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SVT 352: A DUAL PURPOSE RABI SORGHUM CULTURE WITH HIGH TEST WEIGHT, DRY FODDER YIELD AND MODERATE RESISTANCE TO CHARCOAL ROT

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ABSTRACT

SVT 352 is a dual purpose rabi sorghum culture with high test weight, fodder yield and moderate resistance to charcoal rot. It was developed at Agricultural Research Station, Tandur, Professor Jayashankar Telangana Agricultural University, Telangana. The culture is tall with round bold pearly white lustrous grains with a duration of 120 days. It has recorded a mean grain yield of 2475 kg/ha and a dry fodder yield of 8924 kg/ha. Through mutilocation evaluation, the culture was proved to be a potential and stable donor for test weight, fodder yield and charcoal rot resistance and hence can be used as a parent in the rabi sorghum improvement programmes

Key words : Charcoal Rot, Dual purpose, Rabi Sorghum, Test weight.

Introduction

Sorghum is one of the important cereal crops cultivated worldwide for food, feed, fodder and fuel. Globally, it is grown in an area of 40.7 million hectares, with a production of 62.4 million tons and productivity of 1530 kg/ha (USDA-FAS, 2025/26). India ranks first in terms of area and fourth in terms of production in the world. In India, sorghum is the second most important dryland crop after pearl millet, with a productivity of 1250 kg/ha and a production of 3.8 million metric tons from 4.74 million hectares (DA & FW, 2026). In India, 80%, of sorghum is cultivated during the post-rainy season (Rabi) for use as human food and 20% is cultivated in rainy season (*Kharif*) for animal feed, fodder and industrial applications. It is extensively cultivated in the states of Maharashtra, Karnataka, Andhra Pradesh and Telangana as a rainfed crop in kharif and on residual soil moisture conditions in rabi to meet the demand for grain and dry fodder. The productivity is low in rabi sorghum because of poor genetic diversity among the breeding lines owing to excessive utilisation of durra subrace and

Maldandi types in breeding present day cultivated varieties.

Charcoal rot disease is a major production constraint computing to nearly 40 per cent yield loss (Hiremath and Palakshappa, 1994) particularly in the rabi season. It is caused by the soil and seed borne fungus *Macrophomina phaseolina* (Tassi) Goid., which infects more than 500 plant species. The disease is especially severe under high temperatures (30–35°C), low soil moisture, terminal drought, and moisture stress during grain filling, resulting in severe lodging, poor grain filling, and substantial yield losses. Development and cultivation of resistant cultivars is considered the most practical, economical, and environmentally sustainable approach for its management as it is soil borne and chemical and cultural control provide only limited and inconsistent protection (Das, 2019).

Landraces are cultivated by farmers for many generations under subsistence agriculture and were documented as stable sources of nutrition, adaptation and stress tolerance (Elangovan *et al.*, 2012). Rabi sorghum has hundreds of landraces adapted and cultivated by

farmers across different states of the country. The genetic diversity in the landraces was ascertained to effectively select and employ the genotypes as donors for farmer preferred traits in hybridization programmes (Rajappa *et al.*, 2022, Patroti *et al.*, 2022, Anisha *et al.*, 2022). Several studies have indicated that pure-line selection in local popular land races led to the development of many improved cultivars like M 35-1, Phule Yashoda and Parbhani Moti (Patroti *et al.*, 2025). The identification of stable donors for grain size and other quality traits and their deployment is one of the strategy in Sorghum improvement programmes. Hence efforts were focussed at the centre (Agricultural Research Station, Tandur) to use the natural variability available in the diverse local land race collections, purify them through pureline selection and could identify a stable line SVT 352 with high test weight, fodder yield and charcoal rot resistance. The entry was tested through multilocation evaluation under All India coordinated programme in five states where rabi sorghum is extensively cultivated.

Materials and Methods

The sorghum culture SVT 352 (Fig. 1) is a Pureline selection from a local germplasm collection namely Tandur Sorghum Local Collection 5 (TSLC 5) collected from Pagidimarri village, Utukur mandal, Mahabub nagar district of Telangana state.

