

# Pop

## sorghum

**KBRS Visarada\*, C Aruna, M Elangovan, Jinu Jacob and C Ratnavathi**

ICAR-Indian Institute of Millets Research, Rajendranagar, Hyderabad, Telangana 500 030

*Sorghum is a multipurpose crop and its use as food is the key component. Rotis and cooked sorghum are primary consumption patterns, while there are other foods and snacks locally popular in India. One such delicacy is the sorghum pops, as described in this article. Popped sorghum is easy for digestion and is used as weaning food. Sorghum pops are traditionally made with elaborate procedure of soaking, shade drying and popping in pans. In this article, sorghum popping was tested using popcorn maker, a small device that can be purchased with a low cost. The advantage of this procedure is that this pop-maker can be used to pop a handful of seeds and it takes 2–3 min only for the same. It can be explored as an additional income source. There are many varieties released for popping, e.g. Phule Panchami (RPOSV-3), Pop11 and other lines in pop series. Advanced lines having high popping and high yield through breeding efforts are in the pipeline.*

**Keywords:** Low phytic acid, Pop percentage, Pop volume, Sorghum snacks

**S**ORGHUM grain is consumed in the form of food and snacks in many parts of India. Roti and cooked grain are the most popular forms of food preparations, nevertheless, many other products for snacks and tiffins are available in different parts of India. Among them, popped sorghum is a kind that is used as weaning food and snack, which can be explored and popularized. Popped sorghum is fluffy white flower like structure which resembles popcorn, but is smaller in size. Sorghum pops are crispy, tasty with a pleasant fragrance that makes them tastier. Sorghum pops are low in calories and fat, gluten-free and completely devoid of hull. Because of their easy digestibility, sorghum pops are used as weaning food and for feeding the old recovering patients. Sorghum grain is recommended for celiac patients as it is gluten free. Popping treatment reduces phytic acid content in the grain and thus, improves starch digestibility. Sorghum pops do not have bran like rice pops and it makes them easy and ready for use.

### Pop sorghum

Sorghum grains are popped and made to flour. They are made to laddus with jaggery and consumed during Tholi ekadasi (July) in Telugu speaking states. Karnataka state is popular for making sorghum pops. It may be available in many other states but no such record was found. Traditional methods of preparation of sorghum

pops are elaborate which poses to be a reason for its less usage. Sorghum grain is soaked, shade dried and popped in big pans. During the soaking procedure, the grain moisture is brought to 14–16%, and it is exposed to sudden dry heat in a pan. The pan is covered with a mesh dome to avoid spilling of popped grains. In this study, a simple procedure was developed for popping sorghum with the help of a small popcorn maker, costing around ₹2000–3000. It can be used for roasting of other items. In this machine, a handful of grains can be popped in 2–3 min, unlike the conventional popping machines that require large quantities of grains. This procedure takes short time and a small quantity can be popped. Sorghum seed harvested during the winter season (*rabi*) or post-rainy season can be readily used for popping till 5–6 months due to inherent moisture. Later, they can be washed, kept in refrigerator for 1 hr and then popped. Use of pop maker for making popped sorghums is easy and can be done in a short duration.

### Types

Central India, especially Karnataka, has diverse types of pop sorghums. Sorghum varieties for popping have been identified in the series as Pop 1–Pop 120. Among them, germplasm lines, viz. POP 16 (IC 308651), POP 31 (IC 308660), POP 32 (IC 308661), POP 37 (IC 308664), POP 38 (IC 308665), POP 47 (IC 308671), POP



Sorghum pops

49 (IC 308673), POP 50 (IC 308674), POP 54 (IC 308678), POP 58 (IC 308682), POP 59 (IC 308683), POP 60 (IC 308684), and POP 62 (IC 308685) were identified with more than 70% popping ability in studies conducted a decade ago. Later, there were special releases like Phule Panchami (RPOSV-3) from Rahuri (MPKV University) for popping. In our recent study, it was found that guinea race germplasm lines are suitable for semolina and popping. Other breeding like C43 and Pop 11 were found to be very good for popping. A dedicated program to combine popping and high yield resulted in identifying 5–6 lines that have more than 80% popping percentage and 70–100% popping expansion volume.

### Need

There is a need to develop end-use specific lines to promote linkages of farmers and food industry. Under the Indian Council of Agricultural Research, the All India Coordinated Research Projects (AICRP) are conducted for multi-location testing of varieties and hybrids. Under AICRP on sorghum, a coordinated multi-location trial for popping was being arranged to encourage breeding and production of sorghum lines having high popping volume (the size of the grain after popping should be large) and popping percentage (the percentage of grains popped should be more). In order to increase the popping trait, concerted efforts in breeding are active. Considerable genetic variability was found for popping efficiency (both in terms of popping percentage and pop volume). Thus, breeding specifically for popping efficiency is taken up at ICAR-Indian Institute of Millets Research, Hyderabad.

Popping sorghum grain changes the starch granules into thin lattices of interconnecting sheets. Popped starch is more digestible in comparison to native starch and exhibits higher susceptibility to *in vitro* enzymic (pancreatin) digestibility. Significant decrease in carotenoid, moisture content and increase in protein and carbohydrate content was observed upon popping in sorghum.

### Uses and benefits

There are two ways by which the popping in sorghum can reach different strata of society. One is through commercial scale popping on large scale, in which large quantities of seeds are popped in machines. The other one is by popping small quantities of sorghum in the households as and when required in small machines. It can be used as an additional source of income in rural areas, where sorghum pops can be sold in popular places in small quantities. Pop sorghum can be sold for a few hours to generate additional income with low investment. Due to high digestibility and improved access to protein and starch reserves, popped sorghum can be commercially explored for instant food mixes and weaning foods. Sorghum is a rich source of micronutrients and phytochemicals, and its instant popping can be a popular food product made from sorghum due to its easy to prepare and oil free preparation. The availability of sorghum cultivars whose grains exhibit superior popping quality without any pre-treatment should be of significance to food technologists and breeders. Utilization of these popping sorghums in breeding programs aimed at improved popping quality can be rewarding.

### SUMMARY

In central and southern India, popped sorghum is a common traditional snack dish with good commercial potential. It is a major source of carbohydrates and in comparison to raw sorghum grain, has greater starch and *in vitro* digestibility. Popped sorghum is typically cooked over dry heat. As nutritious as popcorn, sorghum grains that have been popped have a pleasant flavour. Additionally, because it is soft and contains less hulls, popped sorghum is also said to be superior to popped corn.

\*Corresponding author's e-mail: visarada@millets.res.in