N/ha 50-120 kg P_2O_5/ha and 65 - 150 K_2O/ha, depending on the expected yields.

Foliar fertilization can also contribute to increase the agricultural production in general and rape, in particular, its stability over time and, not least, its quality. Foliar fertilizers applied to the foliage of plants are designed to stimulate and supplement the plant nutrition during critical periods of nutrition, but, especially in the second part of the vegetation (Alexander, 1985; Borlan 1998 and 1989).

In May, during the flowering period, there may be applied foliar fertilizers containing nitrogen, sulfur, boron, alongside pesticides.

Due to the excess of nutrients, especially the trace elements contained in these foliar fertilizers, plants benefit from optimal growth and development conditions, and, therefore, will fight easier and more efficient against stress factors (Avarvarei, 1997).

The foliar fertilizers used in the rapeseed crop, gave considerable results, with increases of 15 - 20% on soils affected in some way by the deficiency in trace elements. There are formulated several types of foliar fertilizers classified according to plant culture, their availability and their metabolic needs. It can be applied between 2 and 12 l / ha, depending on the composition, together or separated from specific pesticides (Lixandru, 2006; Rusu, 2005; Borlan, 1990).

The rapid development of the methods and technologies of fertilization using extraroot fertilizers and liquids was due both to the possibility of controlled applying of those depending on the phases of vegetation, culture, agrofond and nutritional deficiencies and the increasement of the efficiency indicators on fertilization costs - economic results.

MATERIALS AND METHODS

The usage of fertilizers with foliar application became part of modern technologies of plant culture. It is one of the important technological links to help crops make full use of their genetic potential. Also, the foliar fertilization should be considered a technological intervention in the temporary timing calendar of crop fertilization.

Given the great importance that foliar fertilization has for rape, within the experimental field at SCDA Caracal, it was followed the effect the usage of some foliar fertilizers had upon the plant's height, number of branches / plant, number of capsules/plant and the production of rapeseed.

The experimental device was placed at SCDA Caracal on a cambic baticalcaric chernozem in conditions with no irrigation.

The plant previous to the rapeseed crop was wheat and the tillage consisted of summer plowing, followed by a hard disk work and two works of rolling.

The basic fertilization was done with 250 kg/ha of fertilizer 18-46-0 complex. For the preparation of the seedbed, there was carried out an easy discing and a combiner work.

The rape was sown on the date of 09/19 using the Annise hybrid with a density of 65 germinated grains/m2, while the emergence was good around 09/27.

At the beginning of spring (February 27th), there was also administered 200 kg/ha of ammonium nitrate, with 34.5% N.

The weed-killing was done with Sultan 50 SC, a dose of 2l/ha, and the pesticide treatments were done with Mirage 1l / ha + Lamdex 0.2 l/ha and Zamir 0.7 l/ha + 0,2 l Mavrik/ha.

As foliar fertilizers in vegetation, there were used Lebosol® - Total Care, Lebosol - Mixed rape Aminosol, Molybdenum and Potassium TS.

Lebosol®-Total Which is an organic foliar fertilizer on the basis of hydrolyzed animal protein mixed with trace elements (Cu, Mn, and Zn), a copper content of 0.37% in water soluble form of copper nitrate (4.5 g/l Cu); 1.5% Water-soluble manganese such as manganese nitrate (18.6 g / l Mn); 0.46% water-soluble zinc as zinc nitrate (5.7 g/l Zn). Additionally contains 9% total nitrogen (112 g/l N) (2.7% nitric; 4.7% amide nitrogen, 1.6% organically bound nitrogen); 0.05% water-soluble boron in the form of boretanolamină (0.6 g/l B); 0.9% water-soluble phosphate (11.2 g/l P_2O_5); 2% of water soluble potassium (24.8 g/l K_2O); 1.7% water soluble magnesium (21 g/l MgO), 2.7 < pH.

Lebosol - Mixed rape is a foliar fertilizer, mixed with trace B, Mn, and Mo. It contains 4.1% boron such as calcium borate (61 g/l B), 4.8% total manganese form manganese oxide (71 g/l Mn), 0.5% of molybdenum soluble in water under form of sodium molybdate (7 g/l Mo). In addition it contains 9% calcium oxide (133 g/l CaO), 9.2% sulfur (136 g/l S), pH is 8.5.

Aminosol - organic foliar fertilizer based on animal protein hydrolyzate, containing 9.4% total nitrogen (116 g/l N), 1.1% potassium oxide (14 g/l K_2O). Secondary: 0.25% total sulfur (S), 1.28% total sodium (Na), 66.3% organic substance, pH: 5-7.

Lebosol®-Molybdenum - foliar fertilizer on the basis of molybdenum, a molybdenum content of 15.6% soluble in water (214 g/l Mo), pH value of 7.6.

Potassium Lebosol® TS-340 - S + NK fertilizer solution (3-23 + 15), with a total nitrogen content of 3% nitrogen in form of amide nitrogen (44 g/l N); 23.4% water-soluble potassium (340 g/l K_2O); 15.9% water-soluble sulfur (231 g/l S), pH of 9.

