

## Effect of sowing dates on growth and yield of pearl millet during summer season

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Pearlmillet is the fourth most important cereal staple food crop in India next to rice, wheat and sorghum. Traditionally, it is grown in arid and semi-arid tropics of India and is next to sorghum in area and production in Maharashtra state. The area under pearl millet in Maharashtra is about 18 lakh ha with the production of 10.87 lakh tonnes having productivity of 604 kg ha<sup>-1</sup> (Anonymous, 2001). Sowing time is the most important non monetary input affecting yields of the crop. Due to advent of new genotypes of pearl millet, it is now being grown during summer season under irrigated conditions. Farmers are harvesting bumper yield of pearl millet during summer as compared to *kharif* season, and research information on this is limited.

An experiment was conducted during summer 2000 at Agronomy farm, Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri. The field was laid out in split plot design with three replications and 24 treatment combinations formed due to four sowing dates viz., 1<sup>st</sup> MW (D<sub>1</sub>), 3<sup>rd</sup> MW (D<sub>2</sub>), 5<sup>th</sup> MW (D<sub>3</sub>) and 7<sup>th</sup> MW (D<sub>4</sub>), three fertilizer levels viz., 100% RDF (F<sub>1</sub>), 150% RDF (F<sub>2</sub>) and 50% RDF + 5 t FYM (F<sub>3</sub>) per ha. and two hybrid varieties viz.,

Shraddha (V<sub>1</sub>) and Saburi (V<sub>2</sub>). The crop was sown as per the sowing date treatments mentioned above. The measurement of plant height and dry matter were recorded at 30, 45, 75 DAS and at harvest along with yield contributing characters. The growing degree days were calculated taking base temperature as 17°C (Mungse, 1987).

Data on total heat unit accumulated from sowing to different phases of plant growth are presented in Table 1. The accumulative heat units required during all the phases of crop growth were significantly affected due to different sowing dates. During all the growing phases the sowing date D<sub>1</sub> i.e. 7<sup>th</sup> MW has accumulated maximum heat units followed by D<sub>2</sub> (5<sup>th</sup> MW). Heat unit requirement increased as the sowing of pearl millet crop was delayed. The least heat unit requirement was recorded when the sowing was undertaken during 1<sup>st</sup> MW (D<sub>1</sub>) and subsequently the heat units increased as it was delayed by every two weeks. The variation in heat unit requirements during different phases namely flag leaf, heading, 50% flowering, grain development and physiological maturity might be attributed to ineffective excess heat units accumulated

**Table 1 :** Cumulative growing degree days accumulated at each stage as influenced by sowing dates

Sowing dates	Flag leaf	Heading	50% flowering	Grain development	Physiological maturity
D <sub>1</sub>	137.0	171.1	216.0	283.1	443.3
D <sub>2</sub>	149.4	187.4	256.4	350.4	554.3
D <sub>3</sub>	202.6	351.9	292.4	371.4	674.6
D <sub>4</sub>	272.9	370.7	404.1	461.7	781.4
S.E. m. $\pm$	2.70	1.81	2.11	2.24	5.25
C.D. at 5%	7.92	5.32	6.18	6.57	15.39

**Table 2 :** Effect of sowing dates on growth at harvest and yield contributing characters after harvest of pearl millet during summer

Sowing dates	Plant height per plant (cm)	Leaf area per plant (dm <sup>2</sup> )	Dry matter per plant (g)	Ear head length (cm)	Ear head girth (cm)	Ear head weight per plant(g)	Thousand grain weight (g)
D <sub>1</sub>	127.8	1.71	38.7	15.4	8.9	18.9	11.8
D <sub>2</sub>	149.9	1.91	54.6	17.9	9.5	20.1	12.0
D <sub>3</sub>	143.8	1.69	48.3	16.9	9.0	19.3	11.8
D <sub>4</sub>	128.4	1.45	32.4	14.9	8.6	12.4	9.3
S.E. m. $\pm$	2.77	0.15	2.11	0.33	0.16	0.16	0.35
C.D. at 5%	8.11	0.31	6.19	0.98	0.46	0.46	1.04

