

EFFECT OF DATES OF SOWING ON GROWTH, YIELD AND ECONOMICS OF SMALL MILLETS

Sanjay Kumar^{*1}, Kumer Singh Malviya¹, Lakhan Bakoriya², Sachin Aske¹, V.D. Dwivedi¹, S.K. Singh³ and D.K. Malviya¹

¹*Department of Agronomy, JNKVV College of Agriculture, Rewa-486 001 (M.P.)*

²*Department of Agronomy, JNKVV College of Agriculture, Tikamgarh- 472001 (M.P.)*

³*Food Corporation of India, FSD, Mokama, District Office, Patna- 803302 (Bihar)*

Email: rupanksha.231302@gmail.com

Received-07.02.2019, Revised-26.02.2019

Abstract: A field experiment was carried out during rainy season 2017 at the Instructional Farm, JNKVV College of Agriculture, Rewa (M.P.). To study the effect of dates of sowing on growth, yield and economics of small millets. The growth and development of kodo millet was found superior followed by little millet and then barnyard millet under the influence of normal sowing date. The 15 July (normal sowing) was found the best sowing date for mitigating the climatic changes on kodo millet, little millet and barnyard millet, followed by early sowing and late sowing dates. The maximum grain yield (17.75 q/ha) and net income (Rs 33962/ha) was obtained when kodo millet was sown on 15th July.

Keywords: Dates of sowing, Growth, Yield, Economics, Small millets

INTRODUCTION

Small millets (*viz.* Kodo, Kutki, Ragi, Sawa, Cheena) are the small grained cereal crops belonging to the family *poaceae* (*Gramineae*). Small millets are mainly grown for food and feed purposes in the dry regions of world with limited alternatives for earning cash income and no crop insurance under harsh environments. Madhya Pradesh contributes about 50% area and 35% production of total millet in the country. The state of Madhya Pradesh ranks first among Kodo and kutki growing states in the country. Small millet occupies an area of 3.32 lakh hectare with the production of 0.92 lakhs tonnes in the state of Madhya Pradesh. Study conducted at Dharwad reveals that early sowing recorded significantly higher dry matter production (103.73 g) at maturity which decreased with delayed sowing (86.2 g). The number of effective tillers was higher in early planting crops with early maturity. The grain yield was maximum (7.38 q/ha) in proso millet sown in first fortnight of June (Palled *et al.* 2001). Thus the different small millets react differently in their productivity under normal, early or late sowing dates as reported by Patel and Patel (2002), Kamara *et al.* (2009) and Bashir *et al.* (2015). Looking to these facts, the present research was taken up under the existing agro-climatic conditions of Kymore plateau of M.P.

MATERIALS AND METHODS

The field experiment was carried out during the rainy season 2017 at the Instructional Farm, JNKVV College of Agriculture, Rewa (M.P.). The experimental soil was silty clay-loam in texture. The soil reaction was normal (PH 7.17). The available nitrogen in soil was low (238 kg/ha) while

*Corresponding Author

experimental field was medium in available phosphorus (18.8 Kg/ha) and high in available potash (357 kg/ha). The electrical conductivity was 0.31 d s/m and organic carbon 0.67%. The experiment was laid out in a factorial randomized block design with three replications. The treatments comprised three small millets (kodo millet, little millet, and barnyard millet) and three date of sowing, (1st July, 15th July and 30th July). Thus the 9 treatment combinations were formed in one replication. The experiment were sown on 01, 15 and 30 July, 2017 keeping a seed rate of 10, 7 and 8 kg/ha and row spacing 22.5 cm and plant spacing 7 cm. the fertilizers were applied as per treatment. The crop was grown totally under rainfed condition. The total rainfall during the crop season was 256.89 mm with rainy days. The crop was harvested on 18 October, 2017.

