

The area of cultivated varieties can only be estimated based upon seed production. According to such estimates, total rice area in California 1984 was 184,100 ha, of which 178,100 (ca. 97%) were under semidwarf varieties. The total rice area in the US 1984 was 1.139,000 ha, of which 249,500 ha or 21,9% were under semidwarf varieties.

Table: Rice varieties in California

Variety	Year of release	Source of dwarfism	Height cm	Yield ha	Total area % 1981	1984
<u>Short grain</u>						
S-201	1980	Calrose 76	88	9.05	22.	20.5
Calpearl	1981	IR1318 and Calrose 76	85	9.98		7.0
<u>Medium grain</u>						
Calrose 76	1976	induced mutation of Calrose	95	9.07	7.0	
M-7	1977	Calrose 76	96	9.08	15.0	1.1
M-9	1977	IR8	93	8.57	32.2	10.9
M-101	1979	M-7	88	8.96	5.0	3.3
M-201	1982	IR8	87	9.31		46.4
M-301	1980	M-7	97	-	5.0	-
M-302	1981	M-7	94	9.09	0.1	5.6
M-401	1981	induced mutation of Terso	93	9.34	0.1	1.8
<u>Long grain</u>						
L-202	1984	TN1	80	8.98	-	0.1
<u>Sweet</u>						
Calmochi-202	1981	induced mutation of Calrose	94	8.31	0.1	-
<u>Non semidwarfs</u>					13.5%	3.3%

Reference: D.G. Dalrymple, Development and Spread of High Yielding Rice Varieties in Developing Countries, Bureau for Science and Technology A.I.D. Washington DC.



XA0201361

High yielding and disease resistant mutants of sorghum in Venezuela

The programme was assisted by IAEA under project VEN/5/005 since 1978. It aims at improvement of plant type, earliness and resistance to Macrophomina in the locally adapted varieties Criollo Rojo Pequeño (CRP) and Criollo Blanco Alto (CBA). The mutagenic treatment consisted of seed irradiation at 20, 30 and 40 kR of gamma rays and chemical mutagenesis using sodium azide followed by 5000 kR gamma radiation.

The 16 best mutants were evaluated in multilocation trials during M<sub>6</sub>-M<sub>9</sub> 1981-1984: Mutants from CRP namely 1279, 1543, 1265, 2085, 1251 and 1359 and four mutant from CBA, 109, 467, 469 and 81-1227 were found to be superior to their parents and the existing commercial hybrids. Their distinguishing features are given below, the agronomic data in the Table. CRP 1279, 1543 and 2085 are already under large scale cultivation by farmers and under process for cultivar certification by the Ministry of Agriculture.

Distinguishing features of Sorghum parents and their mutants:

Criollo Rojo Pequeño (CRP) Parent: A semi-dwarf (120-130 cm) local type, 10-12 leaves of medium size (total foliar area 1750-200 cm<sup>2</sup>), flag leaf semi-erect and medium in size (130-150 cm<sup>2</sup>, dark green. About 60% of the leaves are green at grain maturity; 53-56 days for 50% flowering and 96-100 days for maturity; small sized, compact head (20 cm excluding peduncle); 2-3 ear bearing tillers; slightly asynchronous in maturity by one week; reddish brown grain of medium size; good vertical, deep root system; resistant to lodging and drought; moderately susceptible to Macrophomina (charcoal rot) and Fusarium; 15-20 panicles/m at 50 cm X 10 cm spacing; excellent exertion of panicle (12-15 cm); panicle weight nearly 30-35 g each, seed well filled, endosperm white, red subcoat and testa; rapid in germination and root development from seedling; appears to be a dwarf different in origin from the available U.S. sorghum dwarfs; good regeneration of ratoon after harvest, susceptible to semiloopers in April sowings. A very promising locally adapted type, superior to recommended American hybrids which are highly susceptible to charcoal rot.

Mutants from CRP

CRP-1261: Earlier than parent by 5 days; good in drought resistance; good root distribution; panicle size similar to the parent but more panicle/unit area; root activity as measured by <sup>32</sup>P injection is 18.5% at 60-90 cm depth compared to about 2% on the commercial hybrids and 6% in CRP at that soil depth.

CRP-1359: Height about 25 cm less than CRP, panicle size smaller, grain size similar but more panicles per row. Slower leaf drying.

CRP 1543: Panicle size 20-25% larger than CRP, more compact and larger grain similar in shape and size to "Feterita", grain 15-20% larger than CRP, better exertion of panicle but height similar to CRP. Slower leaf drying. Earlier than parent by 5 days.

CRP-2085: Panicle larger than CRP and 50% more panicles/row; superior in exertion of panicle, grain size also 10-15% larger; more leaves green at harvest. Taller than CRP by 20 cm.

CRP-1265: Panicle size 25% larger; 80% more panicles/row; grain size similar to CRP, earlier than CRP by 3 days, superior to parent in resistance to charcoal rot and Fusarium.

CRP-1279: Taller in height by 5-10 cm, panicle size similar to CRP but 25% more panicles; grain size larger; susceptible to drought. Earlier by 3 days. Subsequent selection for survival in severe drought, progeny testing of survivors and mass selection during the next two cycles improved resistances and yield.

Hybrid check P-815 B: Few panicles/row (5 panicles/metre, grain very small and light in weight due to poor seed-filling and hollow belly in grain, panicle size much larger than CRP (>60% in length and excellent in exertion) but rapid in leaf drying (all the leaves dry at harvest) highly susceptible to charcoal rot and drought and also leaf diseases, root activity mostly (>95%) in top 15-20 cm. Leaf size 50% larger in width and 25-30% longer than CRP.

