RESEARCH RESULTS REGARDING THE INFLUENCE OF THE DISTANCE BETWEEN ROWS AND OF THE DEPTH OF SEEDING UPON THE WINTER WHEAT YIELD

REZULTATELE CERCETĂRILOR PRIVIND INFLUENȚA DISTANȚEI ÎNTRE RÂNDURI ŞI A ADÂNCIMII DE SEMĂNAT ASUPRA RECOLTEI LA GRÂUL DE TOAMNĂ

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Abstract: *In this paper are presented the research results regarding the influence of the seeding distance between rows of 6,25 cm, 12,5 cm, 15 cm and 18 cm upon the yield obtained during the experimental period 2007-2009 on a carbonate alluvial gley soil from Lunca Muresului (Mures Meadow). The results show that the optimal seeding distances are those of 6,25 cm and of 12,5 cm, the yield differences between the two variants being insignificant. By increasing the distance between rows to 15 cm respectively 18 cm the yield very significantly decreased. As referring to the influence of the seeding depth upon the sprouted plant percentage it results that, depending on the variety, the percentage were of 10-13% for a seeding depth of 4 cm, of 15-18% for a seeding depth of 8 cm and of 20-24% for a seeding depth of 8 cm.*

Rezumat: *În lucrare sunt prezentate rezultatele cercetărilor privind influența distanțelor de semănat între rânduri de 6,25 cm, 12,5 cm, 15 cm şi 18 cm asupra recoltei, obținute în ciclul experimental 2007-2009, pe un aluviosol carbonatic gleic din Lunca Mureşului. Rezultatele evidențiază ca optime distanțele de semănat de 6,25 cm şi 12,5 cm, între cele două variante diferențele de recoltă sunt nesemnificative. Mărirea distanței între rânduri la 15 cm şi respectiv 18 cm s-a soldat diminuarea recoltei cu diferențe foarte semnificativ negative.Cu referire la influența adâncimii de semănat asupra procentului de plante răsărite rezultă că în funcție de soi, procentele au fost de 10-13% la adâncimea de semănat de 4 cm, de 15-18% la adâncimea de semănat de 8 cm şi de 20-24%, când semănatul s-a efectuat la adâncimea de 8 cm.*

Key words: *wheat, distances and seeding depths.*
Cuvinte cheie: *grâu, distanțe şi adâncimi de semănat..*

INTRODUCTION

The plain in the Western part of our country is a very favourable wheat seeding region in Romania, because in this area the frequency of droughty autumns and of drought during the grain forming period is very low, the winters are mild, the temperatures favourable for the culture during the entire vegetation period and the soils are fertile. The cultivation of many new varieties, originating from different countries, with different climatic conditions in our country in the last years makes necessary the carrying out of researches in order to elaborate a technology specific for these varieties, so that we can obtain economically motivated yields, with acceptable quality indexes.

This research aims at obtaining of new data about the influence of the distance between rows and of the seeding depth upon the yield.

MATERIAL AND METHODS

In order to find an answer to the question regarding the influence of the distance between rows, there was organized a monofactorial experiment with three repetitions, according to the strip method, in the following variants: seeding at 6 cm row distance, at 12.5

cm row distance, at 15 cm row distance and at 18 cm row distance. The wheat variety used for this experiment was Alex. The fertilization was uniformly done with $N_{140}P_{80}K_{80}$.

For the researches regarding the influence of the seeding depth upon the percentage of sprouted plants compared to the germinative capacity determinate in the laboratory we considered the following variants: 4 cm, 6 cm and 8 cm. The used varieties were Boema and Kristina.

RESULTS AND DISCUSSION

Table 1. presents the synthesis results regarding the influence of increasing the row distance from 6,25 cm to 12,5 cm, to 15 cm and to 18 cm.

Taking into consideration the influence of the annual climatic conditions upon the yield, it results that during the first two years the yield difference was insignificant.

