THE INTERACTION OF THE TECHNOLOGICAL FACTORSON THE PRODUCTION OF THE DROPIA AUTUMN WHEAT CULTIVAR

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Abstract
The study of the interaction of several factors, in the case of wheat yield technology, lead to the elaboration of various and more precise conclusions, than in the case of a single factor experiences.
Due to the previously mentioned information, I have analyzed the interaction of the technological factors used in the yield process of the Dropia autumn wheat cultivar seeds, at Leş, Bihor, during the years 2004 and 2006.
To emphasize the favorable effect of the use of the nitrogen fertilizers, the interaction between the fertilization level with nitrogen and the sowing period, the interaction between the fertilization level and the sowing density were analysed. The interaction between the sowing period and the sowing density was analysed too.

Key words: wheat, fertilization, relative yield, sowing period, sowing density.

INTRODUCTION

The autumn wheat is one of the agricultural plants that have to have at their disposal the necessary quantities of nutritive elements, which should be found in easily accessible forms. Under this aspect, the nitrogen is the main nutritive element, which has to be applied to the wheat crops.

The sowing period in the case of autumn wheat is fixed in such a way that, until the arrival of the winter period, it remains a period of about 40 – 50 days, in which the plants should normally vegetate, reach a positive temperature of 450 to 500 degrees Celsius, so that at the arrival of winter, the plants can dispose of 2 to 3 brothers and 3 to 4 leaves.

The sowing density is the essential production component of the autumn wheat. In order to reach the optimum crop density, the number of grains ready for germination per square metre is taken into account, these have to ensure at least, 600 productive ears. This kind of density can be realized, by assuring in the sowing period about 400 – 600 grains ready for germination per square metre.

MATERIAL AND METHODS

The study of the interaction of the technological factors at the Dropia autumn wheat was realized at S.C.A.Leş, Bihor, during the years 2004 and 2006. Two ways of fertilization, a_1 - the fertilization with 60 kg s.a./ha N and a_2 - the fertilization with 120 kg s.a/ha N, three sowing dates : b_1 – 25 IX, b_2-10X, b_3- 10XI as well as five sowing densities: c_1-100 grains ready for germination per square metre, c_2 – 200 grains ready for germination per square metre, c_3 – 400 grains ready for germination per square metre, , c_4 – 500 grains ready for germination per square metre and c_5 -700 grains ready for germination per square metre, were used.

For the analysis of the interaction between fertilization and the sowing period (A × B) the variant a_1b_1 (60 kg s.a./ha N×25 IX) was chosen as a control, for the interaction between fertilization and the sowing density (A×C), the variant a_1c_4(60 kg s.a./ha N× 500 grains ready for germination per square metre) was chosen as a control, while for the interaction between the sowing period and the sowing density (B×C) the a_2c_4 model of sowing at 10^{th} October and a sowing density of 500 grains ready for germination per square metre was chosen as a control, in order to be compared with other types of combinations.

RESULTS AND DISCUSSIONS

1.The interaction between fertilization and the sowing period (A × B).

The study which has as an objective the analysis of the oneside effects that can influence the productivity of the seed lots emphasized their effects. During the process of seed production, more factors that can influence in a favorable way the final result of the process are brought together.

Table1 shows the interaction between the fertilization level (A) and the sowing period (B), two radical factors that determine a high yield, in which were used as controls the fertilization level a_1 – the fertilization with 60kg s.a./ha N and the sowing process from 25IX.

