# RESULTS REGARDING THE INFLUENCE OF TECHNOLOGICAL FACTORS ON SPRING OAT YIELDS

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***Abstract.*** *In our country, in recent years, spring oats was the most cultivated small grain cereal. The crops surface were around 200 thousand hectares in 2012 (194.500 ha). The aim of our field experiences was to improve the quality and production of spring oats crop. Therefore, this study assesses this crop technology in terms of number of sowing seeds correlated with a rational fertilization. In order to achieve the proposed objectives, a three factorial experience was set up with two different seed density per square meter, two fertilizers doses and 25 varieties of spring oats in 3 replications. Numbers of sowing seeds were: 250 germinated seeds/m$^2$ and 500 germinated seeds/m$^2$. Tested varieties were originated from Romania, Germany, Czech Republic and USA. Different doses of fertilizers were used: $N_{50}P_{50}K_0$, $N_{100}P_{50}K_0$. Results were tested with Fisher test and Duncan test with Polifact program. The varieties Mureşana from Romania and Gramena from Germany with an average production of 6 tones/hectare were the most productive studied crops. In conclusion, the experiment showed that there are differences between spring oat genetic varieties in terms of production.*

***Key words:*** *spring oat, number of seeded seeds/square meter, doses of fertilizers*

## INTRODUCTION

Oats are a whole-grain cereal, known scientifically as *Avena sativa*. They are mainly grown in North America and Europe. They are a very good source of fiber, especially beta-glucan, and are high in vitamins, minerals and antioxidants. Due to their beneficial health effects, such as lowering blood sugar and cholesterol levels, oats have gained considerable interest as a health food.

Oats harness better than other plants soils with low fertility of moist areas as well as sandy soils. In our country, in recent year, spring oats is the most cultivated small cereal grain, the surface being around 200 thousand hectares (in 2012, 194.500 ha). Oats is a highly efficient crop because it has easy technology of cultivation and in a short period of maximum 150 days, important productions can get.(MUNTEAN el all, 2003).

## MATERIALS AND METHODS

In order to achieve the proposed objectives, it was organized a poly factorial experience, with three factors: 2 A (number of seeded seeds) x 2 B (doze of fertilizers) x 25 C (varieties) in three replications. Number of seeded seeds were: 250 g.s./m$^2$ and 500g.s./m$^2$ and doses of fertilizers: $N_{50}P_{50}K_0$, $N_{100}P_{50}K_0$. Sowing was done with SPE 8 machine, at a distance of 12.5 cm between rows for 500 seeded seeds/m$^2$ and 25 cm between rows for 250 seeded seeds/m$^2$, plot being 7 m$^2$, and harvest of 5 m$^2$.

Of the studied genotypes seven are created at ARDS Turda, respectively: Mureş, Someşan and Mureşana, T. 90-81 M, T. 21-81 M, T. 38-81 M, T. 44-81M. They come from a USA

population that was subjected to mutagenesis process, mutagenic agent being EtilMetaSulfonatul (EMS). Other six genotypes are from Romania from Lovrin, respectively: LV. 4324-86, LV. 4325-86, LV. 4362-86, LV. 4363-86, LV. 8644-82 and Lv. 7478-82. We can also mention the fact that the varieties of German origin: Romulus and Solidor, and Pan of Czech Republic origin are found at this time in the European Catalogue of varieties along with Mureşana. Experimental results statistics processing was done by ANOVA, based on Fisher criterion (F).

**RESULTS AND DISCUSSIONS**

ANOVA and F test indicates a very significant influence of number of seeded seeds and doses of fertilization at spring oats yields as can see in the table 1. Also, among the varieties of spring oat from this experience there are genetically differences (F = 14,346 ***) in terms of productive level. Similar results were obtained by Protic el all in 2007 at winter wheat.

