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HIGH-PERFORMANCE SWEET SORGHUM HYBRIDS FOR IMPLEMENTATION IN THE AGRICULTURAL SECTOR

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The current trend of global warming significantly impacts the potential for cultivating agricultural crops, substantially reducing their productivity and quality primarily due to drastic temperature increases, the accelerated desertification of agricultural lands, and the growing frequency of increasingly severe and prolonged droughts. Under these circumstances, the exceptional importance of sorghum often dubbed the "camel of agriculture" becomes increasingly evident; it boasts the highest drought resistance and the most efficient water-use profile among all widely grown agricultural crops. Sweet sorghum represents a truly viable source for alternative energy production and animal feed.

The male-sterile lines MSL26A1, Saharnoie 32 and Sever 2 were used in crosses to obtain the sweet sorghum hybrids SAŞM 1 and SAȘM 2.

The SAȘM 1 - simple interlinear hybrid, late with a vegetation period of 126-132 days. The juice contains 13.5-16% carbohydrates, in favorable years up to 22%. The optimal plant density is 105-115 t/ha. The harvest for cultivation without irrigation is 90-120 t/ha and 20-30 t/ha of dry matter, with irrigation -170-190 t/ha of biomass.

The SAȘM 2 - simple interlinear hybrid, late with a vegetation period of 110-115 days. The juice contains 14-16.5% carbohydrates, in favorable years it reaches up to 22%. The optimal plant density is 110-120 t/ha. The harvest for cultivation without irrigation is 75-110 t/ha and 18-27 t/ha of dry matter, with irrigation -140-160 t/ha of biomass. The sweet sorghum hybrids SAȘM1 and SAȘM2, utilized in the current technology transfer project, were tested between 2023 and 2024 at the Brăila Agricultural Research and Development Station. Test results established that these sweet sorghum hybrids are suitable for saline and sandy soils, as well as for sloped

lands prone to erosion; the crop stands out due to its drought resistance and low water requirements (211 mm/year), its contribution to humus levels in the 0–40 cm soil layer (0.12% by soil weight), its capacity for soil carbon sequestration (20–30 t/ha/year via roots and stubble), and its ability to prevent wind erosion on sandy soils and water erosion on vulnerable terrain. Consequently, the crop offers prospects for an agricultural and industrial revival amidst the climate change and increasingly evident aridification in southeastern Romania thanks to its diverse applications across the food, animal feed, energy, and chemical industries. Sweet sorghum hybrids (SAȘM1, SAȘM2) demonstrated a higher production potential, they confirmed a specific capacity to capture 23–72 mg of CO_2 per m² of leaf area per day yielding 1.2 t of biomass per m³ of absorbed CO_2 thereby enabling the achievement of the target of 4.5–5 t of CO_2 per capita per year set by Directive 2009/28/EC, as well as an output of 600 kcal/m²/year (a global food security threshold targeted by the FAO). Consequently, sweet sorghum serving as a food, fodder, and energy crop does not divert arable land away from uses dedicated to food security. Both sweet sorghum hybrids have been registered in the Romanian Plant Variety Catalogue for cultivation in Romania and European Union countries.

Keywords: sorghum, hybrid, genotypes, potential, agriculture.

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