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COLLECTION OF *RABI* SORGHUM GERMPLASM I. NORTHERN KARNATAKA AND ADJOINING AREAS OF ANDHRA PRADESH

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Systematic *rabi* sorghum germplasm collection in India were initiated jointly by the National Bureau of Plant Genetic Resources and International Crops Research Institute for the Semi-Arid Tropics. The collections from Karnataka could be a good addition to the *rabi* sorghum collections. As most of them are grown under residual soil moisture conditions, these are likely to be good source for drought tolerance. Most of them have attractive grain characters which can be used to improve *rabi* sorghums. The pop sorghum and sugary grain (wrinkled) forms are good addition to the limited accessions in world collection of sorghum germplasm. They can be used to breed cultivars for alternative uses of sorghum. Majority of the samples collected in this mission belong to the race *Durra* with a wide range of diversity. Landraces collected seem to be useful in sorghum improvement programmes. Sorghums with large glumes (membranaceum group) were observed to be bird resistant.

Key words : Sorghum, germplasm, variability, landraces, *durra* race, bird resistance

To collect *rabi* (post-rainy season) sorghum from Karnataka, India, a germplasm collection mission was jointly launched by the National Bureau of Plant Genetic Resources (NBPGR), New Delhi and the Genetic Resources Division, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru. Karnataka, one of the most important sorghum growing states in India, lies between 11°31′ and 18°41′ N latitudes and 74°12′ and 78°40′E longitude in the west central parts of peninsular India. The total geographical area of Karnataka state is 1,98,000 sq km, which runs from 700 km north to south and 400 km from east to west. The areas covered were Bidar, Gulbarga, Bijapur, Bellary and Raichur districts of northern Karnataka; Ananthpur and Kurnool districts of Andhra Pradesh. The route followed is given in Fig. 1. The expedition was planned to coincide with the harvesting

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of sorghum in several areas except in parts of Bijapur district where the crop was harvested and head samples were collected from threshing floors. Course grid sampling was followed, with emphasis on collecting random samples. A farmer's field was considered as a unit and random plants were collected as populations. While collecting samples, information on traditional farming practices and other relevant passport data were also gathered. A total of 176 samples of sorghum, were collected. No wild and weedy forms of sorghums were noticed during this collection mission. All the samples collected were authentic indigenous landraces except *muguthi, gangavati,* M35-1 and SPV 894.

The soils are mainly red sandy to black clay in the area explored. The average annual rainfall ranges between 518 mm (Bellary) to 977 mm (Bidar). Sorghum is planted either as sole crop or mixed mainly with safflower. However, farmers of this region also grow pigeonpea, chickpea or groundnut in mixed cropping with sorghum. Most of the *rabi* sorghum landraces were planted in September and harvested in the first or second week of February.

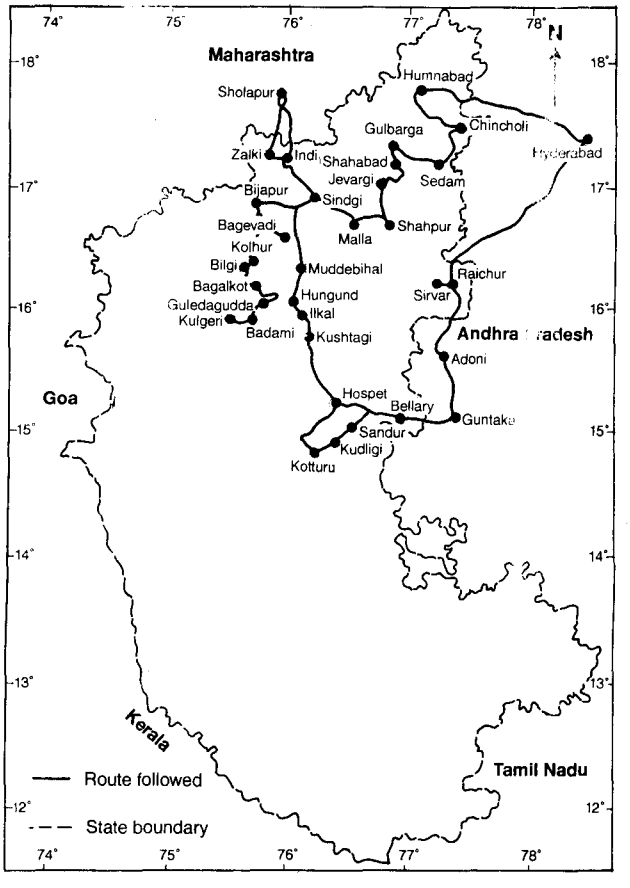

Fig. 1. Route followed and areas explored for germplasm collection in northern Karnataka and adjoining areas of Andhra Pradesh

In some parts of northern Karnataka, sorghum was planted in October and harvested in the last week of February. Sorghum grain is generally used for the preparation of *roti* (unleavened bread) in this area.

