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THE INFLUENCE OF THE DENSITY AND HYBRID USED REGARDING THE BIOMASS AND DRY MATTER YIELD AT SOME GRAIN SORGHUM HYBRIDS AT ARDS BRAILA

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Abstract: The purpose of this paper is to highlight the productive capacity of some grain sorghum hybrids in relation to the amount of green biomass and dry matter. In the experiment were tested eight commercial varieties with good yield characteristics in two different densities. These hybrids were cultivated in a field that benefited from the pedological and climatic conditions from Agronomical Research Development Station of Braila. Through this article it can be highlighted that for the production of a superior amount of green biomass, it is important to cultivate sorghum hybrids that are taller and with greater leaf mass. In this way, can be cultivated some varieties that have an important production of grains but also a high amount of biomass.

• Introduction

Sorghum is one of the most important cereals in the world. It occupies the fifth place, being surpassed only by wheat, rice, corn and barley, worldwide the area occupied by sorghum is 40 million ha., with the main cultivation areas on the African continent alongside India, U.S.A. and some countries from the E.U. as well. Sorghum, with the nickname "The camel of crops" due to its ability to adapt and present high yields, especially in the areas where the precipitation intake is lower and the heat is very often present. Sorghum is known to be a grass species from the Gramineae family which has the potential to be developed optimally as a fodder. It is a very good source of food for ruminants and can be administered in feed recipes together with corn fodder and concentrates. (Liman, 2023). From an economic point of view, it is more profitable for sorghum fodder to be administered in animal feed, taking into account the fact that it is easier to produce on poor soils and in areas where other fodder plants do not show the same productive yield. (Crășmaru, 2021)

• Material and method

The research was conducted at the Agricultural Research Development Station Braila located in Braila County, 11 kilometers from the city. The experiment took place in the 2023 agricultural year on a chernozem soil, characteristic of the area. The experiment was made by the method of subdivided plots with 2 factors. The first factor was represented by the density with 2 graduations: Density 1 with 22 seeds/m² and 70 cm distance between the rows and Density 2 with 25 seeds/m² and 50 cm distance between the rows. The factor B was represented by the commercial sorghum hybrids that have been used. The hybrid had 8 graduations: Es Aize; Es Shamal; Es Arabesque; Es Foehn; Anggy; Ggustav; Belluga; Huggo. All these hybrids are classified as hybrids with very low tannin content, less than 0.3%, starch content of 78% and protein content of 10-11%, being hybrids with high production capacity especially in favorable conditions. The harvest took place on 26th October 2023. For the determination of the biomass and dry matter quantity were made some operations in the experimental field and in the laboratory. At the physiological maturity stage when the humidity was at the 15 % level were harvested 5 plants in 3 samples for each hybrid and repetition. In the laboratory, the leaves and panicles were then separated and weighed, then cut into particles smaller than one centimeter and then placed in a laboratory oven at 105⁰ C. Multiple weighings were carried out until the moment when it was reached a constant mass for each sample. The ANOVA function from Microsoft Excel was used for processing the collected data from the field.

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• Results and discussions

The 2023 year was characterized as a year with a higher precipitation rate, compared to the multi-annual. The total amount of precipitation for the May-September period was also higher compared to the multi-annual period corresponding to these months. During this period, the value of 232 mm was recorded, 5 mm more than the multi-annual May-September in this area of Braila County. Regarding the temperature it can be observed that the year 2023 registered higher values than the multi-annual average, thus, the average of the sorghum vegetation period recorded values higher than the multi-annual average by 1.4⁰ C. The sum of the solar radiation totaled 1242 hours and the wind speed average for the May-September was 2.1 m/s.

Harvested green biomass is divided into three categories in the same way that were separated and calculated in the laboratory. These are the total leaf biomass production, stem biomass production and total biomass per hectare which is the sum of leaf, stem and panicle biomass without grains with the latest representing a very small percentage of the total biomass being in the aisle of 0.03-0.05 percent. For the density of 22 seeds/m² the highest amount of fresh biomass was obtained by Es Shamal hybrid, this having the value of 17.86 t/ha. being closely followed by Anggy hybrid which produced 17.85 t/ha fresh biomass.

The experience average for this density was 16.32 t/ha. Of this amount, the biomass of the leaves was 28.2% and the biomass of the stems was 71.6%. In the Density 2, the most productive hybrid turned out to be the Anggy hybrid, that obtained 19.44 t/ha. The Ggustav hybrid presented a high production as well with the quantity of 19.22 t/ha. The average total biomass harvested for the 8 hybrids is 17.01 t/ha, regardless of the Density factor. Compared to the average value, hybrids Es Shamal, Anggy, Ggustav, Es Alize obtained higher yields. The increases compared to the average were between 1.6 and 5.0 %. From a statistical point of view the hybrids were insignificant, except for the Belluga hybrid which obtained a significantly negative value for the density of 25 seeds/ha and a distinctly significant negative value for the density of 22 seeds/ha.

Conclusions The study revealed that the sorghum was more productive at the density of 25 seeds/m². The average obtained for this density was 17.83 t/ha, comparing to the other density. At the density of 22 seeds/m² it was obtained an 16.32 t/ha average. The most productive hybrid was the Anggy variety which obtained 19.44 tones of biomass per hectare at the higher density. The least productive hybrid in the term of biomass yield was the Belluga variety that obtained 12.26 t/ha at the lower density and 13.41 at the Density 2. It has been observed that there are some tall hybrids that in addition to grain production can also show superior biomass. The average for the dry matter obtained had the value of 5.07 t/ha.