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Research Paper :

Testing sorghum varieties of northern dry zone of Karnataka for flaking

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ABSTRACT

To make sorghum viable in the food sector, either commonly grown jowar needs to be subjected for standardization of food processing or special grain type varieties with suitable flour texture can directly be made into use for commercialization. Therefore, to identify the suitable variety for good flaking two farmers' varieties of *Rabi* sorghum *viz*., Atharga Kempu Jola (Kadabina jola with property of high gelatinization of starch), Sakkari Mukkari Jola (Seetani Jola with sweet grain) were tested along with popular roti making variety M35-1. Flakes of these varieties were valuated for flake yield and quality parameters. Colour and size of the flakes were observed visually and recorded. It revealed that Atharga Kempu Jola recorded high values for flake length, breadth and volume compared to other varieties. The flakes of Atharga Kempu Jola and M35-1 were elliptical, however, those of Sakkri Mukkri Jola were round in shape. The flakes of Atharga Kempu Jola were thin, with uniform shape and slightly elongated compared to M35-1. It also has attractive red colour unlike off white colour in M35-1 and dull colour in Sakkri Mukkri Jola. Organoleptic evaluation of flakes samples was carried out using five point scale by 25 semi trained panel members. Atharga Kempu Jola flakes scored high compared to other two varieties. Comparatively high grain yield, flake yield (%) and flakes quality recorded by variety Atharga Kempu Jola indicated its suitability for commercial exploitation in flaking.

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Sorghum is one of the crops among millets grown in drylands. It is nutritionally superior to other fine cereals such as rice and wheat and hence it is known as nutritional cereal. It is a sustainable choice under water scarce drought conditions. India is major sorghum growing country, with maximum area and production shared by Maharashtra and Karnataka. In Karnataka, Sorghum is mainly grown in districts of Northern dry zone. *Rabi* sorghum being grown in this area is characterized by excellent grain quality, occupying major share of state's sorghum area and production. To make sorghum viable in the food sector, either commonly grown jowar needs to be subjected for standardization of food processing or special grain type varieties with suitable flour texture can directly be made into use for commercialization.

Traditionally sorghum is consumed in the form of Roti, an unleavened bread. However, farmers of Northern dry zone of Karnataka have identified landrace varieties with distinct grain traits and are growing in their fields since many years. They are identified with unique vernacular names depicting specific food purpose for which they are used. These are Kadabina Jola, Seetani jola, Aralina Jola, Holige Jola, Mudde Jola etc. 'Atharga Kempu Jola' is a landrace variety of Kadabina Jola (with high gelatinization property of starch) collected from farmers' fields of Atharga village of Bijapur District in Northern Karnataka (AICSIP Annual reports, 2002-03 and 2004-05 of RARS, Bijapur). The panicle and seed coat of this variety is red in colour and hence, farmers call this as Kempu (*i.e.* Red) Jola (Sajjanar *et al*., 2009). It is suitable for certain traditional food preparations like Kadabu, a steamed product and hence the name Kadabina Jola (Hemalatha *et al*., 2008). Seeds are medium bold, slightly elliptical, smooth and lustrous. 'Sakkari Mukkari Jola' is a landrace variety of Seetani Jola with sweet grains and is generally being used for preparation of Seetani or hurda (roasted tender grains). 'Sakkari' means sugar and 'mukkari' means to gobble. Dried seeds are round in shape, slightly brown and are small sized. A depression can be observed in the seeds of this variety after drying due to high water content of the seeds. This depression is the distinct characteristic feature of this landrace variety and hence farmers also call this as Kach Kach Jola. M 35-1, a popular variety of Rabi sorghum occupied by largest area is a Roti making variety with bold, cream coloured and lustrous seeds. At present the utility of these varieties is restricted for household use especially during festive seasons for traditional food preparations. Their specific grain quality trait needs to be exploited commercially to add value to the grain. The commercialization initiatives will help to realize higher profits by the farmers, when supported by the food

industry. Ready-to-eat foods from *Rabi* sorghum varieties with specific flour texture will create increased demand in urban areas and non-traditional areas. To suit to the changing lifestyle of people and to give value to sorghum, an effort was made to test some of the special varieties for flaking.

METHODOLOGY

Experimental material consisted of three sorghum varieties *viz*., Atharga Kempu Jola, Sakkari Mukkari Jola and M 35-1. These three varieties were subjected for extrusion *i.e.*, for flaking (seed to flake method). Flaking was carried out in association with a local food processing unit, Bhavani Foods and feeds, Bijapur. Sorghum seeds were washed, pearled and steam cooked. The grains were pressed by presser, dried in shade and later roasted in roaster to obtain roasted flakes. Flakes of test varieties evaluated for flake yield and quality parameters like flake length (cm), breadth (cm), volume (g/ml), 100 flakes weight (g), 100 seed weight and flake yield (%). The observations *i.e.* flake colour, thickness and shape were visually recorded. Organoleptic evaluation of flakes samples was carried out by 25 semi-trained panel members. Parameters evaluated by judges included were appearance, colour, taste, aroma, texture and overall acceptability. A five point scale (1-very poor, 2- poor, 3-average, 4- better, 5- excellent) was used to evaluate the samples.