Table 1

The interaction between the A and B factors (fertilization×sowing period), Leş-Bihor (2004-2006)

Nr. crt.	Factor	Average seed yield (q/ha)	Relative yield (%)	Difference to the control (q/ha)	Significance
1	a_1b_1 (mt)	46,8	100,0	-	-
2	a_1b_2	53,7	118,7	+6,9	××
3	a_1b_3	49,1	106,3	+2,3	-
4	a_2b_1	49,2	106,3	+2,4	×
5	a_2b_2	57,3	128,5	+10,5	×××
6	a_2b_3	54,1	119,6	+7,3	×××

LSD 5% = 2,4 q/ha LSD 1% = 4,1 q/ha LSD 0,1% = 7,1 q/ha

Legend:

a_1b_1 (mt)	N_{60}×25 IX	a_2b_1	N_{120}×25 IX
a_1b_2	N_{60}×10 X	a_2b_2	N_{120}×10 X
a_1b_3	N_{60}×10 XI	a_2b_3	N_{120}×10 XI

In the case of the interaction between the fertilization level (A) and the sowing period (B) it can be observed that, confrunted with the sowing process from 25 IX (b_1) and the fertilization with 60 kg s.a./ha N (a_1, control), all the other combinations are superior to the control.

The most favorable results are obtained at the optimum sowing process from 10 X (b_2) with an increased dose of nitrogen of 120 kg s.a./ha (a_3), so that a production growth of 10,5 q/ha (table 1) is obtained compared to the control. Compared with the early sowing process (25 IX), it can be observed that in the case of a late sowing process (10 XI, b_3), there are also superior results to the first sowing period.

The most favorable combination of the two factors, that were analysed, is option number 5, (a_2b_2), the fertilization with a dose of 120 kg N s.a./ha and the sowing process at the optimum period (10 X).

2.The interaction between fertilization and the sowing density (A×C).

Comparing the interaction between the fertilization level and the sowing density (table 2), it can be observed that in the case of a corresponding fertilization, starting with a density of

400 grains ready for germination per square metre, the production growths compared to the control are statistically assured.

The best results are obtained at a fertilization with 120 kg s.a./ha nitrogen and a density of 500 grains ready for germination per square metre (a growth of 22,9%).

Table 2

The interaction between the A and C factors (fertilization and sowing density) upon the seed yield (Base), in the "Dropia" cultivar, Leş-Bihor (2004-2006)

Nr. crt.	Factor	Average yield (q/ha)	Relative yield (%)	Difference to the control (q/ha)	Significance
1	a_1c_1	41,0	75,4	-10,1	000
2	a_1c_2	46,7	89,3	-4,4	00
3	a_1c_3	49,4	97,7	-1,7	-
4	a_1c_4	51,1	100,0	-	-
5	a_1c_5	48,3	93,2	-2,8	0
6	a_2c_1	42,1	78,1	-9,0	000
7	a_2c_2	47,6	91,5	-3,5	0
8	a_2c_3	57,5	115,6	6,4	×××
9	a_2c_4	60,5	122,9	9,4	×××
10	a_2c_5	58,7	118,5	7,6	×××

LSD 5% = 2,6 q/ha LSD 1% = 3,76 q/ha LSD 0,1% = 5,59 q/ha

The sowing with a bigger density (c_5=700 grains ready for germination per square metre) brings no significant changes of grain yield in comparison with the yield level obtained at a density of 400 grains ready for germination per square metre.

The density of 100-200 grains ready for germination per square metre generates small yields, independent of the fertilization level. At the same density, both the fertilization with N_{60} and the one with N_{120} generate aproximately the same yield level. The argument for the use of these two options in order to obtain a rapid multiplication of a new species is possible without the use of great doses of nitrogen.

Significant differences might appear at a density of 400 grains ready for germination per square metre and they continue to 500-700 grains ready for germination per square metre. Logically, bigger densities require the need of fertilizers, influencing positively the grain yield.

The above information emphasizes the fact that a prime manifestation of the competition between plants in the name of vegetation factors is the competition for nitrogen. The plants absorb significant quantities of nutritive elements during the vegetation period, this being connected to the intensity of photosynthesis. It can be observed that the increase of the nitrogen dose applied from a low level to a medium level, allows the increase of the plant density in high yields.

The experiments, which took place in Leş-Bihor, during the years 2004-2006, emphasize the fact that the triad fertilization – the sowing period – the sowing density – applied and realized in optimum conditions and optimum climatic parameters are the determinant factors, besides the used species, in the realization of positive results in the process of grain yield for the autumn wheat.