VARIABILITY IN THE GERMPLASM

Panicle shape and spiklet morphology of the samples were observed and recorded at the time of collection. Though some of the types were similar to those collected during the *kharif* season (Prasada Rao and Gopal Reddy, 1980), most of them were different. The collected samples were classified into the following basic and intermediate races (Harlan and de Wet, 1972) which are presented in Table 1.

Table 1 : Classification of the *rabi* sorghum germplasm collections

Species/race		Number of samples collected
Species : *Sorghum bicolor*(L.)Moench ssp. *bicolor*		
Race	*Durra*	129
	Durra-bicolor	31
	Guinea-durra	4
	Durra-caudatum	4
	Caudatum-bicolor	5
	Guinea	1
	Guinea-bicolor	2
	Total	176

Most of the landraces collected in the present mission belong to the basic race *Durra*. The large glume sorghums (membranaceum group) collected were observed to be bird resistant and excellent source for developing pop sorghums. The predominant races collected during this expedition were *Durra, Durra-bicolor* or *Guinea* (Fig 2). Considerable variation was observed in panicle length, width and shape within *"Tella Jona"* (Fig. 3). They belong to race *Durra* with white grain. The 176 sorghum samples collected in this mission with their local names are listed in Table 2. Wide range of variation was found within the landrace *"Gundu Tenai"* (Fig. 4).

