

Growth, yield and nutrient uptake of browntop millet (*Brachiaria ramosa*) under varying sowing dates and nitrogen levels

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ABSTRACT

A field experiment was conducted during rainy (*kharif*) season of 2019 at research farm of Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad, Telangana to study the effect of sowing dates and nitrogen levels on growth, yield and nutrient uptake of browntop millet [*Brachiaria ramosa* (L.) Stapf]. The experiment was laid out in a randomized block design (RBD) on sandy loam soil with factorial concept consisting of 4 dates of sowing (June 15th, June 30th, July 15th and July 30th) and 4 nitrogen levels (0, 20, 40 and 60 kg/ha) with 3 replications. Results showed that leaf area (683, 1530 and 1412 cm²/plant), dry-matter production (248, 540, 622 g/m²), number of panicles/m² (6.52), panicle length (17.82 cm), grains/panicle (147.92), grain (2,003 kg/ha) and straw yield (3,930 kg/ha); and nutrient uptake (N, P and K) at tillering, flowering and harvest (grain and straw) were significantly higher with June 15th sowing. Among N levels, application of 60 kg N/ha recorded highest leaf area (735, 1,560 and 1,437 cm²/plant), dry-matter production (243, 523 and 619 g/m²), number of panicles/m² (6.48), panicle length (19.08 cm), grains/panicle (152.42), grain (1,921 kg/ha) and straw yield (3,949 kg/ha), and nutrient uptake (N, P and K) at tillering, flowering and harvest (grain and straw) but was at par with 40 kg N/ha over 20 and 0 kg N/ha.

Key words: Browntop millet, Growth, Nutrient uptake, Nitrogen levels, Sowing dates, Yield

In the recent past, there has been an increasing recognition of millets as a substitute for major cereal crops owing to climate resilience apart from the health benefits due to rich nutrient profile. Among the small millets, browntop millet [*Brachiaria ramosa* (L.) Stapf] is one of the rarest crops. It is a drought hardy, heat tolerant crop remarkable for its early maturing ability (75 to 80 days) as grain crop and within 50 days for fodder purpose (Sheahan 2014). Its grain are not only nutritious but also delicious. The millet is gluten free and rich in essential nutrients and natural fibre (8.5%) due to which it serves as an excellent medicine for dealing with life style diseases (Roopa 2015). Agronomists have generated information on ideal varieties and nutrient management for millet crops but, information with regard to the agronomic practices of browntop millet is

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very meagre. With this background present study was planned with an objective to identify the optimum date of sowing and nitrogen level for achieving higher growth, yield and nutrient uptake in browntop millet.

An experiment was conducted during rainy (*kharif*) season of 2019 at research farm of Professor Jayashankar Telangana State Agricultural University, Rajendranagar, Hyderabad (17° 32' N, 78° 41' E at an altitude of 541.6 m amsl), Telangana. The total rainfall received during the crop growth period was 682.2 mm spread in 43 rainy days. The soil was sandy loam with pH 7.11, low in organic carbon (0.47%) and available N (143 kg/ha), and high in available P₂O₅ (75 kg/ha) and available K₂O (313 kg/ha). Browntop millet variety VZM-1 was sown on 15th June, 30th June, 15th July and 30th July 2019 adopting inter-row spacing of 30 cm and 10 cm intra row spacing. The gross plot size was 4.5 m × 3.0 m. Thinning was done 10 days after sowing (DAS) to ensure uniform population. Nitrogen as per treatments (20 kg/ha, 40 kg/ha and 60 kg/ha) was applied through urea in two equal splits, viz. half as basal and remaining half at tillering stage (30 DAS). Entire dose of phosphorous and potassium in the form of single super phosphate (SSP) and muriate of potash (MOP) was applied as basal at the time of sowing. Two hand weeding were

Table 2. Effect of sowing dates and nitrogen levels on nutrient uptake by browntop millet at different growth stages

