PRODUCTION OF SOME BARLEY CULTIVATIONS TESTED IN SCDA LIVADA

Dan COSTANTEA[1], Ioan ROTAR[2], Cecilia BĂNĂȚEANU[3], Anca PLEȘA*[2], Florin PĂCURAR[2], Ioana VAIDA[2*]

1 "Alexiu Berinde" Agricultural Technological High School, Seini, str. Victoriei, no. 2, 435400, county Maramureș, Romania
2Faculty of Agriculture. Department of Plant Crops. University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Manăstur street, 3-5, 400372, Romania.
3 Livada Agricultural Development Research Station, Baia-Mare str., no. 7, 447180, county Satu-Mare, Romania
** Corresponding author, e-mail: anca.plesa@usamvcluj.ro, ioana.vaida@usamvcluj.ro*

Abstract
The increasing need for food these days makes testing some varieties and hybrids of cereals a necessity. This paper refers to the testing of some varieties or lines of autumn barley under the conditions at SCDA Livada, Satu-Mare county. Two technological variants are presented in the paper: sowing at 12.5 cm between rows and 25 cm between rows, then observing the behavior of barley cultivars for dry matter yield and forage quality.

Keywords: barley, forage, quality

INTRODUCTION

The accelerated course of global economic development as well as the exponential increase in the consumption of material and mineral resources in the last century have attracted intense concerns in finding viable alternative methods for increasing the productivity of cultivars and hybrids of cultivated plants.

Barley is the fourth cereal in the world in terms of cultivated area after wheat, corn and rice.

Achieving large productions of barley for grain or green mass, stable and qualitatively superior, requires the cultivation of several valuable genotypes, with high production capacity, with superior qualitative traits, resistant to diseases and adapted to different environmental conditions. Barley grains have valuable nutritional characteristics being widely used in animal nutrition, being an excellent energy feed (Rotar and Carlier, 2010).

Barley is also used for animal feed as a green mass, harvested as a whole plant being an excellent conveyor plant.

The nutrients in barley grains are highly digestible by all animal species and at the same time confer a high nutritional value (Barry, 1965).

Determining the quality of fodder is very important in terms of animal health, meat and milk production. More than a century ago, researchers were already interested in understanding and

describing the quality of animal feed. The nutritional value of a feed is given on the one hand by its content in nutrients, and on the other hand by the body's ability to use these substances, so the nutritional value is the result of the "feed - animal" interaction.

MATERIAL AND METHOD

This research was started in the autumn of 2015 and continued until the summer of 2018, on an assortment of varieties and lines of autumn barley in the pedoclimatic conditions at S.C.D.A. Livada. The experiment was located in the station's research field within the collection of varieties and lines of autumn barley, the research being carried out in the field and in the laboratory (Fig.1).

The experiment had 2 experimental factors: Factor A - the variety or line of autumn barley, Factor B - the distance to sow between the rows (B1-12.5 cm, B2-25 cm). For both sowing distances and for all varieties and lines of winter barley, the same amount of seed per hectare corresponding to one tenth of 500 germinal grains was used.

The experimental field is located at a latitude of $47^0$51', longitude $23^0$08', altitude 120-130 m. The preceding plant was every year fodder peas, and the land preparation work consisted of plowing, and the seedbed being prepared with the disc and the combine.Regarding fertilization, after plowing, complex chemical fertilizers N:P:K (18:46:0) were administered, representing 36 kg/ha N, 92 kg/ha P2O5 active substance and in spring 70 kg active substance N/ ha of ammonium nitrate.

The sowing depth was established and achieved at 3-4 cm. The winter conditions were monitored in: November, December, January, February and March, noting the minimum temperatures in these months, the thickness of the snow layer in cm, establishing the damages due to the frost.

A number of unfavorable factors were taken into account, among which the attack of diseases and pests was expressly followed.

The placement of experiments in the field was done according to the method of randomized blocks, the number of repetitions 3, and the harvestable surface 10 m^2 for each line and variety and different sowing distance (Fig. 1).

