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# Growth and yield of browntop millet as influenced by dates of sowing and nitrogen levels

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**Abstract**
A field experiment was conducted during *kharif*, 2019 at College Farm, College of Agriculture, Rajendranagar, Hyderabad to study the effect of dates of sowing and nitrogen levels on growth and yield of browntop millet. The experiment was laid out in factorial randomized block design with 16 treatment combinations and replicated thrice. The treatments consisted of four dates of sowing *viz*., $D_1$-June 15$^{th}$, $D_2$- June 30$^{th}$, $D_3$-June 15$^{th}$, $D_4$-July 30$^{th}$ and four nitrogen levels *viz*., $N_1$-0 kg ha$^{-1}$, $N_2$-20 kg ha$^{-1}$, $N_3$-40 kg ha$^{-1}$, $N_4$-60 kg ha$^{-1}$. The results revealed that among the dates of sowing, plant height, leaf area at 60 DAS and dry matter production at harvest, effective tillers hill$^{-1}$, panicle length, weight of panicle, number of grains panicle$^{-1}$, grain and straw yield were significantly higher with $D_1$-June 15$^{th}$ sowing and among nitrogen levels, $N_4$-60 kg ha$^{-1}$ recorded higher plant height, leaf area and dry matter production at harvest, number of effective tiller hill$^{-1}$,panicle length, weight of panicle, number of grains panicle$^{-1}$, grain and straw yield but it was on par with $N_3$-40 kg ha$^{-1}$.

**Keywords:** Browntop millet, dates of sowing, growth parameters, nitrogen levels, yield attributes and yield

## Introduction
In recent years, there has been an increasing recognition of importance of millets as a substitute for major cereal crops owing to their climate resilience apart from the health benefits and rich nutrient profile. Millets have the potentiality of contributing to increased food production both in developing and developed countries. In India, they are cultivated on an area of 818.5 thousand hectares with a production of 729.6 thousand tonnes and productivity of 817 kg ha$^{-1}$. In Karnataka, small millets are cultivated on an area of 26 thousand hectares with a production of 12.3 thousand tonnes and productivity of 510 kg ha$^{-1}$ (Indiastat., 2020) [4]. Browntop millet is annual warm-season species that grows 1 to 3 ft tall. The smooth stems have pubescent nodes and may stand erect or ascend from a decumbent base.

The leaves are 2.2 to 18 cm long and 6-18 mm wide and both surfaces are smooth. The inflorescence is indeterminate, open, spreading with simple axis and stalked flowers. It has 3-15 inflorescence and white flowers. Seed is ellipsoid and tan in colour. It is a drought hardy, heat tolerant crop and can be planted in late spring or early summer in many locations. The seeding rate for browntop millet will depend upon both the target species (birds and wildlife) and seeding method. Bird's food plots are generally seeded at the rate of approximately 4-5 kg per acre when planted in rows and 11-12 kg per acre under broadcasting. Combination plantings are ideally suited to larger fields in which the millets are planted in alternating strips with other crops. It is also an excellent choice when combined with other millets. In fact, red gram is grown as an inter-crop for every 12 rows of brown top millet. It is used as a fast-growing cover for erosion control and as a nurse crop in the South-East until a perennial grass cover is established (Miller *et al*., 2007) [6]. This millet is remarkable for its early maturing ability and harvested in about 75 to 80 days and for fodder purpose within 50 days (Sheahan *et al*., 2014) [12]. It requires very less moisture during sowing and one or two rains later, for its normal growth and development. It is grown as a fast-growing catch crop between commodity crops and is not known to be allelopathic and has the ability to accumulate significant amount of zinc and lead in shoot and roots tissues making it an important plant for remediation of contaminated soils (Lakshmi *et al*., 2013) [5]. Browntop millet is not only nutritious but also delicious. The millet is gluten free and rich in essential nutrients. It is a good source of zinc,

