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# INDIGENOUS METHODS OF MILLET SEED CONSERVATION

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## ABSTRACT

In order to preserve seed grains, local practices are useful, ecofriendly and sustainable. A brief survey of traditional grain seeds and their conservation practices in Aurangabad district has been summarized.

**Keywords :** Traditional grain seeds, Millets, Storage, Conservation

## Introduction:

Seed storage is an important process in maintaining viability and vigor of the seeds. Different storage structures are available based on the duration of the seed storage. Storage of seed in cylindrical pits dug in earth, containers made of ropes plastered with mud or in well baked clay pots etc. are some traditional practices. These methods protect the seed material and increas storage life.The material used for traditional storage is user friendly (Kartikeyan and Veerarangavathatham, 2009).

Use of cow dung, milky juice of *solanum indicum* L., coconut water and cow urine, was practiced during Vedic era for seed treatment before storage. In Aurangabad region, farmers depend on herbal treatments for controlling storage pests during seed storage for next crop season. In order to document utilization of indigenous pest protection practices, present study was undertaken.

## Materials and Methods:

Data were collected during the survey through direct observation, group discussion and individual and face-to-face interviews of farmers and sellers. The information was gathered on indigenous methods of seed conservation. Key informants include farmers belonging to small, marginal, aged farmers, farm women and labors. The information was cross-verified by frequent interviews. At least five villages and one market place were surveyed per tehsil to interview farmers and sellers of millets.

## Results and Discussion

It was observed that, in Aurangabad district, more than 80 % storage bins are made up of wooden material, while remaining are those of tin. The bins made of wooden splinter are known as *Kanagi*. The storage bins, made up of plant material, are plastered with a mixture of cow dung, mud, and charcoal mixed in the cow urine to form a paste. This plastering of storage bin is done on both the sides and then sun dried. This is one of the oldest traditional methods of grain storage in Aurangabad.

It was also observed that before storage, good seeds were selected and sundried. Thereafter those were mixed with ash ( 50 gm.ash per kg of seeds ). Leaves of *Neem* (*Azadirecta indica* A. Juss), *Turmeric* (*Curcuma longa* L.), *Tulsi* (*Ocimum sanctum* L.), *Lemon* (*Citrus lemon* (L.) Osbeck), or rhizome of *Vacha* (*Acorus calamus* L.) are mixed with the seeds. These leaves possess insecticidal properties and they also acts as repellants and growth inhibitors of storage pests (Prakash *et al.*, 2016).

Ash is normally mixed with the *sorghum* (*Sorghum bicolar* L. (Moench.) seeds in the ratio of 1:4, and the seeds were tied airtight in the jute gunny bags. *Sorghum* grains



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get stored by this practice for 6 months without any storage pest problems. Some farmers use *neem* (*Azadirecta indica* A. Juss.) and sugar apple or *sitafal* (*Annona squamosa* L. ) leaves during storage of *ragi*. The strong odor of these leaves keep the storage pests away.

It is thus concluded that, the traditional methods of seed conservation are very effective and ecofriendly. However, those needs to be scientifically evaluated so as to make them more popular and to exploit our traditional knowledge

**Acknowledgments:**

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# Some traditional genotypes of *Sorghum* from Hingoli district, Maharashtra

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**Abstract**
Hingoli is one of the districts of Maharashtra state, it occupies an area of 4,526 km² comprising five talukas *viz.* Aundha-Nagnath, Hingoli, Kalamnuri, Sengaon and Basmath. Hingoli is a drought prone area. Nearly 32 % of its area comes under the rain shadow region. Annual average rainfall is 1011mm and drought is a permanent features. About 65% of agriculture is dry land farming and *Jowar* is the major crop after cotton and *soyabean*. Present paper deals with some traditional Genotypes of Jowar found in Hingoli district. Most of them are rare. They are used as medicinal plants and economically very important. It is the need of time to conserve them for the use of next generation. In the present paper the traditional genotypes of *Jowar* like *Talki, Dadar, Dhamna, Bhendi, Goli, Mahu, Gunjavali, Pivli* and *Dukri* etc, will be discussed.

**Keywords:** traditional genotypes, *jowar*

## Introduction

*Sorghum* [*Sorghum bicolor* (L.) Moench] ranks fifth among cereals in both production and area planted worldwide (FAOSTAT, 2008). *Sorghum* (*Sorghum bicolor* (L.) Moench) is the fifth most economically important crop among cereals in the world. It is grown on approximately 44 million hectares of land (Prakash *et al.*, 2010) [13], in 99 countries (ICRISAT, 2009) [9] with an annual production of 60 million tons (Iqbal *et al.*, 2010) [10]. *Sorghum* (*Sorghum bicolor* (L.) Moench) is an important cereal crop in the semiarid tropics. In India, which is the secondary centre of diversity, *Sorghum* is third in importance after *rice* and *wheat*, and is currently grown on 8.7 million hectares with an annual production of 7.2 million tons in India (Food and Agriculture organization (FAO) 2006) [8]. It has a number of advantages which have made it the traditional staple cereal crop in subsistence or low-resource agriculture in the hot semi-arid regions (Nagaraja *et al.* 2008) [12]. *Sorghum* is the principal staple food of Maharashtra, and is also an important food of Karnataka, Madhya Pradesh, Tamil Nadu and Andhra Pradesh (Anonymous, 2006,) [1, 2, 3]. *Sorghum* is used for human consumption in many of the developing countries in a variety of ways (Carter *et al.*, 1989; Asante, 1995; Tuinstra *et al.*, 1997) [6, 4, 14]. *Sorghum* is an important staple food for the rural poor people in the Semi-Arid tropics. Together with millets, *Sorghum* represents a main source of energy and protein for about one billion people in the semi-arid region of tropics and it is part of the staple diet of more than 300 million people in developing countries, representing their major source of energy and nutrients (Ilaria *et. al.*, 2015) [11]. *Sorghum* (*Sorghum bicolor* (L.) Moench) is a drought-resistant crop and an important food resource in terms of nutritional as well as social-economic values, especially in semi-arid environments (Ilaria *et. al.*, 2015) [11]. It is being grown in India in both kharif (rainy) and *rabi* (post rainy) seasons. The Rabi *sorghum* crop accounts for 45% of the total area under cultivation and 32% of the total production. Although *rabi sorghum* is highly valued because of its good grain quality, but its yields are lower (750 kg/ha) compared to kharif yields (1100 kg/ha) (Anonymous, 2006) [1, 2, 3].

