THE PERCENTAGE OF PARTICIPATION TO FORMING BIOMASS YIELD IN SWEET SORGHUM CULTIVATED IN CENTRAL OLTENIA (ROMANIA)

RAPORTUL DE PARTICIPARE LA FORMAREA PRODUCȚIEI DE BIOMASĂ LA UN SORTIMENT DE SORG ZAHARAT CULTIVAT ÎN ZONA CENTRALĂ A OLTENIEI (ROMANIA)

Gh. MATEI*, M. DUDA**

**University of Craiova, Romania*
***Agricultural and Veterinary University of Cluj-Napoca, Romania*
Corresponding author: GH. MATEI, E-mail: matei.gheorghe@gmail.com

Abstract: *In this paper we present the percentage of participation at the biomass yields of different parts of the plant: stalks, leaves and panicles The determinations were done in the milk maturity stage of plant development, when the content of the sugar from the stalks was higher than the other stages. From all the components of the plant the stalks were represented values of 70.7% and 80.5%*

Rezumat: *În lucrarea de față se prezintă participarea la formarea producției de biomasă a diferitelor părți componente ale plantei: tulpini, frunze şi panicule. Determinările au fost făcute în fenofaza de maturitate în lapte a plantelor când procentul de zahăr din tulpini a fost cel mai ridicat. Dintre toate componentele, tulpinile au reprezentat valori de participare cuprinse între 70.7% şi 80.5%.*

Key words*: sweet sorghum, yields, stalks, leaf, panicles*
Cuvinte cheie*: sorg zaharat, producții, tulpini, frunze, panicule;*

INTRODUCTION

The sweet sorghum culture crop is one of the important sources of biomass obtained in agriculture. To know the hybrids with a high percentage of the stalks in forming the biomass yield is very important and they must be experimented and recommended to be cultivated.

MATERIAL AND METHOD

The experiment was made at S.C.D.A. Şimnic Craiova during the 2001 – 2004 years, on a dark-reddish soil with pH 5.8, hummus 1.8% and medium average of NPK. The sweet sorghum was cultivated in non irrigated conditions and the experience was positioned using the linear blokes' method.

As genetically material we use 3 hybrids of sweet sorghum: Doina, F112 and Roza and one variety: Carmen.

The sweet sorghum crop has as previous culture the winter wheat.

As level of fertilization we used $N_{100}P_{100}$ and the plant's density used was 120000/ha with an area of one variant of 42 m^2. The date of sowing in every year was situated in the first pentad of the May and the date of harvesting was situated in the interval 1 – 10 of October.

The determinations were done in the experimental field in the milk maturity stage of plant development.

As a standard we use F112 as first standard and average/experience used as second standard.

RESULTS AND DISCUSSIONS

In average (table no 1) on the experimented years 2001 – 2004, the level of biomass productions varied between 35.73 t/ha at the standard used F112 and 48.34 t/ha at the Carmen variety.

Related to the standard we registered very significant increases in production at the Carmen variety, with a plus production of +12.703 t/ha, which represent a relative increase of 35.55% in comparison with standard's value.

At Roza hybrid the increase in productions registered related to the standard was of 5.95 t/ha which has assured a biomass yields of 41.68 t/ha. That increase 16.66% is very significant from statistically point of view.

Table 1

The total biomass yields obtained at sweet sorghum determinate in the milk maturity stage of plant development related to the standard F112
(2001-2004)

No.	Hybrid	Biomass yield - t/ha -	%	Differences -t/ha-	Signification
1	Carmen	48.43	135.55	+12.703	***
2	Doina	38.65	108.18	+2.926	*
3	F112	35.73	100.00	Standard	Standard
4	Roza	41.68	116.66	+5.954	***

DL 5% = 2.31 t/ha
DL 1% = 3.50 t/ha
DL 0.1% = 5.63 t/ha

The Doina hybrid has obtained as average in the experimented years 38.65 t/ha biomass, a value with a plus production of 2.92 t/ha which means an increases of 8.18% related to the standard and significant considered as statistically point of view.

In the table no. 2 we present the situation related to the percentage of participation of different parts of the plants to forming biomass yields at the sweet sorghum cultivated in non irrigated conditions on the brown-reddish soil in central area of Oltenia.

As it can be observed even in figure no. 1, the highest percentage of participation at the sweet sorghum biomass obtained is represented by the stalks which varied from 70.7% (27.33 t/ha stalks) at Doina hybrid to 80.5% at the Carmen variety (38.98 t/ha stalks). The hybrids F112 and Roza were obtained in the experimented years value of 72.7% (25.97 t/ha stalks) and 74.5% (31.05 t/ha stalks) percentage of participation to forming the biomass yields.

The leafs represent an important percentage of the total biomass formed at sweet sorghum and varied between 10.2% at Roza hybrid and 15.4% at F112 hybrid, which has highest value in all experimented years. The Doina hybrid has during the years of experimentation a value of participation of 11.4%.

The lowest percentage related to the leaf participation to forming the biomass at sweet sorghum was registered at Carman variety of 10.8%.

