NEGLECTED MILLETS THAT SAVE THE POOR FROM STARVATION

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Sankappa is a small farmer owning three hectares of dry land in Vittalpura village of Bellary district in Northern Karnataka, India. This village is situated in the semi-arid Deccan plateau and receives annual rainfall of 500mm in two to three months of the year, which allows one crop during July to October. Sankappa like his forefathers and other farmers of the village is growing foxtail millet. Other crops grown in the village are sorghum, pigeon pea and cotton. Rainfall had been continuously failing during the last four years in this part of the country. It was below 300mm during 2003. “All other crops failed due to extreme drought, and my family and livestock were saved from starvation by the harvest from foxtail millet”, says Sankappa. The traditional foxtail millet varieties grown and conserved by the villagers have excellent drought resistance and suits to the erratic rainfall of the region.

There are major millets and minor millets. Major millets like sorghum and pearl millet are tall growing and fairly drought tolerant. Minor millets are a group of grassy plants with short slender culm and small grains possessing remarkable ability to survive under severe drought. Their deep root system having efficient soil moisture extraction ability makes them capable to grow under very low to severe moisture stress conditions, where most other cereal crops may not survive to produce grain. Eight minor millets crops grown in different regions of Africa, Asia and Eurasia are finger millet (*Eleusine coracana*) (Fig.1), proso millet (*Panicum miliaceum*), little millet (*Panicum sumatrense*) (Fig.2), foxtail or Italian millet

Fig.1: Finger millet is most widely grown in South Asia and Africa

Fig.2: Little millet is seen in foreground

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(*Setaria italica*) (Fig.3), barnyard millet (*Echinochloa crusgalli and E.colona*), kodo millet (*Paspalum scrobiculatum*), teff (*Eragrostis tef*) and fonio (*Digitaria iburua*). Out of these, teff and fonio are native of North Africa and confined to there. Finger millet is also native of Ethiopia, but spread out to Asia few thousand years ago. Little millet and kodo millet were domesticated in India. India is also the home for one of the two species known under barnyard millet, *E. colona,* and *E. crusgalli* is native of Japan. *E. colona* is locally called as *Sawa*. All these crops have an old history of cultivation, going behind 3000 - 5000 years.

Fig.3: Italian or foxtail millet is a hardier crop offering grain under extremely marginal growing conditions

Many indigenous communities in Asia preferred these as their grain crop for shifting cultivation.

The long history of minor millet cultivation and their spread to different regions of the world, which are notable for extremely harsh farming conditions had generated considerable genetic variability in these crops. Among these, Kodo millet is very hardy and possesses highest drought resistance with capability to offer a good yield in growing period between 80-135 days. Barnyard millet could be said as the second hardiest millet with ability to give a modest yield in 50-100 days. Finger millet is more widely grown in Africa and Asia, differentiated in to five races and shows wide variability in appearance, adaptability, maturity period, yield and quality. Foxtail millet may be ranked fourth in yielding ability. The yield potential of little and proso millets is relatively lower and between them proso millet is hardier.

Minor millets are invariably grown in the semi-arid and mountainous regions of tropics and subtropics, where monsoon failure and drought are frequent and soil fertility is poor and land terrain is difficult. These regions are also hot spots of poverty and frequent starvations in populous countries. Traditional agriculture in these regions has found more dependability on minor millets because of their extreme hardiness. They survive with rainfall 300mm or even lower. They offer a more probable harvest from shallow and less fertile soils and in steep slopes of hillocks and mountainous terrains. Their yield varies widely from very low to modestly high across regions and years depending on the soil, management and weather. Millets have retained its primacy under these

farming conditions to provide livelihood and food security to the poor people living in the semi-arid and mountainous regions of Africa and South and Central Asia.