*Sorghum* is cultivated in areas considered to be too dry and hot for other cereals. It is widely grown in Africa, China, USA, Mexico and India. *Sorghum* (*Sorghum bicolor*) is a multipurpose crop grown for food, animal feed and industrial purposes.

*Sorghum* is an important source of human food in semi-arid regions of Hingoli district. In present day, *Jowar* is major crop that undergoes large scale cultivation having commercial importance. Unfortunately, traditional landraces of *jowar* have been marginalized and their distribution is threatened. The traditional genotype of *jowar* is very important but there are lesser people known these genotypes. *Jowar* is grown extensively by indigenous farmers in rural areas for their nutritional content and resistance to drought.

## Study Area

Hingoli is one of the district of Maharashtra state it occupies an area of 4,526 km² comprising five taluka's viz. Aundha Nagnath, Hingoli, Kalamnuri, Sengaon and Basmath. Hingoli is a drought prone area which is an administrative district in the state of Maharashtra in India. The district headquarters are located at Hingoli. The district occupies an area of 4,526 km² and has a population of 11, 77,345 of which 15.60% were urban (as of 2011). Hingoli lies at the northern part of Marathwada in the state of Maharashtra. The district is located between 19°40′ to 20°05′ N latitudes and 76°53′ to 77°02′ E longitudes. It comprises of 710 villages.

Geographically Hingoli is situated at the northern part of Marathwada in Maharashtra. Borders of Hingoli are surrounded by Washim distreits and Yavatmal in northern side, Parbhani in western side, and Nanded at south-eastern side. Nearly 32 % of its area comes under the rain shadow region. Annual average rainfall is 1011mm and drought is a




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permanent features. About 65% of agriculture is dry land farming and *Jowar* is the major crop after *cotton* and *soya-bean*.

Agriculture plays an important role in the Indian economy. Agriculture is the backbone of our country. It includes farming of crops, Over 58 % rural households primarily depend upon agriculture. In Hingoli *jowar* is the main staple food of the people, which is grown over an area of 38,636 hector with an annual production of 310 .47 tones.

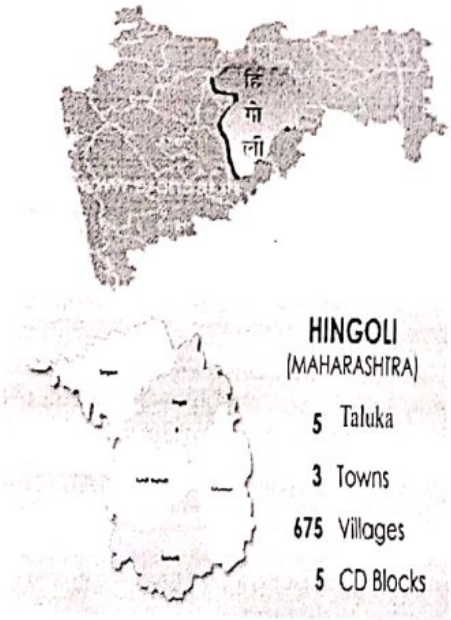


**Fig 1**

**Materials and Methods:**

An intensive survey was conducted to collect the top traditional genotypes of *Jowar* from Hingoli district. The results of the foregoing study guided survey conducted and total of nine genotypes of *jowar* from Hingoli districts were collected. Details of each crop, uses were elicited from informants and make herbarium specimens. The sites selected for this research work were located in both seasons i.e. *rainfed* as well as *kharif* season. Specific information was collected using the following methods: (1) Knowledge holders were requested to accompany us to the field and identified the genotypes; (2) Specimens were brought to the village and shown to knowledge holders for sharing information; and (3) Photographs taken from the field crops for further study. A farm is purposefully chosen to initiate the survey and noted the names and ages as well as their handwritten opinion about these genotypes. The collection study of the areas was initiated from various localities of the districts. The places visit frequently to gather the information of genotypes.

The verification generally made on the basis of repeated information. Vernacular names of the traditional genotypes of *Sorghum* appeared interesting and therefore have been also noted while investigating in the districts. The seed samples were collected from the localities of Hingoli districts.

**Morphology of Traditional Genotypes**

**1) Talki**

Morphological characters:

- Height is 215-225 cm.
- Bend panicle is the characteristics feature of this genotype.
- It produces more fodder having good quality for cattle.
- It requires less water, Duration for maturity is 110-120 days.
- Recommend for low rainfall.
- Quality of *roti* is very good.
- Special for young roasted grains i.e. *Hurda* purpose.
- Production 6-7 q/ acre. It has a sweet grain and used for roasting purpose at dough stage of crop.

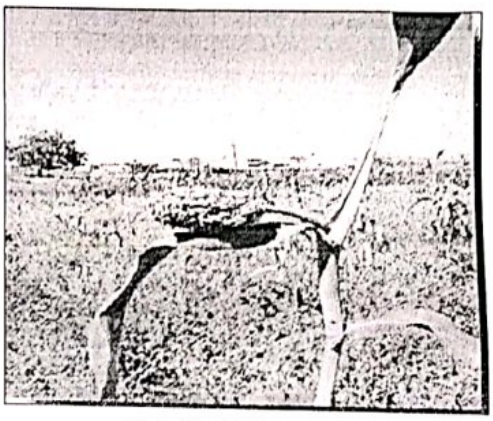

**Fig 2:** Morphology of *Talki*.

**2) Dadar**

- Height is 185-210 cm.
- Feathered and broader at the lower part panicle is the distinct feature of this genotype.
- It is disease resistance.
- Quality of *roti* is good.
- Grains is lustrous bold and white.
- *Dadar* is adapted to moisture condition.
- Fodder preferred by cattle.
- Production 8-10 q/ acre.

