

# Future of nutri-cereals cultivation in India

S S Tomar<sup>1</sup> and Hema Tripathi<sup>2</sup>

Ministry of Agriculture and Farmers Welfare, Krishi Bhawan, New Delhi 110 001

*Millets (nutri-cereals), a group of highly variable small-seeded grasses, are widely grown around the world as cereal crops or grains for fodder and human food. Millets are important crops in the semi-arid tropics of Asia and Africa (especially in India, Mali, Nigeria and Niger), with 97% of millets production in developing countries. The crop is favored due to its productivity and short growing season under dry, high-temperature conditions. The most widely grown millet is pearl millet, followed by finger millet, proso millet, and foxtail millet.*

**Key words:** Millets, Nutri-cereals, Nutritional benefit

THE NAME millet has been derived from the word mil or thousand, is referring to the large number of grains that can be produced from a single seed. The Hindi word *Kadann* has come from a Sanskrit word *Kaddannam*. Barnyard millets and pseudo millets (*Amaranthus* and buck wheat) are used by the devotees during their fast as are rich in nutritive values. The list of crops covered under millets along with their botanical and common names is given in Table 1.

These crops contain substantially high amount of protein, fibre and minerals in comparison to fine cereals like wheat and rice (Table 2). The protein content in millets is comparable with wheat and much higher than rice. Though the finger millet contains lesser protein, but it is rich in mineral matter and calcium in comparison to wheat and rice. Finger millet is the richest source of calcium (344 mg/100 g grains). All the millets contain more fibre than fine cereals; particularly, the small millets namely barnyard millet, *Kodo* millet, little millet and foxtail millet are the richest in fiber in comparison to wheat and rice.

Keeping in view the problem of

combating the prevailing malnutrition especially in children and women and the nutritive value of nutri-cereals, a meeting was conducted in PMO on the issues relating to Science and Technology on 18 July 2017. At the meeting, one issue on introduction of Millets in the Public Distribution System (PDS) was proposed so as to improve the nutritional status and it was decided that the proposal may be jointly examined by ICAR, DAC&FW, D/o F&PD and ICMR under the leadership of NITI Aayog and recommendations be firmed up within a period of six months. On

this recommendation, NITI Aayog suggested following decisions for initiating appropriate action by DAC&FW:

- Millets viz. jowar, bajra and ragi need to be promoted through PDS across the country to improve nutritional content in diet of masses. Instead of calling them coarse grains, millets should be positioned as nutri-cereals and their benefits need to be popularized amongst masses through sustained and effective campaign;
- Research needs to be done to develop high yielding varieties and

**Table 1.** Nomenclature of millets

| Common name                      | Botanical name                                 | Local name (Hindi) |
|----------------------------------|------------------------------------------------|--------------------|
| <i>Millets under cultivation</i> |                                                |                    |
| Sorghum                          | <i>Sorghum bicolor</i>                         | Jowar              |
| Pearl millet                     | <i>Pennisetum glaucum</i>                      | Bajra              |
| Finger millet                    | <i>Eleusine coracana</i>                       | Ragi/Mandua        |
| <i>Small millets</i>             |                                                |                    |
| Barnyard millet                  | <i>Echinochloa frumentacea</i>                 | Sanwa/Jhangora     |
| Proso millet                     | <i>Panicum miliaceum</i>                       | Cheena             |
| Foxtail millet                   | <i>Setaria italica</i>                         | Kakun/Kangni       |
| Kodo millet                      | <i>Paspalum scrobiculatum</i>                  | Kodo               |
| Little millet                    | <i>Panicum sumatrense</i>                      | Kutki              |
| <i>Pseudo millets</i>            |                                                |                    |
| Purple amaranthus                | <i>Amaranthus cruentus</i>                     | Chaulai            |
| Buck wheat                       | <i>Fagopyrum esculentum &amp; F. tataricum</i> | Kuttu              |