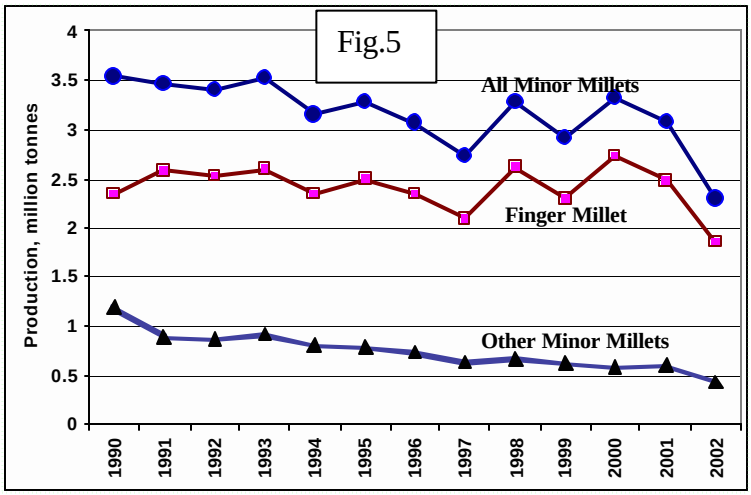
Millets are farmed in subsistence level with years of experience and traditional wisdom embedded in the variety choice and farming systems. These systems are invariably structured on location specific multiple or inter-cropping systems to provide safeguard against livelihood and to take advantage from unforeseen favourable weather (Fig.4). These farming systems and underlying economic compulsions have discouraged extensive use of agro-chemicals like fertilizers, herbicides or pesticides in minor millet farming. Farmers in each region have been innovative in developing many local cultivars, which are well adapted to their farming conditions. Unlike major millets, minor millets have hardly received any attention from national or global food policy makers in research funding and improvement of these crops. Hence minor millets continue to be grown largely by the traditional practices using traditional varieties under subsistence farming. Unlike in other cereals where genetic erosion had been happening with the spread of improved varieties, the danger to this genetic diversity of minor millets arises not from improved varieties but from the from their neglect and often replacement with commercial or non-food crops.

Fig.4: Traditionally two to more different minor millets of varying maturity are mixed and grown. This mixture may also often include pulse and oilseed crops of variable maturity period - A gamble against uncertain rain

One of the threats to the cultivation of these millets, preservation of their variety diversity and the food security provided by them to the poor people is illustrated with a case study from the Kolli Hills of Tamil Nadu state of India. These hills are 1000 to 1300m msl high with a tenuous ecosystem situated at the southern edge of Deccan plateau, as part of the Eastern Ghats. The terrain is steep, soil is shallow and less fertile, rainfall is low (500mm), erratic and distributed within four or five months (June-October) of the year. This allows only one crop during rainy season. The local hill community called *Malayalis* is very poor. Most families own less than half-hectare land, which is far insufficient to eke out a livelihood from farming alone. They have uncertain

employment and income as farm labourers outside the hills. For many years, minor millet farming done on these hills is the source their staple food grain. They have more than 34 land races of four millets namely, finger millet, little millet, foxtail millet and proso millet, grown at subsistence level as a crop mixture. Since last few years cassava cultivation under contract farming promoted by starch factories established in the plane had been causing decline in area under these millets, reduced availability of staple food grain and loss of traditional varieties. This has been forcing the local community to shift their staple to rice, which is costlier than millets. This diversion of minor millet area for an industrial crop has substantially reduced the community access to food and loss of varieties they have been conserving for many years.

The world's millet production is shared by South and East Asia (about 60%), Eurasia and Central Asia (14%), Africa (16%) and rest of the world (10%). India is the leading producer contributing about 38% of the production. Finger millet constitutes about 81 % of the minor millets produced in India and the rest by kodo millet, foxtail millet, little millet and *sawa* (Fig.5). The area and production trends during last several years indicate their continuous decline (Fig.5). Other major producers of these millets, in addition to India, are China, Ethiopia, Niger, Nigeria, and former USSR, who together contribute 70% of the world production. In South Asia, Nepal, Pakistan and Myanmar are other important minor millet producing countries. All most all the millets produced in S. Asia are used as food with very little going as feed. Millets are very rarely brewed in India, while 65 – 80% of the finger millet produced in Central and Eastern regions of Nepal is used to make traditional brew called *chang*. The ban Government of Nepal imposed on using grain for brewing is affecting the farmer preference for this crop.



Budhi Sagar Adhakari from Khanigaum, a mountainous village situated at 900 m MSL in Nuwakot district of Central Nepal, is a traditional grower of finger millet, apart from maize, potato and blackgram. Finger millet is grown in Nepal in about 200,000 ha, in the mid and high-hills at altitude 600-3000m MSL. The area under finger millet is declining in recent times in Khanigaun and other villages due to low yield, high cost of cultivation and the ban on brewing, says Adhakari.

Another major factor discouraging minor millet cultivation and consumption with improvement in living standard or urbanization is the drudgery associated with its processing. No processing technology and machinery suiting to minor millets are available in S. Asia. Hence much of the millets consumed are processed at household level by following a tedious method involving considerable drudgery (Fig.6). With the increasing availability of other grains, households who can afford these grains are avoiding the drudgery of processing millets. There are, however, communities culturally associated with minor millets, who may prefer these grains as staple irrespective of their income, provided the drudgery is obviated. Minor millets are largely consumed as traditional preparations. Increasing urbanization and decreasing time for domestic chores in rural households are discouraging traditional processing of millets. With the increasing availability of other cereals, minor millet consumption in Asia is getting restricted to the poorest of the poor in the semi-arid or mountainous regions, who cannot afford other grains and to those having traditional affinity.