**Fig 3:** Morphology of *Dadar*.





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**3) Bhendi**

- Height 180-235 cm.
- Panicle is much feathered.
- Early maturity.
- Grains shiny reddish in color.
- Bread (*Roti*) quality is very good.
- Dried grains roasted to produce *Lahya*, Light weight fodder.
- Medicinal valuable.
- Suitable for deep soil in irrigated area.
- Production 7-8 q/ acre.

**Fig 4:** Morphology of *Bhendi*.

**4. Gunjavali**

- Height 160-175 cm.
- Panicle compact oval, short to medium.
- Grains red, bold hard and attractive.
- Good fodder quality, stalk is sweet.
- Good grain quality.
- Resistant to drought.
- It is best genotype for heavy soil.
- Production 7-8 q/ acre.

**Fig 5:** Morphology of *Gunjavali*.

**5. Goli**

- Height up to 235-250 cm.
- Large semi-compact panicle.
- It is dual purpose.
- Grains yellowish white.
- Grain quality good.
- Fodder is expensive.
- Demand in market.
- Heavy to medium soil is well for this genotype.
- High production, 12-15 q/acre.

**Fig 6:** Morphology of *Goli*.

**6. Pivli**

- Height 165-175 cm.
- Panicle compact and rigid.
- Grain dark yellow.
- Good fodder quality.
- This genotype is suitable under good moisture condition.
- It is not suited to higher elevation (More than 1200).
- It has medicinal value against diabetis.
- Medium production, 5-6 q/ acre.

**Fig 7:** Morphology of *Pivli*

**7. Dhamna**

- Height is 200-225 cm.
- Loose panicle.
- Taste of *hurda* is good.





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- Demand in the market, economically profitable.
- Easy grain threshability during hurda stage.
- Grains bold.
- Production 7-9q/ acre.

Fig 8: Morphology of Dhamna

**8. Dukri**

- Height 160-167 cm.
- Panicle is inverted, compact and rigid therefore birds are not easily feed.
- This genotype is more popular due to its lustrous bold grain.
- Grains shiny, yellowish white and lustrous and heavy.
- Bread quality is good.
- Fodder quality very good.
- Production 6-7 q/ acre.

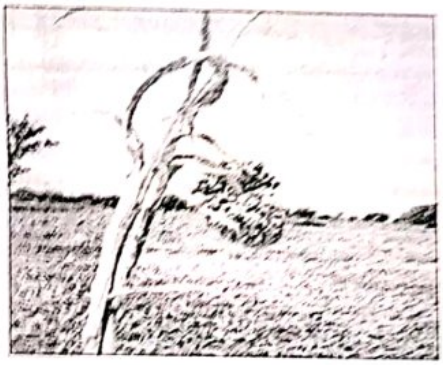

Fig 9: Morphology of Dukri

**9. Mahu**

- Height up to 235 -250cm.
- Grain yellowish white.
- Grain quality good.
- Fodder is expensive.
- Demand in market.
- Heavy to medium soil is well for this genotype.
- It has easy threshability with desirable fragrance.
- High production, 12-15 q/acre.

Fig 10: Morphology of Mahu

Table 2: Grain Parity Test

| Sr. No. | Name of Traditional Genotype | Test Wt. of 100 Grains (gm) |
|---|---|---|
| (i) | Tale Jowar | 3.21 gm |
| (ii) | Dudar Jowar | 3.31 gm |
| (iii) | Bharat Jowar | 3.38 gm |
| (iv) | Dudi Jowar | 3.41 gm |
| (v) | Gumgavti Jowar | 2.76 gm |
| (vi) | Pudi Jowar | 3.35 gm |
| (vii) | Dhamna Jowar | 2.25 gm |
| (viii) | Dukri Jowar | 3.31 gm |
| (ix) | Mahu | 2.32 gm |

**Result and Discussion**

Geographically Sangali district has low rainfall and humidity. The major crop in that area is cotton, soyabean and jowar. Rural people and farmers conserve these traditional genotypes.

Data obtained from field survey are presented in this study 10 traditional genotypes belonging from 10 taluli's have recorded and collected. The grains contain high fiber and non-starchy polysaccharides and starch with some unique characteristics. Protein quality and essential amino acid profile of Sorghum is better than many of the cereals (Chavan U.D. et al. 2007). The Sorghum contains the remedies on several diseases. Many genotypes are useful as several remedies of these 10 genotypes 5 genotypes used as antidiarrhoeic and 10 are used as antidiabetic, 10 genotypes used as miscellaneous use.

Out of 10 traditional genotype Dudi genotype found heavier in weight and Tale genotype found very lighter weight among the all traditional genotypes.

It is interesting to note that the traditional farmers collect the traditional seeds and conserve seeds for next season with hanging the panicle at corners or packed in gunny.

It is observed that Pudi jowar is given to diabetic patient to cure diabetes. The grains belonging to different genotypes vary in length. The height of plant, panicle, Colour of grains, taste, Yields, uses are variable from genotypes to genotypes. The rural people have knowledge to conserve the traditional genotypes.





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## Summary and Conclusion

Some traditional genotypes are endemic to particular region, some are cultivated and some are very rare. The ethno botanical survey of the Hingoli district revealed that the area having good source of traditional genotypes. These traditional genotypes of *Sorghum* need proper conservation. Among 09 genotypes *Talki* is commonly cultivated and *Pivli* is rare in Hingoli district.

