

A COMPARATIVE STUDY ON AUTUMN AND SPRING OAT UNDER THE PEDOCLIMATIC CONDITIONS OF BANAT

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Abstract: Autumn oat is a plant more and more cultivated in many regions of the world. The lands where more than 50% of the cultivation area is cultivated with autumn oat are England, Scotland, France, and in other lands, such as Germany, Sweden, or USA, the surface cultivated with autumn oat is of more than 30% of the total cultivated area. South America and Australia also report surfaces cultivated with autumn oat. The expansion of autumn varieties is justified, as they give us the following advantages: are more productive as the spring varieties, are precocious, tolerate the drought, are more resistant to diseases and pests and have good quality characteristics. The disadvantage of the autumn oat varieties is their lower resistance to low winter temperatures as compared to autumn wheat, rye, triticale and barley. The first researches on autumn oat done in Romania started in 1949 – 1950 at the research station in Cenad, but only in 1987 the autumn oat variety called Florina, created at SCA Lovrin, could be homologated and cultivated in the regions with gentle winters. In the Official Catalogue of Varieties is registered today the Lovrin 27 autumn oat variety. The yields obtained for Lovrin 27 during the experimental period were 12 % higher than the ones obtained for the variety Florina. This paper presents the crop results and the data regarding the evolution of the weight characteristics (weight of 1000 grains and the hectolitre mass) and of the quality (the content of protein and fat and the observations regarding to the pests and diseases attacks on the autumn oat varieties (Lovrin 27, Lowi and Mirabel) as well as two spring oat varieties (Jeremy and G.K. Pilago). The obtained autumn oat yields are of between 5226 kg/ha (Lovrin 27) and 5651 kg/ha (Mirabell) as compared to the reference spring variety yield, Jeremy, which was of 3960. In the researched area the content of protein varied between 13,0% (Mirabell) and 14,1% Lowi) and the content of fat varied between 2,7% (G.K. Pilago) and 3,3% Lowi.

Key words: yields, autumn oat, quality.

INTRODUCTION

The autumn oat varieties of the last decades develop continuously, which explains the high yields obtained for these varieties, their precocity and their resistance to drought and diseases.

The quality characteristics (content of protein and fat) are significantly higher to those of the spring varieties.

The fact that these varieties are more and more cultivated is a consequence of the fact that their resistance to frost has been successfully bettered.

MATERIAL AND METHODS

The studied spring oat varieties were Jeremy (Romania) and G.K. Pillago (Hungary) and the varieties of autumn oat analyzed were Lovrin 27 (Romania), Lowi (Germany) and Mirabell (France).

The experiments were done in the luvisol region situated on the hills between the rivers Caraș and Nera that is in the area Slatina Nera, during the experimental period 2009 – 2011. The climatic classification for Romania shows that the area in which the experiments were carried out belongs to the continental temperate climate of Banat subtype, with Sub/Mediterranean and oceanic nuances.

The experiments were bifactorial with three repetitions, where the A factor was

represented by the cultivated variety, with five graduations, and the B factor was the sowing density. The yield was registered after harvesting and the weight of 1000 grains, the hectolitre mass, the content of protein and of fat were determined.

The previous culture was the rape for rapeseed-oil production.

The fertilization was uniformly done, with $N_{60}P_{60}K_{60}$.

The sowing was done between 25 IX – 5 X at a density of 400, 500 and 600 b.g./m².

RESULTS AND DISCUSSIONS

The crop results of the experimental period are presented in table 1.

Table 1

Crop results of the experimental period 2009 – 2011

| A Factor – variety | A Factor – Density b.g./m ² | | | A Factor averages | | | |
|---------------------|--|------|------|-------------------|-----|------------|---------------|
| | 400 | 500 | 600 | Yield kg/ha | % | Dif. Kg/ha | Signification |
| Jeremy | 4278 | 4162 | 3440 | 3960 | 100 | | |
| G.K. Pillago | 4076 | 3898 | 3303 | 3759 | 95 | -201 | |
| Lovrin 27 | 5208 | 5435 | 5036 | 5226 | 132 | 1266 | XXX |
| Lowi | 5316 | 5492 | 5210 | 5339 | 135 | 1379 | XXX |
| Mirabell | 5747 | 5828 | 5380 | 5651 | 143 | 1691 | XXX |

DL5% = 540 DL1% = 870 DL0,1% = 1090

B Factor averages

| Density b.g./m ² | 400 | 500 | 600 |
|-----------------------------|------|------|------|
| Yield kg/ha | 4925 | 4963 | 4474 |
| % | 100 | 101 | 91 |
| Difference kg/ha | | 38 | -451 |
| Signification | | | 0 |

DL5% = 570 DL1% = 790 DL0,1% = 1080

The crop results underline the superiority of the autumn varieties as compared to the spring varieties. The yield increase as compared to the reference spring variety, Jeremi, was of 32% for the variety Lovrin, of 27 35% for the variety Lowi and of 43% for the variety Mirabell.

