THE INFLUENCE OF SOIL FERTILIZATION AND OF THE FOIL FERTILIZATION UPON THE DISEASE ATTACK AT THE WINTER WHEAT

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Abstract

The fertilization of the wheat by using foil fertilizers together with complex chemical fertilizers applied directly on the soil is determined by the technical and economical advantages that it offers.

The use of foil fertilizers is favored by the mechanization and automation of the transport, storage and administration operations, fact which almost totally eliminates the losses and insures uniformity in application and in controlling the recommended doses of fertilizers.

In order to emphasize the role of fertilization with chemical fertilizers applied on the soil and of the foliar fertilization, the flouration and the septoria degree of attack has been measured upon the Renan type of wheat, by a differenced application of the fertilizing doses: $N_{60}P_{60}K_{0,}$ $N_{120}P_{120}K_{0,}$ $N_{120}P_{120}K_{0}$*+Wuxal Macromix,* $N_{60}P_{60}K_{60,}$ $N_{120}P_{120}K_{120,}$ $N_{120}P_{120}K_{120}$*+Wuxal Macromix.*

Key words:foil fertilization, fertilizers, foil application, soil fertilization, foil diseases

INTRODUCTION

The winter wheat is one of the agricultural plants which positively reacts to the application of fertilizers in all the weather conditions existent in our country. The wheat is pretentious to fattenning due to the fact that it has a poorely developed radicular apparatus with a weak power of solubilization of the soil's nutritious stocks. Although its vegetation period is longer, the most part of the nutritious elements are absorbed in a very short period of time, since the formation of the straw until the in milk ripening. During this short time interval the wheat is not able to ensure itself, in order to give big harvests, the necessary of elements only from the soil's stocks (Bîlteanu etal., 1989).

Nitrogen has got a great importance for the wheat's nutrition as it determines a good growth and development of the plants, it being one of the main elements which forms the complex molecule of the protides, with a direct intervention upon the synthesis of the chlorophyll, determining through this, the plants' synthesis capacity. Phosphorus favors the development of the radicular system through the growth of the roots in depth, and in this period great stocks of phosphorus are stocked in the root later being used to form the leaves, the flowers and the seeds. Potassium acts during the photosynthesis, into the synthesis of the protoplasm and

participates to the synthesis and transport of the carbohydrates. Together with the phosphorus potassium favors the growth of the roots and has an important contribution in the formation of the mechanical tissues, which leads to an increased resistance of the plant to the action of falling and to different diseases (Domuța et al.,2011).

For a production of 5000kg/ha the wheat extracts: 114kg N, 57Kg P_2O_5 and 107 kg K_2O. From these quantities 70% from nitrogen and 66% from phosphorus are accumulated in the seeds, and 70% from the potassium is accumulated into the straws. (Borcean et al., 2006).

The foil fertilization of the wheat represents an efficient measure in the development of productivity elements, especially of the elements regarding the wheat spike. The foliar fertilizers maintain the standard leaf green for a longer period of time, leaf that has got a predominant role into the stocking of the substances accumulated in the wheat grain (Bîlteanu, 2003).

The foliar fertilization of the culture stimulation is situated between the agricultural measures of increasing the degrees of productive use of the nutritious substances in the harvest and the increaseof fertilization efficiency by influencing the internal environment of the plant.

This fertilization measure does not substitute itself but it adds to the soil fertilization, in a balanced and adequate way, according to the nutritious requirements of the cultures, to the level of expected harvests and to the characteristics of the soil. The application of the foil compositions does not eliminate soil fertilization, but, on the contrary, it determines it (Berca, 2008).

Fertilizers with extra radicular application must be presented into the form of solutions/mixtures of homogenous chemical compounds, having the property of being totally miscible in water and they must contain essential nutritious macroelements (N,P,K, Ca, Mg), as well as microelements with a significant role in the development of the biochemical processes of the plants' metabolism. (Fe, Cu, Zn, Mn, B, Co, S, Mo etc.), (Sîrbu et al., 2012).

The foliar fertilization with macro and micro elements is a wheat's supplementary way of nutrition, it stimulates the development of the productivity elements and improves the quality of the harvest. It associates itself with the chemical destruction of weed, foliar diseases and pests (Borza et al., 2010).

