RESEARCH ON THE EFFECT OF WHEAT YIELD FERTILIZATION IN THE LONG TERM EXPERIENCE AT ARDS SECUIENI

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Abstract

The rational application of fertilizers ensure along with other means of increasing production, the raising of soil fertility and the practice of a large productivity agriculture and economic efficiency. The fertilizer dose schedule is a technological activity, based on the agrochemical data from the field and from planned harvest.

This paper presents experimental results for 2006-2009 period obtained in a long experience on the influence of phosphorus and nitrogen fertilizer on winter wheat production at ARDS Secuieni.

The experience had in study: A – P₂O₅ dose: 0, 40, 80, 120, 160 kg/ha; B – N dose: 0, 40, 80, 120, 160 kg/ha.

The cultivated variety: Crina.

The productions were influenced by the dosage of fertilizer applied but also by the climatic conditions during the research. The productions in the unfertilized variant were 3269-6590 kg wheat/ha (period average was 4910 kg wheat/ha). By applying the P₂O₅ and N fertilizers the production increase were 5-33% representing 228-1617 kg wheat/ha. By applying phosphorus fertilizers the productions increases were 358-614 kg wheat/ha representing 6-11% and by applying nitrogen fertilizers increases ranging from 543-1150 kg wheat/ha representing 10-22%.

The marginal increases in phosphorus fertilizer application were 3,83-8,95 kg wheat/kg P₂O₅ and 7,18-13,57 kg wheat/kg N in nitrogen fertilizer application, in both cases were inversely proportional with the doses of fertilizers applied.

Key words: wheat, phosphorus, nitrogen, productions

MATERIAL AND METHOD

The paper aims to analyze the influence of nitrogen and phosphorus fertilizers application on wheat crop during the period 2007-2009 under the conditions of the SCDA Secuieni.

Experience is the bifactorial type has been placed on a mold bill typically by the method of subdivided plots into five repetitions and it is bifactorial type.

Factors studied:
A - P₂O₅ doses: 0-40-80-120-160
B - N doses: 0-40-80-120-160

Variety grown: Crina

Climatic conditions during the research are presented in figure 1.

RESULTS AND DISCUSSIONS

The production of grain

Yields obtained from culture wheat during the period 2007-2009 were recorded variations by the application of fertilizers dosage but also under the influence of climatic conditions.
The productions achieved at fertilized version (N0P0) had values of 3269-6590 kg / ha (average of the period being 4910 kg / ha).

Compared with fertilized version (N0P0) by applying experimented fertilizers dosage were obtained productions of 5137-6493 kg wheat per hectare.

Average production increases by the application of fertilizers (NP) were from 5 to 33%, representing 228-1617 kg ha wheat (table 1, fig. 2).

The productions obtained were directly proportional to the doses of fertilizer applied. By applying fertilizers with phosphorus (after the average of five nitrogen fertilizer graduation) the productions obtained during the period 2007-2009 had values of 3880-8242 kg / ha and the average of the period was 5827-6083 kg / ha.

The productions of wheat achieved in the version fertilized with phosphorus (P0), after the average of five nitrogen fertilizer graduations, were 3683-7319 kg / ha (average of the period being 5469 kg / ha).

Between the doses of fertilizer applied (NP) and the productions obtained was establish highly significant direct correlations (fig. 3, 4).

Average gain brought by fertilizers with phosphorus (average values 2007-2009) was 358-614 kg / ha and represents 6-11%.

Between the production gains achieved and doses of phosphorus applied was establish a highly significant correlation (fig. 5).

Marginal production growth achieved by the application of phosphorus fertilizers was 8.95 kg grain / kg P2O5 dose P40; 6.45 kg wheat / kg P2O5 dose P80; 4.9 kg wheat / kg P2O5 dose P120; 3, 83 kg wheat / kg P2O5 P160 dose (table 2).

Marginal increase production at application of phosphorus fertilizers had values of 3.83 to 8.95 kg wheat / ka P2O5 and was inversely proportional to the dose of phosphorus applied.

