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Rabi Sorghum Production Technology for Sustained Productivity in Telangana State

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Sorghum is an important cereal crop cultivated globally for food, feed, fodder and fuel. It ranks fifth after wheat, rice, maize and barley in area and production. In India, it is grown over an area of almost 4.82 million ha, with a production of over 4.77 million tonnes and a productivity of 989 kg/ha (Anonymous 2021). In India, Rabi Sorghum is extensively grown in Deccan Plateau, in the states of Maharashtra, Karnataka, Andhra Pradesh and Telangana. In Telangana, it occupies an area of 78,000 ha with 120 lakh tonnes production and 1296 kg ha^{-1} average productivity during the rabi season (Anonymous, 2022). In Telangana, it is majorly cultivated in the districts of Adilabad, Kamareddy, Mahabubnagar, Vikarabad, and Sangareddy to meet the demand of grain for grain consumption and dry fodder for animal feed. It is usually grown under residual soil moisture conditions in black soils in Rabi season. In recent times however the area of sorghum has increased in the rabi season in the districts of Adilabad, Kamareddy, Asifabad, Nizamabad due to grain procurement by the government, hike in minimum support price and also availability of sorghum hybrids with high productivity. The best management practices and varieties suitable for the state of Telangana in order to attain sustained and higher productivity (Anonymous 2020) are described here under.

Land preparation: Rabi Sorghum can be cultivated on a variety of soils ranging from rich, medium loam to poor shallow soils having normal pH of 7.5-8.0. Best soils for sorghum cultivation are deep black soils under residual soil moisture conditions. Red, loamy and shallow soils can be used for cultivation if irrigation facilities are available. Land is prepared by 2 to 3 ploughings, followed by 1 to 2 cross harrowings to obtain optimum tilth which is imperative for proper germination and crop establishment. 5-10 tons FYM per hais to be applied befor last ploughing.

Varieties/Hybrids suitable for the state

S. No.	Variety	Features
1	SVT 55 (Tandur Jonna 55)	110-115 days duration, 9-10 q grain yield,15-20 q fodder yield, tolerant to shootfly,stem borer, aphids, good roti quality, released by SVRC, Telangana
2	SVT 68 (Tandur Jonna 1)	115-120 days duration, 10-12 q grain yield,15-20 q fodder, tolerant to shootfly,stem borer, aphids, moderately resistant to charcoal rot,good roti quality, released by SVRC, Telangana
3	CSV 29R	115-120 days duration, 10-12 q grain yield,15-20 q fodder yield, tolerant to shootfly,stem borer, aphids, moderately resistant to charcoal rot,released by CVRC for the entire country
4	M 35-1 (Maldandi)	115-120 days, 8-10 q grain yield,18-20 q fodder, drought tolerant, very good grain and roti quality, released by SVRC, Maharashtra

S. No.	Hybrids	Features
1	CSH 15R	110-115 days duration, 15-20 q grain yield,15-16 q fodder yield, released by CVRC for the entire country
2	CSH 39R	110-115 days duration, 15-20 q grain yield,15-16 q fodder yield, released by CVRC for the entire country
Private hyhrids namely Ganga Kaveri, Mahyco, Syngenta,Adventa,Bayer etc		

Time of sowing*:* Optimum time of sowing is 2nd fortnight of October to 1st fortnight of November under residual soil moisture conditions. Sowing can be extended up to December 1st week under irrigated conditions.

Seed rate: 7.0 to 8.0 kg per hectare seed is required.

Spacing: A spacing of 45 cm between rows and 10-15 cm between plants with in a row is to be maintained. An optimum plant population of 1.3-1.5 lakh/ha is to be ensured for better yields

Weed management: Application of weedicide Atrazine @ 0.8 kg a.i/ha is recommended for spraying on wet soil as pre-emergence application immediately with in 1-2 days after sowing for control of broad leaved weeds till 30 days after sowing. Inter-cultivation with tractor or cattle drawn plough 2 times at 35-45 days after sowing is done not only to check weed growth but also to conserve soil moisture.