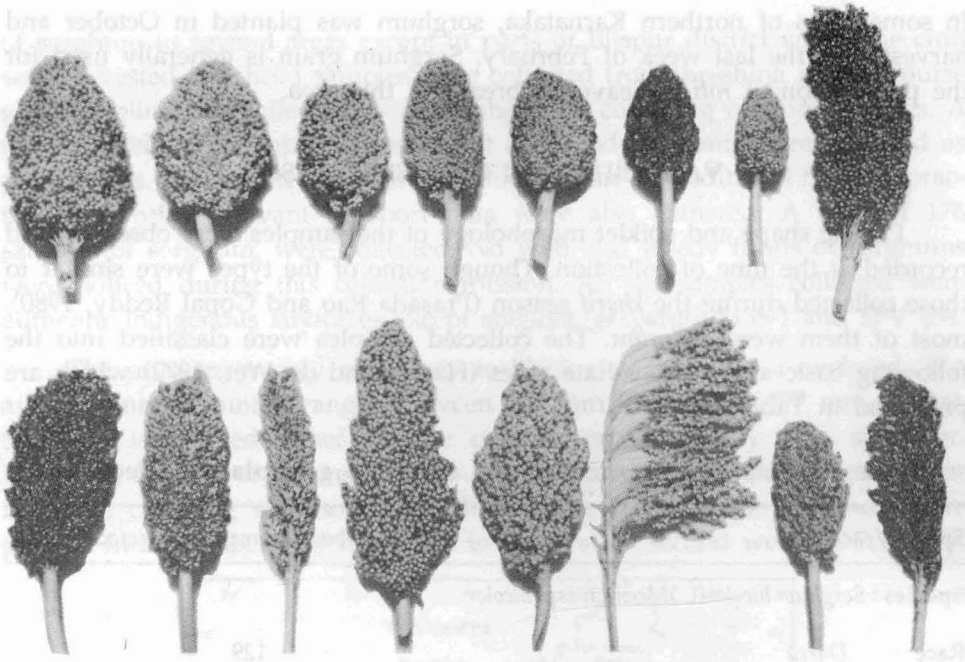

Fig. 2. Different races of sorghum collected from Karnataka

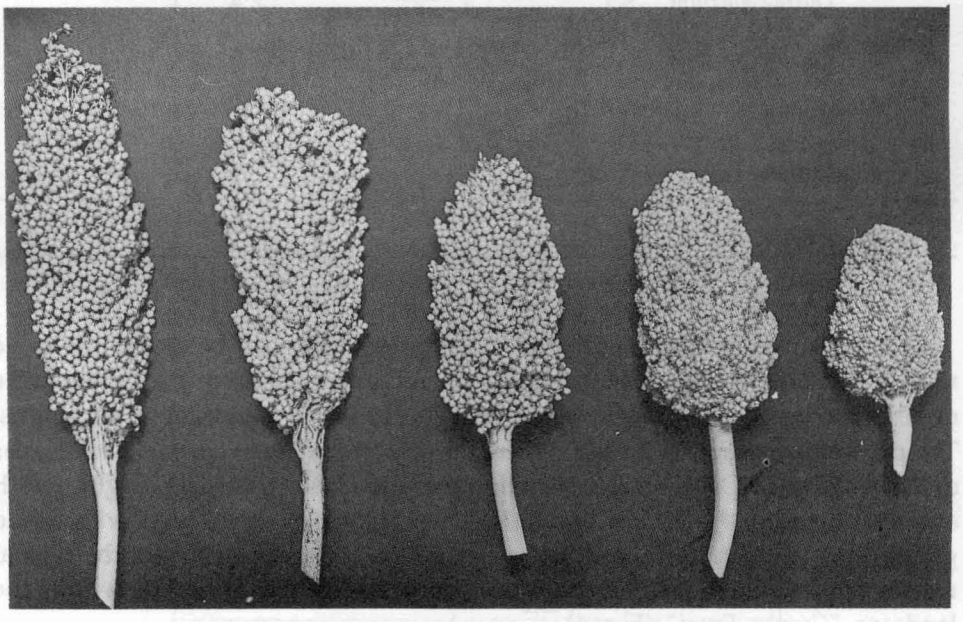

Fig. 3. Variation in landrace - *Tella Jonna*

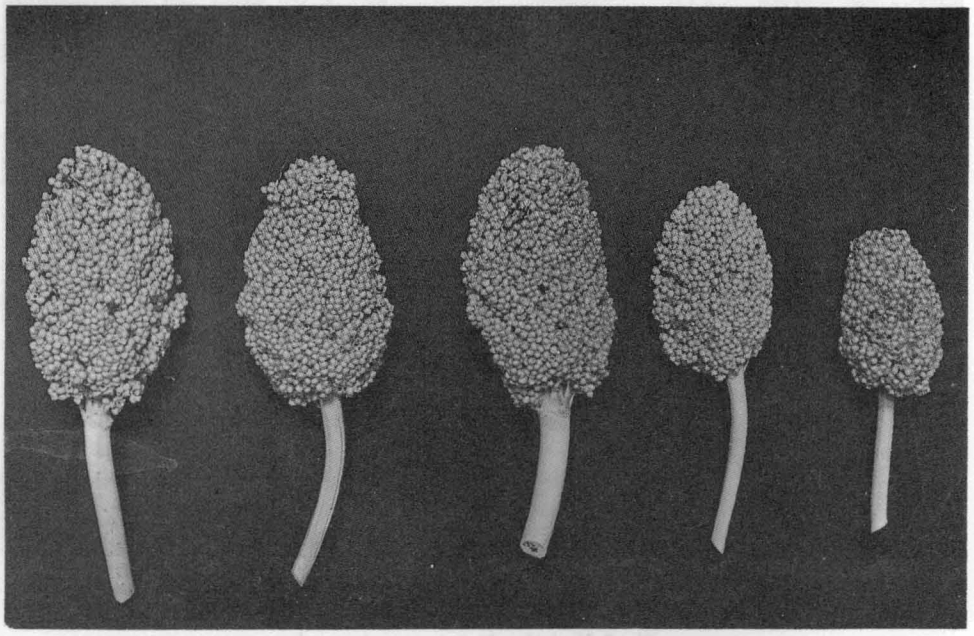

Fig. 4. Variation in landrace - *Gundu Tenai*

In northern Karnataka, though sorghum is mainly used for making unleavened bread, it is also used for popping. Most of the pop sorghums have large glumes with compact to semi compact panicles, which belong to the intermediate race *Durra-bicolor*. In Karnataka, another distinct form of sorghum landrace was collected. It has surgary grain with soft endosperm and wrinkled grain surface (Fig. 5), locally called "*Sakkara Mukri Jola*" and is used to prepare a favourite sweet dish. Variability collected for this landrace will be very useful for contributing genes for sweetness. However, there is a need to estimate gluten content in these collections, which can be compared with some check variety like M-35. Enormous variation was found within Maldandi, an improved landrace, which is extensively grown around Bijapur, Gulbarga and Raichur districts of Karnataka. The local landraces "*Kadabuni Jola*" which has red grains belongs to race *Durra*, and intermediate races *Durra-bicolor* and *Durra-caudatum* (Fig 6). Some collections were also made for sweet-stalk sorghums and can be used in developing varieties for dual purpose. '*Bili Jola*' collection were having compact elliptic to oval shape panicles (Fig 7). The sorghum crop in these areas was generally free from foliar diseases, however, stem borer was the important pest observed during this collection mission. Covered grain smut and ergot were also present.

