RESEARCHES REGARDING THE INFLUENCE OF FORERUNNER PLANT, NUTRITION REGIME AND WEEDING ON SEVERAL PRODUCTIVITY ELEMENTS IN WINTER WHEAT CULTIVATED ON LUVOSOILS

Ardelean Ileana, Bandici Gheorghe*

* University of Oradea, Faculty of Environmental Protection, 26 General Magheru St., 410048 Oradea,Romania, e-mail: ardeleanileana@gmail.com

Abstract

The crop rotation is a decisive factor influencing growth and development of wheat. The role of forerunner plant on wheat growth and development is stressed out by several authors:Popescu (1980).The choice of an appropriate crop rotation, plant-legumes, for instance maintains a normal C/N ratio of 40-70 (assimilative C versus assimilative N – (Popescu,1980). Bacterial N fixation in soil and a normal C/N ratio are conditions that confer to the forerunner plant ameliorative properties.

Key words: crop rotation, fertilisation level, herbicides, productivity elements, winter wheat

INTRODUCTION

Forerunner plant together with other appropriate agricultural practices contribute to the favourableness of growth and development conditions of wheat root system, to an improved synthesis of specific organic compounds and their improved translocation to plant's organs (Lazany, 2000; 2003). Finally, all the enumerated conditions lead to improved efficiency per area unit. Plant growth is fundamental in obtaining yield and is related vegetation and technological factors, the level of yield being reflected in the intensity of production (Dincă, 1982; Bîlteanu,1993)

In the majority of cases, total growth of green mass is considered on the assumption that a maximum yield is obtained by increasing total production and by a favourable repartition of it among plant's organs (Bandici, 1997). However, as a known fact roots are not only absorbing water and nutrients from soil but play a key role in plant's general metabolism. Roots harbour the biosynthesis of some essential compounds for the rest of the plant to which they send the biosynthetic products (Zamfirescu, 1977). The importance of rationale fertilisation and of the forerunner plant on growths and development of plants is stated by many authors: Zăhan, Zăhan,1989.

Crop rotation together with other appropriate agricultural practices contribute to the favourableness of growth and development conditions of wheat root system, to an improved synthesis of specific organic compounds and their improved translocation to plant's organs (Domuța and all., 2007,2008).

Finally, all the enumerated conditions lead to improved efficiency per area unit (Bandici, Guş, 2001).

Productivity elements which permit to justify yield differences between averages of research years (Zăhan, Zăhan, 1989). Thus, main productivity element, was the number of ears/m^2 that influenced very significantly the yield level and at a lesser extent the rest of studied productivity elements (Soltner, 1990; Salisbury, Ross, 1995;).

MATERIAL AND METHODS

During 2010-2011, at Researche and Development Agricole Station (S.C.D.A.) Oradea, was set up a multifactorial experiment (the subdivided stand's method) on a substrate of brown luvic soil. Climatic conditions we favourable during 2010 and marked by drought during 2011, productivity elements was assessed differentially for forerunner plant under different climatic conditions.

The utilised wheat race was DELIA and the production was expressed as g. of q/ha. The results of comparisons were analysed with ANOVA (analysis of variance).

RESULTS AND DISCUSSION

Tables 1 and 2 present several productivity elements which permit to justify yield differences between averages of research years. Thus, main productivity element, was the number of ears/m^2 that influenced very significantly the yield level and at a lesser extent the rest of studied productivity elements.

We present several data in order to illustrate later affirmation concerning the influence of the crop rotation plant and created agrofund on yield level in ears'number/m^2 (table 1).

Thus, in wheat monoculture this productivity element reached 260 ears/m^2 in wheat monoculture and between 358-491 ears/m^2 in crop rotations, in created agrofund as compared to unfertilized alternative, 354 ears/m^2. Mineral fertilization determined an increment between 401-425 ears/m^2.

An important contribution in productivity level played the number of grains/ear that increased from 31 in wheat monoculture to 40 grains/ear in fertilized alternatives, both mineral and mixed. Concerning the weeding, the most important role played MMB that influenced positively the yield level as depending on herbicide type and combination.

Table 2 shows the role of investigated factors on weeding level of wheat crop, an important issue as referred to biological or chemical control of weeds. It is a remarkable fact, the crop rotation causes reduction of

weeds/m^2 as judged with reference to factors that favor weed infestation which determine, due to their rapacity, to the compromise of plants' development and growth.