All the chemical elements involved in the nutrition of the plants present certain effects (positive or negative) in establishing the resistance of the plants to the attack of diseases and pests. Some of them, in certain compositions, (copper, zinc, manganese) have even got disease prevention, restriction and destruction effects (Rusu et al., 2005).

Foliar fertilizers with an effect of protection against diseases provoked by fungi own higher contents of metallic microelements (Fe, Mn, Cu, Zn) under the form of hydroxides and basic salts colloidally spread through the ammonium, potassium and sodium lignosulfonates and thus they protect the leaves, the sprouts and the inflorescences from the attack of any fungi. Beside these effects, foliar fertilizers have got fertilizing effects through the quantities of macro and microelements owned (Rusu etal., 2005).

No matter of the rotation, the wheat does not need more than 550-600mm precipitations to reach maximum production having in view the conjuncture of the other vegetation factors (Berca, 2011).

MATERIAL AND METHOD

Research related to the soil fertilization and to the foliar fertilization regarding the disease attack at the Renan autumn type of wheat have been performed in 2015 at the Leş-Bihor agricultural farm.

The analyzed experimental variants have been the following:

- Factor A- type of fertilizer
  a_0-Non-fertilized witness
  a_1-$N_{60}P_{60}K_0$- solid complex fertilizers
  a_2-$N_{120}P_{120}K_0$- solid complex fertilizers
  a_3-$N_{120}P_{120}K_0$+Wuxal Macromix(3l/ha)–solid complex fertilizers + foil fertilizer
  a_4-$N_{60}P_{60}K_{60}$- solid complex fertilizer
  a_5-$N_{120}P_{120}K_{120}$- solid complex fertilizer
  a_6-$N_{120}P_{120}K_{120}$+Wuxal Macromix(3l/ha)–solid complex fertilizer + foil fertilizer
- Factor B – The diseases' degree of attack

The application of the solid complex fertizers has been performed in autumn, before sowing and during winter, into the snow's mustum. Foil fertilizers are applied in spring, starting with the skin stage of the wheat until the apparition of the wheat's spike and due to the copper the plant is protected against diseases.

Foil fertilizers are more accessible to the plants, the average level of liquid nitrogen usage being of 90-95%, in comparison with 40-45% in the case of solid fertilizers.

The culture technology for the Renan type of wheat has respected the wheat's specific requirements, on a brown luvic soil, the sowing being done during the optimum period 10th -20 th of October.

The weather conditions during the study period have been normal from the point of view of the temperature and of the precipitations.

Wuxal Macromix is a NPK foil fertilizer under the form of a concentrated suspension, and it completes the plant's neccessary of micro elements.

By optimizing the plant's nutrition, Wuxal Macromix has also got a stabilizing effect upon the plant's health.

RESULTS AND DISCUSSION

Research regarding the establishment of the chemical soil fertilizers'efficiency have been performed in 6 variants of work, according to the type of fertilizer and to the doses administered.

For the analysis of the interaction between the applied type of fertilizer (factor A) and the diseases' degree of attack (factor B) we have chosen as a witness the variant: a_0- $N_0P_0K_0$ (Table 1).

The application of the foil fertilizers contributes to the improvement of the nutritious elements'usage coefficient and they have also got a protection effect of the plants against diseases produced by fungi.

Foil fertilizers with protection effect of the plants against diseases produced by fungi have got a higher content of metallic microelements (Fe, Mn, Cu, Zn), under the form of hydroxides and basic salts spread colloidally through ammonium, potassium and sodium lignosulfonates and thus they protect the leaves, the sprouts and the inflorescences from the attack of certain fungi.

By applying normal and balanced doses of complex fertilizers (NPK) associated with foil fertilizers (Wuxal Macromix) which contain the micro elements, the plants' resistance to fungi increases (Table 1).