The optimal sowing density is of 400 – 500 b.g./m². An increase of the sowing density to 600 b.g./m² is not justifiable.

Figure 1 presents the registered results regarding the evolution of weight of 1000 grains.

The average results of the weight value of 1000 grains situate the variety Mirabell, with 34,2 g, on the first place. This variety registered also the highest yield.

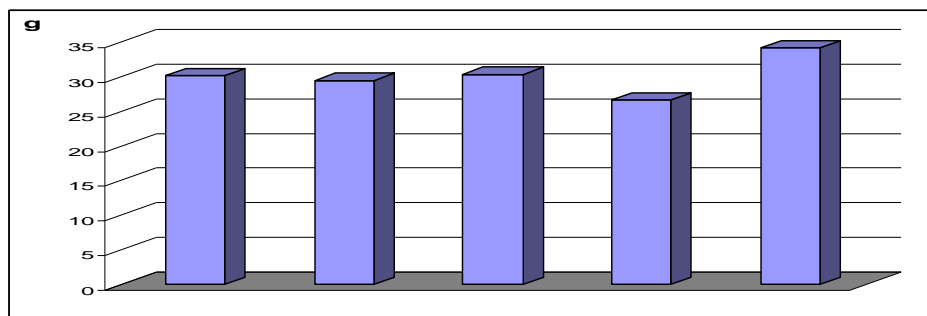
Figure 2 shows the results of the hectolitre mass determinations registered during the experimental period for the cultivated varieties.

As an average on the experimental period, the hectolitre mass was higher at the autumn varieties - 15% higher for the variety Lovrin 27, 17% higher for the variety Lowi and 20% higher for the variety Mirabell - as compared to the spring oat reference variety, Jeremy.

The results of the quality analyses are presented in figure 3 and 4.

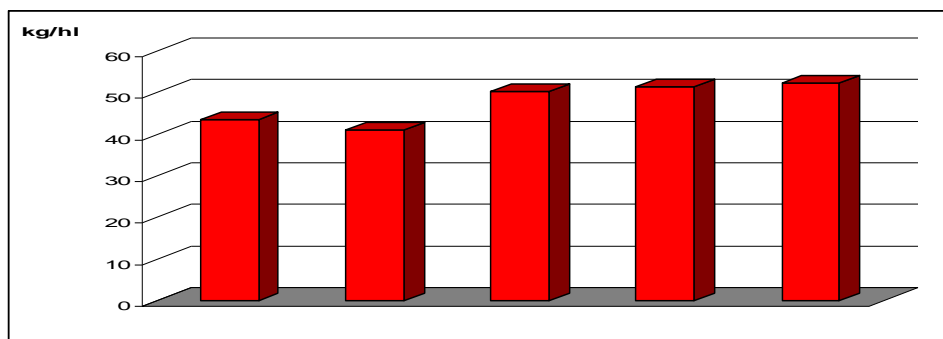
The highest protein content was registered for the variety G.K. Pillago. For the other studied varieties the protein content was of between 13% and 14%.

The content of fat was ob between 2,7% and 3,3%, the difference between varieties being of under 0,5%.



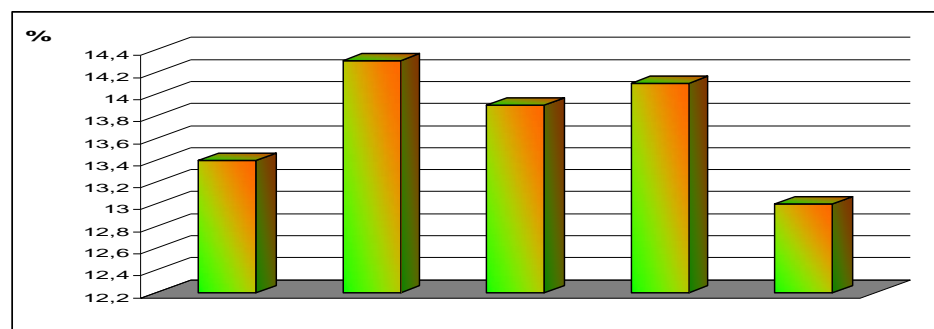
| Specification | Jeremy | G.K. Pellago | Lovrin 27 | Lowi | Mirabell |
|---------------|--------|--------------|-----------|------|----------|
| MMB g | 30,2 | 29,5 | 30,4 | 26,7 | 34,2 |
| % | 100 | 98 | 101 | 88 | 113 |
| Difference g | | -0,7 | 0,2 | -3,5 | 4,0 |

