THE INFLUENCE OF SOME SOWING TECHNOLOGY PARAMETERS ON WINTER WHEAT IN BANAT PLAIN

DRAGOȘ, MARCELA –PÎRȘAN PAUL

Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Agricultural Sciences,
Timisoara, Aradului street, No. 119, RO-300645, ROMANIA
marceladragos@yahoo.com

Abstract - Influence of some sowing technology parameters on winter wheat in Banat Plain
he two years experience was organized at the Didactic Facility of Banat's University of Agricultural Sciences and Veterinary Medicine of Timişoara.
The research objectives are determining the influence of sowing period, row distance and sowing density on the winter wheat yield, the variety used in the study being Alex, a variety representative for the Western Romania.
The experimental plots were laid down after the subdivision of plots using three replications, under the climatic conditions of Timişoara. We monitored four sowing periods, three row distances and four sowing densities. In the experimental plots the technology applied was the classic one. The forecrop was corn. Wheat (*Triticum aestivum ssp. vulgare* L, *var. erythrospermum*) ensures approximately 35-45% of the world food necessity, specifically being used for producing bread and other flour products, as well as for domestic animal feeding. Thus, obtaining a high productivity is very important.
The average data obtained after two years indicate that the first period of sowing, 1-15 October, registered the best results in both years by experience, followed by the variant sown during 15 - 30 October. Periods three and four resulted in significant yield losses. The row distance of the best results was the control, followed by sowing at a row distance of 25 cm with a drop by over 80 kg/ha. The variant sown by scattering registered in both years losses by approximately 1500 kg/ha. Sowing density resulted in constant increases in the yield, from the control variant with a density of 400 seeds/m^2, to 700 seeds/m^2, increases were statistically significant.

Key words: row distance, sowing density, sowing period, winter wheat

INTRODUCTION

Wheat (*Triticum aestivum ssp. vulgare* L, *var. erythrospermum)* is the most important cultivated plant, with the highest prevalence in the world, cultivated in over 100 countries. The importance of wheat (BÂLTEANU,1988; CEAPOIU ET AL., 1984; MOGÂRZAN ET AL., 2004; MUNTEAN ET AL., 2008) is given by:
- Chemical composition of grains and the ratio of carbohydrates and protein requirements in relation to the human body;
- High ecological plasticity: it is grown in areas of different climates (subtropical, Mediterranean, oceanic, continental steppe), different types of soil regarding the level of fertility;
- Possibility of full mechanization of crop production;
- The possibility of transport and storage without spoiling.

Time of sowing has a major influence on the coming harvest, whereas it provides a good tillering plant in autumn, and accumulation of reserve substances needed in the cold season and good winter hardiness.
In recent years in Romania there has been a delay in winter wheat sowing, above the optimal time determined experimentally, recording crop losses (BÂLTEANU, 2003).

The main causes of late sowing is the most often, late harvest and late preparing of the land for sowing (PÎRȘAN ET AL., 2006).
Winter wheat sowing can be done with sowing machine, in rows, and only in rare cases, by spreading by hand or with special machines. The most common method of planting winter wheat in our country and the world is normal drill at a row distance of 12.5 cm (PÎRȘAN, 2003).
In some situations it is recommended to sow at larger distances, 25cm, as in wheat breeding and to ensure more rapid multiplication of seeds. The disadvantage of the longer distance is the reduced capacity of plants to fight against weeds (PÎRȘAN ET AL., 2006).
Because wheat is not thinning, the sowing density is to be determined based on the number of germinable seeds per square meter (g.s./m^2).
Planting density is determined by the ability of tillering of the variety, the sowing time (compared with the optimal time), the quality of seedbed preparation, the soil moisture (humidity ensures a rapid springing) (BÂLTEANU, 1974, 1989, 2003).