*Table 1*

ANOVA and F test in the poly-factorial experience (2x2x25) with spring oat varieties, for yield (q/ha), in 2015 Turda conditions

| Source of variation | Squares sum | Degree of freedom | Medium square | F Test | Significance |
|---|---|---|---|---|---|
| Number of seeded seeds/sq.m. (A) | 9,999 | 1 | 9,999 | 1558,878 | *** |
| Doses of fertilizers (B) | 5,368 | 1 | 5,368 | 1615,095 | *** |
| Varieties of spring oats (C) | 4,843 | 24 | 0,202 | 17,346 | *** |
| AxC | 1,512 | 24 | 0,063 | 5,416 | *** |
| AxB | 0,329 | 1 | 0,329 | 98,891 | *** |
| BxC | 1,220 | 24 | 0,051 | 4,369 | ** |
| AxBxC | 0,539 | 24 | 0,022 | 1,929 | |
| Repetition | 0,974 | 2 | 0,487 | | |
| Other types of interactions + error | 2,261 | 198 | | | |
| Error A | 0,012 | 2 | | | |
| Error B | 0,013 | 4 | | | |
| Error C | 2,234 | 192 | | | |
| Total | 27,045 | 299 | | | |

Calculating share of factors (%) in achieving grain yield of spring oats by reporting the amount of squares sum attributed to each factor to the total sum the result was that the greatest influence of the number of seeded seeds (36,97%), then follow the doses of fertilizers (19,85%) and genetic factor (17,91%). The interactions between factors have a lower participation share (Figure 1).

In some varieties, number of seeded seeds/$m^2$ can cause production an increase with 1480 kg/ha, as we can see the Fucs variety (Table 2). The most productive varieties, Gramena and Mureşana, had increases of productions with 440 kg/ha at 500 s.s./sq. m compared to 250 s.s./sq. m. At the variant with 500 s.s./sq.m was obtained an average production of 5.84 tonnes/ha and in compared with it to variant with 250 s.s./sq.m, production was lower with 0.72 tonnes.

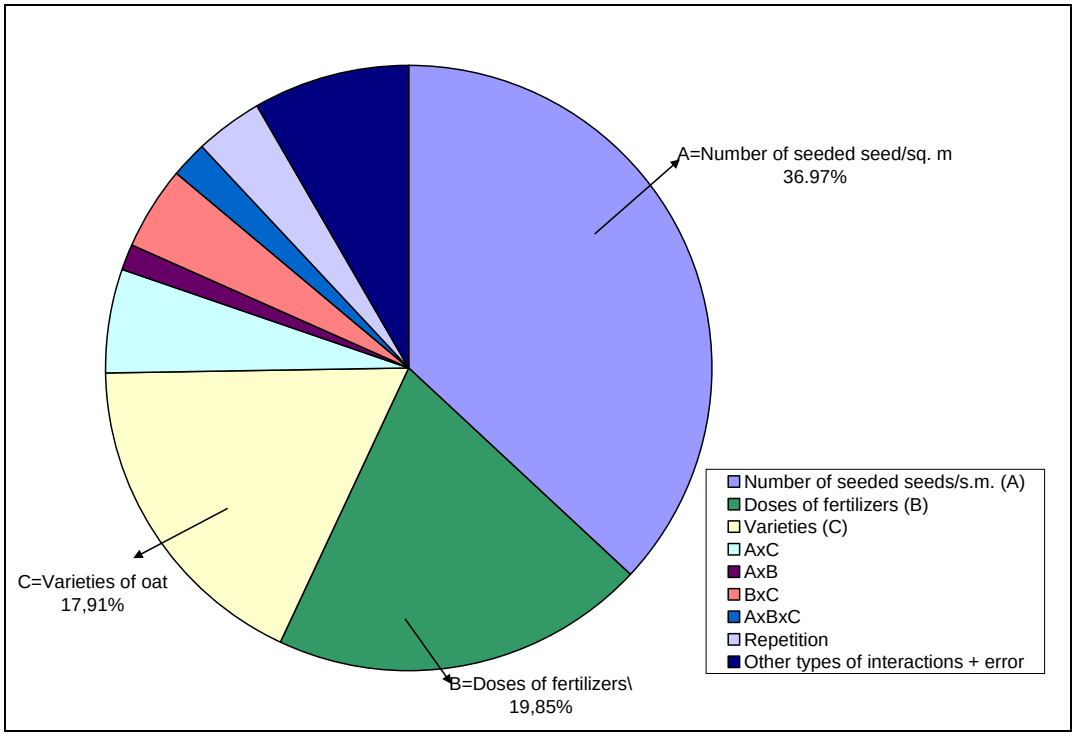


Figure 1. Share of factors (%) in achieving grain yield of spring oats

Through fertilization with 100 kg/ha nitrogen active substance was obtained by an average production of 5.74 t/ha, with 0.52 tonnes higher than the level of fertilization with 50 kg/ha nitrogen active substance (Table 3). In some varieties, such as Someşan, nitrogen fertilization caused a much greater increase in production compared to the number of seeded seeds/$m^2$.

