

A PEARL MILLET VARIETY FOR WESTERN SUDAN



AGRONOMY DEPARTMENT REPORT

KANSAS STATE UNIVERSITY, MANHATTAN

A PEARL MILLET VARIETY FOR WESTERN SUDAN¹

BY

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ABSTRACT

The Ugandi variety of pearl millet, Pennisetum americanum (L.) Leeke, was tested in Northern Kordofan, Western Sudan for several years by ICRISAT and INTSORMIL researchers and was found to be well adapted to the area. Its main positive traits are early maturity and bristled heads. During the extremely dry year of 1984, the 70 - 80 day maturity range enabled Ugandi to produce good heads, while other varieties failed. In the same year, birds were a serious problem. Ugandi's bristled heads rendered protection against bird damage.

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INTRODUCTION

Pearl millet, Pennisetum americanum (L.) Leeke, is a staple food grain in N. Kordofan, Western Sudan. Between 1975 and 1980, about 135,000 metric tons of millet grain were produced in N. Kordofan each year. This amounted to 35% of the total millet production in Sudan (2,3,4).

Millet yields have been declining sharply, from 640 Kg/Ha in the 1960's to 377 Kg/Ha in the 1970's and to a low of 210 Kg/Ha in the early 1980's (1,4). This sharp decline in yields was parallel to the decline in rainfall. Before 1970, the annual precipitation in the area was close to 400 mm. It fell to below 350 mm between 1970 and 1978 and to below 300 mm for the 1978-1984 period (1,5,6,7,8).

Other environmental changes that have contributed to the decline in production are: increase in evapotranspiration, decrease in relative humidity, and increase in mean daily temperatures. During this period, pest problems have also increased tremendously (6,7).

Water balance studies indicate that the El-Obeid area has a growing period of only 66 days (July 9 - Sept. 12) when precipitation is equal to or greater than potential evapotranspiration (9,10).

Because of these environmental factors and changes, it was found necessary to breed, select, and test early-maturing, drought-tolerant, and pest-resistant genotypes of pearl millet.

PRELIMINARY TESTS

A number of Serere composites and Serere lines of pearl millet was introduced from Uganda by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in 1973. These materials were evaluated and used in composite breeding, variety top-cross hybrid development, and intervariety crosses. Most of the Serere research material was early maturing, bristled, tolerant to smut, and possessed good quality grain.

Serere Composite 2 (SC₂) was selected and found high yielding by Dr. R.P. Jain in ICRISAT, Hyderabad, India and introduced to Sudan in 1977 with the inception of the ICRISAT/SUDAN Cooperative Program for pearl millet and sorghum improvement.

SC₂ was tested along with other introduced genotypes and local varieties in national trials from 1977 to 1979. The results are given in Table 1.

TABLE 1. Grain Yield (Kg/Ha) of Three Pearl Millet Cultivars in 11 Trials Conducted During 1977-1979.

MEAN	CULTIVAR		
	SC ₂	KORDOFANI	FAKIABYAD
Mean of 11 trials	1061	678	539
% of best check	156	100	87
Mean of three irrigated trials	2294	1078	899
% of best check	213	100	83
Mean of rainfed trials	598	528	473
% of best check	113	100	91

On the basis of these results and subsequent independent consumer acceptability tests conducted by the Director of Agricultural Services of Darfur Province and our cooperators in Kordofan, SC₂ was officially released for general cultivation in January 1981 by the National Seed Administration under the name Ugandi.

TESTS IN SUDAN

INTSORMIL continued testing Ugandi and found it to be adaptable to the area and higher yielding than other varieties (Table 2).

In the very dry 1984 crop season (about 150 mm effective rainfall) the late-maturing local varieties generally failed to produce heads with seeds. Any seeds produced were eaten by

birds. On the other hand, Ugandi produced a decent crop in several villages (Fig. 1) and its bristled heads prevented bird damage (Fig. 2). In comparison to the local variety, Baladi, which in almost all cases did not pass the boot stage and produced no seed, Ugandi produced measurable yields in several villages (Table 3). Yields were actually higher than those reported, but in the absence of any other crop, the farmers had started eating Ugandi seed at the milk-dough stage (locally known as Farikh).

TABLE 2. Comparison of Grain Yield and Agronomic Data for 5 Millet Varieties Grown at Kaba Experiment Station in 1983.

TREATMENT ¹	PLANT HEIGHT (cm)	NO. OF HEADS PER 20 m ²	SEED WEIGHT gms/head	YIELDS ³ Kg/Ha
Ugandi (+)	147	70	12.09	1228 a
Ugandi (0)	157	68	10.91	1090 c
Baladi (+)	204	78	12.20	1192 b
Baladi (0)	211	49	12.40	855 e
Eish Bornu (+)	205	55	11.58	829 f
Eish Bornu (0)	204	65	11.96	998 d
ICMS 7817 (+)	154	83	9.37	997 d
ICMS 7817 (0)	151	77	7.94	847 e
Hirehree (+)	195	55	12.93	984 d
Hirehree (0)	207	50	11.61	771 g

1 (+) = with fertilizer; (0) = no fertilizer.

2 LSD 0.05 = 22.92; C.V. = 13.59%
to find yield/Feddan multiply Kg/Ha by 0.42

3 Duncan's Multiple Range Test for Yield.
Values with the same letter are not significantly different
at 0.05 probability level.



FIGURE 1. Brema Bakheit, a farmer from Goz Al-Ariif, north of El-Obeid, holds heads of Ugandi millet, which produced grain under drought conditions in 1984.



FIGURE 2. A comparison of bird damage to pearl millet: (1) Hairless and loose heads are completely denuded. (2) Compact heads and those with short bristles are difficult for birds to eat. (3) Birds avoid heads with long bristles, e.g., Ugandi.

TABLE 3. Yield of Ugandi Millet in 1984
INTSORMIL On-farm Trials Around
El-obeid.

VILLAGE	YIELD*	
	Kg/Fed	Kg/Ha
Goz Al-Arif	71.4	170.0
El-Kharta	70.6	168.0
Abu-Haraz	12.6	30.0
Mean	51.5	123.0
Baladi (control)	0.0	0.0

* Unpublished millet yield estimates for N. Kordofan during 1984 are about 17 Kg/Fed. = 40 Kg/Ha.

SUMMARY

Ugandi is a bristled, composite variety of pearl millet showing good promise in its adaptability to the very marginal crop environment of Western Sudan. It is early maturing (70-80 days) and drought tolerant. Its bristled heads have proven resistant to birds, grasshoppers, and, according to farmer's claims, also mice.

In on-farm trials in three villages during 1984 when average effective rainfall was less than 150 mm, only Ugandi produced heads with harvestable seeds. The average yield was 123Kg/Ha, while the most common local variety, Baladi, produced no yield.

USAID/Sudan in cooperation with TENNECO Seed Co. is helping in the seed multiplication of Ugandi in 50 acres under isolation. This seed will be distributed to small farms in North Kordofan during the 1986/87 crop season.

Since Ugandi is a composite variety, continuous selection and improvement for bristling will be necessary. Production of seed also must be carried out under isolation every year.

Breeding efforts are underway to produce other bristled varieties with traits for compactness and early maturity.

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