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Effect of sowing dates and spacing on growth and economics of sorghum (*Sorghum bicolor* L. Moench)

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Abstract
A field experiment was conducted during Kharif 2019 at Central Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P). The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.3), low in organic carbon (0.57%), available N (230 kg/ha), available P (32.10 kg/ha) and available K (346 kg/ha). The treatments consist of 3 different sowing dates *viz*.17th July, 10th and 26th August (respectively) and 3 different spacing *viz*. 30cm, 45 cm and 60 cm, whose effect was observed on Sorghum. There were nine treatments each replicated thrice. The experiment was laid out in Randomized Block Design. The result showed that growth parameters *viz*. Plant height (110.35 cm), Number of leaves (14.91) at 120 harvests were recorded superior with the sowing date 17th July with spacing 45 cm. Gross returns (146415.7 ₹/ha), net returns (106075.7 ₹/ha) and B: C ratio (1.52) were recorded significantly higher with the sowing date 17th July with spacing 45 cm. From the above data the sowing date 17th July with spacing 45 cm was found to be more productive and economically beneficial.

Keywords: Sorghum, sowing dates, spacing, growth, productive, economics

Introduction
The most important food and fodder crop for dryland agriculture is sorghum. It is one of the few resilient crops capable of adapting well to future conditions of climate change, especially drought, soil salinity and high temperatures. The crop is resistant to drought and heat and is particularly valuable because of its short length, fast-growing nature and high biomass in arid and semi-arid regions. Sorghum is the fifth largest cereal crop and is the staple dietary food of over 500 million people in 30 countries (Kumar *et al*., 2011). It is cultivated in the nations of Africa, Asia, Oceania and America. Among them, the major producers are the USA, India, Mexico, Nigeria, Sudan and Ethiopia. In Asia and Africa, the grain is used mainly as food (55%) in the form of flatbreads and porridges (thick or thin). In America, and as feed (33 percent) (ICRISAT, 2011). The stove is an increasingly important source of dry-season feed for livestock, especially in Asia. But cereals are naturally low in zinc, growing them further decreases grain zinc and thus the dietary intake of zinc when consumed on such potentially zinc-deficient soils.

Materials and Methods
The present investigation was carried out during Kharif, 2019 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The farm situated at 25^0 57' 12" N latitude, $87^0$50' 12" E longitude and at an altitude of 98 meter above mean sea level. This area is situated on the right side of the river Yamuna and opposite side of Prayagraj city. Sorghum was sown @ 12 kg/ha with the recommended dose of N, P, K and evaluated in Randomized block design with treatments and three replications. The treatment combinations with Date of sowing and spacing with every 3 various dates and spacings *viz*. 17th July ^{10th} and 26th August. Optimum plant population maintained by thinning and gap filling. The thinning operation was done after 10 days of sowing. The spray of Emamectin benzoate 1ml/litre to reduce the infestation of stem borer. The observations were recorded on the different growth parameters *viz*. plant height, number of leaves per plant and economics.

The experimental crop was harvested on November 14, 2020, December 07, 2020, and December 23, 2020. The produce from net plots was harvested in one lot and tied in bundles and allowed to complete dried material was passed through threshing operation. After threshing and winnowing the clean seeds from each plot were weighed and the weight was recorded as grain yield in kg/plot and then converted in q/ha.

Results and Discussion

Growth parameters

Plant height

Plant height maximum at harvest (110.35cm) in treatment T_2 (17^{th} July + 45 cm) recorded significantly highest plant height as compared to other treatments. Whereas, treatment T_1 (17^{th} July + 30 cm) and treatment T_5 (10^{th} August + 45cm) were found to be statistically on par with treatment T_2 (17^{th} July + 45 cm). Plant height was significantly higher in 17^{th} July + 45 cm spacing. Plant height increased with the decreased spacing. Because in reduced spacing, increases the competition in plants for light. So that plants stops grow in horizontal and grows in vertical. Early sown crop shown higher plant height than late sown crop. Because of early sown crop utilizes the favorable conditions of weather conditions. The increase in plant height of sorghum might be due to favourable climatic conditions in the 2^{nd} fortnight of July. Similar results were found by Karhale *et al.*, 2014 [4].

