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INFLUENCE OF SOWING DATE ON YIELD AND YIELD COMPONENTS OF BAJRA IN RAINFED ALFISOLS OF ANDHRA PRADESH

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ABSTRACT

A field experiment was conducted in split plot design during *kharif* 2013 and 2014 on sandy loam soils in bajra to find out the suitable sowing time for hybrid bajra. The results revealed that second fortnight of June recorded significantly higher yield attributes viz. ear head length, girth, weight, 1000 grain weight and grain yield of bajra hybrid PHB-3 compared to rest of the dates of sowing. The heat use efficiency (HUE) and heliothermal use efficiency (HTUE) was the highest with June second fortnight sown crop.

KEYWORDS: Bajra, Thermal Unit, HUE

INTRODUCTION

In India bajra is cultivated in an area of 8.9 million hectares with grain production of 6.51 million tones and productivity of 731 kg ha^{-1}. In Andhra Pradesh, it is cultivated in an area of 0.05 million hectares with grain production of 0.05 million tones and productivity of 1178 kg ha^{-1}. Bajra is a coarse grain crop and drought tolerant suitable to cultivate in drylands of Andhra Pradesh. Sowing during appropriate time enables any crop to take full advantage of favourable weather conditions. Sowing time for rainy season crops can be determined through information on onset and withdrawal of monsoon, probability of rainfall and rainfall distribution. However, determination of sowing time depends upon the soil moisture availability, optimum temperature, heat unit requirement and thermal use efficiency of crops. (Sahu *et al.,* 2007)

MATERIALS AND METHODS

Two hybrids of bajra *viz*. PHB-3 and PHB-306 were sown on three different dates *viz.* 30th May, 15th June and 30th June 2013 at an interval of 15 days during *kharif* season of 2013 and 2014 in the dryland farm of Regional Agricultural Research Station, Tirupati in a split plot design with dates of sowing as main plot and bajra hybrids as sub plot treatments. Recommended agronomic practices were adopted for the region on red sandy loam soils was adopted for growing bajra crop. The soil of the experimental site was sandy loam with a pH of 6.8, E.C of 0.11, organic carbon of 0.18 available N of 129 kg ha^{-1} available P of 10.2 kg ha^{-1} and available K of 139.7 kg ha^{-1}.

Periodical observations on phenological development, yield and yield attribute characters (Table 1) were recorded. Growing degree days (GDD) were calculated using base temperature of 10°C from daily mean temperature. The thermal use efficiency for the seed yield of bajra was computed as heat use efficiency and heliothermal use efficiency.

Heat use Efficiency (HUE) = Seed yield (kg ha^{-1}) / GDD °C day.

Heliothermal use Efficiency (HTUE) = Seed yield (kg ha^{-1}) / HTU °C hr.

RESULTS AND DISCUSSION

Yield and Yield attributes

The yield attributing characters like ear head girth (10.3 cm) and 1000 grain weight (9.98 g) were superior in June 2nd fortnight sowing where the crop received good distribution of rainfall with optimum temperature and maximum bright sunshine hours during 2013 (Table 1a). Among the hybrids, PHB-3 recorded the highest ear head length (23.97 cm), girth (10.2 cm) weight (41.72 g) and 1000 grain weight (9.08g) which are significantly superior than PHB-306. Similarly during 2014 (Table 1b) all the yield attributing characters like ear head length (23.11 cm), girth (10.11 cm), ear head weight (29.02 g) and 1000

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Table 1a: Effect of sowing dates on yield attributes and yield of Bajra hybrids during *Kharif*, 2013

Treatment	Plant height (cm)	Ear head length (cm)	Ear head girth (cm)	Ear head weight plant^{-1} (g)	1000 grain weight (g)	Grain yield (Kg ha^{-1})	Straw yield (Kg ha^{-1})
Date of Sowing (D)							
D1-31.5.2013	136.4	22.93	9.6	38.60	7.19	3341	14596
D2-15.6.2013	144.0	23.00	10.0	38.45	9.13	3892	9342
D3-28.6.2013	133.1	22.59	10.3	39.22	9.98	4326	4828
CD 5%	NS	NS	0.42	NS	0.98	742	1512
Hybrids (H)							
H1 (PHB-3)	142.6	23.97	10.2	41.72	9.08	4004	11077
H2 (PHB-306)	132.9	21.71	9.8	35.78	8.45	3701	8101
CD 5%	NS	0.93	0.45	2.81	0.61	301	1937
D × H	Sig	NS	NS	NS	NS	NS	Sig