*Table 2*

The influence of number of seeded seeds on the yield (t/ha) to spring oat in 2015, in Turda conditions

| No. | Varieties of oats | Yield (to/hectare) 500 seeded seeds/sq. m | Differences between yields of varieties and check (to/hectare) | Yield (to/hectare) 250seeded seeds/sq. m | Differences between yields of varieties and check (to/hectare) | Differences between yields (kg/ha) 500 and 250 of seeded seeds |
|---|---|---|---|---|---|---|
| 1 | SOMEŞAN | 5,60 | Check variety | 5,16 | Check variety | 440 |
| 2 | SOLIDOR | 5,80 | + 0,20 | 5,36 | 0,20 | 440 |
| 3 | MUREŞ | 5,74 | + 0,14 | $4,72^{000}$ | -0,44 | 1020 |
| 4 | ROMULUS | 5,70 | + 0,10 | $4,86^{0}$ | -0,30 | 840 |
| 5 | RUMAK | 5,64 | + 0,04 | $4,92^{0}$ | -0.24 | 720 |
| 6 | BUG | 5,52 | -0,08 | $4,74^{000}$ | -0,42 | 780 |
| 7 | SKAKUM | 6,04 *** | + 0,44 | 4,96 | -0,20 | 1080 |
| 8 | MUREŞANA | 6,22 *** | + 0,62 | 5,78 *** | 0,62 | 440 |
| 9 | CORY | 6,04 *** | + 0,44 | 5,62 *** | 0,46 | 420 |
| 10 | AVALANCHE | 5,78 | + 0,18 | 4,94 | -0,22 | 840 |
| 11 | INTEGRALE | 5,64 | + 0,04 | 5,06 | -0,10 | 580 |
| 12 | GRAMENA | 6,22 *** | + 0,62 | 5,78 *** | 0,64 | 440 |
| 13 | JUMBO | 5,92 ** | + 0,32 | 5,06 | -0,10 | 860 |
| 14 | FUCS | 6,08 *** | + 0,48 | $4,60^{000}$ | -0,56 | 1480 |
| 15 | PAN | 5,72 | + 0,12 | 5,38 | 0,22 | 340 |
| 16 | T. 90-81 M | 6,16 *** | + 0,56 | 5,26 | 0,10 | 900 |
| 17 | T. 21-81 M | 5,82 | + 0,22 | 5,46 * | 0,30 | 360 |
| 18 | T. 38-81 M | 6,12 *** | + 0,52 | 5,32 | 0,16 | 800 |
| 19 | T. 44-81 M | 6,02 *** | + 0,42 | 5,42 * | 0,26 | 600 |
| 20 | LV. 4324-86 | 5,70 | + 0,10 | $4,62^{000}$ | -0,54 | 1080 |
| 21 | LV. 4325-86 | 6,12 *** | + 0,52 | 5,20 | 0,04 | 920 |
| 22 | LV. 4362-86 | 5,46 | -0,14 | $4,78^{00}$ | -0,38 | 680 |
| 23 | LV. 4363-86 | 6,02 *** | + 0,42 | $4,92^{0}$ | -0,24 | 1100 |
| 24 | LV. 8644-82 | 5,50 | -0,10 | $4,74^{000}$ | -0,42 | 960 |
| 25 | LV. 7478-82 | 5,72 | + 0,12 | 5,28 | 0,12 | 440 |
| | Average of varieties | 5,84 | | 5,12 | | |
| | LSD 5% | 0,24 | | | | |
| | LSD 1% | 0,32 | | | | |
| | LSD 0,1% | 0,42 | | | | |

