CULTIVATION AND UTILIZATION OF *SORGHUM BICOLOR (L.)* FOR BETTER HEALTH OF TRIBAL'S IN TELANGANA STATE, INDIA - A RESUME

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Abstract: *Sorghum bicolor* is one of the most important cereal crops widely grown for food ,feed, fodder and fuel in semi-arid tropics of Asia, Africa, America and Australia. It is the fifrth most important cereal crop in the World. Most of the grain produced in these countries is utilised for human consumption. However *Sorghum bicolor* is one of the most important cereal crops widely grown in the semi-arid tropics of India. The grain of sorghum is utilised in preparation of many traditional foods like Annam, Sankati, Roti Ambali and upma and also in bakery preparations like bread, cakes and biscuits etc. Though sorghum is known for its nutritional quality, the consumption of this cereal is decreasing due to easy availability of rice and wheat through public distribution system and easy methods of processing and cooking of fine cereals (such as rice). Sorghum is cultivated in major districts of Telangana such as Mahabubnagar, Nizamabad, Adilabad, Nalgonda and MedakIn the present study Armoor division of Nizamabad district in Telangana State was selected and survey of sorghum fields was carried out at regular intervals throughout the season. The objective of this investigation is to explore the utility of *Sorghum bicolor* as food and feed amongst tribals in view of nutritional status and health benefits.

Key words: *Sorghum, cultivation*, utilization, food for Tribal , Nutritional status

Introduction:

Origin & Classification: *Sorghum* is an ancient crop. Mann et al (1983) indicated that the origin and early domestication of sorghum took place in north-eastern Africa north of the Equator and east of 10°E latitude, approximately 5,000 years ago. However, carbonized seeds of sorghum with consistent radiocarbon dates of 8,000 years BP have been excavated at an early Holocene archaeological site at Nabta Playa near the Egyptian Sudanese border (Wendorf et al, 1992; Dahlberg and Wasylikowa, 1996)

These sorghums are 3,000 years older and 10-15° latitude further north than had been previously reported and suggests an early interest in sorghum by hunter and gathers and early agriculturalists. These early domestication events followed major trading and migratory paths of early Africans and Asians. As these early domesticated sorghum spread throughout Africa and Asia, plants were selected and dispersed throughout a broad range of environments and utilization giving rise to a widely adapted genetic base that has been further exploited throughout the agricultural process to create the current crop known as cultivated sorghum

Several authors have discussed the systematics, origin, and evolution of sorghum (de Wet and Harlan, 1971; de Wet and Huckabay, 1967; Harlan, 1975; Snowden, 1936). Dahlberg (2000) provides an excellent overview of the present-day classification using an integrated classification system to describe the variation found within cultivated sorghums.

Sorghum is classified under the genus *Sorghum* (Clayton and Renvoize, 1986). De Wet (1978) recognized *S. bicolor,* representing all annual cultivated, wild and weedy sorghums along with two rhizomatous taxa, *S. halepense* and *S. propinquum. Sorghum bicolor* was further broken down into three subspecies: *S. bicolor* subsp. *bicolor, S. bicolor* subsp. *drummondii,* and *S. bicolor* subsp. *verticilliflorum.* Cultivated sorghums are classified as *S. bicolor* subsp. *bicolor* and are represented by agronomic types such as grain *sorghum,* sweet sorghum, sudangrass and broomcorn (Berenji and Dahlberg, 2004

***Sorghum as* Food and Feed:** *Sorghum* is an important food source in Africa and Asia and is widely grown in the southern United States as a cattle feed. In India, *Sorghum* was grown in 7381700 Ha that yielded 9487 Hg/Ha and recorded as top producer of *Sorghum* in the world. *Sorghum* ranks fifth in India for commodity value (FAO STAT 2011). As a cereal grain, it is humanity's principle source of calories and protein along with other cereals. Normally, cereal grains contain 10-15% water, 8-14% protein, 70-75% carbohydrates and 2-7% fat as well as variety of minerals and vitamins. Among the cereals, *Sorghum* has the highest content of phenolic compounds comprising of approximately 6% w/w that includes all classes of phenolic compounds such as, phenolic acids, flavonoids, antioxidants, carotenoids and condensed tannins (seeds with pigmented testa). *Sorghum* is *consumed in different forms*

Sorghum [*Sorghum bicolor* (L) Moench] is valued for its grain, stalks and leaves. It is one of the World's major cereal crops. Worldwide, there are a small number of grains that supply approximately 85% of the World's food energy and only four other foods (rice, wheat, maize, and potatoes) are consumed

more than sorghum. For 500 million people in over 30 countries of the semi arid tropics, sorghum is a dietary staple.

Sorghum is a staple food in African and Asian subcontinents. Most of the grain produced in these countries is utilised for human consumption. In Telangana State *Sorghum* grain is utilised in preparation of many traditional foods like Annam, Sankati, Ambali, Roti, upma and in bakery preparations like bread, cakes and biscuits. *Sorghum* is an important crop for food and fodder in the semiarid tropical India. It is mainly grown in kharif (rainy) and rabi (postrainy) seasons. Sorghum is a staple food in the states of Telangana, Maharashtra and parts of Karnataka, Madhya Pradesh, Tamilnadu, Gujarat, and Andhra Pradesh. *Sorghum* is used not only for human food, but also for fodder and feed for animals, building material, fencing, or for brooms (Doggett, 1988; House, 1985; Rooney and Waniska, 2000).