iron and fibre (/100g). It consists of 11.9g of moisture, 8.89g of protein, 1.89g of fat, and 71.32 g of carbohydrate and provides 338 kcal of energy. The mineral composition constitutes 28 mg of calcium, 7.72 mg of iron, 276 mg of phosphorus, 60 mg of potassium, 94.5 mg of magnesium, 1.99 mg of manganese, 7.60 mg of sodium, 2.75 mg of zinc, and 1.23 mg of copper. It is a rich source of crude fibre (8.5 g) due to which it serves as an excellent medicine for dealing with lifestyle diseases (Roopa *et al.,* 2015) [11]. Keeping the above points in view an experiment was taken up to find the effect of dates of sowing and nitrogen levels on growth and yield of brown top millet.

## Material and methods

The present experiment on brown top millet was conducted during *kharif*, 2019 at College Farm, College of Agriculture, Rajendranagar, Professor Jayashankar Telangana State Agricultural University Hyderabad. The farm is geographically situated at 17º 32' N latitude, 78º 41' E longitude and at an altitude of 541.6 m above mean sea level and falls under the Southern Telangana agro-climatic zone of Telangana. According to Troll's climate classification, it falls under semi-arid tropic region (SAT). The soil of the experimental site was sandy loam in texture with p*H* of 7.1, electrical conductivity 0.31 $dSm^{-1}$, low in organic carbon (0.31%), available nitrogen (143 kg $ha^{-1}$), medium in available phosphorus (74 kg $ha^{-1}$) and high in available potassium (314 kg $ha^{-1}$). The experiment was laid out in factorial randomized block design with four dates of sowing $D_1$-June 15th, $D_2$- June 30th, $D_3$-June 15th, $D_4$-July 30th and four nitrogen levels $N_1$-0 kg $ha^{-1}$, $N_2$-20 kg $ha^{-1}$,$N_3$-40 kg $ha^{-1}$, $N_4$-60 kg $ha^{-1}$ and replicated thrice. Browntop millet variety (VZM-1) was sown on respective sowing dates by adopting a spacing 30 cm X 10 cm under rainfed conditions. Full dose of $P_2O_5$ and $K_2O$ along with 50 % of nitrogen was applied as basal and remaining 50 % nitrogen was applied at tillering. During the crop growth period (June 15th to October 20th) a total rainfall of 682.2 mm rainfall in 43 rainy days, Data on growth and yield attributes were recorded from randomly selected five plants from each net plot and the mean value was worked out. The data was statistically analyzed duly following the analysis of variance technique for factorial randomized block design as suggested by Panse and Sukhatme (1978) [9].

## Results and Discussion

### Growth parameters

### Effect of dates of sowing

It is clearly evident that from the data (Table.1) that dates of sowing had significant effect on growth parameters of browntop millet. Among the dates of sowing, $D_1$-June 15th recorded significantly taller plants at harvest (153 cm), leaf area at 60 DAS (1530 $cm^2$ $plant^{-1}$), dry matter production at harvest (622 g $m^{-2}$) and tillers at 60 DAS (258.75 no. $m^{-2}$). A delay in sowing from June 15th to July 30th registered a gradual reduction in the growth parameters. Lowest plant height at harvest (134 cm), leaf area at 60 DAS (1302 $cm^2$ $plant^{-1}$), dry matter production at harvest (507 g $m^{-2}$), tillers at 60 DAS (176.25 no. $m^{-2}$) were recorded with $D_4$-July 30th sowing.

Earlier sowing $D_1$- June 15th had provided opportunity for prolonged photoperiod coupled with ambient weather parameters that reflected in higher plant height, leaf area, dry matter production and tillers in comparison to delayed sowings (Amanullah *et al*. 2015) [1].

Further, lower growth under delayed sowing could be attributed to the unfavorable weather variables and dry spells at critical stages that led to the reduction in vegetative phase of the browntop millet. These findings are in line with those of Mubeena *et al*. (2019) [7].