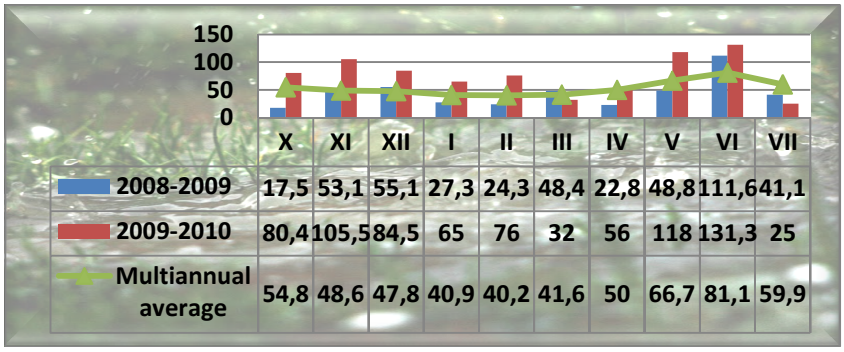
MATERIAL AND METHODS

The purpose of the research is to determine the influence of sowing time and row distance on the number of spikes and the number of plants per square meter.
The material investigated was the variety Alex (Lovrin 50), a variety created by S.C.D.A Lovrin and approved in 1994, representative for the western part of the country and with a production capacity of 7000-8000 kg/ha.
The research was conducted at the Teaching Resort of USAMVB Timișoara. Trials were of the polifactorial type with three repetitions. The sown experimental plot size is of 28.8 sqm (3.6 mx8 m). The harvested area was 20 sqm. In the study the following factors were taken:

- *Factor A* - period of sowing: A1 - 1-15 October ; A2 - 16-31 October ; A3 - 1-15 November ; A4 - 16-30 November.
- *Factor B* – row distance: B1 - 12.5 cm; B2 - 25 cm; B3 – Scattering.
- *Factor C* – sowing density: C1 - 400 g.s./m^2 ; C2 - 500 g.s./m^2 ; C3 - 600 g.s./m^2 ; C4 - g.s./m^2.

In the experimental plot, the forecrop was corn, which is the most common forecrop for wheat.
The technology applied in the experimental field was the classic one. After the harvest of maize a plowing with disc harrow perpendicular on row direction of corn was conducted to shred vegetal remains. Basic plowing was done at a depth of 22 cm. Seedbed was prepared by milling.
The fertilization recipe was N100 P50 K0 kg/ha. In autumn, together with the seedbed preparation, N50 P50 was applied from the fertilizer complex 20:20:0, and in the early spring the difference of N50.
Combating pests and diseases was made by 1 to 2 treatments in vegetation, depending on the conditions of that year. Weed control was based on existing weeds growing.
The amount of precipitation fallen in the two years of experience was different (Figure 1). The first year was dry, especially October, January, February, April and May recorded a lower amount of precipitation compared to the annual average. However, the amount of rainfall throughout the growing season provided a minimum of 400 mm.

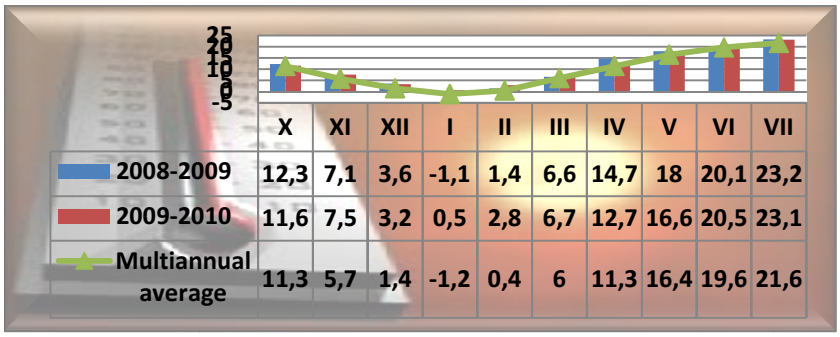
The second year was characterized by heavy rainfall above the annual average, summing up over 700 mm precipitation throughout the vegetation period. Rainfall has not provided the required amount of browsing phase of maximum consumption of wheat, a crop with less uniform emergence in autumn and in summer even though there was the phenomenon of shriveled, formation and grain filling was not conducted in optimal conditions.



	X	XI	XII	I	II	III	IV	V	VI	VII
2008-2009	17,5	53,1	55,1	27,3	24,3	48,4	22,8	48,8	111,6	41,1
2009-2010	80,4	105,5	84,5	65	76	32	56	118	131,3	25
Multiannual average	54,8	48,6	47,8	40,9	40,2	41,6	50	66,7	81,1	59,9

Figure 1. Monthly rainfall, annual and multiannual average (mm)
Meteorological Station Timişoara

Temperatures recorded in the two years of experience were slightly above the annual average during the growing season providing the needs for winter wheat (Figure 2). Temperatures from April to June, going through stages of spike emergence and filling of grains provided good condition for the crop.