**Table 3 :** Effect of sowing dates on yield of pearl millet

Sowing dates	Grain yield (q ha <sup>-1</sup> )	Straw yield (q ha <sup>-1</sup> )	Total biomass (q ha <sup>-1</sup> )	Harvest index (%)
D <sub>1</sub>	18.7	28.5	47.3	39.6
D <sub>2</sub>	20.4	35.3	55.7	37.0
D <sub>3</sub>	19.6	30.3	49.9	39.1
D <sub>4</sub>	15.8	27.8	43.6	36.2
S.E. m. $\pm$	0.96	1.40	2.06	1.60
C.D. at 5%	2.82	4.11	6.05	4.70

due to delay in sowing time. Results of present investigations in general are in agreement with the findings of Mungse (1987).

The data pertaining to various growth characters of pearl millet as influenced by different sowing dates is presented in Table 2. The plant height at harvest was found significantly maximum in  $D_2$  (149.90 cm) but it was at par with that of  $D_3$  (143.80cm). The maximum plant height in pearl millet was recorded for the sowing in 3<sup>rd</sup> MW followed by 5<sup>th</sup> MW. The leaf area per plant at harvest due to the sowing in 3<sup>rd</sup> MW ( $D_2$ ) was significantly superior (1.91 dm<sup>2</sup>) to those found in the rest of the sowings. The above results regarding mean leaf area per/plant are similar to the results obtained by Upadhyay and Nirval (1976) and Lal *et al.*, (1995). Dry matter accumulation per plant due to sowing in 3<sup>rd</sup> MW ( $D_2$ ) was significantly superior (54.58 g per plant) over those recorded in all the other treatments. The accumulation was the lowest in the treatment  $D_4$  (32.37 g per plant). For all the growth parameters, sowing of pearl millet in 3<sup>rd</sup> MW was found superior to the other sowing dates.

Data regarding the length of earhead, girth of earhead, earhead weight per plant and thousand grains weight are presented in Table 2. Significantly maximum length of earhead (17.9 cm) and girth (9.5 cm) were observed due to  $D_2$  (3<sup>rd</sup> MW). Sowing of pearl millet in 3<sup>rd</sup> MW ( $D_2$ ) also produced maximum and significantly more (20.1 g) earhead weight per plant and 1000 grain weight (12.0 g) than those of other dates of

sowing. The weight of thousand grains was minimum (9.3 g) in the treatment  $D_4$  and it was significantly lowest than rest of the treatments. By and large the hybrids showed excellent growth when sown in 3<sup>rd</sup> MW ( $D_2$ ) or 5<sup>th</sup> MW ( $D_3$ ). Obviously it was reflected on yield attributes. The above results in respect of yield contributing characters are in agreement with the findings Patel *et al.* (1995) and Bhagchand and Gautam (2000).

Data pertaining to the yield of grain, straw and total biomass in quintals per hectare and harvest index as influenced by different sowing dates are given in Table 3. Significant differences were observed in grain yield per hectare due to sowing dates. Sowing in 3<sup>rd</sup> MW ( $D_2$ ) out yielded significantly more grain yield (20.4 q ha<sup>-1</sup>) than those observed in rest of the treatments but was statistically identical to the grain yield obtained from  $D_1$  and  $D_3$ . Treatment  $D_4$  recorded significantly the lowest (15.8 q ha<sup>-1</sup>) grain yield. The maximum total biomass production was recorded for the sowing in 3<sup>rd</sup> MW ( $D_2$ ) (55.7 q ha<sup>-1</sup>) which was significantly more than those observed in all other treatments.

The grain, fodder and total biomass were higher due to the sowing of pearl millet during 3<sup>rd</sup> MW ( $D_2$ ). All the values of growth parameters like, height, number of leaves, leaf area, number of tillers etc. were of higher magnitude than those observed in other sowing dates. Maximum harvest index of 39.60 % was recorded for the sowing done in 1<sup>st</sup> MW ( $D_1$ ) which was significantly superior to those observed in all the other sowing dates. The lowest

harvest index of 36.21 5 was observed in 7<sup>th</sup> MW (D<sub>4</sub>). The results regarding grain yield, straw yield and total biomass production were similar to those recorded by Gautam and Kaushik (1984), Bhagchand and Gautam (2000).

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