The experience has been placed as required by experimental technique subdivided, choosing the parcels' method subdivided into 3 options with 3 repetitions:

- V1 - unfertilized;
- V2 with two treatments: Total Care dose of 2 l/ha conducted in fall as seed treatment (September 16th) and Total Care dose of 4 l/ha conducted in spring (April 10th);
- V3 with three treatments, one in autumn and two in spring: Mixed rape at 1.5 l/ha conducted in Fall (Sept. 30); Rape mixed 1.5 l/ha + Aminosol 1 l/ha + Molybdenum 0.2 l/ha in spring (April 10th) and the third treatment with Potassium TS 340 at 3 l/ha in spring (April 20th).

RESULTS

Foliar fertilization is of particular importance in ensuring nutritional trace elements, both for intensive crops, and for the other crops on soils deficient in trace nutrients.

Rape is a plant with a high need of nutrients and, in order to obtain a high production, there is needed appropriate technology to supply it with nutrients and to react particularly sensitive to insufficiency of boron, manganese, molybdenum and sulfur.

For rapeseed, foliar fertilizers along with basic fertilization contribute significantly to the achievement of performant productions by applying them in the second growing season.

At SCDA Caracal, for the rape crop, during the growing season, there were used 5 types of foliar fertilizers that were administered single or combined in two seasons - fall and spring (table 1).

Used fertilizers and sample testing

Table 1

No.	Version	Treatment
1.	V 1 (Mt)	Unfertilized
2.	V 2	- Tr.1 - Total Care 2 l/ha (fall) - Tr.2 - Total Care 4 l/ha (spring)
3.	V 3	- Tr.1 - Mixt rape 1,5 l/ha (fall) -Tr.2 - Mixt rape 1,5 l/ha + Aminosol 3 l/ha + Molibden 0,2 l/ha (spring) - Tr. 3 – Potassium TS 340, 3 l/ha (spring)

The climatic conditions of the year of experimentation, at SCDA Caracal, the usage of foliar fertilizers on complex agrofond 18-46 -0 and ammonium nitrate, had a positive impact on rape culture (table 2).

The rape culture began to flourish on 6 April and the end of flowering was recorded on 16 May. In the mean time, more precisely at the start of flowering (April 10th) foliar treatments have been performed with the proposed products as planned for fertilization in fixed doses. An exception was the third treatment from V3, which was applied a little later (April 20).

The results obtained at rapeseed as experimental versions

Table 2

Version	Beginning of flowering	End of flowering	Height (cm)	No. ram./pl.	No. capsule/pl	Prod. STAS kg/ha
V 1(Mt)	06.04.	16.05	158	7,0	261	3560
V2	06.04.	16.05	170	8,2	293	4136
V3	06.04.	16.05	175	8,3	298	4352

As a result of the application of 5 types of fertilizers in the combinations and dosages established, it was found that they influenced not only the production but also the plants' height, the number of branches and the number of capsules of the plant.

For version V2, the two undertaken treatments followed a single application of the Total Care product at doses of 2 l/ha, in fall, as seed treatment; and 4 l/ha in spring, in vegetation. These two treatments lead to an increase in production of 576 kg/ha, at V2 compared to V1. Also, the average size of the plants was bigger than 12 cm; the average number of branches per plant was 1.2 higher, and the average number of capsules was 32 higher at version V2 compared to V1.

For version V3 were applied three treatments and it was monitored the effect combinations of several products can have on production. The first treatment was carried aut with mixed rape, in fall, at 1.5 l/ha, and the following two treatments were conducted in spring. The second mixed rape treatment combined 1.5 l/ha with Aminosol 1 l/ha and Molybdenum 0.2 l/ha; and the third treatment was carried out with a single product - Potassium TS 340 at a dose of 3 l/ha.

The effect of combined applying of foliar products in fall and spring, through three treatments led to increases in production, plant height, number of branches/plant and number of capsules/plant, both compared to the first version (V1), and to the fertilized version with a single product by means of two treatments (V2). Thus, for version V3, the average plant size was 175 cm, 17 cm, much more than the unfertilized version (V1) and only 5 cm more compared to V2. The average number of branches / plant V3 was 8.3 compared to 8.2 for V2 and 7 branching for V1. The average number of capsules was 298 /plant for version V3, while for V2, it was 293/plant and 261/plant for V1. Regarding the average yield obtained for V3, it was 4352 kg/ha, which means 772 kg/ha higher than the unfertilized version (V1) and 216 kg/ha higher than V2.

CONCLUSIONS

Research conducted in the experimental field from SCDA Caracal, concearning the effect of foliar ferilizanţilor on a culture of rape, lead to important conclusions and considerations, especially for the stage our country's agriculture is facing.

1. Culture of Rape reacted very well to the application of foliar fertilizers used as additional fertilizer, compound fertilizer on agrofond with nitrogen and phosphorus (between 18 - 46-0) and simple nitrogenous fertilizer (ammonium nitrate).

2. For the rape culture, the application of two treatments – in fall and spring - with a single product (Total Care), but in different doses, it had the desired effect, that of increasing production.

3. The application of three treatments with foliar products and the attempt of the combined administration to a single treatment, led to higher yields, compared with the version, in which two treatments were made.

4. Production differences are between versions to which were applied foliar fertilizers and witnesses, but it appears that the biggest difference compared to the first version is represented by V2, which uses a single product in two treatments, but one of which is used for the treatment of seed.

5. It seems that, in economic terms, there is no justification to make more than two treatments or to combine several types of fertilizer, seeing as the obtained production increasement is too low and the expenses too high.

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