Number of leaves per plant

Number of leaves per plant at harvest (14.91) were found to be significantly highest in treatment T2 (17th July + 45 cm) whereas, treatment T4 (10th August + 30 cm) and T5 (10th August + 45 cm) were found statistically on par with T2 (17th July + 45 cm) as compared to other treatments as compared to other treatments. Spacing was significantly affected the number of leaves per plant. In narrow spacing number of leaves per plant was reduced, but the medium and wider spacing shown no significant difference. The data showed that the spacing of 45 cm shown significantly higher number of leaves per plant than other spacing. The dates of sowing showed no significant effects on number of leaves per plant, similar results were found in Gondal *et al*., 2017 [3].

Table 1: Effect of sowing dates and spacing on growth parameters of sorghum

Treatments	Plant height (cm)	No. of leaves/plant
1. 17^{th} July +30 cm	106.71	12.28
2. 17^{th} July + 45 cm	110.35	14.91
3. 17^{th} July + 60 cm	101.95	10.69
4. 10^{th} August + 30 cm	103.67	13.47
5. 10^{th} August + 45 cm	105.73	12.60
6. 10^{th} August + 60 cm	100.06	11.93
7. 26^{th} August + 30 cm	99.8	11.45
8. 26^{th} August + 45 cm	102.29	11.72
9. 26^{th} August + 60 cm	99.13	10.92
S.Em (±)	2.12	0.79
C. D. (P =0.05)	6.32	2.35

Economics

Cost of cultivation (₹ 40340/ha), Gross returns (₹146415/ha), Net returns (₹ 106075/ha), Benefit cost ratio (1.52) were found higher with the early date of sowing 17^{th} July and spacing 45 cm. Gross returns (₹ 146415/ha) was found to be highest in treatment T_2 (17^{th} July + 45 cm) and the minimum gross (₹ 114584.7/ha) was found to be in treatment T_9 (26^{th} August + 60 cm) as compared to other treatments.Net returns (₹ 106075/ha) was found to be highest in treatment T_2 (17^{th} July + 45) and the minimum gross (₹ 74484.77/ha) was found to be in treatment T_9 (26^{th} August + 60 cm) as compared to other treatments. Benefit cost ratio (1.52) was found to be highest in treatment T_2 (17^{th} July + 45 cm) and the minimum Benefit cost ratio (1.30) was found to be in treatment T_3 (17^{th} July + 60 cm) as compared to other treatments.

Table 2: Effect of sowing dates and spacing on economics of sorghum

Treatments	Total cost of cultivation*	Gross returns (□/ha) *	Net returns (□/ha) *	B:C ratio*
1. 17^{th} July +30 cm	40580	130387.3	89807.33	1.42
2. 17^{th} July + 45 cm	40340	146415.7	106075.7	1.52
3. 17^{th} July + 60 cm	40100	117454	77354	1.30
4. 10^{th} August + 30 cm	40580	125976.7	85396.67	1.37
5. 10^{th} August + 45 cm	40340	129877.3	89537.33	1.39
6. 10^{th} August + 60 cm	40100	118170.7	78070.67	1.38
7. 26^{th} August + 30 cm	40580	124741.3	84161.33	1.34
8. 26^{th} August + 45 cm	40340	118708	78368	1.31
9. 26^{th} August + 60 cm	40100	114584.7	74484.67	1.34

*Data was not subjected to statistical analysis

Conclusion

On the basis of one-season experimentation, we can conclude that the treatment combination T_2 (17^{th} July + 45 cm) was found to be the best. T_2 is both productive and economic.

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References

1. Andrade FH, Calvino P, Cirilo A, Baebieri P. Yield responses to narrow row depend on increased radiation interception. Agronomy Journal 2002;94(10):113-118.
2. Chitte AR, Wani AG, Patil HM, Shete BT. Effect of sowing dates, method and row spacing on maize varieties in winter. Indian J of Ecology 2008;15:62-65.
3. Gondal MR, Hussain A, Yasin S, Musa M, Rehman HS. Effect of Seed rate and Row spacing on Grain yield of Sorghum. SAARC J Agri 2017;15(2):81-91.
4. Karhale MB, Jaybhaye PR, Asewar BV, Shinde PB. Effect of Different Sowing Dates on Growth and Yield of Kharif Sorghum Hybrids. J of Agri. and Veterinary Science 2014;7(12):05-08.
5. Kumar S, Yakadri M, Rao SS. Effect of Nitrogen levels and planting geometry on sweet sorghum (*Sorghum bicolor* L.) growth, stalk and grain yields. Crop Res 2012;44(1&2):33-36.