RESULTS AND DISCUSSION

Growth parameters

The growth parameters of small millets revealed that the plant height, number of tillers/m², number of leaves/plant and leaves/plant were found to differ significantly amongst the small millets. The small millet differences amongst these growth characters were highly different. For example barnyard millet was found highest in plant height (109.14 cm), kodo millet was highest in tillers number (240.75/m²), it was highest in number of leaves 18.76/plant. On the other hand, kodo millet was found lowest in plant height (80.76 cm), barnyard millet lowest in tillers count (184.00/m₂), kodo millet was lowest in leaves count (16.09 /plant). So much variation in growth parameters in different varieties was owing to variations in their genetic inheritance in these characters. In fact the growth parameters among the small millets are genetically governed. Such type of

observations among the small millet have also been reported by Craufurd and Bidinger (1989)

As regards with the dates of sowing, 15th July sowing recorded maximum plant height (101.34 cm), tillers (225.33/m²), leaves (17.52/plant). On the other hand, the corresponding values of late sowing (30th July) were almost significantly lowest (89.92 cm height, 203.43tillers, 16.07 leaves,). The maximum growth parameter under timely sowing may be owing to the immediate availability of favorable condition in the requisite of small millets. The increase height tillering and leaves number might be due to role of favorable temperature in rapid multiplication of tissues and increase in amount of growth substances such as normally occurring phytohormones and increase in auxin supply with higher level Patel and Patel (2002), Kamara *et al.* (2009) Bashir *et al.* (2015).

Yield attributing characters

The yield attributing characters viz. number of panicles/plant, number of grains/panicle, length of panicle, weight of grains/panicle and 1000 grain weight were found to deviate up to significant extent due to different small millet and date of sowing. Out of three small millet, kodo millet brought about significantly higher number of panicles 248.15/plant over all the remaining millets. However, the other yield attributing characters were in the highest range case of little millet (234.22 grains/panicle, and barnyard millet was 24.37 cm panicle length, 0.71 g grains weight/panicle and 3.61 g 1000 grain weight in case of kodo millet). In case of kodo millet the grains/panicle, panicle length and grains weight/panicle were in the lowest range whereas 1000 grains weight was in the barnyard millet (2.02g). These type variations may be owing to variations in the genetic build up of the small millets. In fact it is very difficult to inherit all the desirable characters in one variety although efforts are being made in this direction. Such type of variability in the yield attributing characters in the small millets have

been reported by many research Yang and Zhang (2006), Kamara *et al.* (2009) Bashir *et al.* (2015).

The 15th July sowing resulted in significantly higher yield attributes over the remaining date of sowing. The number of panicles was 223.03/m₂, grains/panicle was 217.21, panicle length 23.92 cm, grains weight/panicle 0.65 g and 1000 grains weight 2.66 g due to timely sowing. This might be attributed to the maximum increase in growth parameter including number of leaves/plant due to applied date of sowing. Increased photosynthetic surface (leaves) brought about increased production of photosynthates and thereby increased translocation of photosynthates from source to the sink (Kamara *et al.*, 2009 and Patel and Patel, 2002).

Productivity parameters

The grain and straw yields were secured maximum from kodo millet i.e. 17.75 q/ha,. However, the harvest index was in the higher range (30.67%). The second best millet was little millet producing 11.63 q/ha grain and 27.32 q/ha straw with 29.88% harvest index. The lower 25.47 q/ha straw yield, 29.69 % harvest index. Barnyard millet was found lowest producer of grain and straw. The higher productivity in case of kodo millet might be owing to increased number of panicles/m², the main yield attributing character. The increased yields due to increased yield attributing characters have also been reported by Hawlader and Islam (1991) and Dubey *et al.* (1993). The 15th July sowing date proved significantly superior to other dates in respect to grain and straw yields of small millet. The 15 July sowing resulted in highest grain and straw yield i.e. 14.92 and 32.26 q/ha, respectively, being higher by 11.12 and 29.32 q/ha, respectively over 30th July sowing. The highest yield parameters due to timely sowing might be owing to the highest yield attributing parameters. The present results agree with those of other workers. (Dubey *et al.* 1993) Kamara *et al.* (2009), Ali and Squire (2002) Bashir *et al.* (2015) and Patel and Patel (2002) respectively.