## Acknowledgements

Authors are very thankful to UGC for providing Rajiv Gandhi National Scholarship to junior author; Local farmers and communities of Hingoli district, Maharashtra for providing the information about traditional genotypes of jowar.

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**Abstract :**

Aurangabad is one of the districts of Maharashtra state, it occupies an area of 10,100 km² comprising nine talukas *viz.* Aurangabad, Gangapur, Kannad, Khultabad, Paithan, Phulambri, Sillod, Soygaon and Vaijapur. Majority of its population depends on agriculture. Annual average rainfall is 710 mm and *Jowar* is the major crop after *cotton* and *sugarcane*. Present paper deals with some traditional Genotypes of *Jowar* found in Aurangabad district. Most of them are rare. They are used as medicinal plants and economically very important. It is the need of time to conserve them for the use of our next generation. In the present paper, the traditional genotypes of *Jowar* like *Bedri, Bhavri, Chikni, Dagdi, Fuldandi, Gulbhendi, Jamkhedi, Khondi, Kuchkuchi, Lalbondi, Maldandi* and *Shaloo* etc., are discussed.

**Key words :** traditional genotypes, *Jowar.*

## Introduction :

Sorghum (*Sorghum bicolor* (L.) Moench) is the king of cereals and is one of the important food crops in dry lands of tropical Africa, India and China (Shobha *et al.,* 2008). India ranks second in the world for sorghum production and first with respect to many regionally important crops like millets and pseudo-cereals. *Sorghum* is also used in the preparation of several snacks and for popping, chewing, and malting (Rao and Murty, 1981). *Sorghum roti* is very popular in villages and small towns as an accompaniment to gravy meat and vegetable curries and is one of the traditional recipes of India (Chavan *et al.*, 2017).

It is grown on approximately 44 million hectares of land (Prakash *et al.*, 2010) in 99 countries (ICRISAT, 2009) with an annual production of 60 million tons (Iqbal *et al.,* 2010). *Sorghum* (*Sorghum bicolor* (L.) Moench) is an important cereal crop in the semiarid tropics. In India, which is the secondary centre of diversity, *Sorghum* is third in importance after *rice* and *wheat*, and is currently grown on 8.7 million hectares with an annual production of 7.2 million tons in India (Food and Agriculture organization (FAO) 2006). *Sorghum* grain [*Sorghum bicolor* (L.) Moench] is an important food crop particularly in arid and semi-arid tropics. It is a dual purpose crop providing staple food for human consumption (35%) and rest of as a fodder for livestock (Awika and Rooney 2004). Being a drought-tolerant crop, it can give dependable and stable yields in both *kharif* (rainy) and *rabi* (post rainy) seasons. It thrives with less rainfall than is needed for *rice* and *maize* (Chavan *et al.*, 2016). According to an FAO (2005) report, *sorghum* was grown globally on an area of about 46 millions ha with a production of about 60 million tons. However in India, *sorghum* is cultivated on an area about 9.10 million ha with a production of 7.65 million tons (Anon 2006a, b). *Sorghum* grains are important source of dietary proteins, carbohydrates, minerals and B group vitamins particularly to the vegetarian diets in India (Salunkhe *et al.*, 1984; Chavan and Salunkhe, 1984; Chavan *et al.*,, 1989; Chavan and Patil, 2010; Chavan *et el.*, 2015).

According to Samson *et al.*, *(*1981), *sorghum* has greater untapped potentials than any other crop. It even postulated that if the twentieth century was the century of *wheat*, *rice* and *maize*, then the twenty-first century could become the century of *sorghum*. *Sorghum* is a staple cereal food crop for more than 500 million people. *Sorghum* grain is mostly consumed for food purpose (55%) as flat bread and porridges in several countries of Asia and Africa. In dry season the sorghum stalks are used as feed for livestock, especially in Asia.

*Sorghum* is cultivated in areas considered to be too dry and hot for other cereals. It is widely grown in Africa, China, USA, Mexico and India. *Sorghum* (*Sorghum bicolor*) is a multipurpose crop grown for food, animal feed and industrial purposes. *Sorghum* is an important source of human food in semi-arid regions of Aurangabad district. In present day, *Jowar* is major crop that undergoes large scale cultivation having commercial importance. Unfortunately, traditional landraces of *Jowar* have been marginalized and their distribution is threatened. The traditional genotype of *Jowar* is very important but there are lesser people known these genotypes. *Jowar* is grown extensively by indigenous farmers in rural areas for their

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nutritional content and resistance to drought.

**Study Area:**

Aurangabad is one of the district of Maharashtra state, it occupies an area of 10,100 km² comprising nine talukas *viz.* Aurangabad, Gangapur, Kannad, Khultabad, Paithan, Phulambri, Sillod, Soygaon and Vaijapur. Majority of its population depends on agriculture. Annual average rainfall is 710 mm and *Jowar* is the major crop after *Cotton, Sugarcane and Maize*. Aurangabad is a drought prone area which is an administrative district in the state of Maharashtra in India. The districts headquarter located at Aurangabad. Aurangabad district is spread over an area of 10,100 km² and about 3.28 % of total state Out of which area under cultivation is 8.52 Lakh Ha. Agriculture plays an important role in the district economy. The total number of farmers in the district is 9.16 lakhs, of which, 47 % and 31 % are marginal farmers and small farmers, respectively. The district is surrounded by the East: Jalna district, West: Nasik & Ahmednagar, North: Jalgaon District and South Beed district. The elevation of Aurangabad is a 600 meters from mean sea level that is equal to 1,969 feet.

Nearly 32 % of its area comes under the rain shadow region. Annual average rainfall is 1011mm and drought is a permanent features. About 65% of agriculture is dry land farming and *Jowar* is the major crop after *Cotton, Soya-bean* and *Maize*. Agriculture plays an important role in the Indian economy. Agriculture is the backbone of our country. It includes farming of crops, Over 58 % rural households primarily depend upon agriculture. In Aurangabad *Jowar* is the main staple food of the people, which is grown over an area of 1450.8 hector with an annual production of 171509.2 metric tones.

