

Small millets in India:

Current scenario and way forward

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*In India, sorghum (*Sorghum bicolor*), pearl millet (*Pennisetum glaucum*) and a group of seven small millets together constitute the millets family. The group of small millets includes finger millet (*Eleusine coracana*), little millet (*Panicum flexuosum*), kodo millet (*Paspalum scrobiculatum*), foxtail millet (*Setaria italica*), barnyard millet (*Echinochloa frumentacea*), proso millet (*Setaria italica*) and browntop millet (*Brachiaria ramosa*). These crops, known by different names in local languages have traditionally been the vital component of dry farming and hill agriculture systems in India supporting millions of poor and food insecure people.*

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THE area under millets cultivation has been drastically decreasing over the last six decades in India, especially since the green revolution. The area under small millets (Table 1) has also declined considerably in all the states where they were predominantly grown in the past. Introduction of high yielding varieties (HYVs) of different crops; shift from millets to more profitable crops in *kharif* such as soybean, maize, cotton and sunflower in different states; changing food habits and consumer preferences due to rapid urbanization and rising income levels; difficulty in processing of small millets; poor quality of the grains and lack of market support are the major reasons for losing the area under small millets cultivation.

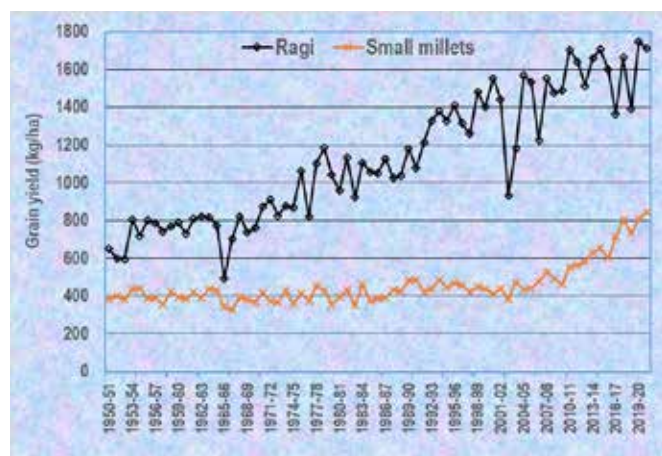
Share of small millets in the Gross Cropped Area has declined to a level of 0.88% (finger millet–0.56%, other small millets–0.32%) during the period of 2014–19, which was 4.9% (finger millet–1.6%, other small millets–3.3%) during the period of 1956–61. Share in the total food grains production has also declined to a level of 0.71% (finger millet–0.58%, other small millets–0.13%) during the period of 2016–21 which was 5.2% (finger millet–2.5%, other small millets–2.7%) during the period of 1956–61. The period between 1951 and 2021 saw a dramatic decline in cultivated area under small millets (89.7% for small millets other than finger millet, 52% for finger millet) (Table 2). The area under finger millet remained nearly stable at around 2.50 m ha during the

Table 1. Vernacular names of small millets

Language	Finger millet	Little millet	Kodo millet	Barnyard millet	Foxtail millet	Proso millet
Hindi	Ragi, Mundua	Kutki, Savan	Kodon	Sanwa	Kangni, Kakun	Cheena, Bari
Kannada	Ragi	Same	Harka	Oodalu	Navane	Baragu
Tamil	Kelvaragu	Samai	Varagu	Kuthiravaali	Tenai	Panivaragu
Telugu	Ragulu	Samalu	Arikelu, Arika	Udalu, Kodisama	Korra	Variga
Malayalam	Moothari	Sama	Varagu	-	Thina	Panivaragu
Marathi	Nachni	Sava	Kodra	Shamul	Kang, Rala	Vari
Gujarati	Nagli, Bavto	Gajro, Kuri	Kodra	Sama	Kang	Cheno
Bengali	Mandua, Marwa	Sama	Kodo	Shyama	Kaon	Cheena
Oriya	Mandia	Suan	Kodua	Khira	Kanghu, Kora	China
Punjabi	Mandhuka, Mandhal	Swank	Kodra	Swank	Kangni	Cheena
Kashmiri	-	Ganuhaar	-	-	Shol	Pingu

period coinciding with green revolution era, but, from the early 1980s, area started declining gradually and fell below 2.0 m ha starting from 1991–92 onwards. In case of other small millets average area remained around 5 m ha till 1960 and then started declining gradually, remained above 4 m ha till 1980. In the next 25 years area fell down drastically reaching to less than 25% and then to 10% by 2020.

