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A short review on millets: A potential nutricereals

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Abstract
Millets are important crop in relation to health/nutritional security and climate change and are well adopted in the farming system of most of farmers with small land holdings. The higher water use efficiency and lesser input requirements of millets for its cultivation again make them a wonderful crop for ecological balance/sustainability as compared to other cereals. The health benefits of millets are one of the reasons for increasing demand of millets in today's scenario. Being as short duration crop (Most millets), they also act as a contingent crop in the situation of natural calamities like drought and flood and are also one of the important climate resilient crops.

Keywords: Nutritional, efficiency, contingent, resilient

Introduction
Realizing the importance and potential of millets in food and nutritional security of the country the Government of India notified millets as 'Nutri Cereals' which includes major millets *viz*. Sorghum, Pearl Millet, Finger Millet; Minor Millets i.e. Foxtail Millet, Proso Millet, Kodo Millet, Barnyard Millet, Little Millet and two Pseudo Millets/pseudo cereals (Buckwheat and Amaranthus). Buckwheat and Amaranthus are known as pseudo cereals because of high carbohydrate concentration in grain as in case of cereals. Millets are known for their potential health benefit which includes anti-diabetic properties and low Glycemic Index in millet based food product which may be helpful in reducing the postprandial blood glucose level and glycosylated hemoglobin. Millet(s) also have antioxidant and antimicrobial properties and protein content of Pearl millet (14.5%), Foxtail millet (11.7), Proso millet (11%), Kodo millet (8.3%) and little millet (7.7%) is more than that present in Rice (7.5%). Also millets are generally rich in total dietry fibre and total phenol content as compared to cereals (Chandra et. al., 2016) [3]. Globally millets are known locally by different names (Table 1) and were the major source of food for most of the population before the success of green revolution in India. Before green revolution, wheat was to be consumed by economically stronger people and millets /*motaanaj*/coarse grains was confined to economically poor population. Also barnyard millet was considered as a substitute for paddy in hills of Northern India. However at the present, the situation is just opposite. Now people are becoming health conscious and they are demanding for millet based products. Although Public Laws schemes (PL180, PL480) of USA in which surplus agricultural commodities (wheat, rice corn) were supplied to India; also resulted in access of wheat to poor people but the quality of wheat was questionable; that's why the imported wheat was also known as red wheat due to red colour of its endosperm. However that was the need of the hour to meet the food demand of country.

Description
With the introduction of new technologies under Green Revolution, the trend of food consumption shifted from coarse millets to paddy and wheat. However still in semi-arid regions of world millets (Finger millet) ranks third in cereal production after sorghum and bajra. The high dietary fiber and phenolic content in millets makes them a boon for diabetic patients. Millets are also a good source of feed/fodder for poultry/livestock and a potential biomass/bioenergy crop. Beside this, there are many industrial and medicinal uses of millets which needs to be commercialized and utilize properly to boost up the income of millet growers. At global level now scientist are focusing on nutritional security especially for developing countries like India. Many international agencies including Harvest Plus are working to remove hidden hunger and malnutrition caused by deficiency of micronutrients, minerals and vitamins through bio-fortification (Breeding/Agronomic/biotechnology) process.

However this malnutrition can be minimized if we take nutricereals in sufficient amount in our diet. The images of some of the millets are given in Figure 1-4. Millets are popular among the farmers owing to their capability to grow under variable and adverse agro - climatic conditions (Table 1). Millets provides a reasonable output from the lands where most of the cereals does not perform well in terms of sustainable yields. Not only this, millets also perform as an excellent fodder crop, industrial crop and important contingent crop under aberrant weather conditions. Millets being a C 4 plant requires less water as compares to paddy and maize and are mainly grown in areas receiving rainfall less than 450 mm and sometimes are also known as 'Famine Crop'. The water requirement (in litre) to produce 1 kg yield for the some of the crops are: Paddy (5000 lt)> Sorghum (833 lt)> Maize (750 lt)> Bajra(667)> Finger millet (1000 lt)> other millets (1111 lt) which clearly indicates less water requirement of millets as compared to paddy. Not only this, millets are also efficient user of fertilizer/nutrients applied to them. The total amount of nitrogen, Phosphorus and Potassium fertilizer used (in kg/ha) in some of the crops and millets are as follow: Paddy (145-195 kg/ha)>Maize (175-280 kg/ha)> Wheat (125-225 kg/ha)> Sorghum (100-215 kg/ha)> Pearl millet (100-175 kg/ha)> Finger millet (115-200 kg/ha) and other millets (55 kg/ha). The short duration of most of these crops makes them fit for contingent crop during the event of drought and flood. Millets also posses traits viz. high temperature tolerance, low water requirement, drought/heat tolerance and salinity tolerance that fits them to be considered as climate resilient crops (Annonymous (2018) [2].