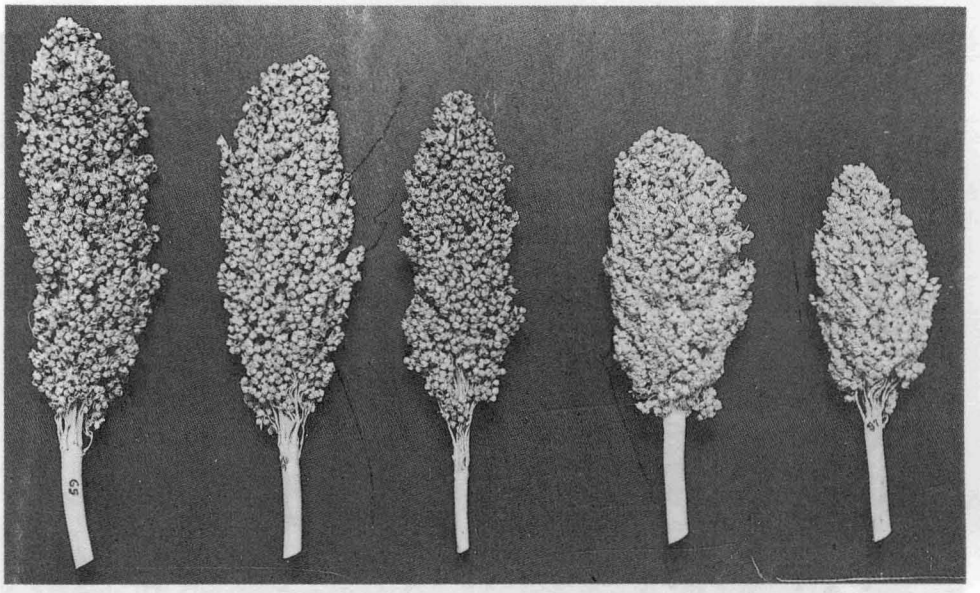

Fig. 5. Variation in sugary grain sorghums

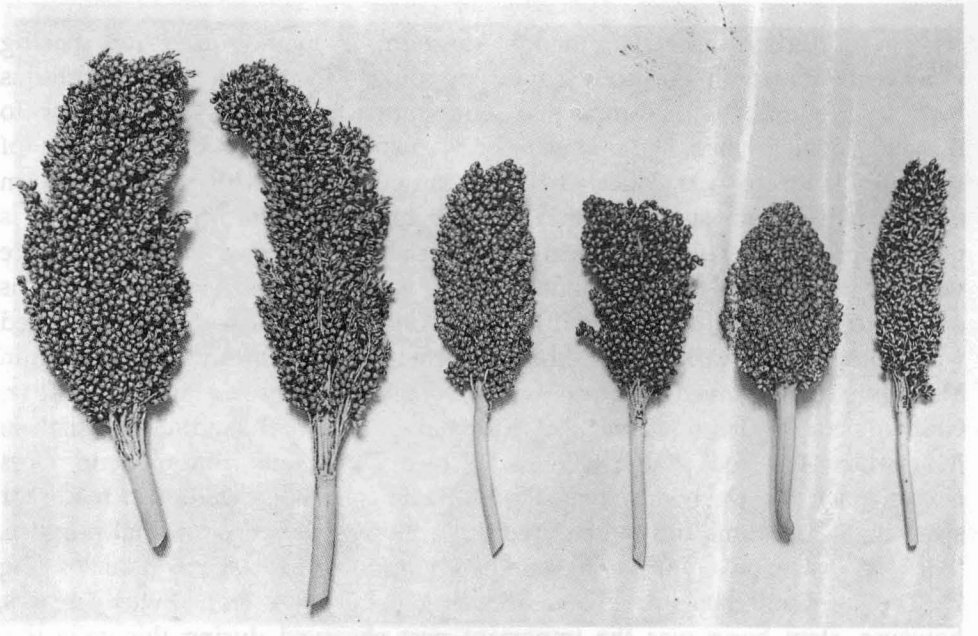

Fig. 6. Variation in landrace - *Kadabuni Jola*

Table 2 : Local names of sorghum landraces collections

S.No.	Local Name	No. of samples	S.No.	Local Name	No. of samples
1	Tella Jonna	10	30	Biligundu	1
2	Badi Jowar	3	31	Afzalpur Local	1
3	M35-1	3	32	Bidar Local	1
4	Maldandi	13	33	Aurada Local	1
5	Bili Jola	22	34	Jewarge Local	3
6	Kempu Jola	4	35	Chittapur Local	1
7	Allina Jola	20	36	Lakkadi	1
8	Kadabuni Jola	12	37	Mattalli	1
9	Safed Jowar	3	38	SPV 894	1
10	Kempu Kate	1	39	Kakimuti Jola	3
11	Ujala Jola	1	40	Phulamalligi	1
12	Basavanna Butta	2	41	Benni Jola	1
13	Gulabi Jowar	1	42	Suryahaula	1