	X	XI	XII	I	II	III	IV	V	VI	VII
2008-2009	12,3	7,1	3,6	-1,1	1,4	6,6	14,7	18	20,1	23,2
2009-2010	11,6	7,5	3,2	0,5	2,8	6,7	12,7	16,6	20,5	23,1
Multiannual average	11,3	5,7	1,4	-1,2	0,4	6	11,3	16,4	19,6	21,6

Figure 2. Monthly temperature ^{o}C, annual and multiannual average
Meteorological station Timişoara

RESULTS AND DISCUSSION

The lack of rainfall from the first year had a negative influence, the yield being relatively smaller than the productivity of the variety of 7000-8000 kg/ha.
The results obtained in the first year of experience are presented in the Table 1.

Table 1. Yield obtained in year 2009

Factor A Sowing period	Factor B Row distance (cm)	Factor C Sowing density (g.s./m^2)				Average factor A			
		400	500	600	700	Average	Difference	%	Significance
Period I	12.5	5,564	5,732	5,658	5,600	5,104.08	Mt.	Mt.	Mt.
	25	5,648	5,704	5,520	5,414				
	Scattering	3,834	4,012	4,217	4,346				
Period II	12.5	5,606	5,874	5,888	5,704	5,053.94	-50.14	99	-
	25	5,530	5,617	5,605	5,512				
	Scattering	3,616	3,849	3,861	3,985				
Period III	12.5	4,810	4,980	5,147	5,236	4,408.50	-695.58	86	00
	25	4,938	4,890	5,064	5,118				
	Scattering	2,900	3,112	3,229	3,478				
Period IV	12.5	2,870	3,146	3,398	3,548	2,996.25	-2,107.83	59	000
	25	3,010	3,160	3,284	3,340				
	Scattering	2,417	2,528	2,573	2,681				

DL 5%=226.47kg/ha, DL 1%=522.99kg/ha, DL 0.1%=1664.32kg/ha

Average factor C					Average factor B			
Average	4,228.58	4,383.67	4,453.67	4,496.86	Average	Difference	%	Significance
Difference	Mt.	155.08	225.08	268.28	4,922.56	Mt.	Mt.	Mt.
%	Mt.	104	105	106	4,834.63	-87.94	98	0
Significance	Mt.	X	XX	XX	3,414.90	-1,507.67	69	000

DL 5%=93.06 kg/ha, DL
5%=80.59kg/ha,
DL 1%=170.91kg/ha, DL
1%=148.01kg/ha,
DL 0.1%=378-68kg/ha DL
0.1%=327.95kg/ha

The period of the sowing had a negative influence on yield obtained in the first year of experience, the difference ranging from 50.14 kg/ha up to 2107.83 kg/ha, compared to the control. The losses of harvest in the periods III and IV are statistically very significant and, distinct significant, respectively.

With regard to the row distance, crop losses range from 2% at 25 cm distance between rows, to 31% at sowing by scattering.

Increasing sowing density had a beneficial effect, the increase being over the statistically significant level in all variants.

In the second year of the experience there were more favorable climatic conditions for the culture, a fact reflected also in the yields obtained. Production results in experimental year 2009-2010 are provided in Table 2.

Table 2. Yield obtained in year 2010

Factor A Sowing period	Factor B Row distance (cm)	Factor C Sowing density (g.s./m^2)				Average factor A			
		400	500	600	700	Average	Difference	%	Significance
Period I	12.5	6,347	6,548	6,510	6,596	5,985.83	Mt.	Mt.	Mt.
	25	6,440	6,578	6,314	6,212				
	Scattering	4,602	4,839	5,260	5,584				
Period II	12.5	6,280	6,634	6,692	6,650	5,964.25	-21.58	100	-
	25	6,415	6,610	6,664	6,518				
	Scattering	4,439	4,683	4,912	5,074				
Period III	12.5	5,570	5,892	6,147	6,318	5,344.67	-641.17	89	00
	25	5,432	5,818	5,954	5,810				
	Scattering	3,844	4,205	4,518	4,628				
Period IV	12.5	4,107	4,328	4,585	4,663	4,074.17	-1,911.67	68	000
	25	4,233	4,357	4,494	4,587				
	Scattering	3,110	3,224	3,514	3,688				