Treatment	N uptake			P uptake			K uptake					
	At tillering stage	At flowering stage	At harvest	At tillering stage	At flowering stage	At harvest	At tillering stage	At flowering stage	At harvest			
	Grain	Grain	Straw	Grain	Grain	Straw	Grain	Grain	Straw			
<i>Sowing dates (D)</i>												
D ₁ , June 15 th	11.20	24.63	36.22	18.07	7.61	17.82	19.94	12.17	13.32	23.45	17.20	43.10
D ₂ , June 30 th	9.05	19.93	29.27	14.51	6.20	15.10	16.74	10.20	10.77	18.97	13.72	34.83
D ₃ , July 15 th	6.26	13.86	20.27	10.01	4.78	12.07	13.63	8.15	7.45	13.19	9.53	24.12
D ₄ , July 30 th	0.72	1.25	1.88	1.27	0.47	0.81	1.04	0.60	0.86	1.18	1.21	2.24
SEM±	2.09	3.60	5.43	3.67	1.35	2.34	3.01	1.74	2.49	3.39	3.46	6.47
CD (P=0.05)	13.30	29.07	42.22	21.78	9.04	20.35	23.17	13.98	15.84	27.67	20.74	50.24
<i>Nitrogen levels (N)</i>												
N ₁ , 0 kg/ha	5.66	12.48	18.44	9.13	4.58	11.35	13.77	7.29	6.74	14.86	10.87	21.94
N ₂ , 20 kg/ha	8.45	18.72	27.03	13.89	6.33	15.05	17.13	9.88	10.05	22.28	16.53	32.17
N ₃ , 40 kg/ha	12.08	26.56	38.94	19.52	7.95	18.50	20.53	12.84	14.37	31.61	23.22	46.33
N ₄ , 60 kg/ha	13.51	29.71	43.57	21.83	8.77	20.43	22.28	14.49	16.08	35.36	25.97	51.84
SEM±	0.72	1.25	1.88	1.27	0.47	0.81	1.04	0.60	0.86	1.32	1.35	2.24
CD (P=0.05)	2.09	3.60	5.43	3.67	1.35	2.34	3.01	1.74	2.49	3.79	3.87	6.47
<i>Interaction D × N</i>												
SEM±	4.17	2.49	3.76	2.54	0.94	1.62	2.09	1.20	1.72	2.65	2.70	4.48
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	7.58	NS	NS

Early sown crop i.e. on June 15th registered significantly higher grain and straw yield (2003 and 3930 kg/ha) over June 30th and July 15th. While, the lowest grain and straw yield (1539 and 3326 kg/ha) were recorded with crop sown on July 30th. Among N levels, crop fertilized with 60 kg N/ha recorded significantly higher grain and straw yield (1921 and 3949 kg/ha) over 20 and 0 kg N/ha but was at par with 40 kg N/ha. Interaction effect of sowing dates and nitrogen levels on grain and straw yield was found to be non-significant. These results corroborate with the findings of Patel *et al.*, (2013) and Raundal and Patil (2017).

Sowing dates, exerted significant influence on nutrient (N, P and K) uptake and crop sown on June 15th recorded highest uptake at tillering (11.20, 7.61 and 13.32 kg/ha), flowering (24.63, 17.82 and 23.45 kg/ha), and harvest stage by grain (36.22, 19.94 and 17.20 kg/ha) and straw (18.07, 12.17 and 43.10 kg/ha) over other sowing dates (Table 2). Among N levels, uptake of N P and K at tillering (13.51, 8.77 and 16.08 kg/ha), flowering (29.71, 20.43 and 35.26 kg/ha) and harvest stage by grain (43.57, 22.28 and 25.97 kg/ha) and straw (21.83, 14.49 and 51.84 kg/ha) was significantly higher with 60 kg N/ha over 20 and 0 kg N/ha but was at par with 40 kg N/ha. These findings are in line with those of Mubeena *et al.*, (2019). Likewise, higher nutrient uptake with the application of 40 and 60 kg N/ha could be ascribed to adequate nutrient availability that improved the dry-matter production and nutrient accumulation over corresponding lower levels of N application. Similar results were also reported by Chouhan *et al.*, (2015) and Divyasree *et al.*, (2018).

Based on the present study's findings on browntop millet, it may be suggested to plant the crop on June 15th and apply 40 kg N/ha in order to improve growth, yield and nutrient uptake.

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