14	Holi Jola	5	43	Bijapur Jola	2
15	Gundu Jola	2	44	Gulbarga Jola	5
16	Holgi Jola	2	45	Dundanna Bilijola	1
17	Gundu Tenai	5	46	Raichur Jola	3
18	Sakkaramukri Jola	6	47	Muddakanki Jonna	1
19	Shakti	1	48	Desavali Jonna	1
20	Kachkach Jola	1	49	Basavannamuthi Jonna	1
21	Banuth Jola	1	50	Cheruku Jonna	1
22	Muddihali Jola	1	51	Bendu Jonna	1
23	Aliali Jola	1	52	Chapati Jonna	3
24	Kempuguni Jola	2	53	Pelala Jonna	1
25	Muguthi	3	54	Yerra Jonna	2
26	Machendri	1	55	Mudda Jonna	1
27	Kagi Moti Jola	1	56	Nandyala Jonna	1
28	Gangavati	1	57	Kanakam Jonna	1
29	Hagari Local	1	58	Kareguni Jola	3
				Unknown	2

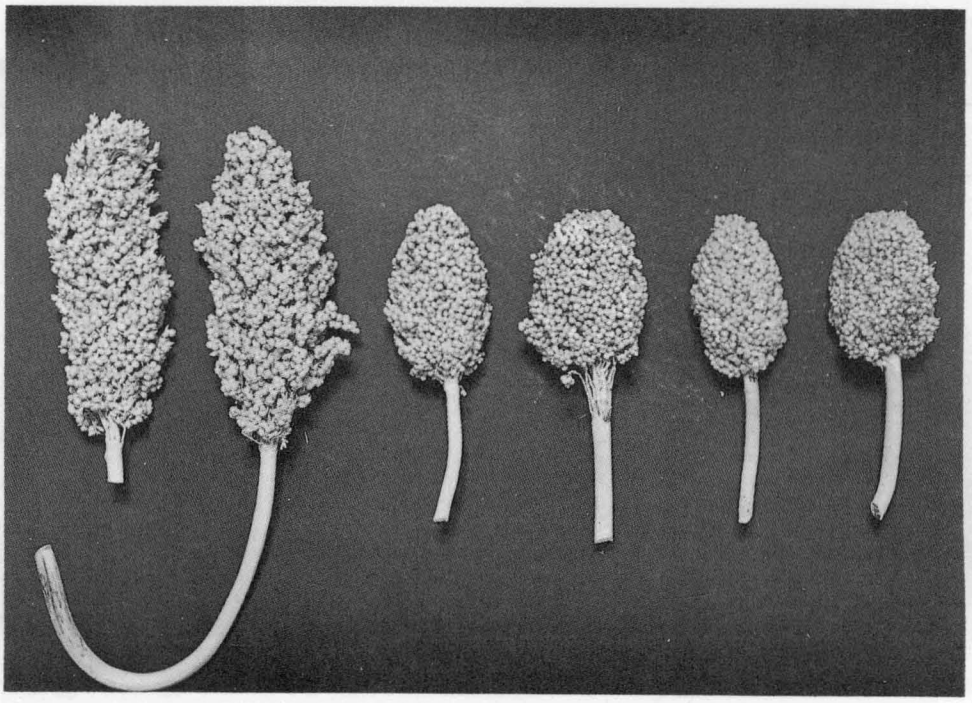

Fig. 7. Variation in landrace - *Bili Jola*

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