The total production of small millets has declined by nearly 44%, though not in the same rate as area. In case of finger millet there was a gradual increase in production corresponding to the initial area increase, reached the highest of 3.20 m t in 1978–79, and thereafter started declining gradually. Overall, total production has actually risen by 12.5% from first 5 year plan to 12th plan despite area getting reduced by more than half during the same period, because of improvement in yield levels owing to adoption of high yielding varieties and production practices by the farmers. In case of other small millets the production levels were fluctuating



Trend in yield levels of finger millet and other small millets

Table 2. Quinquennial area, production and productivity of small millets in India

Year	Finger millet			Small millets		
	Area ('000 ha)	Production ('000 t)	Yield (kg/ha)	Area ('000 ha)	Prod. ('000 t)	Yield (kg/ha)
1951–55	2274	1605	704	5290	2177	410
1956–60	2454	1873	764	5022	1955	389
1961–65	2555	1888	743	4677	1889	404
1966–70	2420	1887	779	4741	1784	376
1971–75	2442	2227	909	4489	1745	388
1976–80	2588	2650	1021	4326	1743	402
1981–85	2474	2612	1054	3459	1391	401
1986–90	2306	2510	1088	2754	1198	437
1991–95	1891	2511	1331	1950	851	439
1996–00	1718	2413	1402	1492	738	435
2001–05	1563	2088	1331	1173	510	435
2006–10	1350	1976	1471	970	467	480
2011–15	1179	1915	1625	683	412	606
2016–20	1033	1674	1612	523	386	739
2021–22*	1079	1700	1576	479	370	772

*As per 4th advance estimate 2021–22. Source: State of Indian Agriculture -different years, Agricultural Statistics at a Glance 2020.

and fell down more than 80%, while productivity has risen marginally from 380 kg/ha during 1950–51 to 800 kg/ha during 2019–20 at all India level. Interestingly in case of finger millet the yield levels have gone up from 649 kg/ha (1950–51) to 1747 kg/ha (2019–20) due to concerted crop improvement efforts and improved crop management practices.

Distribution of small millets in India

Among the small millets, finger millet is the most important crop grown in many states of India from mean sea level in coastal Andhra Pradesh to 8000 feet altitude in the Himalayas. The other small millets in decreasing order of area under cultivation are little, kodo, barnyard, foxtail, proso and browntop millet which are mostly concentrated in specific states/regions. The estimated area, production and productivity of small millets in India, and the important states for each crop are given in Table 3.

The distribution of individual millet is not uniform though small millets are grown in almost every state/region. Karnataka is the major finger millet growing state accounting to 65% of area and production (2019–20) followed by Uttarakhand and Tamil Nadu. But Tamil Nadu has highest productivity (3246 kg/ha) of finger millet followed by Karnataka (1726 kg/ha) which is above the national average yield (1697 kg/ha). In Madhya Pradesh, both kodo and little millet are predominant, while foxtail millet is important in Andhra Pradesh and Karnataka. Barnyard millet and proso millet are grown largely in hills of Uttarakhand, North-Eastern region and plains of North Bihar and western Uttar Pradesh and Maharashtra. Browntop millet, known as *Korale* (Kannada) or *Andakorra* (Telugu) occupies only a few thousand hectares in the dryland

Table 3. Area, production and yield of small millets in India (2015–16)

