The Impact of Sowing Technology on Ponderal Features of Winter Wheat Seeds in Timişoara

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Abstract

Wheat is a grass, originally from the Fertile Crescent region of the Near East, but now cultivated worldwide. The paper presents the results obtained in the last two years of experience, about the influence of sowing technology on the ponderal features of the winter wheat seeds. The experimental parcels were laid down in a randomized complete block design with three replications in the pedo-climatic conditions of Timişoara. The purpose of the research is to determine the influence of some sowing links on the thousand grain mass and hectoliter mass.

The average data obtained after two years of study indicate an increase of about 2 % of the thousand grain mass and hectoliter mass on the second sowing period (16-31 October)and a distinctive decrease of 2-3% on the fourth sowing period(16-30 November). During the two years of experience the row distance and the sowing density had a negative impact on both thousand grain mass and hectoliter mass in both variants compared with the control variant, the difference being statistical significant.

Keywords: hectoliter mass, row distance, sowing density, sowing period, thousand grain mass, winter wheat

1. Introduction

Wheat is the most important cultivated plant, with the highest prevalence in the world, cultivated in over 100 countries. The importance of wheat [1-4] is given by:

- Chemical composition of grains and the ratio of carbon hydrants and protein requirements in relation to the human body;
- High ecological plasticity is grown in areas with different climates (subtropical, Mediterranean, oceanic, continental steppe), different types of soil as a level of fertility;
-Possibility of full mechanization of crop production and obtaining cheap;
- The possibility of storage, transport and storage without spoiling.

Time of sowing has a major influence for the coming harvest, whereas it provides a good twining plant in autumn, and accumulation of reserve substances needed in the cold season and good winter hardiness.

In recent years Romania has been a delay in winter wheat sowing, above the optimal time determined experimentally, recording crop losses. [5].

The main cause of late sowing is the most often, late harvest and preparing land for sowing variety [6].

Winter wheat sowing can be done with the car mechanic, 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 distance of 12.5 cm [7].

In some situations it is recommended planting distances larger, 25cm, as with crop seed to bring înfrăţitul and ensure more rapid multiplication of seeds. The disadvantage of the longer distance is to reduce plant capacity to fight weeds [6].

Because wheat is not thinning, the density is still determined to sow, the number of germinable seeds per meter square.

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Planting density is determined by the ability of the twinning of the variety, sowing time (compared with the optimal time), quality of seedbed preparation, soil moisture (humidity ensure a rapid springing) [5, 8, 9].

2. Materials and methods

The material investigated is the variety Alex (Lovrin 50), variety created by S.C.D.A Lovrin and approved in 1994, representative for the west of the country and with a production capacity of 7000-8000 kg/ha.

The research was conducted at the Teaching Resort of USAMVB Timişoara. Trials were of the polifactorial type with three repetitions [11]. The sown experimental plot size is of 28.8sqm (3.6mx8m).Harvested area is 20 sqm. In the study were taken the following factors:

• Factor A - period of sowing: A1:1-15 October; A2:6-31 October; A3:1-15 November; A4:16-30 November.

• Factor B – distance between rows: B1:12.5 cm; B2:25 cm; B3: Scattering.

• Factor C - density of sowing: C1:400 b.g. / ha C2:500 b.g. / ha; C3:600 b.g. / ha; C4:700 b.g. / ha

In experimental plot, the precursory plant was corn, which is the most common precursory for wheat.

The technology applied in the experimental field was the classic. After the harvest of maize was conducted a plowing with disc harrow perpendicular on rows direction of corn, for shredding vegetal remains. Basic plowing was done at a depth of 22 cm. Seedbed was prepared by milling.

Fertilization recipe will be N100 P50 K0 fertilization. In autumn, with the seedbed preparation was applied N50 P50 from the fertilizer complex 20:20:0, and in the early spring, the difference of N50.

Combating pests and diseases will be made by 1 to 2 treatments in vegetation, depending on the conditions of that year. Weed control will be based on existing weeds growing.