Yield evaluation

The culture was evaluated in the Initial Advanced Varietal/Hybrid Trial (Deep Soil) in the name of SPV3103 during Rabi 2023-24 at 18 locations covering the states of Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Telangana. Standard package of practices and recommended plant protection measures were followed to raise a good crop in order to get reliable field data. Grain yield was recorded as the mean weight of the grain obtained after harvesting and threshing from a plot area of 11.10 sq.m and converted to kg/ha. Dry fodder yield was recorded as mean weight of the total dry fodder from 11.10 sq.m plot area converted to kg/ha. Test weight (g) was recorded by weighing a random sample of 100 completely dried grains

Screening for Charcoal Rot resistance

The genotypes were evaluated for charcoal rot resistance at three hotspot locations (Solapur, Bijapur and Hagari) across the states of Maharashtra and Karnataka during rabi 2023-24. They were evaluated in established *Macrophomina*-infested wilt sickplot (inoculum density of 100 to 150 microsclerotia per gram). Standard spacing of 45 × 15 cm and Randomised block design with 3



Fig. 1 : A) Field view, B) Panicles and C) Grain of SVT 352.

replications was followed. Observations on charcoal rot incidence, mean length of spread (cm) were recorded. Charcoal rot percentage and mean length of spread of lesion were used for estimation of charcoal rot index (CRI) using the formula $(CRI = CRP \times 0.4 + MLS \times 0.6)$. Disease reaction was determined following the CRI scale (Das *et al.*, 2018). If CRI value ≤ 5 it was scored as highly resistant (HR). CRI 6 – 10 resistant (R), 11 – 25 moderately resistant (MR), 26 – 40 susceptible (S) and >40 was scored as highly susceptible (HS).

Results and Discussion

Test weight

It was evaluated in the Initial Advanced Varietal/Hybrid Trial (Deep Soil) during *Rabi* 2023-24 at 18 locations and was identified as second ranked genotype for test weight as compared to 33 genotypes evaluated including checks. At 14 out of 18 locations tested, it recorded consistently higher test weight when compared to the checks CSV 22R, CSV 29R and M 35-1. The culture recorded All India mean test weight of 3.56 g when compared to checks CSV 22R (3.15 g, rank 27), CSV 29R (3.21 g, rank 22) and M 35-1 (3.2 g, rank 24). The culture exhibited superiority of test weight of 13%, over the check CSV 22R, 10.9% over the check CSV 29R and 11.25% over the check M 35-1 based on All India mean data (Table 1). Test weight, is an important yield component and quality trait in rabi sorghum.

Table 1 : Performance of SVT 352 at various locations with respect to test weight (g) during Rabi 2023-24.

S. no.	Entry/ Location	Nand yal	Deesa	Tan cha	Bija pur	Chamra ajnagar	Dhar wad	Gul berga	Hag ari	Auran gabad	Mohol	Parb hani	Rah uri	Sola pur	Was him	Adil abad	Mad hira	Tan dur	Mean
1	SVT352/ SPV3103	3.2	3.91	3.96	3.12	3.67	3.66	3.8	3.01	3.1	3.7	2.97	3.5	2.39	3.3	4.47	4.47	4.38	3.56
2	CSV22R ©	2.97	3.84	3.29	2.7	3.17	2.91	3.56	2.19	3.03	3.23	3.06	3.3	2.07	3.3	4.1	3.63	3.33	3.15
3	CSV29R ©	2.93	3.36	3.43	2.64	3.33	2.85	3.87	2.62	2.43	3.57	2.96	3.3	2.1	3.31	4.07	3.9	3.69	3.21
4	M35-1 ©	2.9	3.6	3.11	2.2	3.5	2.9	3.64	2.7	3.03	3.3	2.94	3.2	2.11	3.32	4.01	3.9	3.35	3.2
	Gen.Mean	3.06	3.75	3.44	2.76	3.51	2.93	3.71	2.67	3.08	3.39	3.1	3.35	2.22	3.33	4.12	3.73	3.47	3.32
	CV(%)	7.86	15.6	8.15	13.05	6.82	8.17	11.4	8.64	17.5	7.01	11.07	5.46	7.58	2.31	4.84	9.63	11.6	9.55
	CD(5%)	0.39	0.95	0.46	0.59	0.38	0.39	0.69	0.38	0.88	0.39	0.56	0.3	0.28	0.13	0.33	0.59	0.66	0.17

Table 2 : Performance of SVT 352 at various locations with respect to dry fodder yield (kg/ha) during Rabi 2023-24.

