THE ACCUMULATION OF THE PHYTOMASS IN AUTUMN WHEAT IN THE CONDITIONS OF DOBROGEA

ACUMULAREA FITOMASEI LA GRÂUL DE TOAMNĂ ÎN CONDIȚIILE DIN DOBROGEA

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Abstract: *In order to have maximum efficiency, each technology element applied to a culture has to be completely in agreement with the characteristics of the plants and soil. Knowing the behaviour type of the plant in different climate and soil conditions during the vegetation period, we can intervene with technological measures that will eventually lead to the anticipated effect, the increase of production in agreement with and following the principles of environmental protection. The paper presents the accumulation of dry phytomass in the autumn wheat, according to the sowing date. In this regard, the accumulation of dry phytomass was observed (the total epigeous phytomass, and on components of the total phytomass), in the case of wheat sown in three different periods: the last part of September, October 9th-10th and the last part of October. The paper also presents results obtained in what regards the sum of accumulated temperature degrees for certain vegetation periods.*

Rezumat: *Pentru a avea eficiență maximă, fiecare element de tehnologie aplicat unei culturi trebuie să fie în deplină concordanță cu însuşirile plantelor şi ale solului. Cunoscând modul de comportare a plantei in diferite condiții de climă si sol pe parcursul vegetației, se poate interveni cu măsuri tehnologice, care în final vor duce la efectul scontat, respectiv creşterea producției, în concordanță şi cu respectarea principiilor de protejare a mediului. În lucrare este prezentată acumularea fitomasei proaspete şi uscate la grâul de toamnă, funcție de data semănatului. În acest sens, s-a urmărit acumularea fitomasei proaspete şi a celei uscate (fitomasa totală epigee, şi pe componente ale fitomasei totale), în cazul grâului semănat la trei epoci diferite, şi anume: în ultima decadă a lunii septembrie, la 9-10 octombrie şi în ultima decadă a lunii octombrie. De asemenea, sunt prezentate rezultatele obținute în ceea ce privește suma gradelor de temperatură acumulate, pentru parcurgerea anumitor faze de vegetație.*

Key words**:** *wheat, dry phytomass, sowing time, the sum of temperature degrees.*
Cuvinte cheie**:** *grâu, fitomasă proaspătă, fitomasă uscată, epocă de semănat*

INTRODUCTION

Original from the Middle East, where it has been cultivated since the 7th millennium BC, wheat is the world's most widely grown cereal and it has a great alimentary weight. Its large ecological plasticity allows wheat to be cultivated on all continents, between 66º north latitude and 45º south latitude, from the sea level to heights of 3000-3500 m, in 110 countries where it represents an important commercial source.

Wheat's place in humankind's alimentation, survival and progress, respectively, is very well suggested in the FAO slogan (The United Nations Organization for Agriculture and Alimentation): "FIAT PANIS", whose heraldic sign is a wheat ear (bread and the various products obtained from wheat flour constitute the basic food for 40% of the world's population).[11]

According to the estimations, the world's wheat crop will decrease by 2.6 % (601 million tones in 2006/2007) and the consumption will also slightly diminish, reaching 612 tones. Even though the wheat production in the European Union will be greater than the one registered in 2005/2006, the estimations are that it will not reach the anticipated results. [10]

MATERIAL AND METHOD

The researches effected have aimed at determining the behaviour, in experimental conditions, of a variety introduced for cultivation in Dobrogea (the Dropia variety) [8], in what regards the accumulation of dry phytomass and its distribution on components of the epigeous phytomass. Also, the studies included the extent to which the accumulation of phytomass differs according to sowing time. In this regard, the studies have observed the accumulation of dry phytomass (the total epigeous phytomass and on components of the total phytomass) in the case of wheat sown in three different periods, that is: the last part of September, October the 9^{th}-10^{th} and the last period of October.

RESULTS AND DISCUSSIONS

The sums of biologically active temperatures during the vegetation period of wheat have been calculated, as well as the useful thermal degrees that are necessary to wheat for the accumulation of a gram of dry substance, on the plant as a total and on the components of the phytomass (stems, leaves, ears). These calculations have been made on the basis of the registered data regarding the accumulation of dry substance as a total and on the components of the phytomass, as well as considering meteorological data.