Table 1b: Effect of sowing dates on yield attributes and yield of Bajra hybrids during *kharif*, 2014

Treatment	Plant height (cm)	Ear head length (cm)	Ear head girth (cm)	Ear head weight/ plant (g)	1000 grain weight (g)	Grain yield (Kg ha^{-1})	Straw yield (Kg ha^{-1})
Date of Sowing (D)							
D1-30.5.2014	137.95	18.92	9.3	26.80	7.75	4833	12072
D2-15.6.2014	138.76	19.54	9.52	27.95	6.18	5572	13691
D3-30.6.2014	143.87	23.11	10.11	29.02	12.7	6937	14083
CD 5%	NS	2.13	0.38	1.60	1.16	208	861
Hybrids (H)							
H1(PHB-3)	143.06	10.04	28.71	9.21	21.72	6335	21.72
H2(PHB-306)	137.32	9.25	27.13	8.54	19.33	5226	19.33
CD 5%	5.11	0.46	NS	0.61	1.88	264	1.88
D × H	NS	NS	NS	NS	NS	NS	NS

Table 2a: Duration and accumulated heat units, thermal use efficiency for different dates of bajra sowing (2013)

Treatment	Duration	GDD	DV	HTU	HUE	HTUE
D1	95	2891	9.44	10,089	1.15	0.33
D2	95	2873	9.32	10,227	1.36	0.38
D3	91	2677	9.01	9,637	**1.62**	**0.45**

Table 2b: Duration and accumulated heat units, thermal use efficiency for different dates of bajra sowing (2014)

Treatment	Duration (days)	GDD	DV	HTU	HUE	HTUE
D1	91	2877	10.6	12243	1.68	0.39
D2	88	2705	10.3	10395	2.06	0.53
D3	**95**	**2782**	**10.3**	10866	**2.49**	**0.63**

grain weight (12.7 g) are superior in June 2nd fortnight sowing and PHB-3 recorded superior performance in yield and yield attributing characters. During both the years, the interaction effect was not significant among the dates of sowing and hybrids.

In the present study significantly higher grain yield (4326 and 6937 kg ha^{-1}) of bajra was recorded when the sowing was done at 2nd fortnight of June (D3) followed by June 1st fortnight (D2) (3892 and 5572 kg ha^{-1}) respectively during 2013 and 2014 (Table 1a and 1b). Significantly lower yield was observed with 1st date of sowing (D1) (3341 and 4833 kg ha^{-1}) in both the years of study. The variation in grain yield of bajra during the both the years was due to difference in amount of rainfall received, but both the years showed similar trend (Deshmukh *et al.,* 2009).

During both the years D1 (May 2nd fortnight) sown crop received less amount of rainfall with less rainy days during its growth period whereas June 1st and June 2nd fortnight sown crops received good amount of rainfall with well distribution and bright sunshine hours which might have contributed in getting good yields. The earliest sown crop experienced extreme moisture stress during the earhead emergence period which drastically reduced the partitioning of drymatter to earhead and its development could not be received even with sufficient moisture conditions later on. On the other hand, favourable moisture conditions during entire period enhanced the contribution to earhead considerably, as in case of June 2nd fortnight sowing (Annual reports of AICRP on Agrometeorology 2000-01). The heat use efficiency and heliothermal efficiency was highest in June 2nd fortnight sown crop compared to May 2nd fortnight and June 1st fortnight crop in both the years (Table 2a and 2b). The efficiency of thermal energy conversion for yield and dry matter production depend upon the genetic factors of crop and sowing time. The thermal use efficiencies were the highest for 3rd sowing (June 2nd fortnight) followed by 2nd and 1st sowings. The poorest thermal use efficiency was observed under the 1st sowing, which might have resulted low yields of bajra.

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