Criollo Blanco Alto parent (CBA) A very tall (280-300 cm) trial type, 20-22 large leaves, with about 12 leaves green at harvest, sensitive to small changes of combinations of temperature and day length, particularly in October sowing when day and night temperatures are high (37°C day, 30°C night), days to 50% flowering vary from 70-75 in June sowings to 80 or more in August sowings and 90-95 in October/November sowings in Zulia State; large compact head (>25 cm), large and thick stem, nontillering, long internodes, large dark green leaves (180-200 cm<sup>2</sup> each), flag leaf medium size (150 cm<sup>2</sup> or more); maturity 130-150 days depending on sowing date, 65-80 g/panicle, seed size large, white, well-filled, endosperm white and semi-glutinous, subcoat purple colored; excellent in resistance to drought and lodging in spite of tallness; several buttress roots, other roots deeper in distribution, resistant to Macrophomina, tolerant to Fusarium, very rapid (16-20 days) in seed filling; regeneration of ratoon crop is variable but superior to American hybrids and poorer than CRP. An excellent source of resistance to charcoal rot and Fusarium. Poor in competition under close spacing of 50 cm or less, which is recommended for dwarf mutants as compared to 70-75 cm of normal spacing.

CBA-109: Height almost half of CBA, three times more panicles/row, >30 days earlier in maturity, number of leaves (12) about 50% of parent, flag leaf similar in size and orientation, excellent exertion of panicle like parent, with almost similar or slightly smaller panicle, grain size large like parent; more susceptible to charcoal rot under artificial inoculation but equal to parent under natural infection.

CBA-467: Short, but 4-6 times more panicles/row, all leaves except three lower ones are green at harvest, flag leaf size similar to the parent. There is variation in panicle size, some larger than the parent, grain size similar. Resistance to charcoal rot but lower than parent.

CBA-469: Similar to CBA-467 in several features, but shorter by 30 cm; grain 15% larger than parent, panicle size smaller than parent but three or 4 times the number of panicles/row. More susceptible to disease under artificial inoculation but similar to the parent under natural infection.

CBA 81-1227: Taller than other mutants by 40-45 cm; earlier than parent by 25-30 days grain size and panicle size similar to the parent; 3 times more panicles; more of green leaves. Better than parent in exertion of panicle; 14-15 leaves/plant compared to 10-12 leaves of other mutants and 20-22 leaves of parent, high resistance to charcoal rot.

All CBA mutants are earlier than the parent by 25-33 days.

Table:

Agronomic data of the best mutants of sorghum derived from Criollo Rojo Pequeño and Criollo Blanco Alto (1981-84)

Genotype	Height cm	Days to 50% flower	Days to mature	No. of leaves total	No. of leaves harvest	Resistance to Macropho mina <sup>*</sup>	No. of panicles m <sup>2</sup>	Yield kg/ha
<u>CRP Parent</u>	136	65.7	97.6	12.2	5.4	4.50	13.6	3393
<u>Mutants</u>								
CRP-1261	142	63.3	103.0	9.2	5.0	3.56	23.6	4729
1359	149	64.0	101.8	10.7	5.2	3.60	20.4	5019
1543	148	61.3	96.3	9.8	5.1	3.00	24.8	4917
2058	154	62.3	98.7	10.3	5.4	3.93	25.6	4275
1265	146	64.0	98.0	10.0	5.6	3.56	24.0	4431
1279	139	62.0	100.1	9.6	4.4	3.73	22.0	4553
<u>CBA Parent</u>	293	95.0	125.9	18.9	12.6	2.50	2.8	1364
<u>Mutants</u>								
CBA 109	151	63.3	97.7	11.5	5.0	4.20	17.6	5291
467	140	65.0	96.2	11.8	6.0	4.80	15.6	5830
469	145	62.0	95.0	11.1	5.8	5.80	20.8	5818
CBA 81-1227	200	70.3	99.9	14.2	8.1	2.00	14.0	4551
Savanna V	145	62.3	101.2	9.2	1.9	8.93	10.0	2650
Hybrid-Check								
C.D.5%	18	4.8	4.7	2.10	2.08	1.84	3.3	674

\* Artificial inoculation by tooth pick method

## REFERENCES

- MURTY, B.R., TABORDA, F., and REINOSO, A., Interdisciplinary approach to selection in mutation breeding in local sorghums for adaptation and disease resistance. In: Induced Mutations for Crop Improvement in Latin America IAEA-TECDOC-305 (1982) 141-172.
- REINOSO, A., Mejoramiento genético de algunos sorgos venezolanos utilizando mutaciones inducidas. Trabajo Ascenso Tesis. Facultad Agronomía, Universidad del Zulia. Maracaibo (1984) 1-73.
- VALERA, M. and MURTY, B.R., Genetic and physiological relationships in N, P and K mobilization in some Sorghum mutants and parents. Theor. Appl. Genet., 69 (1985) 353-359.
- (Contributed by A. Reinoso, B.R. Murty and F. Taborda. Faculty of Agronomy, University of Zulia, Maracaibo, Venezuela).



XA0201362

A higher yielding mutant of black gram with improved nodule formation

Dry seeds of black gram (*Vigna mungo* (L) Hopper) var. T<sub>9</sub> with 12.2% moisture content were irradiated at 10,20 and 30 krad of gamma rays. This was followed by combined treatment of one set in each dose with freshly prepared 0.25% EMS in phosphate buffer at 7.0 pH at 30±1°C for 6 hours. In M<sub>2</sub> population of 20 krad two mutants with pentafoliate instead of