The dry matter yield of the 10 barley cultivars was variable, influenced by sowing distance and variety. The following 10 cultivars were used for harvesting green mass: Univers, Amethyst, F8-2-13, F8-20-10, Andreea, Smarald, F8-3-01, Dana, Cardinal, Amethyst.

Fig. 1. Aspects from the experimental field

RESULTS AND DISCUSSIONS

Over 14 t/ha DM it was obtained in the varieties Dana, Cardinal, Amethyst, F8-3-01, but compared with the control variety Dana it is observed that only the variety Amethyst recorded a higher production of DM t/ha (14.9 t/ha). The highest productions of dry matter have the varieties Ametis of 14.90 t/ha DM, then the variety Dana and Cardinal which reached productions of 14.50 t/ha DM.

Above-average values are also given by the varieties, respectively the lines: Andreea, Smarald, F8-3-01, Dana and Cardinal (Fig. 2).

As is known, the distance between the rows influences crop plants, to an important extent the harvest of dry matter (DM), this being a consequence of the modification of the nutrition space, the grower's interest being there to achieve a maximum use of it (Gaga *et al*., 2018).

Under the conditions at SCDA Livada in 2018, the following results were recorded: between 21.08% and 24.91% DM content, when sowing at 12.5 cm and between 21.7% and 26.69% in the case of sowing at 25 cm between rows. In our case, of the two sowing distances used in the 10 cultivars and lines, we note as a general observation that the dry matter yields obtained are lower at the sowing distance of 25 cm between rows (Fig. 2).

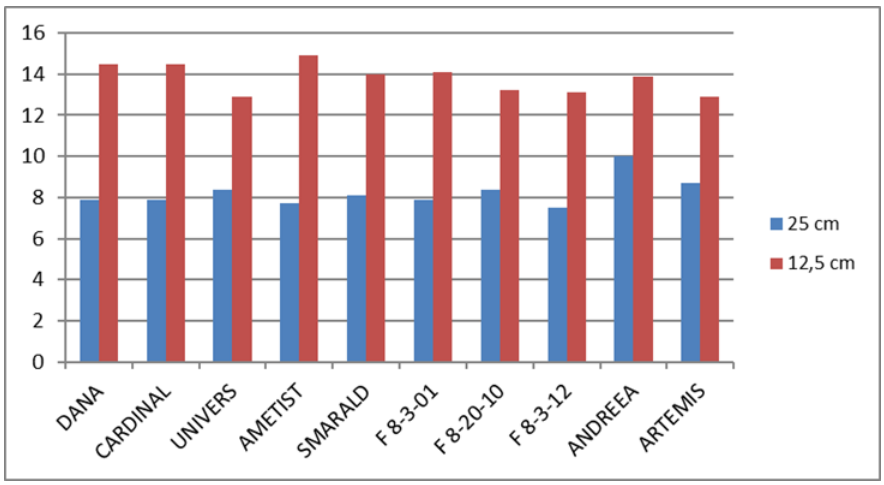
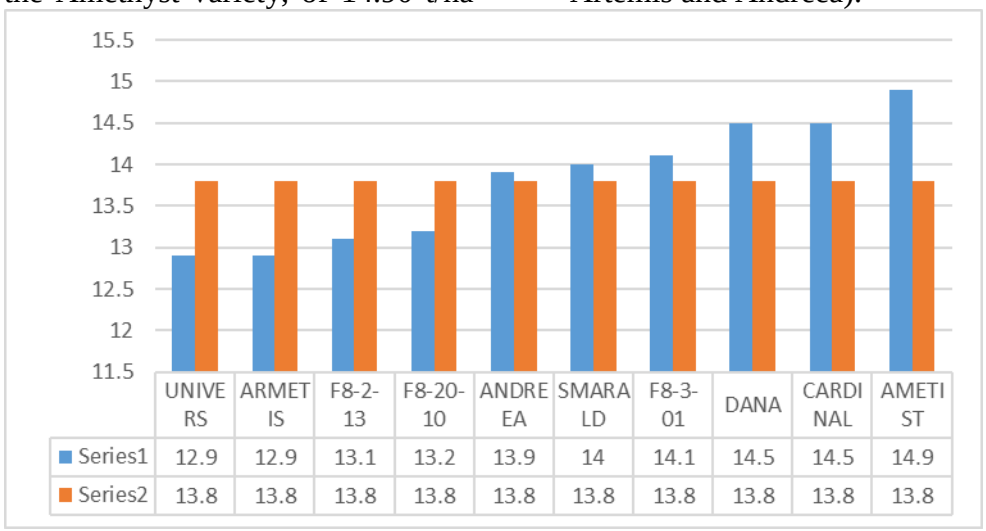


