

Frequently Asked Questions Crop: Sorghum

1. What are the major kharif growing states in India?

Kharif sorghum is grown mainly in the states of Maharashtra (4.70 m ha) Karnataka (1.59), Madhya Pradesh (0.60), Rajasthan (0.60), Telangana (0.48), TN (0.48), UP (0.27) and Gujarat (0.13). Introduction of hybrids witnessed a major change in Indian sorghum farming specifically in kharif season, which was traditionally formed with landraces.

2. What is Sweet-stalk sorghum and can we produce ethanol out of it?

Sweet sorghum stalks can be competitive raw material to molasses for producing ethanol. Demand for renewable energy sources and biofuel which would minimise pollution are expected to rise rapidly in coming years. Sorghum, by virtue of its C4 photosynthetic system and rapid dry matter accumulation is an excellent bioenergy crop. Therefore, sorghum is expected to gain importance in the coming years in bioenergy farming. Ethanol is a clean burning fuel with high octane rating and it can be blended easily with petrol to the extent of 15-20%. Juice from sweet sorghum stalks can be competitive raw material to molasses for producing ethanol. This can also be profitable crop during summer with irrigation or during monsoon season. Till date the SSV 84 and CSV 19SS were the only national released sweet-stalked varieties at national level. Realising the importance of high yielding superior sweet sorghum hybrid, the national programme could release the first sweet stalked sorghum hybrid CSH 20SS which has attracted much attention internationally. Efforts are on for development of sweet stalked sorghums for various specific end-users such as production of alcohol, ethanol, and syrup. CSV 49 SS is recently identified and recommended for national release.

3. What are the best sorghum-based cropping systems in kharif

Sorghum with redgram as an intercrop is found practicable in 2:1 or 3:3 row proportions. Alternatively the sorghum and fodder cowpea as an intercrop in the ratio of 2:2 is also 40% more profitable. Soybean is also becoming other important intercrop with sorghum. In the intercropping systems the yield of grain and fodder from the sorghum crop is similar to its sole cropping. Therefore, the gains from the intercrop are additional. In the deep black soils having adequate rainfall, sunflower or bengal-gram can be grown after kharif sorghum

4. How to prepare a land

One deep ploughing with mould board plough in summer followed by 3 to 4 harrowings to maintain weed free conditions. Making rides and furrows gives better results than open broadcasting. Making compartmental bunds of 10m × 10m in the month of August for soil moisture conservation.

5. Can you recommend Suitable high yielding hybrids and varieties for various states?

See the following table for details:

Region/state	Production condition	Recommended Hybrid	Recommended Variety
Maharashtra	Medium to heavy soil areas	CSH 16, CSH 18, SPH 388, CSH 23, CSH 25, CSH 27, CSH 30 and CSH 35, CSH 37, CSH 38, JAICAR GOLD (CSH 41),	CSV 15, PVK 400, CSV 17, CSV 20, CSV 23 CSV 27, CSV 28. CSV 34, JAICAR SONA (CSV 39), JAICAR Nutrigraze - CSV 43 BMR
Karnataka	Low rainfall areas	CSH 17	CSV 17
	Normal rainfall areas	CSH 16, CSH 13, CSH 18, CSH 23, CSH 25, CSH 27, CSH 30 and CSH 35, CSH 37, CSH 38, JAICAR GOLD (CSH 41)	CSV 15, DSV 2, DSV 3, CSV 31, CSV 27, CSV 28, CSV 34, JAICAR SONA (CSV 39), JAICAR Nutrigraze - CSV 43 BMR
Andhra Pradesh and Telangana	Low rainfall areas	CSH 14, PSH 1	CSV 15, CSV 17, CSV 20, CSV 23,
	Normal rainfall areas	CSH 23, CSH 25, CSH 27, CSH 30 and CSH 35, CSH 37, CSH 38, JAICAR GOLD (CSH 41),	CSV 15, CSV 20, CSV 23, CSV 27, CSV 28, CSV 31 (Palamuru Jonna) JAICAR HEERA (CSV 36), JAICAR HEERA (CSV 36), JAICAR Nutrigraze - CSV 43 BMR
Madhya Pradesh	Entire state	CSH 16, CSH 17, CSH 18, CSH 23, CSH 25	CSV 15, CSV 17SPV 235, JJ 741, JJ 938, CSV 27, CSV 28, CSV 34, JAICAR Nutrigraze - CSV 43 BMR
Gujarat	Normal rainfall areas	CSH 16, CSH 17, CSH 18, CSH 23	CSV 15, GJ 38, GJ 40
	Low rainfall areas (North Gujarat and Saurashtra)	CSH 17, CSH 13, CSH 16, CSH 18	CSV 15, CSV 17, GJ 38, GJ 39, GJ 40, GJ 41 CSV 27, CSV 28, CSV 31 (Palamuru Jonna), CSV 34, JAICAR HEERA (CSV 36), JAICAR Nutrigraze - CSV 43 BMR
Rajasthan	Medium to heavy soil zone	CSH 14, CSH 23, CSH 25	CSV 15, CSV 17, CSV 20, CSV 23 CSV 27, CSV 28, JAICAR HEERA (CSV 36), JAICAR SONA (CSV 39), JAICAR Nutrigraze - CSV 43 BMR
	Semi arid & transitional zones	CSH 16, CSH 18, CSH 23	
Tamil Nadu	Coimbatore & Madurai districts	CSH 14, CSH 17	CO 26, CSV 15, CSV 17, CSV 20, CSV 23, CSV 27, CSV 28, CSV 31 (Palamuru Jonna), JAICAR HEERA (CSV 36), JAICAR SONA (CSV 39), JAICAR Nutrigraze - CSV 43 BMR
	Entire state	CSH 16, CSH 17, CSH 18, COH 2, COH 4 CSH 23, CSH 25, CSH 27, CSH 30 and CSH 35, CSH 37, CSH 38, JAICAR GOLD (CSH 41),	
Uttar Pradesh	Entire State	CSH 14, CSH 16, CSH 18, CSH 23, CSH 25	CSV 15, CSV 17, CSV 20, CSV 23, CSV 27, CSV 28, JAICAR Nutrigraze - CSV 43 BMR
Sweet Sorghum All India	All above sorghum growing states	CSH 22 SS	SSV 84, CSV 19 SS
Forage sorghum All India	All above sorghum growing states	SSG 59-3, PC 106, CSH 20 MF, CSH 24 MF	HC 308, HC 171, HC 136, HC 260, CSV 15, CSV 20 (SPV 1616), CSV 30F, CSV 32 F, CSV 33 MF, JAICAR HARIYALI (CSV 38 F)

