

Season of cultivation: Single-cut and dual-purpose types are concentrated in kharif, while multi cut types are best exploited during summer (Jan-Feb. sowing).

Seed rate and spacing: In order to get higher biomass production from all forage varieties, they need to be sown densely at 30 X 10 cm spacing using a seed rate of 20 -25 kg/ha.

Fertilizer management: The fertilizer schedule for sorghum is 80:40:40 (NPK) with two splits of N, one at basal and the other at 30 DAS. In case of multi-cut types, a 30 kg/ha N after each cut followed by irrigation is recommended.

Insect pest management

Shoot fly and stem borer are the major insect pests occurring during the rabi season.

Shoot fly (*Atherigona soccata* (Rondani))

Planting with the onset of monsoon in Kharif and between September end to first week of October is ideal to escape from shoot fly. Another important practice is to increase seed rate and destroy the dead heart seedlings after removal. Furrow application of Carbofuran 3G @ 2 grams per row or spray Cypermethrin 10 EC @ 0.02% coinciding with Shoot fly oviposition (7-14 days after germination) only for late sown crop.



Stem Borer (*Chilo partellus*):

Destroy thrashed sorghum earheads before the onset of monsoon; use high seed rate and thin out the infected plants after 10-12 days of sowing; apply Endosulfan 4G/Carbonfurn 2 gm @ 8-10 kg. per ha. in plant rows at 20th and 35th days after germination.



Disease management

Grain mold in kharif and Charcoal rot in rabi are the two major diseases effecting sorghum.

Grain mold: Molds occurs when flowering coincides with rainfall. The grains turn black, white or pink in color.

Grow resistant cultivars. Spray ear-heads with Aurefungin 200 PPM + 0.2 % Captan three times from flowering at 10 days interval or Dithane M 45 - 0.2 % + Bavistin 0.2 % twice at 10 days interval after commencement of flowering.



Charcoal rot: Charcoal rot is the significant rabi sorghum disease, which is serious in the shallow soils in dry areas of Maharashtra and Karnataka.



Grow resistant cultivars; apply minimum dose of nitrogenous fertilizers with low plant density in infected soils; adopt inter-cropping rather than sole cropping; resort to moisture conservation practices like mulching with wheat straw; and soil treatment with Thiram @ 4.5 kg/ha at the time of sowing.

Drought mitigation through contingency planning

Early onset of monsoon: Sowing with the onset of monsoon is recommended for assured high yields.

Early onset of monsoon followed by a long gap: Repeated inter-cultivation operations like hoeing, weeding and mulching are suggested to conserve moisture. Under severe moisture stress, reduce the plant population by 2/3 by thinning for judicious use of moisture. Limited plant population assures normal growth of the crop.

Delayed onset of monsoon: In case there is delay in monsoon by 2-3 weeks, short duration cultivars such as CSH 23 can be preferred. Increase seed rate to 1.5 times of the recommended rate and apply 20 Kg of Carbofuran or Phorate (3 g) granules in the seed rows before sowing to safe guard against the shoot fly attack. Other shoot fly control measures (spraying of Endosulfan 2ml/litre of water after sowing) can also be followed if soil application is not adopted.

Prolonged monsoon and excessive rainfall at maturity: These situations at seed development stage are likely to cause heavy grain mold infestation. Harvesting of the crop at physiological maturity to avoid damage by grain mold alternatively spraying fungicidal mixture containing 0.3% Dithane M-45 three times at 10 days interval starting from 50% flowering onwards are recommended.

Failure of monsoon: If monsoon fails after sowing of the crop, plant population should be reduced proportionately to 1/2 either by uprooting alternate plants or alternate rows. However, in case of partial failure and extremely delayed monsoon alternative crops like castor, Pearl millet and horse gram may be sown in light soils.

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Sorghum production technology

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Kharif Sorghum

Seed-bed preparation: Sorghum requires a well prepared seed bed for good crop establishment. Proper tillage reduces weeds by killing the germinating seedlings and burying deep the weed seeds. Seed bed preparation are governed by local conditions such as weed intensity, moisture availability and soil erosion risks.

Planting time: Sowing of sorghum should be undertaken with the onset of monsoon. Dry sowing about one week in advance of monsoon (firm forecast) is also practiced in black cotton soils.

Varietals recommendation:

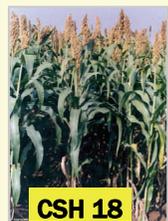


CSV 20

Hybrids: Early maturing: CSH 23, Medium duration: CSH 16, CSH 18, CSH 21 Varieties: CSV 17, CSV 20

Seed rate, spacing and plant density: The optimum plant population depends upon the available moisture, soil fertility status and morphology of genotypes being cultivated.

The optimum plant population recommended is 1,80,000 plants/ha. This can be achieved by using 8 kg seed and planting at 45 cm x 12.5 cm or 60 cm X 9.5 cm.



CSH 18

Fertilizer management: Application of 10 tons/ha FYM at the last ploughing and 40 kg N /ha fertilizer is advised. In the absence of FYM, 80 kg of N and 40 kg P₂O₅/hectare is recommended. One half i.e 40 kg N and full P₂O₅ is to be applied at sowing, while remaining 40 kg N is to be applied 30-40 days after sowing. In case of light soils with low rainfall, 60kg N and 30 kg P₂O₅ is recommended.