Nutrient management: Under rainfed conditions when sorghum is cultivated in shallow to medium soil, 40 kg/ha Nitrogen and 20 kg/ha Phosphorus is applied as basal dose at the time of sowing. Under rainfed conditions in deep soil, 60 kg/ha Nitrogen and 30 kg/ha Phosphorus is applied as basal at the time of sowing. Under Irrigated conditions and for cultivation of hybrids, 80-100 kg Nitrogen,40 kg Phosphorus and 40 kg potash is applied. Nitrogen dose is applied in two equal splits of 50% as basal at the time of sowing and 50% at 30-35 days after sowing.

Water management: Sorghum requires 450- 650 mm rainfall.Under irrigated conditions in medium deep to deep soils, one irrigation at grain filling stage is to be given. In shallow soils 3 irrigations are to be given at critical stages of knee height stage, flowering and grain filling to avoid moisture stress.

Pest Management

a) Shoot fly

Damage symptoms: It is caused by an insect pest *(Atherigona soccata*) which infests the crop during first one month of crop growth. Maggot feeds on the growing tip causing wilting of leaf and later drying of central leaf giving a typical appearance of dead heart (Singh etal 2023).

Control: Seed treatment with Thiomethaxam 70 WS 3g/kg seed or Imdochlorpid @ 7 ml/kg seed and timely sowing of the crop

b) Stem borer: It is caused by an insect pest *Chilo partellus* which infests the crop from 30 days after sowing till maturity.

Damage symptoms: 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. Peduncle tunneling results in either breakage or complete or partial chaffy panicles.

Control*:* The borer can be controlled by application of insecticide Furadan 3 G granules @ 8-12 kg/ha in to leaf whorls at 25 days after emergence.

c) Shoot bug: It is caused by an insect pest *Peregrinus maidis* which is severe under drought conditions.

Damage symptoms: The nymphs and adults suck the plant sap causing reduced plant vigour and yellowing. Panicle formation is inhibited and the plants die if attack is severe. Honeydew secreted by the bug causes growth of sooty mould on leaves and affects photosynthetic efficiency.

Control: Spraying of Dimethoate (Rogor) 2.5ml/ lt water twice at weekly intervals

d) Aphids: It is caused by the insect pest *Melanaphis sacchari*) which infests during the last one month of crop growth phase.

Damage symptoms: The nymphs and adults suck the plant sap from the lower surface of the leaves. Heavily infested leaves show yellowish blotches and necrosis may occur on leaf edges. They excrete abundant honeydew which predisposes the plant to sooty and other sporadic fungal pathogens. Severe damage under moisture stress results in drying of leaves

Control: Spraying of Dimethoate (Rogor) 2.5ml/lt water twice at weekly intervals effectively control aphids.

E) Fall army worm: It is caused by the insect pest *Spodoptera frugiperda* which occurs during the entire crop growth phase

Damage symptoms: Scrapping of leaf surface by young larvae,Older larvae, feeds upon central whorl and cause extensive defoliation.

Control: Spray of azadirachtin 1500 ppm @ 2.5 lit/ha or chlorantraniliprole 18.5 SC @ 200ml/ha (or) flubendiamide 480SC@ 250ml/ha at early stage (15 - 20 days). Spray of Emamectin benzoate 5 SG @ 200g/ha or novaluron 10 EC @ 750 ml/ha or spinetoram 11.7 SC @ 250 ml/ha at late whorl stage (35 - 40 days).

Disease management

a) Charcoal rot

Damage symptoms: The disease is caused by the soil borne fungus *Macrophomina phaseolina*. Infected shoots (culms) turn black,hollow with fungal sooty mass inside the stem. shoots become brittle and the crop lodges leading to loss in grain yield, reduction in grain size,loss of fodder quality and quantity (Anitha etal 2020).

Control: Application of recommended dose of nitrogen fertilizer, crop rotation and cultivation of resistant varieties, avoiding drought stress reduces disease incidence.

Harvesting: It is done at physiological maturity when the crop attains 115-120 days duration and with the appearance of a black spot at the base of the lowermost grains in the panicle. The harvested grain has about 20 % moisture. The panicles are sundried, threshed and stored at 10 -12 % moisture in gunny bags.

		
Shoot fly damage - Dead heart	**Stem borer damage**	**Shoot bug damage**
		
Aphid damage	**Fall army worm damage**	**Charcoal rot damage**

Conclusion

Farmers by way of adoption of the recommended package of practices, proper selection of the varieties, timely execution of various agricultural operations, pest and disease control are expected to obtain higher productivity and reap higher economic returns in Telangana state.

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