### Effect of nitrogen levels

The growth parameters were significantly influenced by nitrogen levels. Among the treatments, application of $N_4$-60 kg $ha^{-1}$ recorded significantly higher plant height at harvest (152 cm), leaf area at 60 DAS (1560 $cm^2$ $plant^{-1}$), dry matter production at harvest (619.25 g $m^{-2}$), tillers at 60 DAS (257.50 no. $m^{-2}$) but it was on par with $N_4$-40 kg $ha^{-1}$ that registered plant height (149 cm), leaf area (1510 $cm^2$ $plant^{-1}$), dry matter production (595 g $m^{-2}$), tillers (241.75 no. $m^{-2}$) respectively. The lowest plant height at harvest (132 cm), leaf area at 60 DAS (1200 $cm^2$ $plant^{-1}$), dry matter production at harvest (491.50 g $m^{-2}$), tillers (no. $m^{-2}$) at 60 DAS (177.25) was recorded with $N_1$-0 kg $ha^{-1}$.

Improved plant height registered with the application of 40 kg N $ha^{-1}$ could be due to adequate availability of nutrients that enhanced cell division and elongation thus, resulted in greater shoot growth as compared to corresponding lower levels of nitrogen. Further improved nutrient supply under higher nitrogen levels might have favoured higher photosynthate assimilation for longer period as evident from the improved leaf area, tiller number and dry matter production. These results are in line with the findings of Raundal *et al*. (2017) [10].

### Yield attributes and yield

### Effect of dates of sowing

The yield attributes and yield (grain and straw) were significantly influenced by the dates of sowing (Table. 2). Yield attributes *viz*; effective tillers (6.52 No. $m^{-2}$), panicle length (17.82 cm), weight of panicle (2.13 g), number of grains $panicle^{-1}$ (147.92), grain (2003 kg $ha^{-1}$) and straw yield (3930 kg $ha^{-1}$) were significantly higher with $D_1$- June 15th. However, harvest index was not significantly influenced by dates of sowing.

Early sown crop had experienced prolonged photoperiod that reflected in improved assimilate synthesis and translocation coupled with favourable weather variables that favoured plant height, leaf area, tillers $m^{-2}$, yield attributes and yield. These results corroborate with the findings of Nagaraju *et al.,* 2009 [8] and Gavit *et al*., 2017 [3].

### Effect of levels of nitrogen

From the data it is observed that there was an improvement in the yield attributes with an increase in N level from 0 to 60 kg $ha^{-1}$. The yield attributes *viz;* effective tillers (6.48 $hill^{-1}$), panicle length (19.08 cm), weight of panicle (2.03 g), number of grains $panicle^{-1}$ (152.42), grain and (1921 kg $ha^{-1}$) straw yield (3949 kg $ha^{-1}$) were significantly higher with $N_4$-60 kg $ha^{-1}$ but it was on par with $N_3$-40 kg $ha^{-1}$ that recorded effective tillers (6.16 $hill^{-1}$), panicle length (17.58 cm), weight of panicle (1.86 g), number of grains $panicle^{-1}$ (147), grain and (1855 kg $ha^{-1}$) straw yield (3862 kg $ha^{-1}$) respectively. While, the lowest yield attributes and yield were recorded by $N_1$-0 kg $ha^{-1}$. However, harvest index was not significantly influenced by varying levels of nitrogen application.

Yield is the function of growth parameters (plant height, leaf area, tillers and dry matter production) and yield attributes (number of effective tillers, length of panicle, number of grains per panicle and weight of panicle). Favourable weather

parameters coupled with adequate nutrient availability improved growth parameters and yield attributes under $D_1$-June 15th sowing and $N_3$- 40 kg N $ha^{-1}$ that finally reflected in higher grain and straw yield. (Table.2). These results are in line with those of Dapake *et al.*, 2016 [2] and Mubeena *et al.*, 2019 [7].

**Interaction effect**

Growth parameters and yield attributes and yield were not significantly influenced by the interaction effect of dates of sowing and levels of nitrogen (Table 1 and Table 2).