Fig. 2 The influence of the sowing distance in the studied varieties

All varieties and lines give a higher DM yield when sown at 12.5 cm row spacing. Among the 10 genotypes used, the highest dry matter (DM) yield is achieved by the Amethyst variety, of 14.90 t/ha sown at 12.5 cm between rows (Fig. 3). However, at the sowing distance of 25 cm between rows, only 4 varieties have a higher-than-average productivity (Univers, F8-20-10, Artemis and Andreea).



	UNIVERS	ARMETIS	F8-2-13	F8-20-10	ANDREEA	SMARALD	F8-3-01	DANA	CARDINAL	AMETIST
Series1	12.9	12.9	13.1	13.2	13.9	14	14.1	14.5	14.5	14.9
Series2	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8

Fig. 3 Dry matter production by varieties

In total experience, the DM productions achieved when sowing 25 cm between rows are lower than those achieved at 12.5 cm between rows. The varieties Artemis and Andreea behave somewhat better, achieving higher DM yields at the sowing distance of 25 cm compared to the average. Depending on the percentage of dry matter, it resulted in a production of DM per surface unit between 12.9 t/ha (Univers and Artemis) and 14.9 t/ha at Amethyst in the classic sowing variant. Sowing in sparse rows, at 25 cm, resulted in a yield of DM t/ha

between 7.5 t/ha (F8-3-12) and 10.0 t/ha (Andreea). All 6-row barley genotypes had a higher percentage of DM in the 25 cm sowing variant, compared to the 12.5 cm sowing variant. In the two 2-row barley genotypes, Andreea and Artemis, the percentage of DM it was higher in the classic sowing option at 12.5 cm, under the conditions of 2018.

Determining the quality of fodder is very important in terms of animal health, meat and milk production. More than a century ago, researchers were already interested in understanding and describing the quality of animal feed. Barley bran has a good feed value, containing 126 g digestible protein and 0.86 nutrient units per kg. (MUTEAN *et al*., 2014).

From the analyzes carried out, the sowing distance influences the forage quality more than the variety/cultivar. The definition of the notion of quality in the case of barley takes on a particularly complex character, and this is due to the fact that the two basic directions of the use of grain crops, animal feed and the manufacture of malt and beer, demand specific quality characteristics, in many diametrically opposed situations.

Table 1

Chemical analysis of the whole plant sown sowing at 12.5 cm between rows

No	Variety /	Moisture	Protein	Fat	Fiber	Ash	Non-nitrogenous extractives
	Line	(%)	(%)	AH (%)	(%)	(%)	
1	DANA	9.36	13.91	3.6	21.16	5.36	46.61
2	CARDINAL	9.36	14.97	3.55	21.73	5.51	44.88
3	UNIVERS	8.94	14.08	3.21	21.63	5.49	46.65
4	AMETIST	7.67	12.84	1.7	22.22	5.22	50.35
5	SMARALD	8.49	14.92	3.11	20.82	5.47	47.19
6	F 8-3-01	8.63	15.86	3.48	19.45	5.74	46.84
7	F 8-20-10	8.69	14.61	3.04	21.86	5.73	46.07
8	F 8-3-12	8.05	14.47	3.26	21.32	5.53	47.37
9	ANDREEA	8.77	15.8	3.64	19.79	5.52	46.48
10	ARTEMIS	8.57	14.11	3.56	20.7	5.34	47.72

