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Performance of *Rabi* Sorghum in Coastal Andhra Pradesh.

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ABSTRACT

A field experiment was conducted at Agricultural College Farm, Bapatla during *rabi* 2017-18 to study the performance of *rabi* sorghum in coastal Andhra Pradesh. The treatments comprised of three sorghum hybrids CSH-14, MAHALAKSHMI, CSH-25 and four dates of sowing i.e, 2nd fortnight of September, 1st fortnight of October, 2nd fortnight of October and 1st fortnight of November. The results revealed that sowing of *rabi* sorghum during 2nd fortnight of September resulted in significantly higher plant height, accumulation of drymatter, number of days to 50% flowering, number of days to maturity, numbers of grains per earhead, earheads per m^2, grain yield and stover yield. Among the hybrids mahalakshmi performed significantly superior to other hybrids during *rabi* season.

Key words: *Dates of sowing, sorghum hybrids, Yield attributes.*

Sorghum (*Sorghum bicolor* (L) Moench) is the fifth most important crop in the world, and the most important millet crop in India with an area of 19.59 lakh ha with a production of 2.42 million tonnes (Crops Division, Ministry of Agriculture and Farmers Welfare, 2016). It is one of the important staple diets popular among the farmers in the arid and semi-arid tropics of the world. It is called as "The camel of crops" because of its ability to grow in arid and semiarid soils and withstand prolonged droughts.

Sorghum is a subsistence crop and is frequently grown by small farmers in of low rainfall and drought areas. Further, its tolerance to high temperature and drought makes it suitable for any climatic condition in general and to the Krishna agro-climatic zone of Andhra Pradesh in particular. In Krishna Agro-climatic zone of Andhra Pradesh, it is emerging as a potential alternative food, fodder and bio-energy crop to several other cereals and millets. The lower yields of sorghum, in general compared to other cereals is mainly due to restricted cultivation mostly confined to dry lands and lack of suitable climatic conditions that can enhance the growth and yield of crop.

Weather plays an important role in determining the growth and development of sorghum crop. The expression of phenotypic traits is the result of interactions of genotypes and the weather (Murthy *et al.,* 2017). Better growth and development of sorghum due to favorable temperature, humidity, photoperiod and soil moisture condition was recorded when crop was sown at early *rabi* season *i.e.,* on 39th meteorological week (Waghmare *et al.*, 2010). Several weather factors influence the crop growth and yield. It is therefore, necessary to understand the influence of weather parameters on crop growth.

MATERIAL AND METHODS

A field experiment was conducted during *rabi* season of 2017-18 at Agricultural College Farm, Bapatla. The experimental soil was sandy in texture having pH. 6.5, low available nitrogen (240 kg ha^{-1}), low in available phosphorus (12.8 kg ha^{-1}) and low in available potassium (118 kg ha^{-1}). The experiment was laid out in a randomized block design with factorial concept with three hybrids of sorghum (CSH-14, mahalakshmi, CSH-25) and four dates of sowing (2nd fortnight of September, 1st fortnight of October, 2nd fortnight of October and 1st fortnight of November) and replicated thrice. A uniform dosage of 150:60:75 N:P:K kg ha^{-1} was applied with entire dose of phosphorus and potassium being applied as basal and nitrogen was applied in 3 split doses. The remaining nitrogen was applied in two equal splits at 30 DAS and 60 DAS for all the treatments.

The weekly mean maximum and minimum temperatures during the crop growth period were 31.57°C and 20.10°C respectively. The weekly mean average relative humidity at 8.30 hrs was 79.8 per cent and at 17.30 hrs was 63.90 per cent. A total rainfall of 220.2 mm was received in 11 rainy days during the crop growth period. The crop was sown with a spacing of 45 × 15 cm. Weeding and plant protection measures were followed as and when needed. Observations regarding the growth and yield attributing characters, grain and straw yield were recorded and subjected to statistical analysis.

RESULTS AND DISCUSSION

Growth

The results of the study revealed that crop growth was significantly influenced by time of sowing. (Table 1). Plant height (155 cm), drymatter production

Table 1. Growth and yield attributes of sorghum hybrids as influenced by dates of sowing.