6. Can you recommend Recommended Rabi varieties Maharashtra and Karnataka?

The national releases are recommended for all rabi cultivating states. However, the following are recommended for Maharashtra and Karnataka:

Deep soil – Rainfed: CSV 216R (*Phule Yashoda*), CSH 15R, CSH 19R, CSV 22, and CSV 26 R, CSV 29 R, DSV 4, DSV 5. *Phule Vasudha*, Parbhani Moti, PKV Kranthi, M35-1,

Medium soil – Rainfed : Phule Chitra, Phule Suchitra, Phule Maulee

Shallow soil – Rainfed : Phule Anuradha, Phule Maulee

Medium / deep soil – Irrigated: Phule Revati, Phule Vasudha, Parbhani Moti, PKV Kranti

7. what are the Methods of sowing?

In general, the crop is sown by bullock drawn seed drills with 2 or 3 coulters at 7 cm depth in the soil by the farmers. The seeds are covered by one harrowing after sowing by seed drill. It is also sown by tractor drawn seed drill with 4 coulters with simultaneous covering of seeds by blade attached to the seed drill.

8. What is the ideal times of sowing for kharif and Rabi

The optimum sowing time for Kharif sorghum is Last week of May to 2nd fortnight of July and Rabi is Mid-September to last week of October.

9. Can you suggest seed rate, spacing and plant population per one hectare?

Seed rate	8-10 kg/ha
Spacing	Row to row 45 cm and plant to plant 15 cm
Plant population	2.0 to 2.2 lakh /ha

10. What is the recommended nutrient management?

In general farmers put farm yard manure in the field. the recommended doses per hectare is as follows:

- 80 kg N, 40 kg P₂O₅/ ha.
- 50% N and full P₂O₅ at sowing, balance 50% 30 days after sowing.

11. Is it necessary to follow Inter-cultivation?

Inter-cultivation 2 or 3 time at 3, 5 and 7 weeks after sowing to check the weed growth and also helps conserve soil moisture by providing top soil mulch.

12. How to control Weeds from the sorghum field?

Application of Atrazine @ 0.5 kg a.l/ha is recommended for spraying on the soil as pre-emergence application i.e., on 2nd or 3rd day of sowing.

13. what are the major Insect-pests damages sorghum crop and suggest control methods?

a) Shoot fly

Damage symptoms: It is a seedling pest and normally occurs in the 1st- 4th week after germination. Maggot feeds on the growing tip causing wilting of leaf and later drying of central leaf giving a typical appearance of 'dead heart' symptoms. If the infestation occurs a little later, damaged plants produce side tillers which again are infested increasing the population build up. To schedule the chemical control, the shoot fly infestation can be

monitored by checking the egg-laying on the lower surface of the seedling leaves before the formation of dead heart.

Cultural control: Shoot fly can be avoided by suitable adjustment of the planting time so that the vulnerable stage of the crop does not coincide with its active period. In rabi, planting towards the September end to October first week is ideal to escape shoot fly damage. Another important practice is to increase the seed rate and destroy the 'deadheart' seedlings after removal, to maintain the optimum plant stand.

