FOOD AND NUTRITION NEWS

Andhra Pradesh Agricultural University

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ALTERNATE USES OF SORGHUM

Sorghum is a major source of energy and protein for a large section of people inhabiting the semi arid tropics of India. These people are specially under privileged and any improvement in the production, processing, use and nutritive value of sorghum would benefit the poorest. To improve the economic and nutritional status of sorghum farmer, it is not sufficient if agriculture production alone is increased. Simultaneously use of sorghum as food should be enhanced which will result in better market returns to the sorghum farmer. The status of sorghum use has been low due its colour, coarseness, high fibre content, long cooking time etc. Difficulty in traditional dehulling process also limits it's use. Semiperishable products with sorghum like flour, grits, flakes, semolina *etc.* are not readily available in the market. This further limits the versatality of the grain as a cereal substitute in prestigious foods or by food industries.

Mechanical dehulling technology developed by this centre for sorghum, other millets and legumes has reduced the drudgery of dehulling process and enhanced the quality of sorghum. This batch type mechanical dehuller relies on carborundum surfaces mounted on a horizontal rotor to progressively abrade the outer layers of the sorghum (Fig.1). Percent recovery rate showed variation among sorghum cultivars ranging from 61-94%. The dehulling time also differed depending on the size and variety of sorghum ranging from 6-11 minutes. Lowest recovery rates were observed in brown or yellow varieties. Sorghum varieties with soft endosperm were not suitable for dehulling due to excessive breakage.

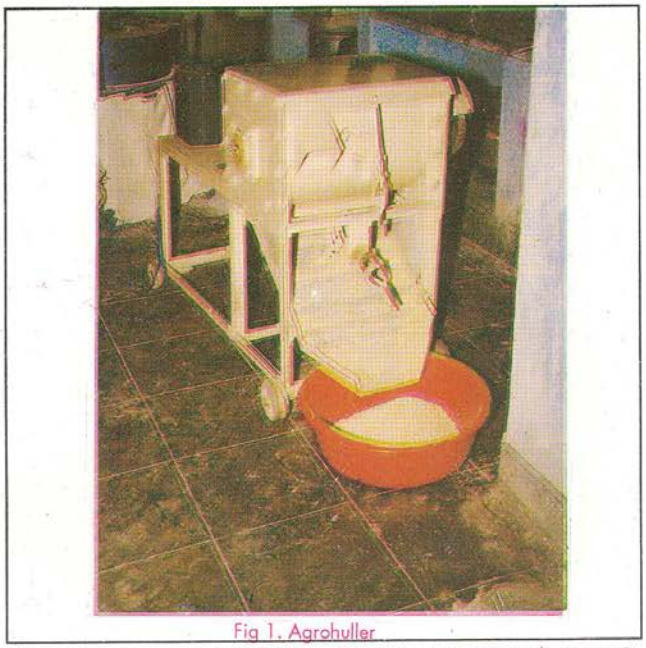

Fig 1. Agrohuller

Dehulling reduced cooking time by 21.6 to 47%. Mechanical dehulling not only improved physical appearance and functional properties, but also enhanced both starch and protein digestibility by reducing tannin and fibre levels.

Uses of whole sorghum were limited. But development of fine quality flour and semolina with dehulled sorghum has led to number of alternative uses of sorghum.

Sorghum based supplementary foods

Infant mixes were developed from a combination of sorghum and chickpea/greengram in the ratio of 4:1 by weight. Sorghum chickpea mixes has better protein quality than sorghum greengram mixes as assessed by biological experiments. Roasting was found to be a better method of processing for infant mixes. Boiling and malting reduced the TD and NPU of sorghum mixes. Sweet and salt biscuits were also developed as alternate supplementary food in combination with sorghum and chickpea. The BV of sweet biscuits was higher to salt biscuits. Moreover the millet legume infant mixes and biscuits developed could easily meet the standards fixed for food supplements prescribed for infant feeding programmes i.e. to provide 300 K cals, 8-10gs of protein per child beneficiary. Field trails have shown that biscuits were highly acceptable supplements to mothers as well as children. Supplementation has also helped in preventing growth faltering and resulted in low morbidity.

Ready to Cook Mixes

In view of increasing demand for convenience foods, ready to use breakfast mixes (*Idli &dosa* mixes) were developed substituting sorghum in place of rice (Table. 1)

Table 1 Composition of Idli and *Dosa* Mixes

Idli Mix Ingredients	%	*Dosa Mix* Ingredients	%
Sorghum semolina	60.0	Sorghum flour	60.0
Blackgram dhal flour	32.0	Blackgram dhal flour	16.0
Salt	3.0	White flour	15.0
Sodium bicarbonate	2.0	Salt	3.30
Citric acid	2.35	Fenugreek seeds	1.40
Sodium acetate	0.65	Calcium Carbonate	1.95
		Citric acid	2.36

Composite *Roti* Mixes

Sorghum is deficient in lysine. The beneficial effects of supplementation of cereals & pulses has long been established. Since sorghum is consumed in the form of *roti* by majority of population, four nutritious *roti* blends of sorghum and legume were developed. (Table 2). The most acceptable *roti* can be made with a combination of sorghum, wheat and bengalgram flours mixed in the ratio of 2:2:1.