Table 2

Chemical analysis of the whole plant in the sowing variant at 25 cm between rows

No	Variety /	Moisture	Protein	Fat	Fiber	Ash	Non-nitrogenous extractives
	Line	(%)	(%)	AH (%)	(%)	(%)	
1	DANA	8.3	11.82	2.67	21.99	5.05	50.17
2	CARDINAL	7.73	12.23	2.62	21.79	5.13	50.5
3	UNIVERS	7.84	11.87	2.65	21.37	5.12	51.15
4	AMETIST	7.52	11.45	2.1	20.89	4.93	53.11

5	SMARALD	7.68	10.7	2.12	21.87	5	52.63
6	F 8-3-01	7.3	12.81	3.16	28.05	5.47	43.21
7	F 8-20-10	7.59	13.33	3.29	21.12	5.54	49.13
8	F 8-3-12	7.65	13.76	3.55	21.02	5.34	48.68
9	ANDREEA	7.37	14.88	3.76	20.73	5.25	48.01
10	ARTEMIS	6.76	13.5	3.39	22.26	5.47	48.62

Analyzing the percentage of crude protein at the two sowing distances (Figure 5) we find that in all 10 cultivars/lines the protein content is higher at the sowing distance of 12.5 cm between rows (table 1). In general, a larger sowing distance between the rows generates in some cultivars a lower fiber content (Emerald, 20.82%), and in others the content in non-nitrogenous extractives increases at a distance of 25 cm between the rows (Amethyst, with 2, 76%) (table 2).

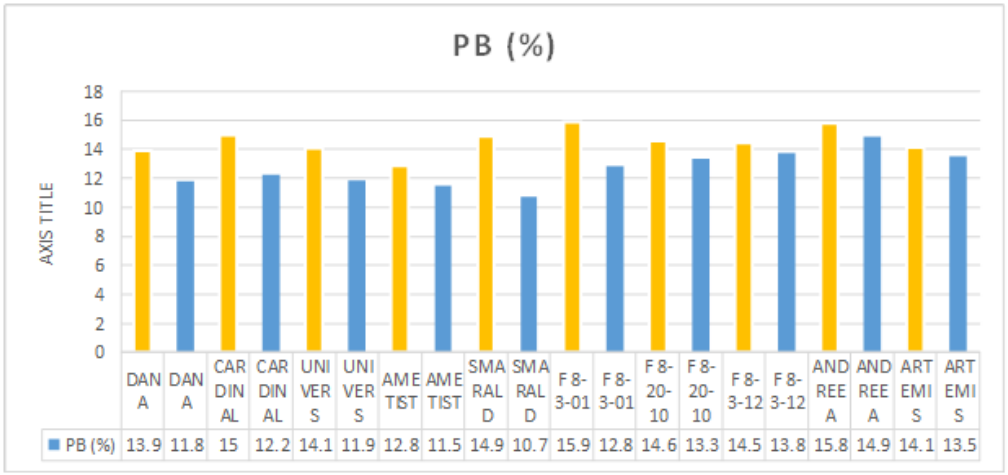


Fig. 5. Crude protein yield (%)

CONCLUSIONS

The dry matter yield obtained from barley is influenced by the cultivated variety, but above all, by the sowing distance.

Among the two genotypes, the highest dry matter yield is achieved by the Amethyst variety (14.90 t/ha DM) at 12.5 cm between rows.

The classic sowing distance (12.5 cm between rows) is superior to the 25 cm sowing distance between rows. Thus, the dry matter yield obtained on average from the 10 barley cultivars is 5.5 t/ha higher than the yield obtained from the same cultivars sown at 25 cm between rows.

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