The test entries of the present study were also evaluated for yield and other ancillary characters for two years (2005 and 2006) during *Rabi* season at Regional Agricultural Research Station, Bijapur. The observations were recorded on grain weight per plant (g), panicle weight (g), panicle length (cm), panicle breadth (cm), plant height (cm) and days to 50% flowering.

FINDINGS AND DISCUSSION

The results of evaluation of varieties for flake yield and quality parameters revealed that the variety, Atharga Kempu Jola recorded higher values for flake length, breadth and volume compared to other two varieties (Table 1). The variety M 35-1 recorded high per cent of flake yield (94.4%) followed by Atharga Kempu Jola (88.3%) compared to Sakkari Mukkari Jola (77.6%). The high flake yield observed in M 35-1 indicates low levels of wastage during processing due to its slightly thick pericarp and its bold size. However, Atharga Kempu Jola recorded slightly lower values than M 35-1, which was due to its thin pericarp and reduced seed size resulting slightly higher wastage during processing. Lower values on flake yield (%) in Sakkari Mukkari Jola was due to low endosperm content in the seeds. Visual observation on colour and size of the flakes revealed that the flakes of Atharga Kempu Jola and M35-1 were elliptical, however, those of Sakkri Mukkri Jola were round in shape. The flakes of Atharga Kempu Jola were thin, crisp with uniform shape and slightly elongated compared to M35-1. It also had attractive red colour unlike off white colour in M35-1 and dull colour in Sakkri Mukkri Jola. These results indicate that, although flakes yield of Atharga Kempu Jola is lesser than M 35-1, but with respect to flakes quality, it is superior over M 35-1. High quality of flakes in this variety in terms of high flake length and breadth, thin and uniform elliptical shaped flakes were due to high gelatinization property of starch.

Table 1 : Evaluation of varieties for flakes yield and quality parameters

Variety/characters	Atharga Kempu Jola	M 35-1	Sakkari Mukkari Jola
Flake length (mm)	17.8	17.3	9.3
Flake breadth	8.7	8	7.8
Flake volume (ml/10g)	73	67	35
100 flakes wt (g)	2.4	3.6	1.7
100 seed wt (g)	2.8	3.8	2.2
Flakes yield (%)	88.3	94.4	77.6
Colour	Red	Cream	Dull white
Flake thickness	Thin	Thick	Very thin
Flake shape	Eliptical and uniform	Eliptical and not uniform	Round and not uniform

Organoleptic evaluation for appearance, colour, taste, aroma, texture and overall acceptability also revealed that Atharga Kempu Jola flakes scored high compared to other two varieties (Table 2). Preliminary analysis by Kashav Reddy (2007) for micronutrients in grains showed that this variety recorded higher iron (3.33 ppm) and zinc (1.83) content compared to M 35-1 (1.71 ppm and 1.4 ppm, respectively).

Table 2 : Mean scores of sensory evaluation for flakes of different *Rabi* sorghum varieties

Parameters/ variety	Atharga Kempu Jola	M 35-1	Sakkari Mukkari Jola
Appearance	4.21	3.57	2.18
Colour	4.23	3.56	2.1
Taste	3.99	3.24	2.76
Aroma	3.64	3.17	2.71
Texture	4.16	3.61	2.24
Overall acceptability	4.00	3.56	2.62

Note: 5-Excellent, 4-Better, 3-Average, 2-poor, 1-very poor

Table 3 : Evaluation of *Rabi* sorghum varieties including special types for yield parameters in station trials (over two years) conducted during *Rabi* 2005 and 2006 at Bijapur

Sr. No.	Entry	Gr. wt/pl(g)	Pan. Wt. (g)	Pan. length (g)	Pan. breadth (g)	No. of primaries	Plant height (cm)	Days to 50% flowering
1.	Atharga Kempu Jola	46.7	55.6	15.6	13.5	60.6	198.1	82.17
2.	Sakkari Mukkri	31.8	38.2	11.3	13.4	47.9	164.8	79.50
3.	M35-1	38.4	51.7	14.9	13.1	51.9	185.1	75.17
	CV	23.05	19.12	8.56	8.67	10.77	7.74	5.17
	CD	19.86	20.27	2.56	2.4	11.87	26.54	8.15

The evaluation of test entries for grain yield and yield components (Table 3) revealed that the variety Atharga Kempu Jola was at par with M 35-1 and showed higher values compared to Sakkari Mukkari Jola for all the parameters recorded. Thus, the results indicated that comparative high yield of Atharga Kempu Jola with that of popularly growing variety M 35-1 and good quality of flakes will benefit farmers to gain higher profits.

Conclusion:

The variety, Atharga Kempu Jola is considered highly suitable for commercial exploitation for flaking compared to other two varieties. The roasted flakes can be used in numerous preparations. It can be spiced with different spice combinations, sweetened with jaggery or sugar, can be consumed with milk and fruits like corn flakes. Value addition to special sorghum types like Atharga Kempu Jola encourage farmers to grow these varieties in larger areas, which otherwise are vanishing from cultivation. Flakes are consumer preferred snack in Karnataka and Maharashtra. Sorghum being the staple diet in these areas, sorghum flakes is expected to gain greater demand in local market itself. This will boost up flake industry. Therefore, there is need for a rational seed production and supply systems. For this an institute has to take up seed supply and farmers are to be motivated to grow these varieties. The village adoption concept can be followed to link farmers and entrepreneurs.

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