CSH 23

Weed management: Summer ploughing for destroying stubbles and perennial weeds. Timely sowing of crop to minimize crop weed competition. Proper spacing to facilitate inter weeding operation. Keep the field free from weeds.

Inter cultivation : Two weeding with one shallow hoeing up to 3 weeks after sowing will keep the field free from weeds. To check severe weed infestation apply Atrazine @ 0.5 kg a.i. per ha followed by hand weeding within three weeks of sowing.

Harvesting: Ideally Kharif sorghum should be harvested at its physiological maturity to avoid grain mold damage.

Storage : Solarized grain by spreading on black polythene sheet. Cover it with white polythene sheet. Keep it in the sun for

four hours. Remove the grain and store it in metal bins. Longevity will be at least for six months.

Sorghum - based Cropping systems

Intercropping: Sorghum intercropped with pigeon pea, sunflower, green gram or soybean has been found to be widely adopted by the farmers. The most ideal sorghum genotypes found suitable for intercropping are CSH 16, CSH 17 and CSH 18.



CSH 14 : REDGRAM
2 : 1

Sorghum and pigeon pea are to be sown in the 2:1 row ratio keeping full normal population of sorghum. No additional fertilizers are required. In case of inter-

cropping, spraying of weedicide/herbicide is not recommended. In some cases, the medium maturing sorghum genotypes such as CSH 16 and CSH 18 are also recommended for intercropping in 3:3 ratio.

Another profitable intercropping system is sorghum and fodder cowpea in 2:2 row proportions. This system besides providing green fodder was also found improve soil fertility and in checking of weed growth.

Sequence cropping: A sequence crop in rabi following sorghum in kharif was found to be profitable in those areas which receive rainfall above 700 mm and having moisture retentive medium to deep black soils. The most suitable and profitable crops are chick pea, safflower and mustard in most of the situations. The following techniques are suggested to make sequence cropping system economical and feasible.

- Kharif sorghum crop should be harvested at its physiological maturity to gain about one weeks time in planting the winter crop.
- Practice of minimum tillage needs to be adopted. It helps to gain time, minimizes land preparatory costs and prevents soil moisture loss.
- Sowing of winter crop should be drilled without much opening of the soil.
- Inter cultivation should be done at appropriate time to minimize weeds and soil water loss.

Rabi season

Varietal recommendation

Varieties: CSV 14R, CSV 216R (Phule Yashoda), CSV 18 (SPV 1595) and M 35-1.

Hybrid: CSH 15R, CSH 19R (Andhra Pradesh, Maharashtra and Karnataka)

Planting time : Planting time in rabi sorghum is



CSH 19 R

dictated by (a) rainfall pattern in the monsoon season and moisture content of the soil at the time of planting; and (b) intensity of seedling pest, the "shoot fly". Timely planting is of paramount importance in rabi. Planting too early invites very heavy infestation of shoot fly, and delay in planting results in yield reduction due to moisture stress at grain development stage. Planting around the middle of September is ideal. In case of moisture availability, the planting could be extended up to first week of October.

Seed rate, spacing and plant density: In rabi season, under receding moisture conditions a plant population of 1,35,000 plants /hectare. However, under irrigated or assured soil moisture conditions, higher yields could be achieved with 1,80,000 plants /ha. A row spacing of 45 or 60 cm with plant to plant distance of 15 cm is optimum. A seed rate of 8 kg/ha is sufficient.

Fertilizer management: Application of 10 tonnes/ha FYM with fertilizers improves soil health and uptake of nutrients at the last ploughing and 40 kg N and 20 kg P₂O₅ /ha fertilizer is advised. Under irrigated situation, 80 kg of N and 40 kg P₂O₅/ hectare is recommended. One half i.e 40 kg N and full P₂O₅ is to be applied at sowing, while remaining 40 kg N is to be applied 30 -40 days after sowing before irrigation.

Inter cultivation: Two weeding with one shallow hoeing up to 3 weeks after sowing will keep the field free from weeds. To check severe weed infestation, pre-emergence application of Atrazine @ 0.5 kg a.i. per ha keeps the crop weed free for about 20-25 days.

Irrigation management: Critical stages of irrigation are 30-45 days (seedling elongation stage); 60-65 days (reproductive or heading stages); 70-75 days (panicle emergence); and 90-95 (grain development stage). However, if only one irrigation is available, this should be applied just before booting (40-50 days) from flowering at 10 days interval or Dithane M 45 - 0.2 % + Bavistin 0.2 % twice at 10 days interval after commencement of flowering.

Fodder Sorghum

General cultural practices for forage sorghum are variable but are similar to those used for grain sorghum production in an eco-geographical region. Pattern of utilization of forage influences the choice of variety and cultivation practices.

Varietal recommendation: The available varieties are distinctly of two types- single cut and multi cut. The single cut varieties are PC 6, PC 23, MP Chari 1&2, HC 171 & 260, multi cut types are SSG 59-3, X 988, MFSH 3 and Hara Sona, CSV 20 MF and the dual purpose types are CSV 15, PC 5, SPV 462 and hybrid CSH 13.



MFSH 20