Table 1

The influence of soil fertilization and of the foil fertilization upon the flouring attack,Leş-Bihor, 2015

Crt. No.	Variant of fertilization	Degree of attack %	% in comparison with the witness	Difference in comparison to the witness	Significance
1.	Non-fertilized witness	12.54	100,00	0.00	-
2.	$N_{60}P_{60}K_0$	11.86	94,57	-0.68	-
3.	$N_{120}P_{120}K_0$	12.98	103.50	+0.44	-
4.	$N_{120}P_{120}K_0$+Wuxal Macromix	11.25	89.71	-1.29	-
5.	$N_{60}P_{60}K_{60}$	7.32	58.37	-5.22	000
6.	$N_{120}P_{120}K_{120}$	7.56	60.28	-4.98	000
7.	$N_{120}P_{120}K_{120}$+Wuxal Macromix	6.22	49.60	-6.32	000

LSD %=2,51 LSD 1%=3,48 LSD 0,1%=4,92

The differential use of the complex fertilizers determines significant differences of the diseases' degree of attack upon the Renan autumn type of wheat. The diseases' degree of attack has got higher values when applying

the NP doses, being between 11.25-12.98%, in comparison with 12.54% at the non fertilized witness and by applying potassium and micro elements the diseases' degree of attack decreases significantly, having values between 6.22-7.32%. The flouring percentage in comparison to the witness variant is higher, reaching 103.50% in case of applying the doses of $N_{120}P_{120}K_0$, which shows that the unilateral application of the NP complex fertilizers even in higher doses determines a higher percentage of flouring.

In order to underline the role of the fertilization upon the resistance to septoria, in the case of Renan type of wheat, the degree of attack has been analysed according to the dose of application for the NP and NPKcomplex fertilizers in association with foil fertilizers (Table2).

Table 2

The influence of soil fertilization and of the foil fertilization upon the septoria attack,Leş-Bihor, 2015

Crt. No.	Variant of fertilization	Degree of attack %	% in comparison with the witness	Difference in comparison with the witness	Significance
1.	Non-fertilized witness	22.35	100,00	0,00	-
2.	$N_{60}P_{60}K_0$	21.56	96.46	-0.79	-
3.	$N_{120}P_{120}K_0$	23.62	105.68	+1.27	-
4.	$N_{120}P_{120}K_0$+Wuxal Macromix	20.36	91.09	-1.99	-
5.	$N_{60}P_{60}K_{60}$	17.25	77.18	-5.10	0
6.	$N_{120}P_{120}K_{120}$	15.42	68.99	-6.93	00
7.	$N_{120}P_{120}K_{120}$+Wuxal Macromix	14.23	63.66	-8.12	00

LSD 5%=4,47 LSD 1%=6,31 LSD 0,1%=9,01

Septoria's degree of attack upon the autumn type of wheat has got higher values than the flouring attack, these values being between 14.23% in case of fertilization with $N_{120}P_{120}K_{120}$+Wuxal Macromix, and it reaches 23.62%, in case of fertilization with doses of $N_{120}P_{120}K_{0.}$

The highest flouring attack is registered in case of fertilization with huge doses of NP, which shows that the unilateral fertilization, without adding potassium, weakens the wheat plant's resistance to the attack of the diseases.

By applying increased doses of NPK, associated with the application of foil fertilizers plants are stimulated and efficiently protected against diseases determined by pathogenic fungi. Beside the corresponding concentrations of macro and micro elements, fertilizers form persistent pellicles of hydroxides and basic salts colloidally spread and included in the ammonium, potassium and sodium lignosulfonates.

CONCLUSIONS

The winter wheat is very pretentious when it comes to fertilization as its radicular system is poorely developed and it explores a reduced volume

of soil, thus having a lower power to absorb nutritious elements from the soil.

The highest level of nutritious elements' consumption is registered during the straw's period of elongation until the ripening of the wheat. During this period the wheat needs corresponding quantities of nutritious elements and under accessible forms.

By applying foil fertilizers during the vegetation period, a favorable report is created between the micro and macro elements, favoring the uniform development of the plants.

Foil fertilizers are compatible and miscible with most fito pharmaceutical products used in fito sanitary treatments of the wheat culture(herbicides, insecticides şi fungicides).

The association of foil fertilizers and of pesticides concomitently realize more works from the culture technology by a single passing of the machines on the fields thus determining a decrease of the fuel consumption.

The flouring and septoria degree of attack have been the lowest by applying complex fertilizers such as $N_{120}P_{120}K_{120}$, associated with the foil fertilizer Wuxal Macromix(3l/ha), being of 6.22% to flouring, in comparison with 12.54% in the case of the non-fertilized witness and of 14.23% to septoria in comparison with 22.35% in the case of the non-fertilized witness.

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