**Table 2.** Nutritional composition of millets as compared with major cereal crops (/100 g)

| Commodity       | Protein | Carbohydrates (g) | Fat (g) | Crude fibre (g) | Mineral matter (g) | Calcium (mg) | Phosphorus (mg) |
|-----------------|---------|-------------------|---------|-----------------|--------------------|--------------|-----------------|
| Sorghum         | 10. 4   | 72. 6             | 1. 9    | 1. 6            | 1. 6               | 25           | 222             |
| Pearl millet    | 11. 6   | 67. 5             | 5. 0    | 1. 2            | 2. 3               | 42           | 296             |
| Finger millet   | 7. 3    | 72. 0             | 1. 3    | 3. 6            | 2. 7               | 344          | 283             |
| Proso millet    | 12. 5   | 70. 4             | 1. 1    | 2. 2            | 1. 9               | 14           | 206             |
| Foxtail millet  | 12. 3   | 60. 9             | 4. 3    | 8. 0            | 3. 3               | 31           | 290             |
| Kodo millet     | 8. 3    | 65. 9             | 1. 4    | 9. 0            | 2. 6               | 27           | 188             |
| Little millet   | 8. 7    | 75. 7             | 5. 3    | 8. 6            | 1. 7               | 17           | 220             |
| Barnyard millet | 11. 6   | 74. 3             | 5. 8    | 14. 7           | 4. 7               | 14           | 121             |
| Barley          | 11.5    | 69.6              | 1.3     | 3.9             | 1.2                | 26           | 215             |
| Maize           | 11.5    | 66.2              | 3.6     | 2.7             | 1.5                | 20           | 348             |
| Wheat           | 11. 8   | 71. 2             | 1. 5    | 1. 2            | 1. 5               | 41           | 306             |
| Rice            | 6. 8    | 78. 2             | 0. 5    | 0. 2            | 0. 6               | 10           | 160             |

also varieties with longer shelf life.

It may also be examined whether nutri-cereals can be promoted as a sub-mission under the National Food Security Mission (NFSM).

On the basis of the above decisions, the Central Government declared millets comprising sorghum (jowar), pearl millet (bajra), finger millet (ragi/mandua), minor millets i.e. foxtail millet (kangni/kakun), proso millet (cheena), kodo millet (kodo), barnyard millet (sawa/sanwa/jhangora), little millet (kutki) and two pseudo millets (buck wheat-kuttu) and amaranthus (chaulai) which have high nutritive value as nutri-cereals from production, consumption and trade point of view. The notification was published, on the 10 April 2018, and, the Ministry notified 2018 as the year of Nutri-cereals, to give a big push to nutri-cereals.

The Department of Agriculture, Cooperation and Farmers Welfare, launched Sub-Mission on Nutri-cereals under NFSM program from 2018-19. National Food Security Mission – Nutri Cereals comprising sorghum, pearl millet, finger millet and small millets, viz. little millet, kodo millet, barnyard millet, foxtail millet, proso millet is being implemented from the year 2018-19 in 202 districts of 14 states (jowar in 88 districts of 10 states, bajra in 88 districts of 9 states, ragi in 44 district of 8 states and other millets in 43 districts of 7 states) of the country. For the year 2018-19, the allocation of NFSM is Rs 1,700.00 crore (BE). Out of BE of Rs 1,700.00 crore, a sum of Rs 300.00 crore was allocated

to NFSM-Nutri Cereals.

The sub-mission started with the following objectives:

- (i) Developing strategy for addressing issues concerning production, demand, and research with market oriented approach.
- (ii) Increasing production of nutri-cereals through area expansion and productivity enhancement in a sustainable manner in the identified districts of the country.
- (iii) Strengthening seed supply system of nutri-cereals
- (iv) Enhancing post-harvest value addition at farmgate for better price realization to farmers through efficient market linkages.