Table 1: Millets with some of their traits

S. No	Crop	Scientific name	Vernacular name	Origin place	Traits
	Finger millet	*Eleusine coracana* (L.) Gaertn.	Ragi, Mandua,Nagli, Kapai, Marua, Nachni, African bird's foot, rapoko, Hunsa, wimbi, bulo, telebun, koracan, kurakkan	East African highlands	Moderately resistant to heat, drought and humidity, adapted to wide altitude range (Up to 2100 m amsl), rich source of calcium.
	Barn yard millet	*Echinochloa crus-galli* (L.) P. Beauv. (syn. *E. esculenta* (A. Braun)	Japanese, Jhingora, Kudraivali, Oodalu, sanwa, sawan, Korean, kweichou	Japan	Very short duration (Fastest growing), voluminous fodder, not limited by moisture, high altitude adapted (Up to 2700 m amsl)
	Sawa millet	*Echinochloa colona* (L.) Link ssp. *frumentacea* (Link) (= *E. frumentacea* Link).	-	Peninsular India	-
	Foxtail	*Setaria italica* (L.) P. Beauv ssp. *italica*	Kauni, KAngni, Korra, Tenai, Rala, Italian, German, Hungarian, Siberian, navane, thanahal	China	Adapted to low rainfall, high altitude (Up to 2000 m amsl), short duration, tolerant to low fertility and drought
	Bristley foxtail millet	*Setaria verticillata* (L.) P. Beauv	Bristley foxtail millet	South India	
	Kodo millet	*Paspalum scrobiculatum* L.	Varagu, bastard, ditch, naraka, water couch, Indian paspalum, creeping paspalum, amu	India	Long duration, but very hardy, needs little rainfall, comes up in very poor soils, grown ewll in shallow and deep soil, good response to improved management
	Little millet	*Panicum sumatrense* Roth. ex Roem. & Schult. Subsp. *sumatrense* (syn. *P. miliare* auct. pl.)	Little millet, Kutki, Samalu, Same, samai, Blue panic, heen meneri	India	short duration, Adapted to low rainfall and poor soils- famine food; withstand waterlogging to some extent, Up to 2000 m amsl
	Proso millet	*Panicum miliaceum* L. ssp. *miliaceum*	Cheena, Panivaragu, Variga, Baragu Common, hog, broom, samai, Russian, panic, mahameneri	China	Short duration, adopted to low rainfall and high altitude area, tolerant to heat and drought
	Sorghum	*Sorghum bicolor* (L.) Moench ssp. *bicolor*	Great millet, jowar, cholam, jola, jonna, durra, Egyptian millet, feterita, Guinea corn, jwari, juwar, milo, shallu, gaoliang, kaoliang, kafir corn, dura, dari, mtama, solam.	African Savannahs	Drought tolerant, excellent recovery mechanism from stresses, highly adapted to wide range of soils, altitudes and temperatures, responsive to high input management
	Pearl millet	*Pennisetum glaucum* (L.) R. Br (= *P. americium* (L))	Bajra, cattail, bulrush, candlestick, sanyo, munga, seno	West African Savannah	Highly resilient to heat and drought, come up in very poor soils, but responsive to high input management
	Brown top millet	*Brachiaria ramosa* (L.) Stapf. (syn. *Urochloa ramosa* (L.) R. D. Webster)	korale	South East Asia	Short duration, adapted to poor soils with less rainfall. Seed used as feed for game bird.
	Fonio	*Digitaria exilis* (Kippist) Stapf.	Fonio, acha, fundi, hungry rice	West Africa	Shorter duration (70-150 days), Adapted to poorly fertile sandy and stony soils, low rainfall

	Black fonio	*Digitaria iburua* Stapf.	Black fonio, iburu, hungry rice	West Africa	Shorter duration (70-150 days), Adapted to poorly fertile sandy and stony soils, low rainfall
	Tef	*Eragrostis tef* (Zucc.) Trotter	Abyssinian lovegrass	Ethiopian highlands	Short duration, drought and flood tolerant, high altitude adapted, fit in diverse cropping systems Brown top millet 60-80 Short duration, adapted
Source: Pal (1997) [7], Prasad (2012), Annonymous (2015) [1], Annonymous (2018) [2], Sujata *et al*. (2018) [6]					

Conclusion

Millets can be considered as the potential crop to cope up with the climate change and decreasing water availability and for better environmental sustainability. However, proper location specific research and extension works needs to be more enhanced to meet out growers and consumers demand. Also there is a potential scope for improving the productivity of millets through their germplasm collection/characterization and breeding technique. Awareness among the consumers in relation to millets uses needs to be strengthen and more emphasis on post harvesting operations/ processing of millets and marketing of its product is need of the hour.

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Fig 1: Brown Top Millet

Fig 2: Finger Millet

Fig 3: Barnyard Millet

Fig 4: Foxtail Millet

References

1. Annonymous Vision 2050. Indian Institute of Millets Research (Indian Council of Agricultural Research) Rajendranagar, Hyderabad 500 030 (Accessed online), 2015.
2. Annonymous. The Story of Millets Millets were the first crops Millets are the future crops. Published by: Karnataka State Department of Agriculture, Bengaluru, India with ICAR-Indian Institute of Millets Research, Hyderabad, India (Accessed online), 2018.
3. Chandra D, Chandra S, Pallavi, Sharma AK. Review of Finger millet (*Eleusine coracana* (L.) Gaertn): A power house of health benefiting nutrients. Food Science and Human Wellness. 2016; 5:149-155.
4. Mahendrapal. *Mote anajo k kheti*. Text Book (In Hindi)

Published by Indian Council of Agricultural Research, New Delhi, 1997.
5. Prasad R. Textbook of Field Crops Production-Food grain crops Volume I. Text Book Published by Indian Council of Agricultural Research, New Delhi, 2012.
6. Sujata B, Prabhu CG, Nandini C, Prabhakar, Thippeswamy V. Browntop Millet- A Review. Agri Res & Tech: Open Access J. 2018; 14(5):555937. DOI: 10.19080/ARTOAJ.2018.14.555937