Table 1

The accumulation of dry epigeous phytomass, as a total and on components in wheat sown in the last part of September

Date	Julian days	The components of the epigeous phytomass g/m^2			Total epigeous phytomass g/m^2
		Stems	Leaves	Ears	
Nov 21st	326	23.0	38.4	-	61.4
March 5th	429	43.2	86.4	-	129.6
May 6th	492	678.2	172.8	-	851.0
May 19th	504	846.7	354.2	130.2	1331.1
June 17th	533	721.6	359.0	556.2	1636.8

Table 2

The accumulation of dry epigeous phytomass, as a total and on components in wheat sown on October 9^{th}-10^{th}

Date	Julian days	The components of the epigeous phytomass g/m^2			Total epigeous phytomass g/m^2
		Stems	Leaves	Ears	
Nov 21st	326	20.8	8.3	-	29.1
March 5th	429	38.4	92.2	-	130.6
May 6th	492	656.6	302.4	-	959.0
May 19th	504	721.3	301.8	136.2	1159.3
June 17th	533	1078.2	445.4	736.0	2259.6

It can be noted that up to the beginning of winter, in all three sowing periods, the phytomass values are small. The smallest value was registered in wheat sown in the last part of October. Also, the smallest values of phytomass were registered in this period even when

mature, both as a total and on components.

Table 3

The accumulation of dry epigeous phytomass, as a total and on components in wheat sown in the last part of October

Date	Julian days	The components of the epigeous phytomass g/m^2			Total epigeous phytomass g/m^2
		Stems	Leaves	Ears	
Nov 21st	326	5.4	6.3	-	11.7
March 5th	429	31.1	47.5	-	78.6
May 6th	492	224.0	197.1	-	421.1
May 19th	504	334.8	180.0	64.8	579.6
June 17th	533	846.7	329.3	619.4	1795.4

Table 4

The accumulation of dry epigeous phytomass, as a total and on components in wheat sown in the last part of September

Date	The components of the epigeous phytomass % of the total phytomass from the determination date			Total epigeous phytomass %	The components of the epigeous phytomass % of the total phytomass from maturity			Total epigeous phytomass %
	Stems	Leaves	Ears		Stems	Leaves	Ears	
Nov 21st	37.5	62.5	0	100	1.4	2.4	0	3.8
March 5th	33.3	66.7	0	100	2.6	5.3	0	7.9
May 6th	79.7	20.3	0	100	41.4	10.6	0	52.0
May 19th	63.6	26.6	9.8	100	51.7	21.6	7.9	81.2
June 17th	44.1	21.9	34.0	100	44.1	21.9	34.0	100

Table 5

The accumulation of dry epigeous phytomass, as a total and on components in wheat sown on October 9th-10th

Date	The components of the epigeous phytomass % of the total phytomass from the determination date			Total epigeous phytomass %	The components of the epigeous phytomass % of the total phytomass from maturity			Total epigeous phytomass %
	Stems	Leaves	Ears		Stems	Leaves	Ears	
Nov 21st	71.4	28.6	0	100	0.9	0.4	0	1.3
March 5th	29.4	70.6	0	100	1.7	4.1	0	5.8
May 6th	68.5	31.5	0	100	29.1	13.4	0	42.5
May 19th	62.2	26.1	11.7	100	31.9	13.4	6.0	51.3
June 17th	47.7	19.7	32.6	100	47.7	19.7	32.6	100

Table 6

The accumulation of dry epigeous phytomass, as a total and on components in wheat sown in the last part of October

Date	The components of the epigeous phytomass % of the total phytomass from the determination date			Total epigeous phytomass %	The components of the epigeous phytomass % of the total phytomass from maturity			Total epigeous phytomass %
	Tulpini	Frunze	Spice		Tulpini	Frunze	Spice	
Nov 21st	46.2	53.8	0	100	0.3	0,3	0	0.6
March 5th	39.6	60.4	0	100	1.7	2.6	0	4.3
May 6th	53.2	46.8	0	100	12.5	10.9	0	23.4
May 19th	57.8	31.0	11.2	100	18.6	10.0	3.6	32.2
June 17th	47.2	18.3	34.5	100	47.2	18.3	34.5	100

Table 7

The sum of temperature degrees accumulated in wheat sown in the last part of September

Determination interval	accumulated $\sum^{o}t>0^{o}C$ (°C)	The components of the epigeous phytomass °C/gram s.u./m^2			Total epigous phytomass °C/gram s.u./m^2
		Stems	Leaves	Ears	
Sunrise-11.21.	482.3	20.9	12.6	0	7.8
11.21.1996-03.05.	267.0	6.2	3.1	0	2.1
03.05.1997-05.06.	386.9	0.6	2.3	0	0.5
05.06.1997-05.19.	227.1	0.3	0.6	1.7	0.2

