

THE ROLE OF THE PRECURSORY PLANT IN ORDER TO OBTAIN BIG AND HIGH QUALITY PRODUCTIONS AT THE WINTER WHEAT IN THE WEST PLAIN'S WEATHER CONDITION

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Abstract

The winter wheat represents one of the most important cereal and occupies the biggest cultivated surfaces on the globe, as well as in our country. Due to its high content of carbohydrates and of protean substances, wheat is used in producing bread and other different flour containing products and it represents the basic food for the biggest part of the world's population.

In order to obtain big and high quality productions, the precursory plant represents an important role in the wheat's culture technology, which manifests itself through the quantity of the remaining organic tailings in the soil and through the biological processes of decomposition which shall finally reflect upon production.

The precursory plants for the winter wheat must correspond to the following requests: these plants should not be in the Plains early in the summer so that the soil be ready for sowing, the soil should also be cleaned of any weed, with improved physical and chemical features, rich in nutritional and organic substances.

In order to emphasize the role of the precursory plant in the culture of the winter wheat we have analyzed the quantitative and qualitative production in the conditions of a wheat mono culture, the two year rotation culture wheat – corn and the three year rotation culture peas – wheat – corn and colza - wheat – corn.

Key words: crop rotation, precursory plants, monoculture, gluten content, proteins

INTRODUCTION

The Plain in the west part of the country is characterized by a weather condition very favorable for the winter wheat. The frequency of the drought years during the winter wheat sowing period or during the grain formation period is more reduced here than in any part of the country.(Bîlteanu, 2003).

The precursory plant used in the wheat crop rotation has got an important role in destroying weed, diseases and pests and it has also got an effect upon the wheat production. The rational plant succession has a positive influence upon the production level as well as upon the quality of the obtained production.

The winter wheat has special pretensions in what the precursory plant is concerned. The wheat production differs a lot according to the type of the precursory plant.(Tătaru et al., 1973).

The wheat is assuming towards the precursory plant because the wheat needs to be sowed in autumn, quite early, so that by the time the weather is

cold it manages to twin and to harden itself in order to resist during the winter. (Muntean et al., 2001).

For the winter wheat a precursory plant is the best when it is cleared off the Plain as soon as possible and when it creates better conditions for the soil preparation.(Bîlteanu, Bîrnaure,1989).

In what the crop rotation is concerned, it needs to create the best growing conditions for each culture. Crop rotation on the same area is absolutely necessary, as cultivated plants differ a lot in the way they use water or nourishing substances from the soil, in the way they resist diseases and pests, in the way they assimilate organic substances in the soil, etc.(Popescu, Duvlea, Olteanu, 1983).

The best precursory plants are the plants harvested early: vegetables, colza, lin for oil, lin for fibres, corn cultivated for green mass and silo, early potato, the beet for seeds, the hemp for bunLSDe.(IBorcean et al., 2006)

Wheat is a very good precursory plant for the majority of the cultures, as it is early harvested from the Plains and allows ploughing starting early in summer.(Borza, Stanciu, 2010).

Cultivating wheat several years round on the same area leads to good conditions for the development of different diseases and pests. It is a must to have a wheat culture after a corn culture, as both these plants occupy together, about 60% of the ploughing surface of the country, and in the special corny areas they occupy even more.(Bîlteanu, Bîrnaure,1989).

The wheat – corn rotation is the most widely present in our country and it represents a special economical importance. It must be though noticed that the wheat – corn production is significantly lower than the production obtained on a longer period crop rotation.(Bîlteanu, 2003).

The pea is a precursory plant that has got a special value for the winter wheat, because it can be harvested early and it fixes the atmosphere nitrogen. The increase of production obtained for the wheat cultivated after the corn can be comprised between 9,7 and 17,73q/ha(Domuța et al., 2011).

Colza is one of those plants capable of changing the micro flora of the soil and it can favor the destruction of certain parasites, this is why it is considered an excellent precursory plant for the wheat.(Berca, 2011).

In the two year rotation wheat – corn, the total number of weed is smaller to the number of weed existent in the monoculture, but from one experimental cycle to another , the number of the weed increases on all agricultural areas. In the three year rotation, peas – wheat – corn, the weed attack was obviously less than that in the monoculture.(Gh. Ciobanu, Domuța et al., 2003).

MATERIAL AND METHOD

The research has been done on the winter wheat, having in view the weather conditions existent in the West Plain, at the agricultural farm of Leş-Bihor. The analysis of the obtained productions during the crop rotation was researched for the time period 2012 - 2014.

We have used three types of crop rotations, of two years and of three years, in order to establish big and high quality productions:

- wheat monoculture;
- wheat-corn;
- peas-wheat-corn;
- colza-wheat-corn;

The wheat monoculture variant was chosen as a witness for the analysis of the level production for the three types of crop rotation.

The following indexes have been analyzed in order to establish the quality of the winter wheat for the studied period 2012 – 2014: the content of protein and the content of gluten.

RESULTS AND DISCUSSIONS

1. The influence of the precursory plant upon the winter wheat production's level.

The precursory plant has a very important role in the winter wheat culture technology through the recrudescence time on the same surface area and through establishing the fertilization system in order to ensure good conditions for the development of the culture and having as a main aim a big and high quality production.

The study related to the role of the precursory plant upon the winter wheat's production level on a two and three year rotation crop, in comparison with the monoculture is presented in table 1.

