

Production characteristics of miscanthus
(Miscanthus x giganteus Greef et Deu) under agroecological conditions of Serbia



Nenad Đurić¹*, Dobrivoj Poštić², Vera Rajčić³, Gordana Branković⁴, Gorica Cvijanović⁵,
Radiša Đorđević¹, Slađana Savić¹



¹Institute for Vegetable Crops, Karađorđeva 71, Smederevska Palanka, Serbia; e-mail: nenad.djuric@outlook.com

²Institute for Plant Protection and Environment, Teodora Drajzera 9, Beograd, Serbia; e-mail: pdobrivoj@yahoo.com

³Faculty of Agriculture, Kosančićeva 4, Kruševac, Serbia; e-mail: verarajicic@yahoo.com

⁴Faculty of Agriculture, Nemanjina 6, Zemun-Belgrade, Serbia; e-mail: gbrankovic@agrif.bg.ac.rs

⁵Institute of Information Technologies, University of Kragujevac, Jovana Cvijića bb, Kragujevac, Serbia; e-mail: cvijagor@yahoo.com

Introduction

Miscanthus was originally grown only as an ornamental plant. It is characterized by extremely strong growth and high genetic potential for fertility (Đurić *et al.*, 2019) and is becoming important as an energy crop. Miscanthus is mainly grown for production of biofuels from aboveground biomass. Fresh plant biomass mown in the panicle forming stage, serves as raw material for biogas and bio ethanol, while dry stalks are burned directly in large boiler plants or used to produce pellets and briquettes (Janković *et al.*, 2017), (Maksimović, 2016). The aim of this research is to analyse the influence of agroclimatic conditions of the Srem locality in Serbia on the yield of dry miscanthus plant mass in five different production years, with and without spring fertilization with nitrogen fertilizers.

Material and methods

The experiment was set up at a site in eastern Srem in the Danube village of Surduk, in 2012. The land belongs to the type of carbonate chernozem on a loess plateau. It is located at an altitude of 150 meters. For the time being, a plantation was formed in April 2012, on the 10 m long and 2 m wide experimental plot, by planting two rhizomes per square meter, so that 8 elementary plots with two clusters, or a total of 40 clusters, were obtained. To date, every year at the end of March, 30 kg per ha-1 of pure nitrogen were added on four plots in a random distribution, while on the other four plots plants were grown without additional mineral fertilizers.

Results

Table 1. Stalk height in the panicle stage (cm) 2015-2019

Year/Variant	2015	2016	2017	2018	2019	AVERAGE
Control	222	295	235	328	357	287,4
N, 30 kg ha ⁻¹	227	318	242	356	361	300,4
Average	224,5	306,5	238,5	342	359	294,1
LSD, years	5%	74,474		1%	129,668	
LSD, N ₃₀	5%	15,26		1%	26,57	



Table 2. Dry stalk yield (kg ha⁻¹) 2015-2019

Year/Variant	2015	2016	2017	2018	2019	AVERAGE
Control	20.425	25.320	18.025	30.655	33.373	25.560
N, 30 kg ha ⁻¹	21.470	25.550	17.980	32.210	34.525	26.347
Average	20.948	25.435	18.003	31.433	33.949	25.953
LSD, years	5%	74,474		1%	129,668	
LSD, N ₃₀	5%	15,26		1%	26,57	

Table 3. Stalk cellulose content in (%) 2015-2019

Year/Variant	2015	2016	2017	2018	2019	AVERAGE
Control	31,95	32,13	32,21	32,09	32,14	32,11
N, 30 kg ha ⁻¹	32,01	32,20	32,19	32,01	32,16	32,12
Average	31,98	32,17	32,20	32,05	32,15	32,11
LSD, years	5%	0,253		1%	0,431	
LSD, N ₃₀		0,091			0,156	

Conclusion

The average value of stalk height during the five-year research was 294.1 cm, with very significant variations by years of research. Nitrogen supplementation on a multi-year average also influenced this morphological trait of miscanthus. The yield of dry stalks for the entire experiment on a five-year average, calculated in kilograms per hectare, was 25,953 kg ha-1. Significant variations of dry stalks yield in the overall average were influenced by weather conditions, as well as crop nutrition. Dry stalks had a high share of cellulose in all variants and years of research (32.11%). The year factor had a very high statistical significance for stalk height (738.3**) and dry stalk yield (6541.8**). The year had no statistically significant effect on cellulose content. The fertilization factor had a very high statistical significance for stalk height (42.56**) and dry stalk yield (105.43**). Crop fertiliza-tion had no statistical significance on cellulose content.

Acknowledgements: This research was funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Project No. 451-03-68/2020-14/200216).

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