**Material and Methods:**

An intensive survey was conducted to collect the top traditional genotypes of *Jowar* from Aurangabad district. The results of the study and survey conducted revealed twelve genotypes of Jowar from Aurangabad districts were collected. Details of each crop, uses were elicited from informants and make herbarium specimens. The sites selected for this research work were located in both seasons i.e. *rainfed* as well as *kharif* season. Specific information was collected using the following methods: (1) Knowledge holders were requested to accompany us to the field and identified the genotypes; (2) Specimens were brought to the village and shown to knowledge holders for sharing information; and (3) Photographs taken from the field crops for further study. A farm is purposefully chosen to initiate the survey and noted the names and ages as well as their handwritten opinion about these genotypes. The collection study of the areas was initiated from various localities of the districts. The places visit frequently to gather the information of genotypes.

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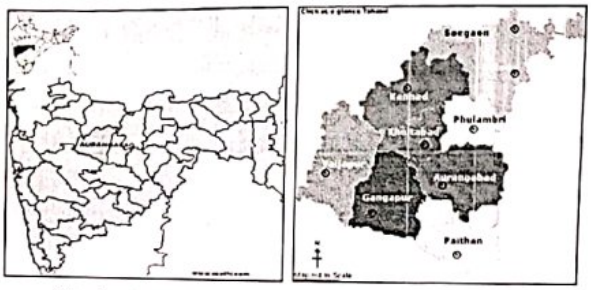


**Fig 1:** Aurangabad District map.

**Morphology of Traditional Genotypes :**

**1) Bedri :**

- The height is 150-160cm.
- Panicle is feathered.
- It produce more fodder, Fodder is good quality.
- It requires less water.
- Duration-110-125 days.
- Production 6-7q/acre.
- Quality of *roti* is very good.

**Fig 2:** Morphology of *Bedri.*

**2) Bhavri :**

- Height is 160-170cm.
- Panicle is totally straight.
- Resistant to diseases.
- Quality of *roti* is good.
- Grain is lustrous, bold and white.
- Production 8-10 q/acre.
- *Bhavri* is adapted to all types of soil.




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**Fig 3:** Morphology of *Bhavri.*

**3) Chikni :**

- » Height 225-235cm.
- » Late maturity.
- » Cultivated in kharif season.
- » Grains are whitish red and bold in colour.
- » Bread (Roti) quality is very good.
- » Dried grains roasted to produce *Lahya*, *Light weight of fodder.*
- » *Medicinal* valuable.
- » Production 7-8 q/acre.

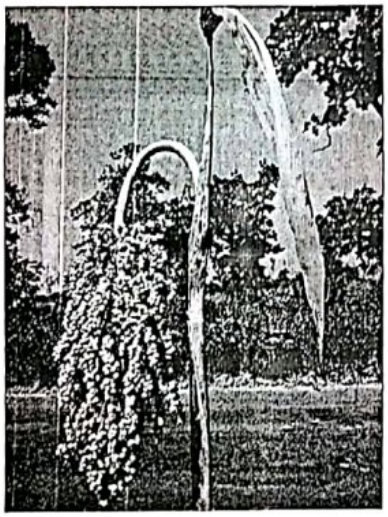

**Fig 4:** Morphology of *Chikni.*

**4) Dagdi :**

- » Height up to 185 -195cm.
- » It is dual purpose.
- » Color of grain is white.
- » Grain quality is good.
- » The grains are nutritious used for preparing bread and papad.
- » It is cultivated in rabi season, excellent grain and *roti* quality.
- » Fodder is expensive as well as fodder yield is better, cherished by animal.
- » High production, 12-15 q/acre.
- » Demand in market.
- » Heavy to medium soil is well for this genotype.

**Fig 5 :** Morphology of *Dagdi.*

**5) Fuldandi :**

- » Height 165-186cm.
- » Panicle is straight.
- » Color of grain is dull white.
- » Cultivated in rabi season.
- » It is easy for seed production.
- » Medium production, 5-6q/acre.
- » Straw (green and dried) very nutritious for cattle, increases milk yields/ hence some farmers cultivate especially for fodder.
- » Production 6-7q/acre.

**Fig 6:** Morphology of *Fuldandi.*





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**6) Gulbhendi :**

- Height 166-178 cm.
- Panicle is elliptic and straight.
- Grains are bold white.
- Good grain and fodder quality.
- It is cultivated in rabi season
- It has easy threshability with desirable fragrance.
- Special for young roasted grains i.e. *Hurda* purpose.
- It has a sweet grain and used for roasting purpose at dough stage of crop.
- Production 7-8q/acre.

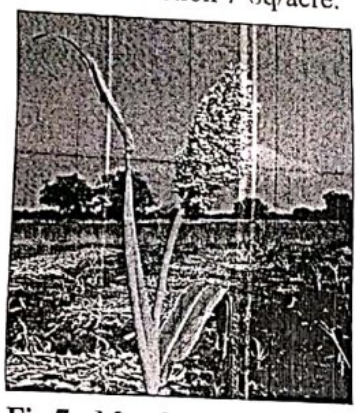

**Fig 7 :** Morphology of *Gulbhendi.*

**7) Jamkhedi :**

- Height 182-202 cm.
- Panicle is semi compact.
- Grains are whitish grey.
- Good grain and fodder quality.
- It is cultivated in rabi season.
- It is the best traditional crops for any type of soil.
- It has early and medium height and best suitable for intercropping.
- Production 6-7q/acre.

**Fig 8 :** Morphology of *Jamkhedi.*

**8) Khondi :**

- Height 220-225 cm.
- Panicle is bend and feathered.
- Grains are lustrous and bold white.
- Good grain and fodder quality.
- It is cultivated in kharif season.
- It has easy threshability with desirable fragrance.
- It has a sweet grain and used for roasting purpose at dough stage of crop.
- Production 9-10q/acre.