Chemical control: When planted late, the pest can effectively be controlled by seed treatment with Furadan 50 SP @ 100 g/kg seed. Under moderate levels of infestation, a mixture of 60% treated and 40% untreated seed could be used. Besides, any of the granular formulations of Furadan 3G or Phorate 10 G at the time of sowing as soil application in the seed furrows @ 20 kg/ha can also effectively check the pest incidence. In case soil granular application is not done, damage can be minimized by spraying seedling at 7 and 14 days stages with endosulfan @ 2 ml/liter water.

b) Stem borer

Damage symptoms: It infests the crop from 2nd week till maturity. Initially, the larvae feed on the upper surface of whorl leaves leaving the lower surface intact as transparent windows. As the severity of the feeding increases, blend of punctures and scratches of epidermal feeding appears prominently. Sometimes 'dead heart' symptoms also develop in younger plants due to early attack. Subsequently, the larvae bore into the stem resulting in extensive stem tunneling. Peduncle tunneling results in either breakage or complete or partial chaffy panicles.

Cultural control: The carryover of the pest from one season to another is through stubbles left in the field as well as the stems/stalks kept for use as fodder after harvest. Uprooting and burning of stubbles and chopping of stems prevent its carryover.

Chemical control: Effective control of the borer can be achieved by application of any of the following insecticides in to the whorl i.e. Endosulfan 4G / 4D, Carbaryl 3G, Malathion 10D or Furadan 3 G @ 8-12 kg/ha at 20 and 35 days after emergence. The treatment should only be given after ascertaining the infestation levels as evidenced by leaf injury symptoms.

c) Shoot bug

Damage symptoms: Being a sporadic pest, under favourable conditions, it produces several generations and can cause heavy damage to sorghum. However, heavy infestation is seen on the rabi crop, when rain occurs at seedling stage. Both the adult type (Branchypterous and Macropterous) and nymphs suck the plant sap causing reduced plant vigour and yellowing. In severe cases, the younger leaves start drying and gradually extends to older leaves. Sometimes, complete plant death occurs. Heavy infestation at vegetative stage may twist the top leaves and prevent either the formation or emergence of panicles.

Chemical control: Application of Endosulfan 4G or Carbaryl 3G @ 8 kg/ha in the whorls can effectively check the incidence of the pest.

d) Aphids

Damage symptoms: Occasionally, they cause damage to seedling sorghum. Attack during boot stage may result in poor panicle exertion. However, after panicle emergence, their population rapidly declines. Bigger plants in boot and later stages generally tolerate larger populations without any significant damage. Both the adults and nymphs suck the sap and heavily infested leaves show yellowish blotches and necrosis may occur on leaf edges. They produce abundant honeydew which predisposes the plant to sooty and other sporadic fungal pathogens. The honeydew excretion hinders harvesting process and result in poor quality grain. Severe damage was noticed under moisture stress conditions resulting in drying of leaves as well as plant death. Unlike the corn leaf aphid, sugarcane aphid predominantly is a serious pest in rabi and prefers to feed on older leaves and also infest younger leaves including panicle at flowering stage. Adults are yellow to buff coloured. Both adults and nymphs suck the plant sap and cause stunted growth.

Chemical control: Spraying of Metasystox 35 EC (@ 1 lt/ha in 500 lt water) effectively control aphids.

14. What are the major diseases attack on sorghum crop and suggest control methods?

Grainmold

Damage: Grain molds are severe during the years of prolonged rainfall at the time of grain maturity. It results in discoloration of grain, but severity of infection reduces grain weight and size leading to considerable loss of yields even upto 100%; reduces germination and acceptability of the harvested grain, nutritive value and market price. The toxins produced are harmful to animals

Cultural control: Avoiding cultivars that mature when there is likelihood of rains is a precaution that can be used to avoid grain molds. Harvesting of genotypes at physiological maturity and drying also reduces mold incidence. Delay in harvesting of matured crop should be avoided.

Chemical control: Effective control can be obtained by three sprays on the Earheads with Aureofungin (200ppm) and 0.2% Captan, starting from flowering with 10 days interval. But it is impracticable and uneconomical, except in seed plots. Spraying three times with Captan (0.3%) + Dithane M-45 (0.3%) at 10 days interval from flowering period can also control grain molds.

15. Is it profitable to grow Sorghum in rice fallows conditions

Introduction of sorghum in rice fallows, especially in non-conventional areas like coastal Andhra Pradesh when water is insufficient for second crop of rice, appears to be potentially promising with planting in late December to January ensuring high quality fodder yield and much gain for

feed industry. The farmers from Guntur district are cultivating sorghum under zero tillage conditions in the month of December. The farmers from Tenali division of Guntur district recorded bumper yields to the tune of 7 -8 tons per hectare. Now the cultivation area is extended up to 50 thousand hectares in Guntur district.