

## **SORGHUM, EVOLUTION AND CULTIVATION IN ROMANIA**

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### **Abstract**

*The sorghum crop has expanded rapidly in Romania since 1950 due to the creation of new varieties and hybrids with high productivity and their ability to be harvested with the grain combine harvester.*

**Key words:** sorghum, variety, hybrid, soil

### **INTRODUCTION**

The sorghum belongs to the Andropogoneae tribe, Gramineae family, the Sorghum Adams genus comprising several annual and perennial species.

The cultivated sorghum belongs to the Sorghum vulgare species, Sorghum bicolor (L) Moench, this species being divided by Janusevski and Kalinin researchers into four groups according to their use: grain sorghum, sweet sorghum, broomcorn and forage sorghum.

### **MATERIAL AND METHOD**

This study analyzes the evolution of sorghum, breeding and cultivation of varieties and hybrids for the purpose of their cultivation on the territory of our country, varieties and hybrids of the 4 groups of uses: grain sorghum, sweet sorghum, broomcorn and forage sorghum.

### **RESULTS AND DISCUSSION**

Broomcorn (Sorghum vulgare tehnicum) is a variety of high stems, very short main spindle and long branches, which entered the earliest in our country along with the invasions of the Tatars, having the name of tatarka, and which got adapted to the pedoclimatic conditions in our country where it was preserved and cultivated for the manufacture of brooms, animal feed, and binding of grain sheaves. Broomcorn was a valuable source for genetics, being used genes for androsterility in the breeding of sweet sorghum and grain sorghum at National Institute for Agricultural Research and Development in Fundulea (Antohe, 2007). In our country the breeding of sorghum was initiated in Fundulea starting with 1978, the objectives

being: reduction of the size, resistance to dropping, increase of panicle yield. As a result of these researches in Fundulea, the following values were obtained for the average yield of panicles (without grains) and the yield of grains in a single varieties mowing: the Population of Sinesti, Siret, Denisa, Donaris in a non-irrigated system.

Table 1

Yield of varieties t/ha		
Variety	Panicles yield /ha	Grains yield t/ha
Population of Sinesti	3.1	3.5
Siret	3.3	2.9
Denisa	3.5	3.5
Donaris	3.3	3.3

Sweet sorghum (*Sorghum vulgare saccharatum*) is considered to be an energy plant and a source of raw materials for chemistry, and it begun to be cultivated in Romania since 1935 in Dobrogea, Banat and Oltenia.

Starting with 1949, given the qualities of this plant, the Romanian Agronomic Research Institute (I.C.A.R.) aimed to find the best sweet sorghum for forage. For this purpose, since 1949 it has been proceeded to the gathering of the existing material in the country, from where 9 populations from the regions of Bucharest and Timișoara were collected. Of these populations, 500-1,000 elite plants with different morphological characters and biologic attributes influencing productivity and forage quality were selected. The researches were carried out at the Royal Mill near Bucharest alongside 4 foreign varieties, researches that were completed by the creation of ICAR S-54 variety (Annals of the Romanian Agronomic Research Institute vol. XXXIII 1954-1955).

In 1981, I.N.C.D.A. Fundulea creates a special program for the breeding of sweet sorghum for energy purposes, which was completed in 1993-1994 with the creation and registration of the first hybrid of sweet sorghum called Roza in 1991 and of the first sweet sorghum variety called Carmen in 1994. Another variety created also by I.N.C.D.A. Fundulea is Prut variety which is a variety with a vegetation period of 72 days to bloom and 127 days to the physiological maturity, recommended for the plain areas. (Borcean, 2006).

The yields of sweet sorghum varieties are somewhere at 20 t - 80 t/ha of stalks where by pressing 60% juice is obtained with a sugar content of 8-15% and by concentrating the juice are obtained 50-60 litres of syrup for each ton of stalks.

Forage sorghum (*sorghum vulgare sudanense*) can be used in animal feed mixed with corn or lucerne, their nutritional efficiency being lower than that of corn. In Romania, forage sorghum hybrids were created in Fundulea between 1960-2006, the first being F 1104 in 1971, Tutova

(1992), Tinca (1998) and Tereza (2003). The F1104 hybrid was maintained in cultivation until 1998.

Table 2 shows the green mass and the dry mass yields (t/ha) of forage sorghum hybrids created in Fundulea in a non-irrigated system.

Table 2

HYBRID	Green mass and dry mass yields per hectare			
	HARVESTING PHASE			
	PRE-BELLOW		MATURITY IN MILK	
	Green mass	Dry mass	Green mass	Dry mass
F 1104	79.4	17.9	81.2	19.8
Tutova	82.4	19.5	84.2	21.2
Tinca	86.9	20.2	93.7	24.0
Tereza	88.7	23.7	108.9	28.1

Grain sorghum (*Sorghum bicolor* (L.) Moench) is the most widely spread sorghum crop with a nutritional value equal to corn or even higher in protein content but lower in fat content.

Table 3

Chemical composition of sorghum and corn  
(Balteanu, 1983)

PLANT	PROTEINS%	STARCH%	FATS%	CELLULOSE%	ASH%
SORGHUM	11.84	75.37	3.79	2.18	1.28
CORN	11.18	72.46	4.70	-	-

Starting with 1957, small hybrids were tested in our country which between 1961 and 1962 yielded 5,500-7,300/ha exceeding HD 311 maize by up to 32%. Higher yields have also been obtained in Dobrogea, Braila and on the sandy soil of Flamanda Agricultural Cooperative, the corn yielded in 1962 only 1,762 kg/ha and the NK 210 sorghum hybrid reached 4,537 kg/ha (Zamfirescu et al, 1965).

Among the hybrids brought from abroad that have adapted to the pedoclimatic conditions in our country, stood out NK-210, a hybrid with a 75-95 cm short stalk, panicle of 20-25 cm, vegetation duration of 128-140 days, NK-230 with a 70-90 cm stalk, semicompact panicle, vegetation duration of 125-135 days, much more rich in protein than NK-210, and N 135, a hybrid with a stalk of 80-100 cm and a vegetation period of 115-125 days (Zamfirescu et al, 1965 ).

Table 4

Chemical composition of the 3 hybrids acclimatized in Romania

HYBRID	WATER %	PROTEIN %	FATS %	CELLULOSE %	ASH %
NK 210	11.3	10.0	3.71	2.58	1.27
NK 230	11.0	13.1	4.08	2.14	1.21
NK 235	10.9	12.9	4.09	2.07	1.22

The Corn Culture Institute in Fundulea has created a sorghum breeding program in order to increase production capacity, to breed grain quality and reduce the tannin content along with protein and amino acids

content increase. Thus was created the simple F31 hybrid in 1971, a semi-early hybrid with a high stalk of 90-130 cm, drought-resistant, poorly resistant to dropping, with a yield of over 4,000 kg/ha, zoned for Jijia steppe, in Dobrogea plain and the southern and western plains.

In 1979, was created a new F44 hybrid with a small stalk of 80-110 cm. resistant to drought, dropping and breakage with yields of over 4,500 kg/ha. Other hybrids breded in our country were F40 and F21 (1979), F32 (1979) and F30 (1881).

## CONCLUSIONS

The first variety of sorghum created in Romania is the ICAR-S54 sweet sorghum variety, the creator being the Romanian Agronomic Research Institute. Most programs for the creation and breeding of sorghum for the purpose of its production are made by the National Institute for Agricultural Research and Development Fundulea. These creation and breeding programs have led to the cultivation of varieties and hybrids with high yielding potential, resistant to diseases and pests and resistant to climate influences.

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