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EFFECT OF SOWING DATES ON FOXTAIL MILLETS (*Setaria italica* L.) DURING KHARIF SEASON

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ABSTRACT

Sarker MB, Shaha AK, Hossain MM, Sarker MAI, Sarker MN (2023) Effect of sowing dates on foxtail millets (*Setaria italica* L.) during kharif season. *Int. J. Sustain. Crop Prod.* 18(1), 24-28.

A field experiment was conducted during Kharif season of 2020 at the Regional Agricultural Research Station, BARI, Burirhat, Rangpur to find out the variety-specific sowing time of foxtail millets. Treatments were two varieties of foxtail millets i.e., BARI Kaon-2 and BARI Kaon-3 and four dates of sowing i.e., Sowing on 25th February, 7th March, 15th March, 30th March and 15th April. The results revealed that the variety BARI Kaon-3 recorded significantly higher stature of growth, yield attributes and yield. The above parameters were at their lower level with the variety BARI Kaon-3. The crop sown on 7th March performed significantly higher stature of plant growth parameters; yield attributes and yields, while they were found to be at their lower level when sown on 15th April. The results concluded that sowing of foxtail millet variety BARI Kaon-3 up to 7th March was profitable to the farmers in the sandy loam soils of Rangpur.

Key words: *foxtail millets, sowing dates, kharif season, variety, yield*

INTRODUCTION

Foxtail millet (*Setaria italica* L.) is known as Italian millet, German millet and korralu, Kangu, Kangani, Koni and Kaon in different parts of India. It is one of the oldest crops cultivated for food, grain, hay and pasture. It ranks second in the total world production of millets and it continues to have an important place in world agriculture providing food for millions of people in arid and semiarid regions. It is known for its drought tolerance (Cheng and Liu, 2003) can withstand severe moisture stress and is also suited to a wide range of soil conditions. Foxtail millet has an excellent nutritional profit and is miles ahead of rice and wheat in terms of protein, fiber, minerals and vitamins. It is rich in dietary fiber (6.7), protein (11%), and low in fat (4%). Unlike rice, foxtail millet releases glucose steadily without affecting the metabolism of the human body. As the consumption of foxtail millet is increasing day by day, particularly by people suffering from diabetes, there is an increasing demand for foxtail millet (Hariparasanna 2016). It is a rich source of crude fibre (8.5 g) which serves as an excellent medicine for dealing with lifestyle diseases (Roopa 2015).

Urbanization increases in income and changes in food habits also made millet a poor man's food. However, in recent times, millets have regained their lost pride due to a re-evaluation of nutritional qualities (Maitra 2020). The area under Cheena & Kaon production in Bangladesh is about 1541 acres with a production of 617 m tons (BBS 2017). Under drought and poor soil conditions, it also gives a better yield compared to all other crops, where there is a probability of complete failure of other grain crops (Jiaju 1986). Millets are climate-resilient and sustainable crops that can be grown with a minimum amount of input (Kothari *et al.* 2005). The main effects of climate change are an increase in temperature, uncertainties in rainfall and enhancement of greenhouse gas emissions (mainly carbon dioxide). As C4 plants, millets can use enhanced atmospheric CO_2 and convert into biomass (Brahmachari *et al.* 2018) Foxtail millet is an underutilized, drought-tolerant crop that stands to become much more important in a potentially much warmer and dryer future environment (Wang 2012). In 2007–2008, the coverage and total productions were only 1770.44 ha and 1466 t, respectively which decreased to 809.72 ha and produced 1000 t (BBS 2014). Millets play an important role in global agriculture and have been grown from ancient times in traditional agriculture systems with low or without inputs with consequent low productivity they can tolerate both drought and saline soil conditions and possess wider adaptation to environmental fluctuation and as such they can escape drought or flood and give more or less yield. In Bangladesh, millet is grown as a supplement to the major cereals and is consumed as a breakfast and fancy dish. But millet has many health benefits. So, at present to challenge the climatic change due to global warming millet should receive more attention for its varietal improvement as it can be grown in areas where irrigation water is limited and other cereal cannot be grown successfully. During the Rabi crop season, the cultivation of many high-value crops such as Boro rice, potatoes, maize and other vegetables is full, while the availability of land for the production of non-conventional cereal crops is less. Among the varieties, BARI Kaoun-2 is capable of higher yield but there is a possibility of crop loss due to a slightly taller fall. On the other hand, BARI Kaun-3 is dwarf likely to be damaged due to the impact of Kharif monsoon storms due to its shorter and stronger stem. For this reason, this study was undertaken to determine the timing and variety selection of Kaoun crops in the Kharif season.

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MATERIALS AND METHODS

Location

The experiment was conducted at the Regional Agricultural Research Station of BARI, Burirhat during Kharif 2020.