S. no.	Entry/ Location	Nandyal	Deesa	Tancha	Chamra jnagar	Dhar wad	Hagari	Auran gabad	Nanded	Parb hani	Rahuri	Solapur	Washim	Adil abad	Mad hira	Tandur	Mean
1	SVT352/ SPV3103	11111	14114	10841	8160	8741	9616	6456	7778	7568	5360	8256	8129	8175	8787	10765	8924
2	CSV 22R ©	9399	9610	10721	7636	6444	9250	6982	6637	7598	6243	5405	7628	7001	10496	7904	7930
3	CSV 29R ©	8979	10511	10060	7968	6333	12208	7583	8499	8859	6916	6456	7958	10379	10316	9335	8824
4	M35-1 ©	8679	11111	10511	8916	7963	11574	8634	7297	6907	6155	4955	7961	8654	11557	9922	8720
	Gen.Mean	9542	11336	10533	8170	7370	10662	7414	7553	7733	6169	6268	7919	8552	10289	9481	8599
	CV(%)	17.4	12.7	20.0	10.4	14.6	12.6	15.3	13.7	10.6	15.7	21.7	4.0	20.6	14.3	24.9	15.2
	CD (5%)	2541	2513	3644	1395	1637	2315	1766	1599	1223	1630	2204	511	2917	2195	4373	2164.3

Table 3 : Performance of SPV 3103 with respect to Charcoal Rot Index (CRI) during *Rabi* 23-24.

S. no.	Entry/Location	Solapur	Bijapur	Hagari	Mean	Disease reaction
1	SVT 352/SPV3103	21	26	21	22.7	Moderately Resistant
2	CSV 22R(C)	21	28	26	25.0	Moderately Resistant
3	CSV 29R(C)	17	17	18	17.3	Moderately Resistant
4	M35-1 (C)	17	24	28	23.0	Moderately Resistant
5	E36-1(RC)	10	8	11	9.7	Resistant
	Mean	17.2	20.6	20.8	19.5	
	C.V.(%)	15	25	23	21.0	
	C.D. (5%)	5.2	10.6	11.5	9.1	

Identification of bold-seeded germplasm is valuable for both crop improvement and commercial cultivation because higher test weight contributes directly to grain yield and higher consumer and market preference. In many *rabi* sorghum-growing regions of India, particularly Maharashtra, Karnataka and Telangana, consumers prefer bold, lustrous grains for preparing traditional foods such as bhakri. Improvement in grain size also contributes to grain yield improvement as they are positively correlated (Anisha *et al.*, 2022).

Fodder yield

Based on mean data of 15 locations the culture recorded higher dry fodder yield values (8924), when compared to the checks CSV 22R (7930), CSV 29R (8824) and M 35-1 (8720). The culture exhibited superiority of 12.5%, over CSV 22R, 1.1% over CSV 29R and 2.3% over M 35-1 based on All India mean data (Table 2). *Rabi* sorghum is a dual-purpose crop cultivated for both grain and fodder in the semi-arid regions. Besides providing food grain, the crop produces substantial dry fodder, which serves as an important source of livestock feed during *rabi* season. Identification of high fodder yielding genotypes is essential to develop dual-purpose cultivars that combine high grain yield with fodder to improve farm income and livestock productivity (Reddy *et al.*, 2007; Blummet *et al.*, 2010; Kumar *et al.*, 2011).

Charcoal Rot Screening

The culture recorded a mean charcoal rot index (CRI) of 22.7 when compared to checks CSV 22R (25), CSV 29R (17.3) and M 35-1 (23) when tested at 3 locations while the resistant check E 36-1 recorded a CRI value of 9.7 (Table 3). This indicates that the entry is moderately resistant to charcoal rot disease similar to the elite checks. These results were in accordance with studies of Sukanya *et al.* (2017), Chattannavar and Bannur (2020), Ayyappa *et al.* (2023), Khaja Mohinuddin *et al.* (2023) and Swathi *et al.* (2026), who identified

resistant sources to charcoal rot by systematic screening under wilt sick conditions.

Conclusion

The present study through multilocation evaluation identified the *rabi* sorghum culture SVT 352, which is superior to the popular cultivars (elite checks) in terms of the three traits namely test weight, dry fodder yield and charcoal rot resistance, which are very much essential for sustained productivity under *rabi* conditions. The entry could serve as a stable donor for improvement of the above traits in future sorghum improvement programmes

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Competing interests

Authors have declared that no competing interests exist.

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