In the third experimental year, as a consequence of the drought during the straw formation – earring period, as well as because of the exceeding precipitations during the grain-filling period, the yield decreased with 24%.Referring to the influence of the distance between rows there can be noticed, that by increasing the distance from 6.25 cm to 12.5 cm the yield decreased with 2%, the difference being insignificant, that is of 89 kg/ha. By increasing the distance between rows to 15 cm, the yield decreased with 6%, the difference being significantly negative, that is of 344 kg/ha.

The poorest yield, 14% lower than that of the reference variant, the difference being very significant negative, respectively of 768 kg/ha, was obtained for the variant in which the distance between rows was of 18 cm. As a conclusion, the optimal row distances for the winter wheat in the reference region are of 6.25 cm and 12.5 cm. It is not justified to increase the distance more than 12.5 cm, as the yield decreases with 6-14%.

The results regarding the influence of the seeding depth on the plant sprouting for Boema variety are given in Table 2 and in Figure 2.

One can notice that, compared to the germinative capacity determined in the laboratory, the number of sprouted plants on the field was lower than in the year 2007 for all the variants, the germinative capacity determined in the laboratory being of 96%. The percentage of sprouted plants in the variant seeded at a depth of 4 cm decreased to 88%, in the variant seeded at a depth of 6 cm the percentage of sprouted plants reduced to 82%, and in the variant seeded at a depth of 8 cm the percentage of the sprouted plants was of only 76%

The same tendency was noticed in the second experimental year too, when compared to a germinative capacity of 97%, determined in the laboratory, the percentage of sprouted plants was of 90% for the variant seeded at a depth of 4 cm, of 79% for the variant seeded at a depth of 6 cm and of 72% for the variant seeded at a depth of 8 cm.

Table 1.

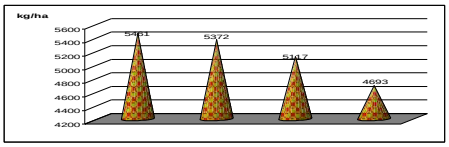
The Synthesis of the Results Regarding the Influence of the Raw Distance upon the Wheat Crop, during the Experimental Period 2007 – 2009

A Factor The experimental year	**B Factor. The distance between rows**				**The averages of the A factor**			
	6.25	12.50	15.00	18.00	Yield kg/ha	%	Difference kg/ha	Signification
2007	5828	5724	5447	5134	5533	100		
2008	6050	5951	5637	5235	5718	103	185	
2009	4507	4442	4268	3711	4232	76	-1301	000

DL5% = 188; DL1% = 255; DL0.1% = 358

Averages of the B Factor

Specificare	6.25	12.5	15.00	18.00
Recolta kg/ha	5461	5372	5117	4693
%		98	94	86
Diferența kg/ha		89	-344	-768
Semnificația			000	000



DL5% = 144; DL1% = 208; DL0.1% = 296

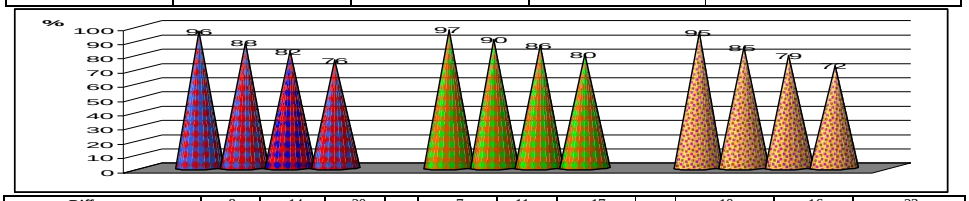
5461	5372	5117	4693
6.25	12.50	15.00	18.00
The distance between rows cm			

Figure 1. The crop according to the raw distance (cm)

Table 2.