Table 8

The sum of temperature degrees accumulated in wheat sown on October 9th-10th

Determination interval	accumulated $\sum^{o}t>0^{o}C$ (°C)	The components of the epigeous phytomass °C/gram s.u./m^2			Total epigous phytomass °C/gram s.u./m^2
		Stems	Leaves	Ears	
Sunrise-11.21.	274.4	13.2	33.0	0	9.4
11.21.1996-03.05.	267.0	7.0	2.9	0	2.0
03.05.1997-05.06.	386.9	0.6	1.3	0	0.4
05.06.1997-05.19.	227.1	0.3	0.8	1.7	0.2
05.19.1997-06.17.	507.3	0.4	1.4	0.7	0.2

The greatest value of the total epigeous phytomass at maturity was registered in the variety sown between October 9th-10th, that is 2259.6 g/m^2.

The smallest value of the total epigeous phytomass at maturity was registered in the variety sown during the last part of September, that is 1636.8 g/m^2.

At the beginning of winter, however, the greatest value of the epigeous phytomass was registered in the variety sown during the last part of September, that is 61.4 g/m^2 (the table), and the smallest value, in the variety sown during the last period of October, that is 11.7 g/m^2.

Table 9

The sum of temperature degrees accumulated in wheat sown in the last part of October

Determination interval	accumulated $\sum^{o}t>0^{o}C$ (°C)	The components of the epigeous phytomass °C/gram s.u./m^2			Total epigous phytomass °C/gram s.u./m^2
		Stems	Leaves	Ears	
Sunrise-11.21.	70.6	13.1	11.3	0	6.1
11.21.1996-03.05.	267.0	8.6	5.6	0	3.4
03.05.1997-05.06.	386.9	1.7	2.0	0	0.9
05.06.1997-05.19.	227.1	0.7	1.3	3.5	0.4
05.19.1997-06.17.	507.3	0.6	1.5	0.8	0.3

During the winter months (December, January, February), increases of the dry epigeous phytomass were registered in all the studied varieties (the table).

In percentage, at the beginning of winter, only 3.8% of the total dry epigeous phytomass was accumulated at maturity in the first variety, 1.3% in the second and 0.6% in the third. At the end of winter, 7.9% of the total dry epigeous phytomass was accumulated at maturity in the first variety, 5.8% in the second and 4.3% in the third.

At maturity, on components, the stems represented between 44.1-47.7% of the total epigeous phytomass, the leaves between 18.3-21.9% and the ears between 32.6-34%.

By the beginning of winter, 5.8-9.8°C biologically active temperatures were necessary for the accumulation of a gram of dry substance on square meter, during the 2-3,4 winter period. From the end of spring to maturity, the values were subunitary in all the studied varieties (0.2-0.9°C/gram/ m^2.

CONCLUSIONS

The epigeous phytomass differs according to the sowing time over its entire vegetation period.

By the beginning of winter, the varieties sown earlier accumulate a greater dry epigeous phytomass quantity than the varieties sown later.

Over the vegetation period, these differences are maintained, but not as strongly as before the beginning of winter.

The sum of temperature degrees necessary for the accumulation of a gram of dry substance differs according to the sowing time.

LITERATURE

1. MUNTEAN L.I., BORCEAN I., AXINTE M., ROMAN GH. V, FITOTEHNIE, ED. ION IONESCU DE LA BRAD, IAŞI, 2001
2. BUDOI GH., Agrochimie, Ed. Didactică şi Pedagogică, R.A., Bucureşti, 2000
3. CHIRILĂ CTIN., LUP A., Cerealele în România şi în lume, editură mondograf constanța, 2000
4. LUP A., Dobrogea Agricolă – de la legendă la globalizare, Ed. Ex Ponto Constanța, 2003
5. OANCEA I., tehnologii agricole performante, Ed ceres, 2003
6. LILIANA PANAITESCU, Cercetări privind biologia şi tehnologia de cultivare a grâului în condițiile din

7. xxx., Anuarul Statistic al României, 2000-2005
8. xxx., Lista Oficială de Soiuri şi Hibrizi din România, 2000-2005
9. xxx., *Monitorul oficial al României*, 2004.
10. xxx., *Raport de mediu 2002, Europa Centrală şi de Est*, Heidelberg Cement, Bucureşti, 2003.
11. . xxx., FAO Production Yearbook, 2000-2004