Application of nitrogen fertilizers (after the average of 5 fertilizers graduations with phosphorus) has lead to productions during the period 2007-2009 of 3764-8550 kg wheat / ha, while the average by the period of 5718-6325 kg / ha.

Compared to the version not fertilized with nitrogen (N0) that recorded values of the production of 3414-6915 kg / ha (period average 5175 kg / ha) increases production by applying the nitrogen fertilizers were 543-1150 kg / ha, representing 10 -22% (table 3).

Between the production gains achieved and nitrogen doses were established significant correlations (fig. 6).

Marginal increase production through the application of nitrogen fertilizers was 13.57 kg wheat / kg N dose N40; 10.41 kg wheat / kg N dose N80; 8.57 kg wheat / kg N dose N120, 7, 18 kg wheat / kg N N160 dose (table 3).

The limits of variation of the production growth during the period 2007-2009 through the application phosphorus fertilizers were 195-923 kg wheat / ha and was directly proportional to the applied dose of P2O5 and the marginal growth of production was 3.75 - 15.02 kg wheat / kg P2O5, being inversely proportional to the applied dose.

To the application of nitrogen fertilizers, the limits of variation of production growth has been of 475-1711 kg / ha and was directly proportional to the applied dose and increase marginal production wheat was 5.66 to 15.05 kg / kg N is inversely proportional to the applied dose (table 4).

At the application of nitrogen fertilizers, the limits of variation of the growth production has been of 475-1711 kg / ha and it was directly proportional to the applied dose and the increase marginal production wheat was 5.66 to 15.05 kg / kg N being inversely proportional to the applied dose (table 4).

Highly significant direct correlations were established between the elements of productivity (no. wheat ears/m2 and MMB) and doses fertilizers applied (fig. 7, 8, 9, 10).

The technical and economic indicators at the application of NP fertilizers on wheat crop during the period 2007-2009 were influenced by the applied fertilizer formula.

In reality, the technical and economic indicators are highly more influenced of climatic conditions and by the exploitation price of the wheat. The data from Table 5 give technical and economic indicators obtained in the various formulas of fertilization, showing a increase in production by 32% (from 4910-6493 kg wheat / ha), between 10-40% of the total expenses, the cost of production between 1-35%, a decrease of profit between 5-52% and a rate of profitability from 55.07 to 14.66%.
Figure 1 Climatic conditions in ARDS Secuieni during 2006 - 2009 and the multiannual average
### Influence of nitrogen and phosphorus fertilizer on wheat production (2007-2009) ARDS Secuieni

<table>
<thead>
<tr>
<th>Var.</th>
<th>Dose P$_2$O$_5$ kg/ha</th>
<th>Dose N kg/ha</th>
<th>Limits of variation of production kg/ha</th>
<th>Average production kg/ha</th>
<th>Relativ production %</th>
<th>Difference kg</th>
<th>Semnif.</th>
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<td>4295-8625</td>
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<td>132</td>
<td>1583</td>
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</table>

**Note:** DL 5% = 48 kg/ha, 1% = 64 kg/ha, 0,1% = 83 kg/ha

Figure 2 Influence of nitrogen and phosphorus fertilizer on wheat production (2007 – 2009) ARDS Secuieni

![Figure 2](image-url)
Figure 3 The correlation between doses of phosphorus and production of wheat

\[ Y = 5484.172 + 9.089X - 0.034X^2 \]
\[ r = 0.996^{***} \]

Figure 4 The correlation between doses of nitrogen and production of wheat

\[ Y = 5194.801 + 13.665X - 0.042X^2 \]
\[ r = 0.998^{***} \]

Table 2

<table>
<thead>
<tr>
<th>Dose P₂O₅ kg/ha</th>
<th>Limits of variation of production kg/ha</th>
<th>Average production kg/ha</th>
<th>Relative production %</th>
<th>Difference kg/ha</th>
<th>Semnif.</th>
<th>Marginal increase kg wheat/kg P s.a.</th>
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<tbody>
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<td>P₀</td>
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</table>

DL 5% = 48 kg/ha  DL 1% = 64 kg/ha  DL 0.1% = 83 kg/ha
Figure 5 The correlation between doses of phosphorus and increase production of wheat

\[ Y = 132.750 + 6.529X - 0.022X^2 \]
\[ r = 0.999^{***} \]