Data from table 2 show a great number of weeds in wheat monoculture, 158 weeds/m^2, and a significant decrease in 4year. crop rotation (12 weds/m^2). Concerning created agrofund one must remark that compared to unfertilized alternative, the number of weeds increases after fertilization reaching values that are superior to blank alternative with 11.4-40.9%.

Certainly, if one considers only weeds level, may conclude that fertilization increases weeding and decreases crop level. The stimulation determined by fertilization in productivity elements, induces a raise in yields.

Applied herbicides alone or in combinations of different ratios, under experimental conditions may reduce weeds' level from 100% in alternatives with no herbicides to 22.8-47.0% concerning weeds' level/m^2.

Table 1

The influence of.factors: crop rotation plant, fertilisation level and herbicides on several productivity elements in winter wheat cultivated on luvosoils, Oradea 2010 – 2011

Investigated factor	Productivity elements							
	ears / m^2		grains / spic		MMB		M.H.	
	no.	%	no.	%	g	%	kg	%
a.Crop rotation plant								
Wheat monoculture (Mt.)	260	100	37	100	33.9	100	71.5	100
2 years crop rotation (W-C)	358	137.6	36	97.3	35.2	103.8	72.4	101.2
3 years crop rotation (P-W-C)	473	181.9	37	100	35.2	103.8	72.7	101.7
4 years crop rotation (P-W-C-C)	491	188.8	36	97.3	34.4	101.5	72.6	101.5
b. Fertilisation level								
N_0P_0 (Mt.)	354	100	31	100	38.2	100	72.8	100
$N_{120}P_{80}$	401	113.3	40	129	34.3	89.8	72.1	99.0
$N_{100}P_{80}$ + 10 t/ha manure	425	120.0	40	129	34.8	91.1	71.8	98.6
c.Weeding								
No herbicidest (Mt.)	438	100	36	100	33.8	100	71.9	100
Arelon super 2l/ha	395	90.2	38	105.5	35.4	104.7	72.3	100.5
Assert + Icedin super 2.5+1 l/ha	364	83.1	36	100	34.8	102.9	72.0	100.1
Puma super + Icedin super 1+1 l/ha	376	85.8	36	100	34.9	103.2	72.7	101.1

Table 2

The influence of.factors: crop rotation plant, fertilisation level and herbicides on plant development, weeds' level and grains wilt in winter wheat cultivated on luvosoils, Oradea 2010- 2011

Investigated factor	Plant'development				Wilting level (%) :				weeds	
	height		ears'length		No. grains/ ear		grains weight/ eart		No / m^2	%
	cm	%	cm	%	nr.	%	g	%		
a. Crop rotation plant										
Wheat monoculture (Mt.)	65.6	100	7.2	100	9.3	100	0.7	100	158	100
2 years crop rotation (W-C)	67.1	102.3	6.9	95.8	9.3	100	0.7	100.0	36	22.8
3 years crop rotation (P-W-C)	71.0	108.2	7.4	102.8	6.7	72.0	0.7	100.0	23	14.5
4 years crop rotation (P-W-C-C)	73.0	111.3	7.5	104.2	9.2	98.9	0.9	128.6	12	7.6
b. Fertilisation level										
N_0P_0 (Mt.)	61.0	100	6.6	100	6.0	100	0.6	100	44	100
$N_{120}P_{80}$	71.3	116.9	7.4	121.1	7.1	118.3	0.7	117.7	62	140.9
$N_{100}P_{80}$ + 10 t/ha manure	52.3	85.7	7.8	118.2	7.3	121.7	0.8	133.3	49	111.4
c. Weeding										
No herbicides (Mt.)	72.0	100	7.1	100	1.4	100	0.5	100	119	100
Arelon super 2 l/ha	72.5	100.7	7.5	105.6	20.1	193.3	0.9	180.0	41	34.4
Assert + Icedin super 2.5+1 l/ha	72.5	100.7	7.4	104.2	15.3	147.1	0.6	120.0	56	47.0
Puma super + Icedin super 1+1 l/ha	75.2	100.7	7.4	104.2	17.1	164.4	0.5	100.0	27	22.8

CONCLUSION

Certainly, if one considers only weeds level, may conclude that fertilization increases weeding and decreases crop level. The stimulation determined by fertilization in productivity elements, induces a raise in yields.