Millet	Area (lakh ha)	Production (lakh tonnes)	Yield (kg/ha)	Important states
Finger	11.38	18.21	1601	Karnataka, Uttarakhand, Maharashtra, Tamil Nadu, Odisha, Andhra Pradesh, Gujarat, Jharkhand and Telangana
Little	2.34	1.27	544	Odisha, Madhya Pradesh, Chhattisgarh, Gujarat, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Jharkhand
Kodo	1.96	0.84	429	Madhya Pradesh, Chhattisgarh, Tamil Nadu, Gujarat, Maharashtra, Karnataka, Uttar Pradesh and Andhra Pradesh
Barnyard	0.96	0.73	758	Uttarakhand, Tamil Nadu, Maharashtra, Madhya Pradesh, Karnataka and North Eastern states
Foxtail	0.87	0.66	762	Andhra Pradesh, Karnataka, Tamil Nadu, Telangana and Rajasthan
Proso	0.41	0.22	531	Tamil Nadu, Bihar, Karnataka, Andhra Pradesh, Madhya Pradesh and North Eastern states
Browntop	-	-	-	Karnataka (Tumkur, Chitradurga, Chikkaballapura), Andhra Pradesh (Ananthpur)

tracts of Karnataka-Andhra Pradesh border areas. The state-wise area, production and productivity of small millets are given in Table 4 and 5.

The biggest small millets producing state is Karnataka (56% of total production) followed distantly by Tamil Nadu (14.0%) and Uttarakhand (9.3%). Rest of the states together contribute about one-fifth of the total production. In terms of cultivated area Karnataka has the highest proportion (48%) followed by Maharashtra (10.5%). Though Madhya Pradesh has more area under other small millets, its contribution to total production is less owing to poor yield levels in the predominantly grown kodo and little millet, and total production has high year to year fluctuations.

Research and development efforts

The goal of breeding small millets remains improvement of grain yield including maximization of biomass and the harvest index. Cultivars need to be developed depending on the location specific requirements of soil, rainfall, temperature, humidity, day

length and cropping patterns. Nutrient-use efficiency, particularly nitrogen, both native and applied needs to be enhanced as small millets are in generally sown to poor soils. Breeding of dwarf varieties is an objective of intensive cultivation as lodging is a major problem. Being drought tolerant, water-use efficiency of these crops needs to be further improved. Non-shattering cultivars are required to prevent yield loss in the field, while post-harvest technology demands free threshing of grains and easy dehulling for minimizing human drudgery.

Compared to other crops, attention on small millets was limited till establishment of separate AICRP on small millets in 1986. The project focuses on developing high yielding cultivars and appropriate production technologies to meet regional needs through multidisciplinary approach involving centres located in State Agricultural Universities (SAUs) and other cooperating centres. Through the efforts of AICRP a number of varieties with higher yield, variable maturity, tolerance to various diseases and insect pests have been

Table 4. Area, production and productivity of small millets in prominent states of India (2019–20)

State	Finger millet			Other small millets		
	Area ('000 ha)	Production ('000 t)	Yield (kg/ha)	Area ('000 ha)	Production ('000 t)	Yield (kg/ha)
Andhra Pradesh	33.6	44.3	1320	23.3	22.1	947
Arunachal Pradesh	-	-	-	26.8	27.5	1025
Chhattisgarh	4.5	1.2	267	63.1	18.3	290
Gujarat	11.6	10.0	862	8.2	13.6	1657
Jharkhand	14.6	12.8	875	-	-	-
Karnataka	673.7	1162.5	1726	52.4	38.1	727
Madhya Pradesh	-	-	-	79.8	73.9	926
Maharashtra	82.2	87.3	1061	76.4	30.9	405
Odisha	35.9	26.2	731	32.9	17.0	517
Rajasthan	-	-	-	10.1	5.2	518
Tamil Nadu	84.5	274.5	3246	17.9	26.3	1466
Uttarakhand	91.6	130.0	1419	50.3	68.0	1351
Others	10.8	13.2	1222	20.8	29.1	1399
All India	1043	1762	1697	462	370	809

Source: Ministry of Agriculture, GoI

Table 5. Percentage contribution of states to total area and production of small millets in India (2019–20)