Figure 6 The correlation between doses of nitrogen and increase production of wheat

\[ Y = 173.249 + 10.324X - 0.026X^2 \]
\[ r = 0.999^{***} \]

Table 3

<table>
<thead>
<tr>
<th>Dose N kg/ha</th>
<th>Limits of variation of production kg/ha</th>
<th>Average production kg/ha</th>
<th>Relative production %</th>
<th>Difference kg/ha</th>
<th>Semnif.</th>
<th>Marginal increase kg wheat/kg N s.a.</th>
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<td>-</td>
<td>-</td>
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<td>N(_{40})</td>
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<td>122</td>
<td>1150</td>
<td>***</td>
<td>7.18</td>
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</table>

DL 5% = 53 kg/ha        DL 1% = 70 kg/ha        DL 0,1% = 90 kg/ha
### Table 4

The limits of variation of total production growth and margin growth by applying fertilizers with nitrogen and phosphorus on winter wheat Secuieni (2007-2009)

<table>
<thead>
<tr>
<th>Specificare</th>
<th>Limita de variatie a sporului de productie la grau kg/ha</th>
<th>Limita de variatie a sporului marginal de productie la grau kg grau/kg ingr. s.a.</th>
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</thead>
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<td>9,02-12,72</td>
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<td>7,37-12,43</td>
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<tr>
<td>N&lt;sub&gt;160&lt;/sub&gt;</td>
<td>907-1711</td>
<td>5,66-10,69</td>
</tr>
<tr>
<td>P&lt;sub&gt;40&lt;/sub&gt;</td>
<td>195-601</td>
<td>4,87-15,02</td>
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<td>P&lt;sub&gt;80&lt;/sub&gt;</td>
<td>421-744</td>
<td>5,26-9,31</td>
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<td>4,05-7,06</td>
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<tr>
<td>P&lt;sub&gt;160&lt;/sub&gt;</td>
<td>601-923</td>
<td>3,75-5,77</td>
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</table>

**Figure 7** The correlation between doses of phosphorus and nr.spice / m in wheat

**Figure 8** The correlation between doses of nitrogen and nr.spice / m in wheat
**Figure 9** The correlation between the doses of phosphorus and wheat MMB

\[ Y = 37.971 + 0.034X - 0.001X^2 \]

\[ r = 0.991^{**} \]

**Figure 10** The correlation between doses of nitrogen and in wheat MMB

\[ Y = 38.229 + 0.039X - 0.001X^2 \]

\[ r = 0.926^{**} \]

### Table 5

<table>
<thead>
<tr>
<th>Formula de fertilizare kg s.a./ha</th>
<th>Productia kg/ha</th>
<th>Valoarea producției lei/ha</th>
<th>Cheltuieli totale lei/ha</th>
<th>Profit lei/ha</th>
<th>Rata rentabilității %</th>
<th>Costul de productie lei/ha</th>
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</thead>
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<td>1151</td>
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</table>
CONCLUSIONS

The productions obtained on autumn wheat during the period 2007-2009 through the fertilization with NP had average values between 5137-6493 kg / ha.

By applying fertilizers of NP increases of production have been 228-1617 kg / ha representing 5 to 33%.

Phosphorus fertilizers have realized production increases by 6-11% representing 358-614 kg / ha.

Nitrogen fertilizer brought production increases by 10-22%, representing 543-1150 kg / ha.

Between the doses of fertilizer applied and the productions obtained were highly significant direct correlations established.

Marginal of production increases have been influenced by the climatic conditions in the year of experimentation and were inversely proportional to the doses of fertilizer applied. They had higher values (7.18 to 13.57) kg wheat / kg N for nitrogen and lower (3.83 to 8.95 kg wheat / kg P2O5) for phosphorus.

Between the doses of NP fertilizer applied and obtained production, the increase of production and the elements of productivity were established highly significant correlations.

On wheat crop the technical and economic indicators were influenced by the fertilization formula applied and climatic conditions during the period of research.

BIBLIOGRAPHY