**Fig 9 :** Morphology of *Khondi.*

**9) Kuchkuchi :**

- Height 190-215 cm.
- Bend panicle.
- Grains are lustrous and bold white.
- Good grain and fodder quality.
- It is cultivated in rabi season.
- It has easy grain thresh ability.
- Special for young roasted grains i.e. *Hurda* purpose. It has a sweet grain and used for roasting purpose at dough stage of crop.
- Production 6-7q/acre.

**Fig 10:** Morphology of *Kuchkuchi*





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**10) Lalbondi :**

» Height 185-200 cm.
» Panicle is semi-bend and feathered.
» Grains are lustrous and bold grey and reddish.
» Good grain and fodder quality.
» It is cultivated in kharif season.
» It has high grain yield potential.
» It has easy threshability with desirable fragrance.
» Production 8-9q/acre.

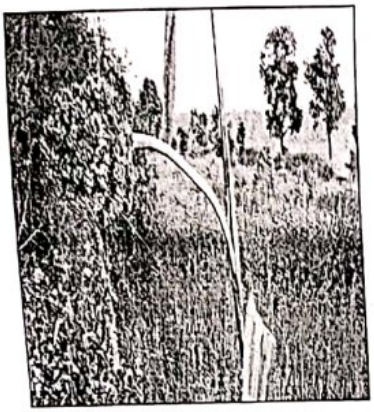

**Fig 9 :** Morphology of *Lalbondi*

**11) *Maldandi* :**

» *Height 188-210* cm.
» Panicle is straight and semi compact.
» Grains are pearly white.
» Good grain and fodder quality.
» Good quality of roti.
» Its flour having highest water holding capacity.
» It also having good organoleptic taste but low yielder.
» It is cultivated in both seasons.
» Production 5-7q/acre.

**Fig 12:** Morphology of *Maldandi.*

**12) Shaloo :**

» Height 220-225 cm.
» Panicle is bend and loose at upper part.
» Grains are lustrous and bold white.
» Good grain and fodder quality.
» It is cultivated in both season
» It has a sweet grain and used for roasting purpose at dough stage of crop.

**Fig 13:** Morphology of *Shaloo.*

**Table No. 1 : Grain Purity test.**

| Sr. No. | Name of Traditional Genotype | Total Wt. of 100 grains (gm). |
|---|---|---|
| 1. | Bedri Jowar | 2.42 gm |
| 2 | Bhavri Jowar | 2.43 gm |
| 3 | Chikni Jowar | 2.44 gm |
| 4 | Dagdi Jowar | 2.54 gm |
| 5 | Fuldandi Jowar | 1.79 gm |
| 6 | Gulbhendi Jowar | 3.43 gm |
| 7 | Jamkhedi Jowar | 2.67 gm |
| 8 | Kuchkuchi Jowar | 1.73 gm |
| 9 | Khondi Jowar | 2.22 gm |
| 10 | Lalbondi Jowar | 2.54 gm |
| 11 | Maldandi Jowar | 2.84 gm |
| 12 | Shaloo Jowar | 3.16 gm |

**Result and Discussion :**

Geographically Aurangabad district has low rainfall. The major crop in that area is *Cotton*, *Soyabean*, *Maize* and *Jowar*. Rural people and farmers conserve these traditional genotypes. Data obtained from field survey are presented in this study 12 traditional genotypes belonging from 09 tehsil's have recorded and collected. The grains contain high fiber and non-starchy polysaccharides and starch with some unique characteristics. Protein quality and essential amino acid profile of *Sorghum* is better




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than many of the cereals (Chavan U.D. *et al.,* 2017). This contributes the remedies on several diseases. Many genotypes are useful as several remedies.

Out of 12 traditional genotype *Gulbhendi* genotype is found to be heavier in weight and *Kuchkuchi* genotype found very lighter weight among the all traditional genotypes. It is interesting to note that, the traditional farmers collect the seeds and conserve seeds for next season with hanging the panicle at homes or packed in knots.

The grains belonging to different genotypes vary in height. The height of plant, panicle, Colour of grains, taste, yields, uses are variable from genotypes to genotypes. The rural people have knowledge to conserve the traditional genotypes.

**Summary and Conclusion :**

Some traditional genotypes are endemic to particular region, some are cultivated and some are very rare. The ethno botanical survey of the Aurangabad district revealed that the area having good source of traditional genotypes. These traditional genotypes of *Sorghum* need proper conservation. Among 12 genotypes *Dagdi* and *Maldandi* are commonly cultivated and *Kuchkuchi* and *Chikni* are rare in Aurangabad district.

**Acknowledgements :**

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# SOME TRADITIONAL GENOTYPES OF JOWAR FROM NANDED DISTRICT, MAHARASHTRA

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**ABSTRACT**

Present paper deals with some traditional genotypes of *Jowar* from Nanded district of Maharashtra state. Under present day situation most of the genotypes are rarely observed. They are economically very important and are used as medicinal plants. It is essential to conserve them for next generations. Traditional genotypes of this popular crop, e.g. *Talki, Warhadi, Mahu, Dukri, Pivla, Pandharkavdi, Bhendi* and *Pandhrapivla* have been described.

**Key words :** Traditional Genotypes, *jowar.*

## Introduction:

*Sorghum bicolar* (L.) Moench is one of the most important cereal crop widely grown for food, feed, fodder and fuel in the semiarid tropics of Asia (Reddy *et al.*, 2010). It is fifth most commonaly cultivated cereal crop (Poehlman, 1994). It is used as staple food in more than 30 countries. Nabimba *et al.*, (2005) reported that *sorghum* is grown for varying uses, that included production of alcohol, sweet beverage and local bread. *Sorghum* grains are mostly used as food. Stover from *jowar* is an important source of dry fodder in Asian countries. The crop is raised both in *kharif* and *rabi* seasons in Marathwada region of Maharashtra state, as a drought-resistant crop and as an important source of food (Ilaria *et. al.*, 2015)..