*Table 3*

The influence of doses of fertilizers on the yield (t/ha) to spring oat in 2015, in Turda conditions

| No. | Varieties of oats | Yield (to/hectare) Dose of fertilizers $N_{100}P_{50}K_0$ | Differences between yields of varieties and check (to/hectare) | Yield (to/hectare) Dose of fertilizers $N_{50}P_{50}K_0$ | Differences between yields of varieties and check (to/hectare) | Differences between yields (kg/ha) $N_{100}P_{50}K_0$ $N_{50}P_{50}K_0$ |
|---|---|---|---|---|---|---|
| 1 | SOMEŞAN | 5,86 | Check variety | 4,90 | Check variety | 960 |
| 2 | SOLIDOR | 5,94 | + 0,08 | 5,22** | + 0,32 | 720 |
| 3 | MUREŞ | $5,34^{000}$ | -0,52 | 5,12 | + 0,22 | 220 |
| 4 | ROMULUS | $5,54^{00}$ | -0,32 | 5,00 | + 0,10 | 540 |
| 5 | RUMAK | $5,34^{000}$ | -0,52 | 5,22** | + 0,32 | 120 |
| 6 | BUG | $5,32^{000}$ | -0,54 | 4,94 | + 0,04 | 380 |
| 7 | SKAKUM | 5,80 | -0,06 | 5,20* | + 0,30 | 600 |
| 8 | MUREŞANA | 6,06 | + 0,20 | 5,94*** | + 1,04 | 120 |
| 9 | CORY | 6,18** | + 0,32 | 5,50*** | + 0,60 | 680 |
| 10 | AVALANCHE | $5,52^{00}$ | -0,34 | 5,20* | + 0,30 | 320 |
| 11 | INTEGRALE | $5,48^{00}$ | -0,39 | 5,20* | + 0,30 | 280 |
| 12 | GRAMENA | 6,20** | + 0,34 | 5,80*** | + 0,90 | 400 |
| 13 | JUMBO | 5,72 | -0,14 | 5,28** | + 0,38 | 440 |
| 14 | FUCS | $5,46^{00}$ | -0,40 | 5,22** | + 0,32 | 240 |
| 15 | PAN | 5,84 | -0,02 | 5,24** | + 0,34 | 600 |
| 16 | T. 90-81 M | 6,14* | + 0,28 | 5,26** | + 0,36 | 880 |
| 17 | T. 21-81 M | 6,00 | + 0,14 | 5,30** | + 0,40 | 700 |
| 18 | T. 38-81 M | 5,98 | + 0,12 | 5,46*** | + 0,56 | 520 |
| 19 | T. 44-81 M | 6,10* | + 0,24 | 5,34*** | + 0,44 | 760 |
| 20 | LV. 4324-86 | $5,46^{00}$ | -0,40 | 4,86 | -0,04 | 600 |
| 21 | LV. 4325-86 | 5,96 | + 0,10 | 5,36*** | + 0,46 | 600 |
| 22 | LV. 4362-86 | 5,70 | -0,16 | $4,54^{00}$ | -0,36 | 1160 |
| 23 | LV. 4363-86 | 5,75 | -0,11 | 5,18* | + 0,28 | 570 |
| 24 | LV. 8644-82 | $5,26^{000}$ | -0,60 | 4,98 | + 0,08 | 280 |
| 25 | LV. 7478-82 | 5,86 | 0,00 | 5,16* | +0,26 | 700 |
| | Average of varieties | 5,74 | | 5,22 | | |
| | LSD 5% | 0,24 | | | | |
| | LSD 1% | 0,32 | | | | |
| | LSD 0,1% | 0,42 | | | | |

## CONCLUSIONS

F test showed the fact that between spring oat varieties tested genetically differences exist in terms of the level of production. Duncan's ranking put on the first place varieties: Mureşana and Gramena with an average production of 6000 kg/ha.

Mureşana variety represents a genetically progress in comparison with Mureş considering that is a reselection of it.

Number of seeded seed/$m^2$ can cause increases of spring oat production varieties ranging between 360 and 1480 kg/ha.

Among the varieties of spring oat exist differences concerning the nitrogen fertilization response, emphasizing in particular Mureşana which obtained comparable productions on both levels of fertilization

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