Technologies to improve the grain quality of kharif sorghum

Indian Institute of Millets Research, Hyderabad

Decreasing demand for *kharif* sorghum grains was mainly due to the poor quality of the sorghum grain produced during the rainy season that fetches low market price. Heavy rains at the time of crop maturity caused severe damage to the grain leads to blackening. The grain quality deterioration is due to infection caused by a complex of fungi resulting in moulded and discoloration of grain called grain mould. The significant genotype x environment interactions make it a long term task to breed suitable cultivars. Therefore, the following alternatives to breeding for improving the sorghum grain quality were identified and practiced in 18 farmers' fields each in the districts of Parbhani, Akola (Maharashtra), Mahabubnagar (AP), Indore (MP), Coimbatore (TN) and Dharwad (Karnataka).

- Identification of cultivars with superior grain quality among the released genotypes,
- Harvesting at physiological maturity and artificial drying,
- Treatment with anti-heating chemicals and fungicides to retain grain quality in relation to moulds,
- Pearling of grain to improve marketability of the deteriorated grain,
- Identification of grain mould tolerant genotypes, and
- Solarization to improve storability of *kharif* grain.

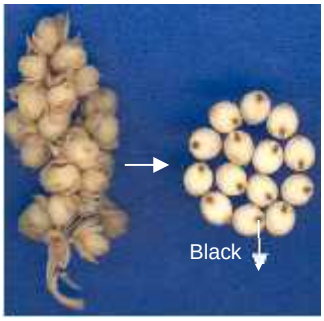
Identification of cultivars with superior grain quality among the released genotypes

Trials were undertaken to demonstrate the advantage of cultivating genotypes giving better quality grain (especially mold tolerant) among available cultivars to the farmer. Among the released cultivars, CSH 16 was identified as the best available hybrid. CSH 16 has bold, round and lustrous grain and fetched 3 to 21% more market price than grains of other commercial cultivars and local popular varieties. CSH 16 has large grain (100 seed weigh 3.2 grams) as against smaller grain in other cultivars (2.35 g of CSV 15, and 2.2 g of CSH 14). CSH 16 grains are also very lustrous, and are less susceptible to attack by grain mould as compared to other released cultivars.

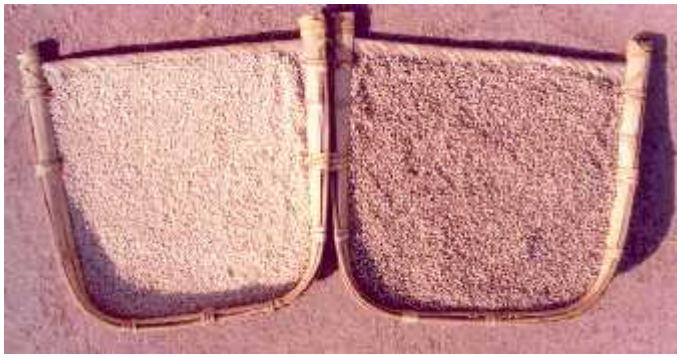
CSH 16- suitable cultivar for *kharif* cultivation

Harvesting at physiological maturity and artificial drying

The technology of harvesting at physiological maturity (end of grain filling) and artificial drying was found to be most effective to improve grain quality. At physiological maturity, the grains have accumulated maximum total grain dry weight. Therefore, harvesting at this stage will not result in any loss in grain yield while it has the advantage of escaping from grain mold attack (no deterioration). On an average, over four years, this technique resulted in 35% increase in market price of the produce as compared to the grains harvested at normal maturity. This technology does not have any adverse effect on grain yield and biochemical attributes. On the other hand, it offers the benefits by way of improving the grain quality and market price. Thus this technology not only fetches remunerative price to the farmer for the better grain quality but also it gives extra benefits by facilitating early arrival of the sorghum produce in the market so that planting of second crop can be advanced to exploit more moisture in drylands under double cropping.



Demonstration of identifying the physiological maturity stage to the farmer



Physiological maturity and Normal maturity
Grains harvested at different maturities.

A simple low-cost community drier was developed and tested by the Directorate of Sorghum Research institute which would enhance the profit to the farmers by drying produce @1.5 tonnes/hour. To save costs, farm waste was used for heating in place of diesel and electricity. These were installed one each at Parbhani, Mahabubnagar and Dharwad districts by Agricultural Processing Engineering, CAE, MAU, Parbhani.

Inauguration of community drier by Dr.CD Mayee, ex-Agriculture Commissioner, Govt. of India

Treatment with anti-heating chemicals and fungicides to retain grain quality in relation to moulds

Among the different anti-heating chemicals tried acetic acid treatment was most effective. The treatment of wet harvested panicles with 4% acetic acid reduces the grain mould score from 3.5 to 2.0 on the scale of 1 to 5 (where 1= no deterioration and 5 = > 50% deteriorated). The acetic acid treated produce fetched 17% more market price over the control (no treatment).

A B C

A = Panicles sprayed with water, B= Control, C = Panicles sprayed with 4% acetic acid.
Effect of anti heating chemicals on quality of sorghum panicles.

Pearling of grain to improve marketability of the deteriorated grain

Market price was higher when normal deteriorated grain was pearled, i.e., the pericarp is polished by grinding stones and the mould infection is rubbed off. Significant improvement in market price was recorded for normal maturity produce with pearling over that of normal maturity produce without pearling. There was 17% increase in the market price in 2001 and 36% increase in 2003 of the produce from harvest at normal maturity with pearling over the harvest at normal maturity without pearling.

Evaluation of grain mould tolerant genotypes

A new high yielding variety SVD 9601 is proved superior in grain mould tolerance when tested under severe mold-inducing conditions. During four years, variety SVD 9601 performed superiorly (grain mould score = 2.25) for grain mould tolerance over the check CSV 15 (2.7 grain mould score) across different environments.

A B

A = SVD 9601 and B = CSV 15, Check.

SVD 9601 – A grain mould tolerant variety identified

Solarization to improve storability of *kharif* grain

The technology of solarization of harvested and processed produce and storing in metal bins helped in reducing the insect infestation by about 40%.

Pr ility.

These technologies can be pr Each technology was beneficial, combination of technologies worked synergistically and significantly increased benefits to its farmers. Cultivating good quality high yielding genotype followed by harvesting the produce at physiological maturity and artificial drying and storing the solarized produce in metal bins would be the best practice for improving the grain quality of the *kharif* produce. Government, co-operative societies, and young entrepreneurs need to pick up and popularize the above technologies especially harvesting at physiological maturity and artificial drying.