Table 2 Sorghum Legume *Roti* Blends

Composite *roti* blends	Proportion (%)
Sorghum + Greengram	80: 20
Sorghum + Black gram	80 : 20
Sorghum + Wheat + Blackgram	40:40 :20
Sorghum + Wheat + Bengal gram	40 : 40 : 20

Sorghum Based Traditional Foods

In Fermented batter products like *Dosa* & *Idli*, rice was substituted either fully or partially with sorghum and these products were standardised. With few modifications products like Khara *Idli*, Vegetable *Idli*, Pepper *Idli*, fenugreek *dosa, Uthappam* and *Dokla* were standardised to improve acceptability. Preparations like *upma* and biriyani were standardised using semolina. Several snack items (like *Muruku, chekkalu, Pakodi* etc.) were standardised using sorghum. In some of the products pulse flour was added which improved the nutritional quality and acceptability of sorghum foods.

Baked Foods

Baked foods are prestigious foods which cater to the needs of elite. Now it is possible to prepare almost all baked products with dehulled sorghum flour except bread. In products such as biscuits, cookies and cakes, incorporation of 20% refined flour was found to be essential to increase the palatability.

Therapeutic foods

Sorghum foods can be beneficially utilized for lowering blood glucose levels in diabetic subjects. Consumption of whole sorghum recipes resulted in significantly (0.05) lower plasma glucose level in diabetic subjects when compared with dehulled sorghum recipes, rice and wheat recipes. Least glycemic response was observed with whole sorghum semolina *upma* (74.6 mgs) followed by *missi roti* (77.8 mg) and *dokla* (84.5

mgs). Fibre rich sorghum can be advantageously used in the formulation of therapeutic foods.

Malted Foods

Sorghum is malted in large scale in parts of Africa. The goal of malting is to produce high enzyme activity and a characteristic flavour with a minimum loss of dry weight. Malt has number of uses. It can be used in brewing industry and baking industry and also in breakfast food industry as a flavouring agent.

Dehydrated Foods

Dehydrated foods like papads are usually prepared with blackgram. But dehulled sorghum flour lends itself very well for the preparation of papads.

Development of alternate uses of sorghum alone will not solve the problem of sorghum farmer. Sustainable production of sorghum as well as wide consumer market for these products need to be developed by the collaborative effect of Agricultural scientists and Home Scientists.

V. Vimala
P. Geervani
Kanwaljit Kaur
K. Krishnakumari
T. Hymavathy

An Extruded Maize Product Paves Way for Combating Vitamin A deficiency

Maize puffs developed using maize grits with curry leaf powder and carrot powder at 30% level and 30:70 PRO and GNO blends (Red Palmoil : groundnut oil) were highly acceptable among preschool children. The average energy, protein and fat content in the product was 446.5 Kcals, 11.3% and 12.3g% respectively. The ß carotene content in control product was negligible where in the product with curry leaf powder and carrot powder had 6.54 and 10.86 mg% of ß-carotene respectively. During storage, the retention of ß-c arotene was found to be very high i.e. 70-80%. Studies on the effect of long term feeding of this product on serum vitamin A levels in preschool children will give useful information for policy makers and programme planners.

K.N. Bhavani
Kamini Devi

High Fibre Low Calorie Maize Biscuits for Therapeutic Use

An acceptable high fibre low calorie biscuits using maize flour was developed by modifying the basic recipe. Change in fat, energy and fibre contents was brought about by reducing the sugar content from 25 to 15% reducing the fat level from 50% to 10% and incorporating GMS (Glyceryl monostearate) a fat substitute at 10% level and incorporating cellulose at 10% level. There was significant reduction in fat (21.5 to 18.9 g /100g biscuits), energy (526.6 to 468 Kcals/100g biscuits) increase in fibre (14.2 to 16g/100g biscuits) contents in the modified maize biscuits. Use of these biscuits can be aimed at reducing risk of common disorders like diabetes, cardiovascular disease etc.

Sameena Hameed
Kamini Devi

ANNOUNCEMENT

A short course on "Processing of fruits and Vegetables" will be held from 2-12-96 to 21-12-96, by the Centre of Advanced studies, Department of Foods & Nutrition, Post graduate and Research Centre, College of Home Science, A.P. Agricultural University, Hyderabad. Free boarding and lodging will be provided. Nominations of trainees from. State Agricultural University teachers may be sent to

The Director
Cente of Advanced Studies,
Postgraduate and Research Centre
A.P. Agricultural University
Rajendranagar, 500 030.

Last date for receipt of Nominations : 1-10-1996

Popping and Flaking Quality of Sorghum Cultivars

Sorghum Pops and flakes were standardised useing two cultivars. The grain samples were popped at 16% moisture level using corn popper. For flaking, the dehulled grains were soaked in water, pressure cooked, conditioned and flaked using flaking rolls. There were significant genotype differences among cultivars for popping and flaking quality. Invitro starch and protein digestibility of grain showed variation among the cultivars. Popping and flaking caused a shift in protein and starch digestibility of the grains. A five fold increase in starch digestibility was observed in both the processes. However heat processing had a deleterous effect on protein digestibility which is more pronounced in flaked products.

Y. Sailaja
P. Geervani

Suggested Readings
(APAU Publications)

1. Sorghum food enterprises for alternative uses and supplementary feeding 1993
2. Proceedings of workshop on "sorghum and legume based food enterprises for supplementary feeding". 1990
3. Proceedings of summer institute on "appropriate food processing technologies for rural development". 1990
4. Varietal preference, marketing, storage, processing and utilization of sorghum and millets in Andhra Pradesh 1981

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For any correspondence

Address to

Editor :
Dr (Mrs) Vijaya Khader
Director
Centre of Advanced Studies
Post graduate and Research Centre
A.P. Agricultural University
Rajendranagar, Hyderabad 500 030.

Issue Editor :
Dr (Mrs) V. Vimala
Associate Professor
Department of Foods & Nutrition

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Mail to :