State	Finger millet		Other small millets	
	Area (%)	Production (%)	Area (%)	Production (%)
Andhra Pradesh	3.2	2.5	5.0	6.0
Arunachal Pradesh	-	-	5.8	7.4
Chhattisgarh	0.4	0.1	13.7	4.9
Gujarat	1.1	0.6	1.8	3.7
Jharkhand	1.4	0.7	-	-
Karnataka	64.9	66.0	11.3	10.3
Madhya Pradesh	-	-	17.3	20.0
Maharashtra	7.9	5.0	16.5	8.4
Odisha	3.5	1.5	7.1	4.6
Rajasthan	-	-	2.2	1.4
Tamil Nadu	8.1	15.6	3.9	7.1
Uttarakhand	8.8	7.4	10.9	18.4
Others	1.0	0.7	4.5	7.9
All India	100	100	100	100

developed for general cultivation across the country. Keeping in view the declining area, more intensive efforts and support both in terms of research and development is needed for sustaining the production of small millets. Apart from Government support, many NGOs and SHGs (Self Help Groups) are also actively involved in promoting millet cultivation and consumption.

Future thrust areas

The area under small millets is declining year after year, which needs to be arrested with the involvement of all stakeholders. The highest decline in area has been observed in Andhra Pradesh (undivided) followed by Tamil Nadu, Madhya Pradesh including Chhattisgarh and Gujarat. The area is being diverted to more remunerative crops like cotton, maize, soybean and rice. Improving productivity is the key to enhance competitive ability in the marginal agro-ecologies together with enhancing demand, especially among the urban elite for arresting the further decline. Some of the crop improvement and management strategies apart from policy initiatives that require immediate attention for sustaining small millets cultivation are as follows:

- Breeding varieties with better tolerance of biotic and abiotic stresses.
- Mechanization to reduce cost of cultivation.
- Strengthening recombination breeding to create more variability.
- Exploitation of the available genetic potential through better crop management.
- Quality seed production of improved varieties and promoting varietal spread.
- Strengthening of research on grain processing and value addition to improve demand.
- Development of health foods, nutraceuticals and their commercialization to promote among the urban elite.
- Area expansion to non-traditional regions.
- Engaging private sector in millet popularization.
- Cooperative, collective and FPO (Farmer Producer Organization) led farming.
- Special incentive for low productive areas, organic farming, and MSP (Minimum support price), and assured procurement of produce.
- Introduction of millets in PDS (Public Distribution System), mid-day meal and other Public funded programmes.

SUMMARY

In spite of the nutritional superiority, drought tolerance and adaptability to marginal conditions the area under small millets is constantly declining. Research efforts have resulted in several high yielding varieties and improved production technologies, but the small millets are not able to compete with more remunerative crops. Cultivation of small millets needs urgent interventions by the Government agencies to make it more profitable and attractive. Market development, assured procurement and value-chain development are the key for encouraging the farmers. With the growing demand for food production from limited cultivated area and under changing climatic regimes, small millets can promote farming in a more environmentally sustainable manner ensuring food and nutritional security.

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Jai Kisan, Jai Vigyan

- A total of ₹ 788.33 crores have been sanctioned for opening six new agricultural colleges for eastern India under Central Agricultural University, Imphal, and a new Central Agricultural University in Meghalaya.
- For the establishment of two new agricultural research institutes in Asom and Jharkhand, a sum ₹ 100 crores is allocated.
- First academic session of the Rani Lakshmbai Central Agricultural University has been allocated for four new agricultural colleges in Datiya and Jhansi.
- An Memorandum of Understanding was signed for transforming the Rajendra Central Agricultural University, Pusa, Samstipur, Bihar. A proposal of ₹ 400 crores is submitted in EFC.
- Post-Graduate Institute of Horticulture is being established in Amritsar, Punjab.
- Foundation stone of the Indian Institute of Agricultural Biotechnology is laid at Ranchi for promoting agricultural biotechnology.