Treatments and design

Two varieties *viz.*, BARI Kaon-2 and BARI Kaon-3 in combination with five dates of sowing *viz*., 25th February, 7th, 15th, 30th March and 15th April were adopted, thus a total of 10 treatments were imposed. The experiment was laid out in a Randomized block design with a factorial concept (FRBD) and it was three replicated.

Experimental procedures

The crop was sown in line sowing was done in 4 m long 4 rows plot. The crop was sown in lines at 30 × continuous sowing. The recommended dose of N, P and K (40-30-20 kg ha^{-1} N, P_2O_5 and K_2O) was applied to all plots in the form of Urea and SSP. The recommended fertilizer dose was applied by following (Mondal *et al.* 2014) Weeding and spading were done when necessary. Standard cultivation techniques and intercultural operations were followed to have a good crop. The time of harvesting varied from 75-90 days after sowing, depending upon the varietal duration. Data were recorded as per descriptors for *Setaria italica* and *S. pumilia* Plant growth parameters; yield attributes and yields.

Statistical analysis

Data were analyzed statistically. The analysis of variance (ANOVA) used Statistic10 software. The mean separation test was done through DMRT.

Climate of the experimental site

The experimental area was situated in the sub-tropical climatic zone, Information regarding monthly temperature, relative humidity and rainfall data recorded during the period of the present study were collected from the weather station at Rangpur (Table 1).

Table 1. Records of meteorological observation (weekly) during the period of the experiment January-May 2020

Months	Average temperature (^oC)			Relatives Humidity %		Rainfall (mm)
	Maximum Temperature	Minimum Temperature	Average	Maximum	Minimum	
January	22.50	11.92	17.2	97.42	57.10	0
February	26.08	12.93	19.50	96.72	44.45	0
March	30.09	17.94	24.01	92.74	44.16	31.1
April	31.42	20.60	26.0	90.10	51.53	190
May	31.45	23.15	27.3	93.70	69.97	347.4

Source: Weather station at Rangpur

RESULTS AND DISCUSSION

Days to maturity were significantly influenced by different varieties as well as sowing dates and their interaction effect. Early maturity was found BARI Kaon-2 (81 days) followed by BARI kaon-3 (82 days) (Table 2), when the foxtail millet was sown on 15 April the crop life was reduced (75 days) but longer life was observed for the crop sown on 25 February (88 days) (Table 3). In the combined effect, it can be observed that the 25 February sowing time and BARI Kaon-3 take the maximum harvest time (90 days), and relatively accurate results (88 days) are obtained in the case of the March 07 sowing and BARI Kaon-3 combination. But the crop can be harvested in relatively less time if sowing is done on April 15, BARI Kaon-3 (Table 4). Plant height recorded at harvest was significantly influenced by different varieties and the interaction between varieties and sowing dates, whereas dates of sowing were found to be non-significant. Significantly tallest plant recorded was BARI kaon-2 (111 cm) Verity but the dwarf plant was BARI Kaon-3 (64 cm) (Table 2). On the other hand, it has short stature habits its does not get damaged by falling. In terms of combined effect, it can be observed that BARI Kaon-2 when sown on 25 February, gave the highest plant height but BARI Kaon-3 was sown relatively late (Table 4), and the crop height decreased. The difference in plant height among the varieties might be due to the variation in their genetic character and inter nodal length. The above results conform to the findings of Navya Jyothi *et al.* (2015).

The total number of tillers/Hill recorded at harvest was significantly influenced by dates of sowing and interaction between verity and sowing dates. While the varieties were found to be non-significant (Table 1). The Highest tiller was obtained on 15th March sowing (4.5) but the lowest tiller was obtained on 25th February sowing (2.8) (Table 3), as observed in the combined effect, the highest tiller was obtained by sowing BARI Kaon-3 on 15th March (Table 4).

The panicle length of foxtail millet was significantly influenced by different varieties, dates of sowing, and the interaction effect (Tables 2 to 4). The variety BARI Kaon-2 produces longer panicles (20 cm) (Table 2), this might be due to the genetic potential of the variety in deciding the length of the panicle and in better partitioning of assimilates from source to sink. Similar results were obtained by Intodia (1994), Saini and Negi (1996) and Navya Jyothi *et al.* (2015).

A significantly longer panicle was found on 25th February sowing (20.3 cm) and shorter panicles were found on 7th March, and 15th April sowing (10 cm). The synergistic effect can be seen in that a maximum panicle length of 22 cm was obtained when sowing on 25th February (Table 3).

There is an effect of Kaon sowing at different times on individual panicle weight and even a combined effect but not in cultivars variation.