The interventions covered under NFSM-Nutri Cereals include Cluster Front Line Demonstrations on improved package of practices, seed distribution of hybrids and HYVs, Certified seed production of HYVs seeds, distribution of

micro-nutrients, bio-fertilizers, weedicides, plant protection chemicals, bio-agents, manual sprayer, sprinkler, cropping system based training on 60:40 sharing basis between Government of India and State Governments. The interventions i.e. Frontline demonstration, formation of FPOs in cluster area, creation of processing units for FPOs, creation/strengthening of Centre of Excellences, creation of seed hubs, creation of breeder seed production, organizing events (State/District level workshop, festivals, road show), creation of awareness, publicity and distribution of seed minikits are also included under the Sub-Mission on 100 % GoI share.

Three National Centre of Excellences (CoEs) have already



been established at CCS Haryana Agricultural University, Hisar for pearl millet; Indian Institute of Millets Research, Hyderabad for sorghum; and University of Agricultural Sciences, Bengaluru for small millets by the DAC&FW. As an introduction, millets are one of the earliest grains that are being cultivated and consumed by the people in India and the world. Prior to the initiation of Green Revolution in mid-1960s these nutri-cereals (millets) were important crops in India with higher area coverage as compared to wheat and rice. The area of nutri-cereals in the country was 36.90 million hectare (mha) during 1965-66 which has declined to 14.72 m ha during 2016-17 which is 60.2% less area coverage. However, the production of nutri-cereals has gone up to 16.50 million tonnes during 2017-18 from 14.22 million tonnes during 1965-66 despite more than 60% decline in area under nutri-cereals during the same period. *Bajra* and sorghum are the most important food-grain crops in India after rice, wheat and maize in terms of area and production. Finger millet (*ragi*) also forms a major part of the foodbasket in Karnataka, Telangana and Uttarakhand states. The other minor millets are also being cultivated in varying scales in various parts of the country, mainly by tribal and marginal farmers. The future of millets/nutri-cereals/super food cultivation (super food means nutritious and healthy food) in India is bright. Millets are grown in resource poor agro-climatic regions, and hilly and tribal areas of the country in rainfed conditions. Being hardy crops, they are well suited to adverse situations of climate change. They are drought tolerant, photo-insensitive and resilient to climate change etc. and therefore can be grown in arid and semi-arid tracts under low rainfall (200-600 mm) conditions, where fine cereals like wheat and rice cannot be grown profitably.

The Government as a part of its doubling farmers' income strategy has prepared a roadmap to promote millets and achieve an increase in area

and output. The targeted production is 20 million tonnes by 2022-23 taking it up from the current 16.50 million tonnes. The MSP has been hiked substantively assuring the farmers a minimum of 50 % as profit margin on the cost of production. A robust procurement system will also be put in place, which will incentivise millet production. Coarse grains including nutri-cereals are already a part of the PDS. Some nutri-cereals are allocated in terms of NFSA, 2013 at highly subsidized price of ₹ 1/kg. As per DFPD existing guidelines for procurement of nutri-cereals (*jowar, bajra, ragi*), States are allowed to procure these commodities from farmers at MSP under central pool subject to the prior approval of GoI on the detailed procurement plan prepared by State Governments in consultation with FCI, and the whole procured quantity of nutri-cereals is required to be distributed under TPDS (Targeted Public Distribution System)/OWS (Other welfare Schemes) in the State/UT.

#### Nutritional benefits of nutri-cereals

The nutri-cereals (millets) are beneficial for the lifeline of human being. They are good for prevention and management of diabetics, effective in reducing blood pressure, rich in dietary fiber that decreases incidence of obesity and has anti-cancer properties. Regular millet diet reduces the risk of coronary heart disease. They turn the stomach alkaline, which is beneficial in treating stomach ulcers and gall stones. Millets are good for controlling anemia, malnutrition, degenerative disease, kidney and liver disorders and asthma. These are not only beneficial in preventing allergic reactions but are also gluten free. Millets are used in celiac (digestive disorder) patients. Being rich in antioxidants enhance immune system, and also keep cholesterol level in check, and eliminate problems like constipation, excess gas bloating and cramping.