Table 1

The influence of the precursory plant upon the average wheat production for the winter wheat, in the conditions of the West Plain, in Leş-Bihor, 2012-2014

Crt. Nr.	Crop rotation	Average production 2012-2014		Difference		Significance
		kg/ha	%	kg/ha	%	
1.	Wheat monoculture -Mt.	2850	100	-	-	-
2.	Wheat-corn	4270	149.82	1420	49.82	xxx
3.	Peas-wheat-corn	5420	190.17	2570	90.17	xxx
4.	Colza-wheat-corn	4940	173.33	2090	73.33	xxx

LSD 5%=342,00

LSD 1%=505,00

LSD 0,1 %=780,66

In the three years of culture, for the monoculture wheat we got the lowest level of production: 2850 kg/ha; for the wheat – corn rotation crop, having corn as a precursory plant the level of production has increased to 4270 kg/ha, so there was a production increase of 149,82%; in the case of the three year crop rotation peas – wheat – corn, having as a precursory plant the pea, the production has reached 5420 kg/ha, with a production increase of 190,17% in comparison to the witness, and in the three year crop rotation colza – wheat – corn, having as a precursory plant a technical plant – the colza, the production increase was of 173,33%.

2. The influence of the precursory plant and of the crop rotation upon the content of gluten.

The quality of the wheat is given by the content of gluten. The influence of the precursory plant and the crop rotation have got a very important role upon the quantity of gluten existent in the wheat. Introducing a second or a third plant within the crop rotation, unlike the wheat monoculture, leads to an increase in the quantity of gluten. In the case of a three year rotation crop, by introducing into the rotation the vegetable plant the pea, which has the capacity to enrich the soil with nitrogen, the content of gluten from the wheat shall show a significant increase.

The study related to the role of the precursory plant upon the quantity of gluten existent in the winter wheat, for the time period 2012 – 2014, in a crop rotation of two and three years in comparison with the monoculture is presented in table 2.

Table 2

The influence of the precursory plant upon the content of gluten in the winter wheat, in the condition of the West Plain, in Leş-Bihor, 2012-2014

Crt. Nr.	Crop rotation	2012		2013		2014		2012-2014	
		Wet Gluten	%	Wet Gluten	%	Wet Gluten	%	Wet Gluten	%
1.	Wheat monoculture - Witness	25.2	100	25.6	100	25.9	100	25.5	100
2.	Wheat-corn	26.5	105.1	27.2	106.2	27.5	106.1	27,0	105.8
3.	Peas-wheat-corn	27.8	110.3	28.3	110.5	28.6	110.4	28.2	110.5
4.	Colza-wheat-corn	27.3	108.3	27.6	107.8	28.0	108.1	27,6	108.2

From the data presented in the table it can be noticed that during the three years of culture, the quality of the wheat represented by the wet gluten presents significant variations according to which was the precursory plant.

Thus, in the case of the wheat monoculture, the average value of the gluten in the three years of study was of 25,5; in the two year crop rotation wheat-corn, the average value was of 27, and in the case of the three year rotation crop having the pea as a precursory plant, the average content of gluten was of 28,2 and of 27,6 when the precursory plant was the colza, a technical plant.

3. The influence of the precursory plant and of the crop rotation upon the protein content.

In what the wheat production quality is concerned, during the experiment years 2012-2014, by introducing one, two or more plants in the crop rotation we have noticed that the content of protein actually increased in comparison with the wheat monoculture.

The wheat in rotation with the corn leads to an increase of the quantity of proteins in two consecutive years. In a three year rotation crop, the influence of a technical plant or of a vegetable like the pea, which has the capacity to enrich the nitrogen quantity in the soil, leads to significant increases of the protein content in the wheat grains.(table 3).

Table 3

The influence of the precursory plant upon the protein content at the winter wheat in the conditions of the West Plain in Leş-Bihor, 2012-2014

Crt. no.	Crop rotation	2012		2013		2014		2012-2014	
		Protein	%	Protein	%	Protein	%	Protein	%
1.	Wheat monoculture - Witness	13.2	100	13.4	100	13.8	100	13,4	100
2.	Wheat-corn	14.1	106.8	14.5	108.2	14.8	107.2	14.4	107.4
3.	Pea-wheat-corn	14.8	112.1	15.2	113.4	15.6	113.0	15.2	113.4
4.	Colza-wheat-corn	14.5	109.8	14.8	110.4	15.1	109.4	14.8	110.4

The protein content of the wheat follows the ascending course of the gluten content, being influenced by the precursory plant and by the duration of the crop rotation. In the case of the wheat cultivated in monoculture, the protein content has got an average value of 13,4 during the three years of culture; it reaches an average increase of 107,4% in the case of the wheat cultivated in a two year crop rotation, having as a precursory plant the corn; in the case of the three year crop rotation it realizes an increase of 110,4%, having as a precursory plant the colza and it reaches 113,4% in case in which the precursory plant is the pea, plant which brings a substantial enrichment of the soil with nitrogen.

CONCLUSIONS

The study related to the influence of the precursory plant upon the level of production and upon the quality of the winter wheat in the weather conditions existent in the West Plain, more exactly in Leș-Bihor, emphasizes the crucial role of the precursory plant as well as its place within the crop rotation.

The difference of production between the wheat cultivated in monoculture and the one cultivated in the two or three year rotations begin right from the second year, then it maintains itself and then it keeps increasing.

In comparison with the wheat monoculture, the introduction of the corn in a two year crop rotation leads to a production increase of 1420 kg/ha, and by using a three year crop rotation, which helps the fertilization of the soil by introducing the colza into the crop rotation, the production difference is of 2090 kg/ha, and it reaches 2570 kg/ha when the precursory plant is the pea.

In what the quality of the wheat is concerned, the influence of the precursory plant and that of the crop rotation have got a very important role. In the wheat-corn rotation, the gluten and protein content represent higher values in comparison to the values obtained for the wheat monoculture and in the case of the three year rotation, by introducing the colza as a precursory plant or the pea, especially, the increase is absolutely significant.

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