In Nanded district, *jowar* is the main staple food, which is grown over an area of 255425 hector with an annual production of 2,39500 tones, with the production potential of 1020 kg per hectare.

## Materials and Methods:

Nine genotypes of *jowar* were collected from Nanded district. Details of each crop were elicited from informants and herbarium specimens were prepared. The sites selected for this research work were located in both *rainfed* as well as *kharif* season. The verification was made on the basis of repeated information. Vernacular names of traditional genotypes of *Sorghum* appeared interesting and therefore those have been noted. The seed samples were collected from different localities. The information on traditional genotypes of *Sorghum* has been summarized as under.

***Talki :*** Height is 215-225 cm., bent panicle is the characteristics feature of this genotype. It produces more nutritious fodder for cattle. It requires less water, The crop duration up to maturity is 110-120 days. It is recommend for cultivation in low rainfall areas. The quality of *roti prepared from its flour* is good. Its young tender green grains is used as *Hurda* after roasting. Production 6-7 q / acre. It has a sweet grain and used for roasting purpose at dough stage of crop.

***Bhendi:*** Height 180-235 cm., Panicle is much feathered, Early maturity. Grains shiny and reddish in color. The of *Roti* is very good. Dried grains are popped and used as a snack. Produces light weight fodder. It is medicinally very valuable. Production 7-8 q / acre.



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***Pivla:*** Height 165-175 cm. Panicle compact and rigid. Grain dark yellow. It produces good quality of fodder. This genotype is suitable for cultivation under good moisture condition. It has medicinal value as antidiabetic agent. Production, 5-6 q / acre.

***4). Dukri:*** Height 160-167 cm. Panicle is inverted, compact and rigid. Lustrous yellowish white bold heavy grain. Quality of roti made from the grains is good. Fodder quality very good. Production 6-7 q/ acre.

***Mahu:*** Height up to 235 -250 cm. Grains yellowish white. Quality of the grains is fairly good. Fodder is expensive. It has high Demand in market. Heavy to medium soil is well for its cultivation. Higher production, 12-15 q/acre.

***Warhadi:*** Height up to 235 -250 cm. Grains medium bold with pearly white. The grains are sweet and tasty, compact panicle with oblong shape. Better quality of *roti* and fodder can be obtained from this genotype. Heavy to medium soil is good for cultivation of this genotype. Production, 5-6 q / acre.

***Pandharapivla :*** Height 165-175 cm. Panicle loose and rigid. Tall growing habit. Grains dark white. Provides good fodder quality. Suitable for cultivation under good moisture condition. It has medicinal value against diabetes. Production, 5-6 q/ acre.

***Pandharkavdi :*** Height 165-175 cm. Panicle loose and feathered. Tall growing, non-lodging habit. Grain dark white. Good fodder quality. Easy threshability with more sweetness, excellent aroma and taste. This genotype is suitable for cultivation under good moisture condition. Production, 5-6 q / acre.

A comparative account of quality of grains has been summarized in Table 1.

**Table 1. Quality of grains of *Sorghum* genotypes**

| Sr. No. | Traditional Genotype | Wt. of 100 grains (g). | % Purity |
|---|---|---|---|
| i) | *Bhendi* | 2.20 gm | 96 % |
| ii) | *Dukri* | 3.12 gm | 98 % |
| iii) | *Mahu* | 2.45 gm | 97 % |
| iv) | *Pandhrapivla* | 2.25 gm | 96 % |
| v) | *Pivla* | 2.35 gm | 95 % |
| vi) | *Pandharkavdi* | 2.11 gm | 94 % |
| vii) | *Talki* | 2.44 gm | 95 % |
| viii) | *Warhadi* | 2.23 gm | 96 % |

**Results and discussion:**

Eight traditional genotypes of *Jowar* from Nanded district have been described. Some of them are still under cultivation, while other are very rare. Among the 8 genotypes. *Pivla* is commonly and *Mahu* is rarely cultivated genotypes in Nanded district. *Pandharapivla* genotype is considered as endemic to Nanded district. Conservation of these genotypes should be given priority.

**Acknowledgements**

First author is thankful to UGC for providing Rajiv Gandhi National Scholarship. He also thanks local farmers and communities of Nanded district, Maharashtra for providing the information on traditional genotypes.

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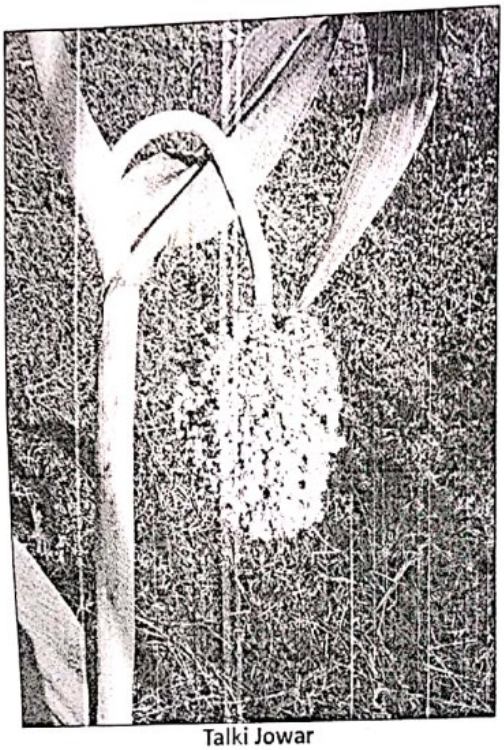
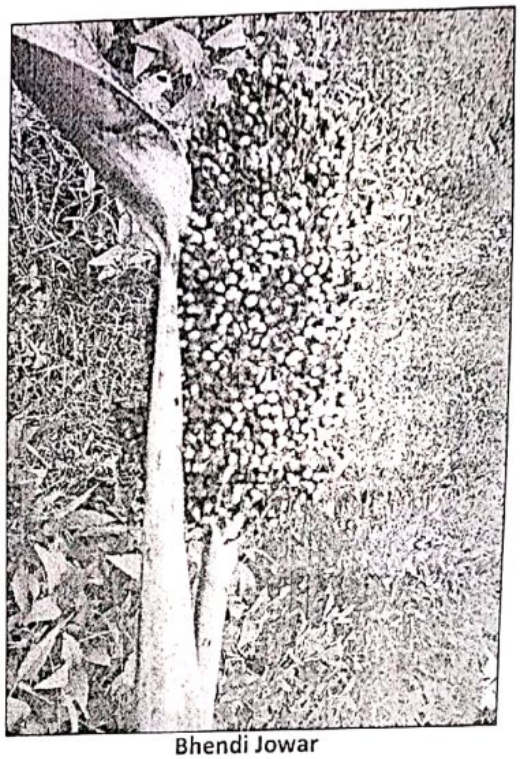
# PLATE - 1