3. Results and discussion

Climatic conditions in the two years of experience are considered in the favorability parameters for wheat crop. Rainfall recorded during the two years of experience, exceeding 400 mm in the entire vegetation period, have created favorable conditions for the growth of wheat plants. Temperatures over 16 ºC from May to July of the first year of experience have created very favorable conditions for wheat crop.

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 to the annual average. However, the amount of rainfall throughout the growing season provided a minimum of 400 mm rainfall.

Second year was characterized by heavy rainfall over the annual average, totaling over 700 mm precipitation throughout the vegetation period. Rainfall has not provided the required amount in the phase of maximum consumption for wheat, the crop having less uniform emergence in autumn, and in summer even though there was no phenomenon of shriveling, the formation and grain filling has not occurred in optimal conditions.

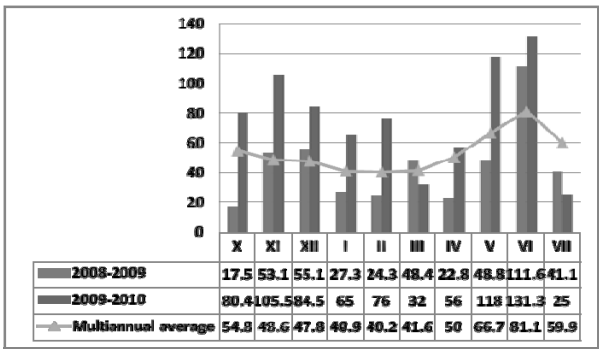

Figure 1. Rainfall recorded at Meteorological Station Timişoara

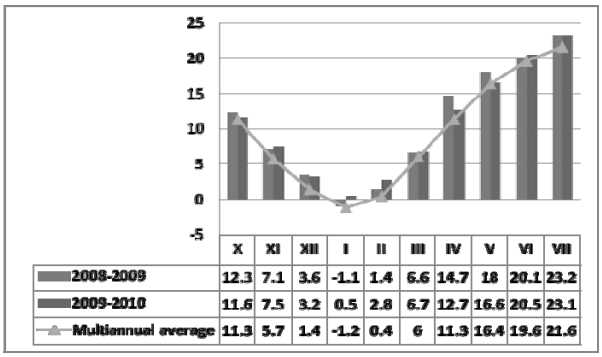

Figure 2. Temperature recorded at Meteorological Station Timişoara

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

The following tables contain the results obtained during the two years of experience.

The influence of different links of the sowing technology on the thousand grain mass in the two years of experience is presented in the Table.1 and Table.2. The sowing period showed in the first year of experience (2008-2009) a distinctive increase of 2 % (0.72g) compared with the control variant of the second sowing period. The variants sowed after November 1th showed a negative difference of 1-2% compared to the control variant. The distance between rows showed a decrease of 1-3% in both variants compared to the control variant (12.5 cm distances between rows). Concerning the sowing density, the experience showed a statistical distinct difference of all three densities compared to the control variant (400 g.s/sqm).

Table 1. The influence of sowing period, row distance and sowing density on the thousand grain mass of winter wheat in year 2008-2009

Factor A Sowing period	Factor B Distance between rows	Factor C Sowing density				Factor A average			
		400	500	600	700	Average	Difference	%	Significance
1-15 October	12.5	46.00	45.08	45.08	44.94	44.73	Mt.	Mt.	Mt.
	25	45.77	45.31	44.92	44.53				
	Scattering	43.84	45.16	43.84	42.46				
16-31 October	12.5	46.92	46.46	46.00	45.86	45.46	0.72	102	XXX
	25	46.69	46.23	45.85	45.63				
	Scattering	44.62	44.23	43.70	43.43				
1-15 November	12.5	45.17	44.67	44.16	44.48	44.19	-0.54	99	000
	25	44.48	44.43	44.00	44.25				
	Scattering	44.39	43.77	43.24	43.38				
16-30 November	12.5	44.67	44.16	43.70	43.56	43.62	-1.12	98	000
	25	44.39	43.93	43.54	43.33				
	Scattering	43.70	43.31	42.78	42.46				