#### Nutri-Cereals production

Millets provide nutritious food and fodder, consume less water than other cereals, grow faster and put less

stress on environment, no insects pest and diseases problem, grow in even marginal lands, guarantee for complete food and nutritional security and supplement the existing income of the farmers. But the major constraints/threats in nutri-cereals production are—lack of availability of HYVs and hybrids, non-availability of seeds in local markets at right time, place and price, and sometimes infestations of shoot fly at early stage and grain mould disease affect the production and quality. Millets are less remunerative than other cash crops like cotton, soybean, oilseeds, vegetables, etc. Young generation does not prefer millets as food due to easily available fine cereals (wheat and rice). Sometimes delayed monsoon and erratic rainfall pattern greatly affect timely sowing, production and quality of nutri-cereals.

Thus, there is a need to reduce the constraints and follow the strategies to increase production and productivity. Need to create awareness about the positive aspects like the suitability in the dry-land agriculture and more adaptability to the climate changes through demonstration and training programs. Development and distribution of HYVs and hybrids of millets among the farmers and promotion of Seed village program to maintain own quality seeds to avoid purchasing seeds every year from the open market. Assured remunerative price through proper buy-back arrangements and coverage under insurance scheme to avoid any loss due to crop failure and other natural calamities.

Also need to improve the export competitiveness through release of pests and diseases resistant varieties to improve grain quality. Need to promote co-operative or contract farming for reducing the cost of cultivation and improve the bargaining power of the farmers. Value addition of millets products will improve the export competitiveness. Promote diversification of the export basket for gaining exports like gluten free, sweet sorghum syrup, alcoholic beer, stalks based ethanol/grain based



potable spirit, nutri- foods etc. Providing incentives to millets growers, processing and value addition enterprises, and tax benefits on value added millet products to generate demand and area expansion.

Demand for millets products is to be created through value addition and spreading awareness about the nutritional and health benefits of the millets and their products. Inclusion of millets under mid-day-meal (MDM) Scheme and other procurement schemes further create demand. At present, Price support policies have no provision of MSP for the minor millets including kodo and

little millet from the government. This may hamper the cultivation of these crops which in turn will have a negative impact on the farmers.

Long term strategies need to promote Farmer Producer Organizations (FPOs), including policy supports for small and minor millets and developing proper market intelligence system, creating farm gate processing and warehouse facilities and promotion of integrated farming system approach. The introduction of all nutri-cereals under PDS scheme will automatically create huge demand in the country. This will give a boost to the production of

all the nutri-cereals and consequently, it will add to the existing income of the farmers. Assured procurement support with competitive prices will encourage diversification of area under nutri-cereals. Recognition of the nutritive value in Nutri-Cereals among the consumers including that they are low in gluten and high in glycaemic index apart from being rich in various nutrients will automatically change the food habit of the masses.

<sup>1</sup>Additional Commissioner (Crops), DAC&FW, Ministry of Agriculture and Farmers Welfare, Krishi Bhawan, New Delhi. <sup>2</sup>Principal Scientist, ICAR- CIRB, Hisar.

## Did you know?

Over **820 million** people suffer from **hunger**.



**149 million** children under five are **stunted**, while **49 million** are affected by **wasting**.



**670+ million** adults and **120+ million** boys and girls (age 5-19) are **obese**.

**40 million** children under five are **overweight**.

Unhealthy diets, combined with sedentary lifestyles, are the **No. 1 risk factor for disability and death** from non-communicable diseases.



Health problems linked to **obesity cost** national budgets worldwide an estimated **USD 2 trillion** in treatment each year.



Different forms of **malnutrition can co-exist** within the same household and even the same individual during their lifetime and can be passed from one generation to the next.

Environmental damage caused by the food system could increase **50-90%** in low- to middle-income countries due to the increased consumption of processed foods and meat.



Some 6 000 **plant species** have been cultivated for food throughout human history. Today, **only 8** of them supply **more than 50%** of our daily calories.

**Climate change** threatens to reduce both the quality and quantity of crops, lowering yields.