Table 2

The percentage of different parts of the plant to forming the biomass yields (2001-2004)

No.	Plant parts	Hybrids							
		Carmen		Doina		F112		Roza	
		t/ha	%	t/ha	%	t/ha	%	t/ha	%
1	Total plants	48.43	100.0	38.65	100.0	35.73	100.0	41.68	100.0
2	Stalks	38.98	80.5	27.33	70.7	25.97	72.7	31.05	74.5
3	Leafs	5.23	10.8	4.40	11.4	5.50	15.4	4.25	10.2
4	Panicles	4.22	8.7	6.92	17.9	4.26	11.9	6.38	15.3

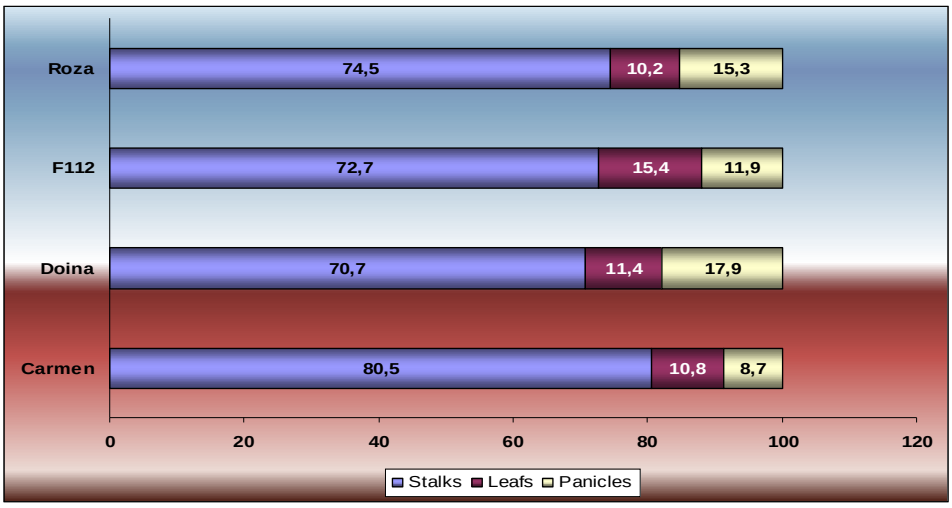

Figure 1. The percentage of different parts of the plant to forming the biomass yields (2001-2004)

In comparison with the second standard used – the average/experience – table no 3, which has a value of the stalks percentage of 30.83 t/ha, only Carmen variety and Roza hybrid had realized a higher values than the standard. At Carmen variety we registered a plus production of 26,43% which means 38.98 t/ha stalks and to the Roza hybrid we obtained a plus productions of 0.71% which means a very small increase of 0.22 t/ha, the biomass productions obtained being of 31.05 t/ha stalks.

The Doina and F112 hybrids have values of participation of 88.64% respectively 84.23%.

Regarding the percentage of leafs to forming the biomass yields at sweet sorghum it can be observed that the average in the experimented years was of 4.84 t/ha. Related to this value the highest percentage is registered at F112 hybrid with a plus of 13.63%.

Table 3

The percentage of different parts of the plant to forming the biomass yields related to the average/experience (2001-2004)

No.	Hybrids	Biomass yield							
		Total plants		Stalks		Leafs		Panicles	
		t/ha	%	t/ha	%	t/ha	%	t/ha	%
1	Carmen	48.434	117.77	38.98	126.43	5.23	108.05	4.22	76.03
2	Doina	38.657	93.99	27.33	88.64	4.40	90.90	6.92	124.68
3	F112	35.731	86.88	25.97	84.23	5.50	113.63	4.26	76.75
4	Roza	41.685	101.35	31.05	100.71	4.25	87.80	6.38	114.95
Average/exp.		**41.125**	**100.00**	**30.83**	**100.00**	**4.84**	**100.00**	**5.55**	**100.00**

The panicle percentage was determinate in the milk maturity stage of plant development and he has values which varied between 4.22 t/ha at the Carmen variety and 6.92 t/ha to the Doina hybrid. The highest values of percentage of participation to forming biomass yields were registered at the hybrids Doina and Roza: 124.68% and respectively 114.95% in comparison with the average/experience values.

CONCLUSIONS

From the previous presented data we can say that:

- The highest productions of biomass of 48.43 t/ha were obtained at Carmen variety followed by Roza hybrid with 41.68 t/ha;
- The highest percentage of participation to forming biomass yields was registered to the stalks with a value of over 80.0% at Carmen variety;
- Related to the average/experience which has a value of 30.83 t/ha stalks the highest increase was observed at Carmen variety of 26.43%
- The leaves and panicles participate in a small percentage to forming biomass productions.

REFERENCES

1. ANTOHI, I., POP., G., ROTEA MARIANA, 2004 - Breding on grain stalk quality of sweet sorghum. Simpozionul Internațional „Noi materii prime pentru chimie, energetică şi industrii conexe – Industrializarea totală a sorgului zaharat" Ed. I., Bucureşti.
2. ANTOHI, I., POPESCU, M.I., DRĂGULESCU, G., 2005 - Prognozarea producției de biomasă şi de zahăr la sorgul zaharat. Simpozionul Internațional „Noi materii prime pentru chimie, energetică şi industrii conexe – Industrializarea totală a sorgului zaharat" Ed. a II-a, Bucureşti.
3. DRĂGHICI,I., DRĂGHICI, RETA, CARSOFSCHI ILEANA, 1997 - Cercetări privind influența epocii de recoltare asupra producției şi calității fitomasei la sorgul zaharat cultivat pe solurile nisipoase. Lucrări Ştiințifice S.C.C.C.P.N. Dăbuleni, vol. IX.