Table 1. Growth, yield-attributes, yield and economics of small millets under different dates of sowing

Treatments	Plant height (cm)	Tillers/m ²	Leaves/plant	Panicles/m ²	Grains/panicle	Panicle length (cm)	Weight of grains/panicle (g)	Test weight of 1000 grains (g)	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index (%)	Net income (Rs/ha)	B:C ratio
Small millets													
Kodo	72.1	241	18.8	240	187	20.5	0.71	3.61	17.75	39.66	30.67	33962	2.45
Little	94.6	211	16.2	210	234	23.4	0.55	2.07	11.63	27.32	29.88	15626	1.71
Barnyard	109.1	182	16.1	182	203	24.7	0.56	2.02	10.16	25.47	28.69	10849	1.49
C.D.(P=0.05)	4.34	10.2	1.2	10.2	12.0	0.86	0.07	0.25	1.72	3.63	NS	--	--
Dates of sowing													
1 st July	92.2	214	17.5	213	210	22.9	0.62	2.55	13.50	30.87	30.28	20667	1.45
15 th July	97.3	221	17.5	221	217	23.9	0.65	2.66	14.92	32.26	31.53	25215	1.71
30 th July	86.2	199	16.1	199	196	21.6	0.55	2.48	11.12	29.32	27.43	10724	1.49
C.D.(P=0.05)	4.34	10.2	1.2	10.2	12.0	0.86	0.07	0.25	1.72	3.63	2.20	--	--
Interaction	NS	NS	NS	NS	NS	NS	Sig.	NS	Sig.	Sig.	Sig.	Ns	--

Economical gain

Out of three small millet under study, kodo millet took a lead with respect to economical gain. The maximum net income from this kodo millet was up to Rs. 33962/ha with B: C ratio 2.449. The second best variety was little millet giving net income up to Rs. 15626/ha with B:C ratio 1.709. The lowest net income (Rs. 10849/ha) and B:C ratio (1.489) were obtained from barnyard millet. This was eventual as the net income is directly positively correlated with the grain and straw yields per hectare from those varieties.

Under 15th July sowing date, the net income was highest up to Rs. 25215/ha with B:C ratio 1.71. It was higher by Rs. 2667/ha over 1st July sowing. This was owing to highest grain and straw yields from 15th July sowing which filched higher market value. The economical gain was further aggravated when kodo millet was sown on 15th July. This was eventually due to increased production of grain and straw from both these interactions.

REFERENCES

Ali Azam, S.N. and Squire, G.R. (2002). *Principle of Tropical Agronomy*. CABI Publishing: Wallingford, United Kingdom.

Bashir, M.M.H., Yagoub, S.O. and Ahmed Mohammed, S.A. (2015). Effect of different sowing dates on growth and yield of three pearl millet (*Pennisetum glaucum* (L.) R. Br) cultivars in West Darfur Sudan. *International Journal of Plant & Soil Science*, **5**(4): 191-200.

Craufurd, P.Q. and Bidinger, F.R. (1989). Potential and realized yield in pearl millet (*Pennisetum americanum*) as influenced by plant population density and life-cycle duration original research article. *Field Crop Research*, **22** (3): 211-225.

Dubey, O.P., Upadhyaya, S.P. and Chourasia, S.K. (1993). Effect of sowing date and plant spacing on kodo millet (*Paspalum scrobiculatum*). *Indian Journal of Agronomy*, **38** (1): 160-162.

Hawlader, M.S.H. and Islam, M.H. (1991). Response of foxtail millet varieties to varying dates of sowing in kharif season. *Bangladesh Journal of Scientific and Industrial Research*. **26** (1-4): 204-207.

Kamara, A.Y., Ekeleme, F., Chikoye, D. and Omoigui, L.O. (2009). Planting date and cultivar effects on grain yield in Dryland corn production. *Agronomy Journal*, **100**: 91- 98.

Patel, B.J. and Patel, I.S. (2002). Response of summer pearl millet (*Pennisetum glaucum*) to different dates, methods of sowing and nitrogen levels under north Gujarat Agro-climatic Conditions. *Crop Research Hisar*, **24** (3): 476-480.

Yang, J. and Zhang, J. (2006). Grain filling of cereals under soil drying. *New Philologist*, **169**: 223-236.

