

Improved agronomic practices

for enhanced productivity of small millets

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Small millets termed as nutri-cereals hold great promise for food and nutrition security amid burgeoning population and climate change. Nutritionally, these are superior to the cereals in terms of protein, minerals and amino acids. In India, small millets are largely cultivated under resource constraint conditions resulting in low crop productivity. Thus adoption of improved agronomic practices is the key to increase their productivity and project them as golden crops of the future.

Keywords: Agronomic strategies, Millets, Production

MILLETS are small seeded annual cereal grasses and are the oldest and first crops to be domesticated and cultivated. They are classified into major (sorghum, bajra) and minor/small millets (finger millet, foxtail millet, proso millet, barnyard millet, little millet, kodo millet and brown top millet) based on their seed size and extent of cultivation. They are a staple food with superior nutritional qualities compared to other cereals and thus referred as “nutricereals”. India is one of the major producers of millets in the world and accounts for more than 40% of the global consumption. Small millets are idyllic crops to cultivate in diverse soils, climates and harsh environments and require low inputs. Their grains contain higher protein, fibre, calcium and minerals than the widely consumed fine cereals, and can ensure nutritional security to the poor people who can not afford dietary diversity. These crops are last standing crop in times of severe drought and are considered as wonder grain that has a capability to enhance nutritional security in the country. Despite their nutritional qualities and climate resilience, the area under small millet cultivation is declining due to shift in area to other remunerative crops, lack of awareness and low production levels. The need of the hour is to focus on enhancing cultivation and increasing production through improved agronomic practices.

Selection of improved varieties/cultivars

Development of high yielding varieties with wide adaptability resulted in increased production despite the decline in area under cultivation. A list of some of the promising small millet cultivars in India are given in Table 1.

Table 1. Promising varieties of small millets

Crop	Varieties
Finger millet	VR 929, VL 376, VL 379, CFMV 1, Indravathi, CFMV 2, GPU 28, GPU 66, GPU 67
Foxtail millet	SiA 3156, SiA3088, SiA 3085, SiA2644, SiA 2593
Barnyard millet	DHBM 93-3, DHBM 23-3, CO 1, CO 2, VL 181, VL 29
Little millet	CLMV 1, Sree Neelima, OLM 203, OLM 217, CO 4, DHLM 36-3, JK 8, LMV518
Proso millet	PR 18, TNAU 202, TNAU 145, GPUP 21, Bhawna, TNAU 164, TNAU 151, Sagar, Nagarjuna, CO 4, CO 3, ATL 1(TNPm230), GPUP 25
Kodo millet	GPAUK 3, TNAU 86, RK 390-25, JK 41, RBK 155, ATL-2, BK-36

Climate and soil requirement

Millets are hardy crops and can withstand harsh environmental conditions better than other cereals. They can be grown in both tropical and sub-tropical regions. Millet has wide adaptability to different soil from very poor to very fertile and can tolerate a certain degree of alkalinity. The best soils for their cultivation are alluvial, loamy and sandy soil with good drainage.

Land preparation

Millets require fine tilth for crop establishment, initial root and shoot development. One ploughing followed by 2–3 harrowing and cross plantings is necessary to obtain fine tilth. Levelling of fields is necessary for adequate drainage.



Optimum time of sowing

Millets are grown in almost all the seasons of the year. The best time for sowing *kharif* crop is last week of June to first week of July depending on the onset of monsoon. Whereas *rabi* crop is sown in the month of October–November and summer crop in the month of January–February. In Bihar and Uttar Pradesh, these crops are grown as irrigated catch crop in the month of mid-March to mid-May.

Seed rate and spacing

Optimum seed rate and spacing ensures higher yield in millets. Seed rate depends on the method of sowing and seed size. The recommended seed rate to achieve the required plant population of ~4.0–5.0 lakh/ha for most of the millets is given in Table 2. The line to line distance at the time of sowing should be 20–30 cm and plant to plant distance should be 10–15 cm.

Table 2. Optimum seed rate for higher yield in small millets

Crop	Method of sowing	Seed rate
Finger millet	Line sowing	5–6 kg/ha
	Transplanting	4 kg/ha
Other small millets	Line sowing	5–6 kg/ha
	Broadcasting	8–10 kg/ha

Fertilizers/nutrient management

Millets respond well to fertilizer application especially to nitrogen (N) and phosphorus (P). The recommended doses of fertilizers vary from state to state and with seasons. Judicious use of organic and inorganic manures enhances the fertilizer efficiency (Table 3). Entire P_2O_5 and K_2O should be applied at sowing, whereas nitrogen should be applied in 2 or 3 split doses depending upon moisture availability. In areas of good rainfall and moisture availability, 50% of recommended nitrogen should be applied at sowing and the remaining 50% in 2 equal splits at 25–30 and 40–45 days after sowing (DAS). In areas of uncertain rainfall, 50% nitrogen at sowing and the remaining 50% around 35 DAS is recommended.

Table 3. Recommended dose of fertilizers in small millets

Crop	Season/soil	Dose
Finger millet	Irrigated	60:30:30 kg NPK/ha
	Rainfed	40:20:20 kg NPK/ha
Other small millets	Irrigated	40:20:00 kg NPK/ha
	Rainfed	20:20:00 kg NPK/ha

Irrigation/water management

Millets are grown as rainfed crop and do not require any irrigation. However, based on the availability of water, 1 life-saving irrigation and 3–4 irrigations at critical stages of growth i.e. tillering, flowering and grain developmental stage needs to be given. Summer crop requires 2–5 irrigations depending upon soil type and climatic conditions.

Weed management

Millets do not compete well with weeds during early growth until 4–5 weeks after planting, thus requires special attention during this phase. Adoption of preventive measures like proper seedbed preparation (to ensure uniform stands), appropriate spacing (to ensure adequate plant populations), covering the soil surface with intercrops or cover crops and practicing proper crop rotation with densely growing legumes suppresses weeds. Application of one pre-emergence spray followed by hand weeding at 20–25 DAS, effectively controls the initial flush of weeds. Inter-cultivation/hand hoeing 2 or 3 times at 3, 5 and 7 weeks after sowing is recommended to check the weed growth, which also helps to conserve soil moisture by providing top soil mulch.

Harvesting and threshing

Harvesting at appropriate time is necessary to avoid shattering and post-harvest losses. The crop is ready for harvest in 70–150 days after sowing depending on the crop and variety.



Small millet + Pigeon pea intercropping



Finger millet + Soybean intercropping

Cropping systems

Small millets fit well in cropping systems. Some of the promising cropping systems are:

- Millet + Black gram/green gram/cowpea
- Millet + Sesamum/soybean/pigeon pea
- Millet + pigeon pea
- Millet - Niger
- Millets - Soybean

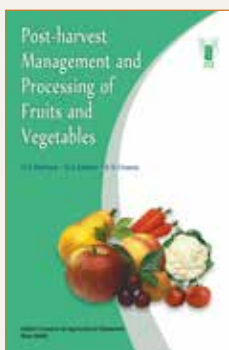
SUMMARY

Small millets have become integral components of subsistence agriculture by virtue of their high nutritional content and better resilience to adapt harsh

weather conditions. Agronomically, these crops are superior to major cereals in terms of their lesser water requirement, lower occurrence of insect pests and diseases, and minimum vulnerability to environmental stresses apart from nutritional superiority. In order to enhance and sustain the millets productivity at desired levels for better food and nutritional security, refinement and adoption of improved agronomic practices needs greater emphasis.

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