Treatments	Plant height (cm)	Drymatter production (kg ha^{-1})	Days to 50% flowering	Days to maturity	No of earheads per m^{-2}	Earhead length	No. of grains per earhead	Grain yield	Stover yield	Harvest Index
Hybrids										
CSH-14	133	9826	56	114	17	23	1443	4607	6967	29.7
MAHALAKSHMI	154	14053	59	122	19	26	1998	5198	9432	32.33
CSH-25	145	11856	57	118	18	25	1653	4903	8112	31.6
SEm±	5.16	649.52	0.8	2.04	0.44	0.71	113	141	480	0.67
CD (0.05)	NS	1903.5	2.36	5.97	1.3	2	330	414	1406	1.96
Dates of sowing										
(D_1) 2nd fortnight of September	155	13776	60	124	19	26	1936	5162	9109	33.05
(D_2) 1st fortnight of October	146	12700	57	118	19	25	1828	5082	8454	31.17
(D_3) 2nd fortnight of October	137	10707	56	116	18	24	1748	4839	7574	30.62
(D_4) 1st fortnight of November	137	10463	56	114	17	23	1282	4526	7544	29.99
SEm±	5.96	749.45	0.96	2.37	0.51	0.82	130	163	415	0.7
CD (P=0.05)	17.81	2198.36	2.71	6.92	1.5	2.4	381	478	1218	2.2
Interaction										
SEm±	10.32	1298.01	1.61	4.07	0.88	1.42	225.13	141	830.7	1.3
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CV (%)	12.7	18.8	4.8	5.9	8.3	9.9	22.1	9.9	17.6	7.4

(13776 kg ha^{-1}) were increased upto harvest when crop sown in 2nd fortnight of September sown crop followed by 1st fortnight of October sown crop. Maximum number of days to 50% flowering (60) and maturity (124) were recorded in earlier dates of sowing compared to later dates of sowing. This might be due to optimum availability of sunshine hours, temperature, rainfall which triggered better utilization of resources and hence better crop growth. The results are in conformity with Ammanullah *et al*. (2015), Karhale *et al*. (2014). Among the hybrids mahalakshmi recorded higher plant height (154 cm), drymatter (14053 kg ha^{-1}), number of days to 50% flowering (59) and number of days to maturity (122) followed by CSH-25. This is due to better response of hybrid mahalakshmi to all weather conditions which resulted in better growth over other hybrids. The results are in conformity with Biradar *et al.* (2004) and the interactions were non-significant.

Yield attributes

Regarding yield attributing characters (Table 2), significantly highest number of earheads per m^2 (19), earhead length (26), number of grains per head (1936), grain yield (5162 kg ha^{-1}), stover yield (9109 kg ha^{-1}) and harvest index (33.05 %) were recorded with early sown sorghum *i.e.,* 2nd fortnight of September followed by 1st fortnight of October which might be due to more favourable weather conditions created at grain filling stage of sorghum caused a better source-sink relationship and higher seed yield. Under delayed sowings, lack of soil moisture due to cessation of rains effected the grain yield. These findings were in ordinance with Umrani *et al. (*1988).

Among the hybrids tested highest number of earheads per m^2 (19), earhead length (26), number of grains per head (1998), grain yield (5198 kg ha^{-1}), stover yield (9432 kg ha^{-1}) and harvest index (32.33 %) were recorded with mahalakshmi and followed by CSH-25 and CSH-14 this is due to the light part of solar spectrum in photosynthesis with mahalakshmi hybrid is more predominant which might be due to excitation of chlorophyll by light which culminated in better synthesis of ATP and NADPH by this hybrid and also the it has responded better to light intensities during the vegetative and reproductive stages of the crop . This process ultimately resulted in higher seed yield of mahalakshmi hybrid when sown on 2nd fortnight of September (Taiz and Zeiger, 2003). Similar findings were reported by Karhale *et al.* (2014).

CONCLUSION

Thus, it may be concluded that optimum time of sowing of *rabi* sorghum is 2nd fortnight of September, mahalakshmi hybrid performed well when sown during 2nd fortnight of September.

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