Results Regarding the Influence of the Seeding Depth upon the Precentage of Sprouted Plants as Compared to the Germinative Capacity Determined in the Laboratory for the Boema Variety

Experimental variety	F.G. (%)	% sprouted plants in the field, according to the seeding depth		
		4 cm	6 cm	8 cm
2007	96	88	82	76
2008	97	90	86	80
2009	95	85	79	72
X	96	87	82	76
Difference		-13	-18	-24



Difference	-8	-14	-20		-7	-11	-17		-10	-16	-23
Seeding depth	4 cm	6 cm	8 cm		4 cm	6 cm	8 cm		4 cm	6 cm	8 cm
Year of determination	2007				2008				2009		

Figure 2 . The relation between the germinative capacity determined in the laboratory and the plant springing on field, for the Boema variety

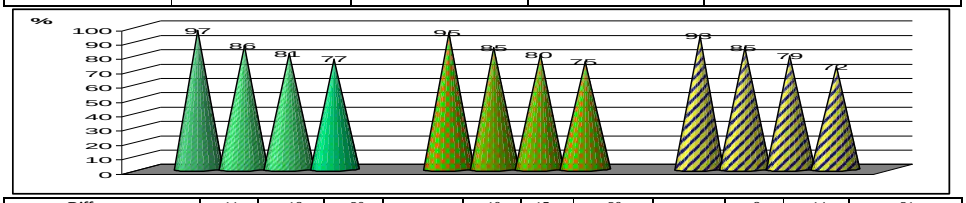
In the third year the percentage of sprouted plants decreased in comparison to the germinative capacity of 95% and according to the seeding depth to 85% for the variant seeded at a depth of 4 cm, to 79% for the variant seeded at a depth of 6 cm and to 72% for the variant seeded at a depth of 8 cm. Compared to the germinative capacity determined in the laboratory it results that, for the variant seeded at a depth of 4 cm the loss percentage was of 13%, for the variant seeded at a depth of 6 cm the loss percentage was of 18% and for the variant seeded at a depth of 8 cm the loss during the sprouting was of 24%. The second studied variety was Kristina, a creation of the Institute from Novi Sad, Serbia. The researches extended to this variety too, because the loss percentage during the sprouting time according to the seeding depth also depends on the length of the coleoptiles, which varies from one variety to the other.

The results underline some differences regarding the results obtained in different years. As Table 3 and Figure 3 show, the average loss during three years, compared to the germinative capacity determined in laboratory, were of 10% when the seeding was done at a depth of 4 cm, the loss increasing at 15% when the seeding depth increased to 6 cm and at 20% for the variant in which the seeding depth was of de 8 cm.

Table 3

Results Regarding the Influence of the Seeding Depth upon the Percentage of Sprouted Plants as Compared to the Germinative Capacity Determined in the Laboratory for the Kristina Variety

Experimental variety	F.G. (%)	% sprouted plants in the field, according to the seeding depth		
		4 cm	6 cm	8 cm
2007	97	86	81	77
2008	95	85	80	75
2009	93	85	79	72
X	95	85	80	75
Difference		-10	-15	-20



Difference	-11	-16	-20		-10	-15	-20		-8	-14	-21
Seeding depth	4 cm	6 cm	8 cm		4 cm	6 cm	8 cm		4 cm	6 cm	8 cm
Year of determination	**2007**				**2008**				**2009**		

Figure 3. The relation between the germinative capacity determined in the laboratory and the plant springing on field, for the Kristina variety

CONCLUSIONS

1. The researches regarding the influence of the distance between rows upon the yield showed that the yields obtained were closed if the distance between rows were of 6.25 cm and 12.5, the differences being insignificant.

2. By increasing the distance between rows to 15 cm, the yield obtained reduced very significantly, with 344 kg/ha. The poorest yield was obtained for the variant where the distance between rows was of 18 cm, the yield loss compared to the variant where the distance between rows was of 6.25 cm being very significant, of more than 760 kg/ha.

3. Compared to the germinative capacity of 96% determined in the laboratory, the decrease of the sprouted plants in the field, when the seeding was done at a depth of 4 cm, was 10-13% lower, according to the variety, and increased to 10-18% for the variant seeded at a depth of 6.00, coming to 20-24% in the variant seeded at a depth of 8 cm. This shows that, if the seeding conditions are optimal, there is no need to seed at a depth of more than 4 cm.

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