Fig.6: Tedious manual milling of minor millets is labour intensive and time consuming. The mortar is wooden or stone. Pestle is shaped from wood, with or without iron sleeves at ends.

In India, minor millets are still the staple to large section of people in the semi-arid region. It is a major staple in the State of Karnataka, where finger millet is grown widely even under irrigation with yield as high as 3 t/ha. While major share of consumed grain is processed at household level, mechanized processing is common in urban and peri-urban areas. In the absence of specialized processing machineries for millets, it is processed in wheat or rice processing systems. Finger millet is not husked and directly

milled in the roller flour mill used for wheat milling. Much of the husk is sieved out from the flour. All other minor millets require de-husking, de-branning (decortication) and milling. The traditional de-husking and decortication use the laborious manual beating of the grain in mortar with pestle. Cone polisher, centrifugal rice sheller and rice polisher are also used to dehusk and polish these millets. The grain recovery from these machineries is low varying from 63 – 79%, with 16 – 29% husk and 5 – 9% bran. The polished grain called 'millet rice' is either used directly or further milled in plate or hammer mill to semolina or flour. These processing add value to these millets three to four-fold and make them acceptable to the elite urban consumers as niche food or health food. Finger millet malt is a traditional weaning food with agreeable flavour and rich nutrition.

Proximate composition of millet grains compares well with other cereals in respect of major constituents. The nutritional significance of minor millets lies in their richness in micronutrients like calcium, iron, phosphorous, vitamins, and surphur containing amino acids. While their starch is comparable to major millets in gelatinisation temperature, their carbohydrate has certain uniqueness, which makes it a health food. It has relatively higher proportion of non-starchy polysaccharides and dietary fiber and low glycemic index. Minor millet diet releases sugars very slowly and its fiber content is reported to exclude the incidence of duodenal ulcer in regular consumers. Soluble fiber content of minor millets varies from around 3.4 % in foxtail and proso millets to 6.5% in barnyard, little and finger millets. For these superior properties of minor millets, they have been recently designated as 'nutritious millets' by Prof. M.S. Swaminathan. These unique properties of minor millets are shifting the nutritious millets from poor man's grain to the health food of the affluent.

Global neglect to the minor millets and increasing emphasis on few elite food crop species are precariously narrowing the food security basket. The most disadvantaged by this food production and distribution policy are the poorest of the poor and those who are logistically vulnerable to poverty and famine. The shrinking number of food crops in the regional and global food basket is restricting the opportunity of farmers in difficult regions from using their land resources, environment and traditional knowledge for broadening the food basket and minimizing the chances of local food shortage. Another

serious implication of this neglect to these minor millets is the irrevocable loss of their genetic diversity and the associated traditional knowledge of the community. As a humble start to arrest this trend, a programme to strengthen the food security of small farmers and rural communities by raising production, consumption and income from three minor millets was initiated two years back by M.S. Swaminathan Research Foundation (MSSRF) in collaboration with partners in India and Nepal with the kind support from International Fund for Agricultural Development (IFAD) and the International Plant Generic Resource Institute (IPGRI). A strategic approach underlying this programme is farmer participatory enhancement of yield and quality through variety selection, improved and need-based farming system, optionally avoiding use of agricultural chemicals, promoting consumption at household level by removing the drudgery in grain processing, and increasing income generation through creating capability for value addition and marketing entrepreneurship. Participatory variety selection and conservation of regional genetic diversity and traditional knowledge are taken up hand in hand to enhance the local agro-biodiversity. Grain processing machinery is introduced at group level and village level to eliminate drudgery to women from traditional method of processing. Capability in value addition and marketing entrepreneurship to farm women is gained by first organizing them in to self help groups (SHGs) and training them on skills to produce de-husked finger millet flour, finger millet malt, pearling of little and foxtail millets, production of semolina from millet rice, for product packaging and in marketing. This end-to-end approach from productivity increase through value addition to marketing is making substantial gain to farmers in terms of drudgery reduction, increased employment opportunity and enhanced income. Their income by direct marketing of value added products has increased 44 per cent over what they were earning traditionally from the sale of grain.

Widening of food basket to enhance local accessibility to food, using the productive resources of difficult regions, where production of major food crops is not possible, for ensuring the food security of vulnerable section of the people and conservation of agro-biodiversity of under-utilized crops are issues relevant to tackle hunger, poverty and malnutrition. The policies and funding support on ground at national and international levels on the under-utilized crops begs for greater awareness among policy makers and donor organizations concerned with elimination of hunger and conservation of agro-

biodiversity. During later this year MSSRF is joining hands with IFAD, IPGRI, GFU and other interested agencies in organizing an international meet to generate support from food policy makers and donor agencies to promote cultivation, research, use and conservation of under-utilized crop species, valuable in food, nutritional and health security of many traditional communities.