3. The interaction between the sowing period and the sowing density (B×C).

Analysing the interaction between the sowing period (B) and the sowing density (table 3) it can be observed that compared with the chosen control, the sowing process at 10th October and a density of 500 grains ready for germination per square metre (b_2c_4), all the combinations except b_3c_4 (10th November, 500 grains ready for germination per square metre) are inferior to the control, with assured differences, a fact that emphasizes that late sowing, but at a density of 500 grains up to germination per square metre, can lead to yield differences, that were not assured. The above aspects make us believe that early sowing is not beneficial. Late sowing leads to concrete yield loss, especially at low densities, the differences being diminished once the density at sowing is increased.

Table 3

The interaction between the B and C factors (sowing period×sowing density) upon the seed yield (Base), in the “Dropia” cultivar, Leş-Bihor (2004-2006)

Nr. crt.	Factor	Average yield (q/ha)	Relative yield (%)	Difference (q/ha)	Significance
1	b_1c_1	40,1	60,4	-19,7	000
2	b_1c_2	41,4	63,0	-18,4	000
3	B_1c_3	43,2	66,7	-16,6	000
4	B_1c_4	48,5	77,3	-11,3	00
5	B_1c_5	48,0	76,3	-11,8	00
6	B_2c_1	42,0	64,3	-17,8	000
7	B_2c_2	42,7	65,7	-17,1	000
8	B_2c_3	49,7	79,7	-10,1	00
9	B_2c_4	59,8	100,0	-	-
10	B_2c_5	51,3	83,1	-7,5	0
11	B_3c_1	42,1	64,4	-17,7	000
12	B_3c_2	40,9	62,1	-18,9	000
13	B_3c_3	47,5	75,3	-12,3	00
14	B_3c_4	43,1	86,1	-6,7	-
15	B_3c_5	47,8	75,9	-12,0	00

LSD 5% = 7,10 q/ha LSD 1% = 9,30 q/ha LSD 0,1% = 14,30 q/ha

CONCLUSIONS

The study of the multiple factor interaction leads to the elaboration of various and more precise conclusions compared with the case of monofactorial expertize. Thus, the interaction between fertilization and the sowing period (A×B), shows their contribution to the realisation of increased yields. It can be observed that compared with the control variant (25 IX × 60 kg s.a./ha N) all the other combinations are superior to the control. The most favorable results are obtained in the case of an optimum sowing from 10 X with a nitrogen dose of 120 kg s.a./ha. Even in the case of a late sowing, using the same fertilization dose (120 kg s.a./ha) the results are superior to the prime sowing period, with a low nitrogen fertilization (N_{60}).

Under the aspect of the interaction between fertilization and the sowing density (A×C) it can be observed that in the case of a fertilization with 120 kg s.a/ha N, starting with a density of 400 grains ready for germination, the increase of the yield compared to the ones of the control are statistically assured; the best results are obtained at a fertilization of 120 kg s.a./ha N and a density of 500 grains ready for germination per square metre (an increase of 22,9%).

The density of 700 grains ready for germination per square metre doesn’t bring significant changes in the grain yield, compared with the density of 400 grains ready for germination per square metre, a fact that confirms the information above, that in the case of a rapid multiplication of a new species, the density of 400 grains ready for germination per square metre and a fertilization of 120 kg/ha N should be used.

Comparing the two factors, the level of fertilization and the sowing density, it can be observed that at a density of 100-200 grains ready for germination per square metre, the fertilization doesn’t bring significant yield growths. To sum up, significant differences start appearing at a density of 400 grains ready for germination per square metre, which are to be assured with increased nitrogen doses, a fact that influences positively the yield.

The interaction between the sowing period and the sowing density (B×C) emphasizes the fact that compared to the control (sowed at 10^{th} October and the density of 500 grains ready for germination per square metre – b_2c_4), all the combinations except b_3c_4 (10 XI – 500 grains ready for germination per square metre) are inferior to the control with negative differences statistically assured. In the case of late sowing, a precise loss in the yield can be observed, especially at lower densities, the differences being diminished once the sowing density was increased.

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