Some traditional Genotypes of *Sorghum*



Talki Jowar



Bhendi Jowar

Pivla Jowar

Dukri Jowar



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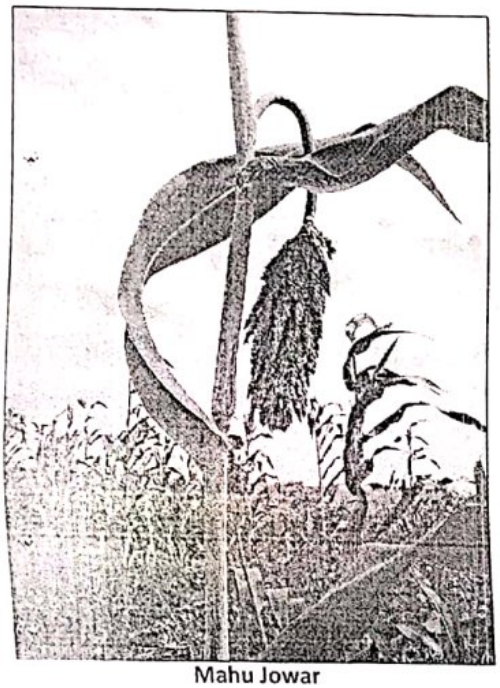
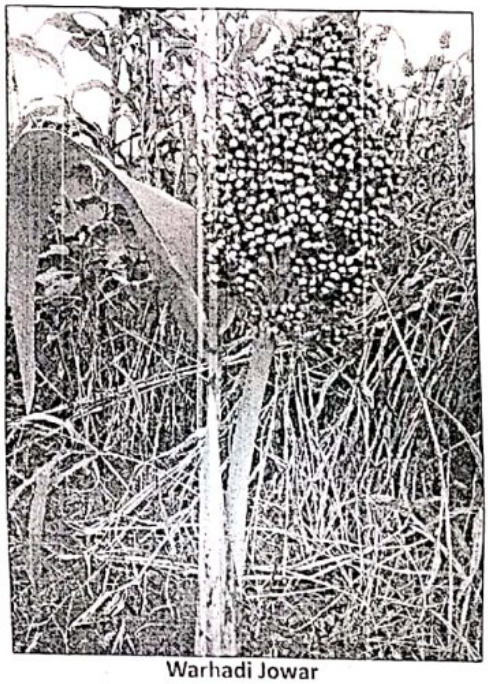
# PLATE - 2

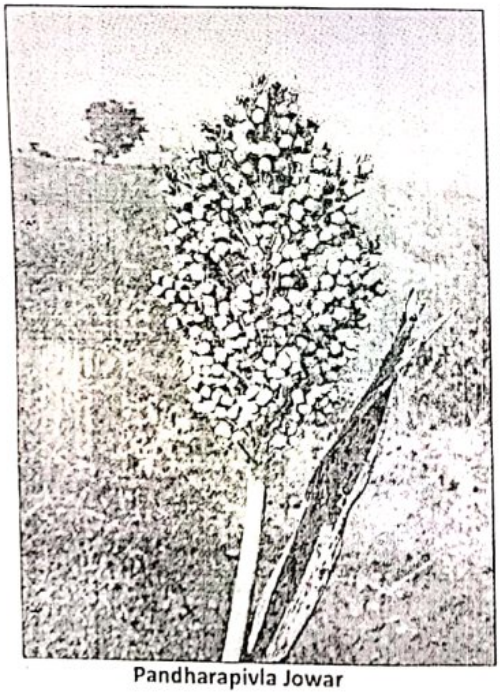
Some traditional Genotypes of *Sorghum*



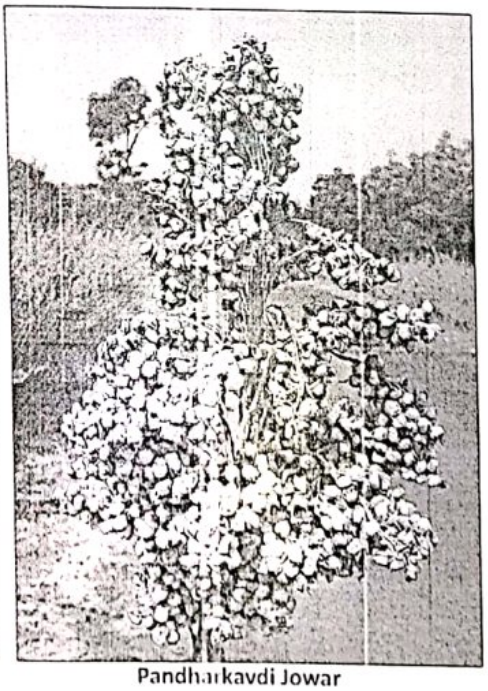
Mahu Jowar



Warhadi Jowar



Pandharapivla Jowar



Pandharkavdi Jowar



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