Applied herbicides alone or in combinations of different ratios, under experimental conditions may reduce weeds' level from 100% in alternatives with no herbicides to 22.8-47.0% concerning weeds' level/m^2.

REFERENCES

1. Bandici, G., E., 1997, Contribuţii la stabilirea influenţei premergătoarei şi a fertilizării asupra dinamicii acumulării biomasei, la grâul de toamnă, cultivat pe soluri cu exces temporar de umiditate, în centrul Câmpiei de Vest a României. Doctoral thesis. University of Agriculture Sciences and Veterinary Medicine Cluj-Napoca, Romania [in Romanian], p.158.
2. Bandici, G.,,E., P., Guş, 2001, Dinamica acumulării de biomasă la grâul de toamnă. University of Oradea Press, p.107.
3. Bîlteanu, G., 1993, Fitotehnie, Ceres Printing House. Bucharest, p.457.
4. Dincă, D., 1982, Asolamentele agriculturii moderne. Ceres Printing House, Bucharest, p.257.
5. Domuta C., V. Scheau, Gh. Ciobanu, Maria Sandor, Violeta Scheau, Cornelia Ciobanu, Alina Samuel, M. Carbunar, Maria Colibas, Ioana Borza, Cr. Domuta, N.C. Sabau, A. Domuta, Camelia Bara, L. Bara, R. Brejea, A. Bunea, Ileana Ardelean, A. Vuscan, Anuta Jurca 2009 – " Irigatiile in Campia Crisurilor 1967-2008". Editura Universitatii din Oradea, pag. 392
6. Domuta C**.**, Bandici Gh., Ciobanu Gh., N. Csep, Ciobanu Cornelia, Samuel Alina, Bucurean Elena, Sandor Maria, Borza Ioana, Bunta Gh., Ileana Ardelean, Cr. Domuta, 2007, "Asolamentele în Câmpia Crisurilor". Editura Universitatii din Oradea, ISBN 978-973-759-350-4, pag. 254.
7. Domuta C**.** , Bandici Gh., Ciobanu Gh. Ciobanu Cornelia, Samuel Alina, N. Csep, Bucurean Elena, Borza Ioana, Sandor Maria, Bunta Gh., Ileana Ardelean**,** Cr. Domuta., 2008, "Asolamentele in sistemele de agricultura", Editura Universitatii din Oradea. , pag. 297.
8. Domuta C., 2005, Irigarea culturilor, Ed. Universitatii din Oradea, Oradea, p.330.
9. Lazany, J., 2000, Soil fertility management in Westik's crop rotation experiment. Role of fertilizers in Sustainable Agriculture. CIEC Conference. p.77-80, p.255.
10. Lazany, J., 2003, Differences in soil carbon content in the treatments of Westik's crop rotation experiment. Natural resources and sustainable development. International scientific session and reviewed papers. Oradea-Debrecen, p.119-120, p.288.
11. Popescu Ana - 1980 - "Procesul de fixare biologică a N atmosferic şi factorii care îl condiţionează". Probleme de Agrofit. teor. şi practică, nr.1, vol. II, p. 35-45.
12. Zamfirescu, N., 1977, Bazele biologice ale producţiei vegetale. Ceres Printing House, Bucharest, p.337.
13. Zăhan, P., R., Zăhan, 1989, Cercetări privind influenţa plantei premergătoare şi a fertilizării asupra dinamicii de acumulare a masei vegetale la grâul cultivat pe soluri podzolice cu exces temporar de umiditate din Câmpia de Vest a ţării (I). Probleme de agrofitotehnie teoretică şi aplicată nr. 1, vol. XI, p.97-102, p.300.
14. Zăhan, P., R., Zăhan, 1989, Cercetări privind acumularea biomasei vegetale radiculare şi calitatea recoltei obţinute, sub influenţa plantei premergătoare şi a fertilizării la grâul cultivat pe soluri podzolice cu exces temporar de umiditate din Câmpia de Vest a ţării (II). Probleme de agrofitotehnie teoretică şi aplicată, nr. 1, vol. XI, p.237-240, p.300.
15. Salisbury F.B., C.W. Ross, 1995 - Fisiologia vegetale. Seconda edizione italiana condota sulla quarta edizione americana. Editura Zanichelli.
16. Soltner D., 1990, „Phytotechnie speciale", Colection sciences et Techniques Agricoles, Angers