Individual panicle weight was significantly higher 7th March sowing (12.9 g) and lower 15 April sowing (10.2 cm) (Table 3). The combined effect of kaon variety and sowing date showed that BARI Kaon-3 on 7 March sowing had higher individual weight of panicle (13.5 g) but less in late sown 15 th April BARI Kaon-2 cultivars (9 g) (Table 4).

Table 2. Shows the yield and yield-related traits of foxtail millets as influenced by cultivar variation

Treatments	Days to Maturity	Plant Height(cm)	Tiller number	Panicle length(cm)	Individual weight of panicle(g)	Yield t/ha
BARI Kaon-2	81.8 b	111.5 a	3.4	20.3 a	11.1	1.84 a
BARI kaon-3	85.2 a	64.9 b	3.3	18.6 b	11.4	1.3 b
Level of significant	**	**	NS	*	NS	*
CV%	1.4	9.8	16.2	6.7	4.6	14.2
LSD	0.94	6.6	0.42	1.0	0.4	0.13

Table 3. Shows the yield and yield-related characteristics of foxtail millets as influenced by variation in sowing time

Treatments	Days to maturity	Plant Height(cm)	Tiller number	Panicle length(cm)	Individual weight of panicle(g)	Yield t/ha
25-February sowing	88.0 a	92.3	2.8 b	20.3 a	12.0 b	1.9116 b
07-March sowing	85.6 b	92.5	3.1 b	19.1 ab	12.9 a	2.25 a
15-March sowing	85.0 b	87.1	4.5 a	18.5 b	10.0 d	1.4568 c
30-March sowing	83.0 c	83	3.3 b	19.5 ab	11.0 c	1.2627 c
15-April sowing	75.6 d	86.1	3.0b	20.1 ab	10.2 d	1.197 c
Level of significant	**	NS	*	*	**	**
CV%	1.4	9.8	16.2	6.7	4.6	14.2
LSD	1.4	0.93	0.66	1.6	0.64	0.2

Table 4. Presents the yield and yield-related characteristics of foxtail millet under the combined effects of cultivars and sowing time variation

Treatments	Days to Maturation	Plant Height (cm)	Tiller number	Panicle length (cm)	Individual weight of panicle (g)	Yield t/ha
25 February × BARI Kaon-2	85.6 b	121.0 a	3.3 cd	22.6 a	11.6 bc	2.2 a
25 February × BARI Kaon-3	90.3 a	63.6 c	2.3 e	18.0 d	12.5 b	1.5b cd
7 March × BARI Kaon-2	82.6 c	63.6 c	2.6 de	20.5 abc	13.5 a	1.86 b
7 March × BARI Kaon-3	88.6 a	70.3 c	3.6 bc	17.8 d	12.4 b	2.6 a
15 March × BARI Kaon-2	81.6 cd	108.6 ab	4.3 ab	18.5 cd	11.3 cd	1.7 bc
15 March × BARI Kaon-3	88.3 a	65.6 c	4.6 a	18.4 cd	10.6 de	1.1 d
30 March × BARI Kaon-2	80.3 de	104.3 b	3.3 cd	19.0 bcd	10.6 de	1.3 cd
30 March × BARI Kaon-3	86.0 b	61.6 c	3.3 cd	20.0 bcd	10.1 e	1.1 d
15 April × BARI Kaon-2	78.6 e	109.0 ab	3.3 cd	21.0 ab	9.0 e	1.2 d
15 April × BARI Kaon-3	72.6 f	63.3 c	2.6 de	19.1 bcd	9.9 e	0.8 d
Level of Significant	**	*	*	*	*	*
CV%	1.4	9.8	16.2	6.7	4.6	14.2
LSD	2.1	14.9	0.93	2.2	0.9	0.29

This effect was observed in the grain yield of foxtail millets with cultivars variation and sowing at different times of Kharif season as well as its combined effect on grain yield. The highest grain yield of foxtail millets

crop was observed in BARI Kaon-2 Variety (1.8t/ha) (Table 2), Differences in yields among the varieties can be attributed to their genetic potentiality to utilize and translocate photosynthates from source to sink (Anitha *et al*. 2015). The results conformed with the findings of Munirathnam *et al.* (2006), Divya and Maurya, (2013), Revathi *et al*. (2017) and Navya Jyothi *et al*. (2015). On the other hand, sowing on March 7 gave the maximum grain yield of foxtail millets (2.35 ton/ha) combined effect of variety and sowing the highest yield was observed in BARI Kaon-3 when sown on March 7 (2.6 ton) (Table 4).

CONCLUSION

From this study, it can be concluded that BARI Kaon-2 as a variety is good but for Kharif season the yield is reduced due to lodging in stormy rains during Kharif season. Due to this, the comparatively dwarf variety BARI Kaon-3 was found higher productivity in the Kharif season and this variety is best if we could sow before the 7th of March.

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