Figure 1. Variation of the weight of 1000 according to the variety



| Specificare | Jeremy | G.K. Pellago | Lovrin 27 | Lowi | Mirabell |
|-------------|--------|--------------|-----------|------|----------|
| MH kg/hl | 43,6 | 41,0 | 50,4 | 51,4 | 52,3 |
| % | 100 | 94 | 115 | 117 | 120 |
| Diferenta g | | -2,6 | 6,8 | 7,8 | 8,7 |

Figure 2. Hectolitre mass variation on varieties



| Specification | Jeremy | G.K. Pellago | Lovrin 27 | Lowi | Mirabell |
|---------------|--------|--------------|-----------|------|----------|
| % protein | 13,4 | 14,3 | 13,9 | 14,1 | 13,0 |
| Difference | | 0,9 | 0,5 | 0,7 | -0,4 |

Figure 3. Content of raw protein (%)

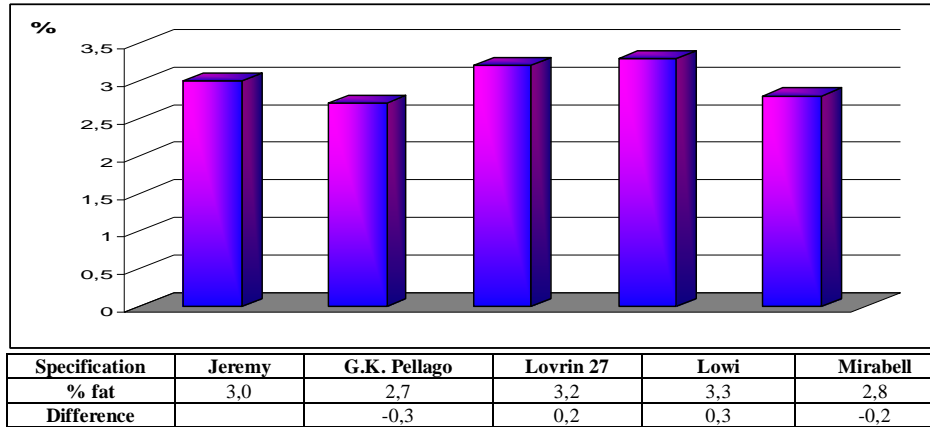


Figure 4. Content of fat (%)

CONCLUSIONS

1. The autumn oat varieties analysed registered better yields as the spring varieties, their yield being also 32 % - 43% bigger as the one of the reference variety, Jeremy, which motivates the extension of their cultivation.

2. The weight of 1000 grains varied between 26,7 g for the variety Lowi and 34,2 g for the variety Mirabell.

3. The hectolitre mass was of above 50 kg/hl, as compared to 43,6% kg/hl, which corresponds to the reference spring variety, Jeremy.

4. The protein content was between 13,0% for the variety Mirabell and 14,1% for the variety Lowi, and the content of fat was between 2,7% for the variety G.K. Pillago and 3,3% for the variety Lowi.

5. The seed treatment, done with Vitavax 2 kg/t, ensured the protection of all varieties against *Ustilago avenae*. No treatments against foil diseases were necessary during vegetation.

BIBLIOGRAPHY

1. ANDERSON H.M., HUBAND N.D.S. 1987. – Improvement of winter hardiness and seedling growth of oats with seed dressing of tetraclacis. Plant growth Regulators for Agricultural and Amenity Uses. British Crop Protection Council 72-76.
2. ARNY D.C., 1972 The worst diseases of crops oats and barley. Crop and soils, Madison, vol. 24, nr.9.
3. COJOCARU C., BORCEAN I., 1978, Perspectivele cultivării ovăzului de toamnă în Banat, Cereale și plante tehnice. Producția vegetală, vol.30, nr.9, București.
4. MANEA D.N., Contribuții la stabilirea tehnologiei de cultivare a ovăzului de toamnă în vestul țării, Teză de doctorat, USAMVB Timișoara, 1998.