DL 5%=0.12g, DL 1%=0.23g, DL 0.1%=0.50g

Factor C average					Factor B average			
Average	45.05	44.73	44.23	44.03	Average	Difference	%	Significance
Difference	Mt.	-0.32	-0.82	-1.03	45.06	Mt.	Mt.	Mt.
%	Mt.	99	98	98	44.83	-0.23	99	00
Significance	Mt.	000	000	000	43.64	-1.41	97	000
DL 5%=0.04g, DL 1%=0.07, DL 0.1%=0.14g					DL 5%=0.09g, DL 1%=0.20g, DL 0.1%=0.65g			

The thousand grain mass obtained in the second year(2009-2010) of experience a distinctive increase of 2 % (0.94g) under the influence of the sowing period compared with the control variant of the second sowing period. The variants sowed after November 1th showed a negative difference of 2-3% compared to the control variant. The distance between rows showed a decrease of 1-2% in both variants compared to the control variant (12.5 cm distances between rows). Regarding the sowing density, the experience showed a statistical distinct difference, from 0.49g to 1.12g of all three densities compared to the control variant(400 g.s/sqm).

Table 2. The influence of sowing period, row distance and sowing density on the thousand grain mass of winter wheat in year 2009-2010

Factor A Sowing period	Factor B Distance between rows	Factor C Sowing density				Factor A average			
		400	500	600	700	Average	Difference	%	Significance
1-15 October	12.5	48.2	47.24	47.23	47.09	47.17	Mt.	Mt.	Mt.
	25	47.96	47.48	47	46.66				
	Scattering	47.38	47.24	47.14	45.45				
16-31 October	12.5	49.17	48.68	48.2	48.05	48.11	0.94	102	XXX
	25	48.93	48.44	47.96	47.81				
	Scattering	48.2	47.72	47.24	46.95				
1-15 November	12.5	47.34	46.8	46.28	46.61	46.31	-0.87	98	000
	25	46.61	46.56	46.03	46.37				
	Scattering	46.51	45.79	45.31	45.45				
16-30 November	12.5	46.8	46.27	45.79	45.65	45.70	-1.47	97	000
	25	46.51	46.03	45.55	45.4				
	Scattering	45.79	45.31	44.83	44.49				

DL 5%=0.17g, DL 1%=0.30g, DL 0.1%=0.67g

Factor C average					Factor B average			
Average	47.45	46.96	46.55	46.33	Average	Difference	%	Significance
Difference	Mt.	-0.49	-0.90	-1.12	47.21	Mt.	Mt.	Mt.
%	Mt.	99	98	98	46.96	-0.26	99	0
Significance	Mt.	000	000	000	46.30	-0.91	98	000

DL 5%=0.05g, DL 1%=0.10g, DL 0.1%=0.20g

DL 5%=0.12g, DL 1%=0.28g, DL 0.1%=0.90g

The influence of different links of the sowing technology on the hectoliter mass in the two years of experience is presented in the Table.3 and Table.4. The sowing period showed in the first year of experience (2008-2009) a moderate increase on hectoliter mass of 2 % (72.80kg) of the second sowing period, compared with the control variant. The variant sown in the third period (1-15 November) has no statistical significance. The variants sowed after November 15th showed a negative difference of 2% compared to the control variant. The distance between rows showed a decrease of 1-3% in both variants compared to the control variant (12.5 cm distances between rows). Concerning the sowing density, the experience showed a statistical distinct difference of all three densities compared to the control variant (400 g.s/sqm).

The hectoliter mass obtained, in the second year of experience (2009-2010), a distinctive increase of 2 % (1.44kg) under the influence of the sowing period, compared with the control variant of the second sowing period. The variants sown after November 1th showed a negative difference of 2-3% compared to the control variant.

Table 3. The influence of sowing period, row distance and sowing density on the hectoliter mass of winter wheat in year 2008-2009

Factor A Sowing period	Factor B Distance between rows	Factor C Sowing density				Factor A average			
		400	500	600	700	Average	Difference	%	Significance
1-15 October	12.5	73.67	72.20	72.20	71.98	71.64	Mt.	Mt.	Mt.
	25	73.30	72.56	71.83	71.31				
	Scattering	70.21	72.20	70.21	68.00				
16-31 October	12.5	75.14	74.41	73.67	73.45	72.80	1.16	102	X
	25	74.78	74.04	73.30	73.08				
	Scattering	71.46	70.72	69.99	69.54				
1-15 November	12.5	72.34	71.53	70.73	71.24	70.77	-0.87	99	-
	25	71.24	71.17	70.35	70.87				
	Scattering	71.09	69.99	69.25	69.47				
16-30 November	12.5	71.53	70.72	69.99	69.77	69.85	-1.79	98	000
	25	71.09	70.35	69.62	69.40				
	Scattering	69.99	69.25	68.51	68.00				