DL 5%=205.80kg/ha, DL 1%=475.25kg/ha, DL 0.1%=1512.38kg/ha

Average factor C					Average factor B			
Average	5,068.25	5,309.67	5,463.67	5,527.33	Average	Difference	%	Significance
Difference	Mt.	241.42	395.42	459.08	5,866.69	Mt.	Mt.	Mt.
%	Mt.	105	108	109	5,777.25	-89.44	98	0
Significance	Mt.	XX	XXX	XXX	4,382.75	-1,483.94	75	000

DL 5%=84.76kg/ha, DL
5%=73.41kg/ha,
DL 1%=155.66kg/ha, DL
1%=134.81kg/ha,
DL 0.1%=344.92kg/ha DL
0.1%=298.71kg/ha

Sowing after 1st of November registered major losses of production compared to the control, ranging from 11% in the third period, up 32% in the fourth period, being statistically very or distinct significant, respectively.
With regard to the distance between rows, the loss of harvest was statistically significant, the deficit ranging from 89.44 kg/ha in the variant sown at 25 cm row distance up to 1483.94 kg/ha in the variant sown by scattering.
Higher densities resulted in increases in production, statistically assured as very significant, significant and distinct significant, the differences ranging from 241.42 kg/ha to 459.08 kg/ha.

CONCLUSIONS

Research conducted in the experimental cycle of 2008-2009, aimed mainly at establishing a technology based on the common situations in which, for various reasons, we can not sow in the optimal sowing period. The influence of sowing period, sowing density and row distance on yield was monitored by using the wheat variety, Alex.

On the average of the two years of experience and sowing technology applied, harvest results showed the following:
- The first period of sowing, 1-15 October, gave the best results in both years of experience, followed by the variant sown during 15-30 October. Sowing periods No. three and four resulted in significant yield losses, thus the sowing of winter wheat is not recommended after 1th of November.
- The row distance with the best results was that of the control variant, followed by sowing at a row distance of 25 cm with a drop by over 80 kg/ha. The variant sown by scattering resulted in losses by approximately 1500 kg/ha both years.
- Sowing density registered constant increases of the in yield, from control variant, density of 400 g.s./m^2 to 700 g.s./m^2, increases statistically assured as significant.

REFERENCES

BÂLTEANU GH. (1974) Fitotehnie. Editura Didactică şi Pedagogică, Bucuresti
BÂLTEANU GH. (2003) Fitotehnie, Ed. Ceres
BÂLTEANU GH., BÂRNAURE V. (1989) Fitotehnie, vol. I. Editura "Ceres",Bucureşti
BÂLTEANU GH., BÂRNAURE V. (1988) Mica enciclopedie agricolă, Ed Ştiinţifică şi Enciclopedică, Bucureşti
CEAPOIU N., BÂLTEANU GH., SĂULESCU N.N., NEGULESCU FLOARE, BĂRBULESCU AL. (1984) Grâul, Editura Academiei, Bucuresti
CIULCĂ S. (2006) Metodologii de experimentare în agricultură şi biologie, Ed Agroprint, Timişoara
MOGÂRZAN AGLAE, MORAR G., ŞTEFAN M. (2004) Fitotehnie. Editura "IonIonescu de la Brad", Iaşi
MUNTEAN L.S. (1995) Mic tratat de fitotehnie, vol.I, Cereale şi leguminoasepentru boabe, Ed. Ceres
MUNTEAN L., CERNEA S., MORAR G., DUDA M.M., VÂRBAN D.I., MUNTEAN S. (2008) Fitotehnie. Editura "Academic Pres", Cluj-Napoca
PÎRŞAN P., DAVID GH., IMBREA FL. (2006) Fitotehnie, Eurobit
PÎRŞAN P. (2003) Tehnologia plantelor de camp, Editura Agroprint, Timisoara
XXX – Administraţia Naţională de Metorologie: Statia meteorologică:Timişoara