In other countries like USA, *Sorghum* grain has traditionally been used for livestock feed and stems and foliage for green chop, hay, silage, and pasture. Some people in the USA are familiar with sorghum for the syrup made from the sweet juice pressed from stalks of certain sorghum varieties. In Europe, however, there is very little production of sorghum (Berenji, 1991; Berenji and Dahlberg, 2004). Though sorghum is not used routinely in Europe, it has been around for many centuries as highlighted by paintings of sorghum in festoons found in the villa Farnesina from the late 1700s.

Materials & Methods:

Study Site: Nizamabad district lies between 18° 40' and 19° 00' North latitude and between 78° 10' and 79° 10' East longitude .Density is 321 km^2 Area 7956 km . The district is rich source of agriculture, producing different types of cereals and pulses

In the present study Armoor division of Nizamabad district in Telangana State was selected to survey the sorghum fields. Survey of field was carried out at regular intervals throughout the cultivation season of year 2015 and observations were recorded

Climatic Conditions : *Sorghum* requires an average temperature of at least 25 °C to produce maximum grain yields in a given year. Maximum photosynthesis is achieved at daytime temperatures of atleast 30 °C and night time temperatures below 13 °C . Sorghum cannot be planted until soil temperatures have reached 17 °C. The long growing season, usually 90–120 days, causes yields to be severely decreased if plants are not in the ground early enough.

Yields have been found to be boosted by 10–15% when optimum use of moisture and sunlight are available, by planting in 25 cm rows instead of the conventional 1-meter rows.

Observations: During survey of field few photographs were taken with the help of digital camera as presented in Figure-1,Figure-2,Figure-3 and Figure-4

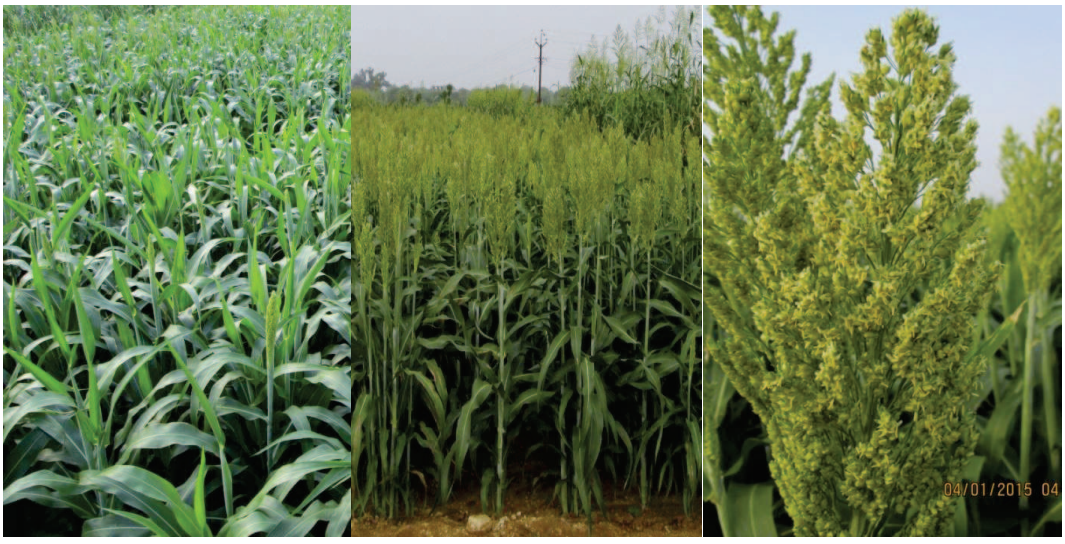

FIGURE 1 : (SHOWING FLOWERING STAGE)

FIGURE-2 : (SHOWING MATURE SPIKE OF RED & WHITE VARIETIES)

FIGURE-3 (SHOWING HARVESTING STAGE OF WHITE *SORGHUM)*

FIGURE-4 : (SHOWING HARVESTING STAGE OF RED *SORGHUM)*

Results and Discussion: On consultation of common and tribal people of Armoor region it was confirmed that tribals used sorghum grain as food to a major extent when compared to others either for preparing roti,ambali or jawa as presented in Figure-5 and Figure-6.

FIGURE-5 (TRIBAL WOMAN GRINDING SORGHUM INTO FLOUR)

FIGURE-6 (TRIBAL WOMAN MAKING ROTI WITH SORGHUM FLOUR)

Conclusion: Sorghum is a rich source of proteins and important nutrients like iron, calcium, potassium, etc. that are necessary to keep the body healthy. The presence of anti-oxidants in sorghum is believed to have reduced the risk of cancer, diabetes, heart disease, nerve disorders, etc. Grain sorghum also contains Vitamin B-complex that is also important for the steady growth of living beings.

Nutritional status of Sorghum is presented in Table-1

TABLE-1

Constituent	Range
Protein (%)	4.40 - 21.10
Water Soluble Protein (%)	0.30 – 0.90
Lysine (%)	1.06 – 3.64
Starch (%)	55.60 – 75.20
Amylose (%)	21.20 – 30.20
Soluble Sugars (%)	0.70 – 4.20

Reducing Sugars (%)	0.05 – 0.53
Crude Fibre (%)	1.00 – 3.40
Fat (%)	2.10 – 7.60
Ash (%)	1.30 – 3.30
Minerals (mg/100g):	
a. Calcium	11.00 – 586.00
b. Phosphorous	167.00 – 751.00
c. Iron	0.90 – 20.0
Vitamins (mg/100g):	
Thiamine	0.24 – 0.54
Niacin	2.90 – 6.40
Riboflavin	0.10 – 0.20

Tribal people of Telangana are highly using sorghum as traditional food in preparation of Roti, Sankati, Ambali, Annam, and Upma . New molecular evidence confirms that sorghum is completely gluten-free, and reports that the grain provides health benefits that make it a worthy addition to any diet.

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