DL 5%=1.03kg, DL 1%=1.27kg, DL 0.1%=1.74kg

Factor C average					Factor B average			
Average	72.15	71.59	70.80	70.51	Average	Difference	%	Significance
Difference	Mt.	-0.56	-1.35	-1.65	72.16	Mt.	Mt.	Mt.
%	Mt.	99	98	98	71.77	-0.39	99	00
Significance	Mt.	00	000	000	69.87	-2.29	97	000

DL 5%=0.21, DL 1%=0.42, DL 0.1%=0.93kg

DL 5%=0.14kg, DL 1%=0.33kg, DL 0.1%=1.06kg

The distance between rows showed a decrease of 1-2% in both variants compared to the control variant (12.5 cm distance between rows). The variant sown at 25 cm between rows has a mild statistical significance, but the variant sown by scattering has a distinct statistical significance. Regarding the sowing density, the experience showed a statistical distinct difference, from 0.74g to 1.71g of all three densities compared to the control variant(400 g.s/sqm).

Table 4. The influence of sowing period, row distance and sowing density on hectoliter mass of winter wheat in year 2009-2010

Factor A Sowing period	Factor B Distance between rows	Factor C Sowing density				Factor A average			
		400	500	600	700	Average	Difference	%	Significance
1-15 October	12.5	73.72	72.25	72.25	72.02	72.15	Mt.	Mt.	Mt.
	25	73.35	72.61	71.88	71.36				
	Scattering	72.47	72.25	72.10	69.52				
16-31 October	12.5	75.19	74.46	73.72	73.50	73.58	1.44	102	XX
	25	74.83	74.09	73.35	73.13				
	Scattering	73.72	72.98	72.25	71.80				
1-15 November	12.5	72.39	71.58	70.78	71.29	70.82	-1.33	98	0
	25	71.29	71.21	70.40	70.92				
	Scattering	71.14	70.03	69.30	69.52				
16-30 November	12.5	71.58	70.77	70.03	69.81	69.90	-2.25	97	000
	25	71.14	70.40	69.67	69.44				
	Scattering	70.03	69.30	68.56	68.04				

DL 5%=1.15kg, DL 1%=1.42kg, DL 0.1%=2.23kg

Factor C average					Factor B average			
Average	72.57	71.83	71.19	70.86	Average	Difference	%	Significance
Difference	Mt.	-0.74	-1.38	-1.71	72.21	Mt.	Mt.	Mt.
%	Mt.	99	98	98	71.82	-0.39	99	0
Significance	Mt.	00	000	000	70.81	-1.40	98	000

DL 5%=0.25kg, DL 1%=0.47kg, DL 0.1%=1.04kg

DL 5%=0.19kg, DL 1%=0.43kg, DL 0.1%=1.38kg

4. Conclusions

Experimental research conducted in 2008-2010 cycle have as purpose the establishment of a seeding technology under the current climate conditions, based on the frequent situations in which, for various reasons we can't saw in the optimal sowing period, monitoring the influence of sowing period, distance between rows and sowing density, on winter wheat variety Alex.

The results shown on the two years of experience and the sowing technology applied the following:

- Sowing period had the greatest impact on ponderal features of winter wheat, ascertaining the possibility of performing seeding in the second half of October, with about 2% increase on the ponderal features of winter wheat;
- Distance between rows had a significant negative impact on ponderal features, the differences ranging from 0.24g to 1.43g on thousand grain mass, and from 0.39kg to 2.29kg on hectoliter mass, certifying that the most appropriate is the control variant;
- Sowing density also had a negative impact on ponderal features, the results showing a decrease of 1-2% compared to the control variant, certifying that the most appropriate is the control variant.

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