**Conclusion**

On sandy loam soils of Southern Telangana region, browntop millet sown on June 15th along with the application of 40 kg N $ha^{-1}$ recorded significantly higher growth parameters (plant height, leaf area, dry matter production and number of tillers $m^{-2}$), yield attributes (number of effective tillers $hill^{-1}$, panicle length, weight of panicle and number of grains $panicle^{-1}$), grain and straw yield.

**Table 1:** Growth parameters of browntop millet as influenced by dates of sowing and nitrogen levels.

| Treatment | Plant height at harvest (cm) | Leaf area ($cm^2$ $plant^{-1}$) at 60 DAS | Dry matter at harvest (g $m^2$) | Tillers at 60 DAS |
|---|---|---|---|---|
| **Factor 1: Dates of sowing** | | | | |
| $D_1$-June-15th | 153.00 | 1530.00 | 622.00 | 258.75 |
| $D_2$-June-30th | 147.00 | 1447.50 | 584.75 | 240.75 |
| $D_3$-July-15th | 140.00 | 1370.00 | 545.25 | 200.50 |
| $D_4$-July 30th | 134.00 | 1302.50 | 507.00 | 176.25 |
| SEm ± | 2.00 | 17.93 | 11.80 | 5.52 |
| CD (P=0.05) | 6.00 | 51.79 | 34.07 | 15.94 |
| Factor 2: Nitrogen levels | | | | |
| $N_1$-0 kg $ha^{-1}$ | 132.00 | 1200.00 | 491.50 | 177.25 |
| $N_2$- 20 kg $ha^{-1}$ | 140.00 | 1380.00 | 553.25 | 199.75 |
| $N_3$-40 kg $ha^{-1}$ | 149.00 | 1510.00 | 595.00 | 241.75 |
| $N_4$-60 kg $ha^{-1}$ | 152.00 | 1560.00 | 619.25 | 257.50 |
| SEm ± | 2.00 | 17.93 | 11.80 | 5.52 |
| CD (P=0.05) | 6.00 | 51.79 | 34.07 | 15.94 |
| Interaction (D x N) | | | | |
| SEm ± | 4.00 | 35.86 | 23.59 | 11.04 |
| CD (P=0.05) | NS | NS | NS | NS |

**Table 2:** Yield attributes, yield and harvest index of browntop millet as influenced by dates of sowing and nitrogen levels

| Treatment | No. effective tillers $hill^{-1}$ | Panicle length (cm) | Weight of panicle (g) | No. grains $panicle^{-1}$ | Grain yield (kg $ha^{-1}$) | Straw yield (kg $ha^{-1}$) | Harvest index (%) |
|---|---|---|---|---|---|---|---|
| **Factor 1: Dates of sowing** | | | | | | | |
| $D_1$-June-15th | 6.52 | 17.82 | 2.13 | 147.92 | 2003 | 3930 | 33.77 |
| $D_2$-June-30th | 6.02 | 16.03 | 1.81 | 137.42 | 1837 | 3764 | 32.08 |
| $D_3$-July-15th | 5.52 | 14.22 | 1.54 | 127.00 | 1738 | 3618 | 32.45 |
| $D_4$-July 30th | 5.04 | 12.33 | 1.26 | 120.17 | 1540 | 3466 | 30.76 |
| SEm ± | 0.14 | 0.38 | 0.06 | 1.96 | 27 | 50 | 0.50 |
| CD (P=0.05) | 0.42 | 1.09 | 0.18 | 5.65 | 77 | 143 | NS |
| Factor 2: nitrogen levels | | | | | | | |
| $N_1$-0 kg $ha^{-1}$ | 4.84 | 10.29 | 1.30 | 109.58 | 1569 | 3326 | 31.94 |
| $N_2$- 20 kg $ha^{-1}$ | 5.62 | 13.45 | 1.56 | 123.50 | 1773 | 3642 | 32.68 |
| $N_3$-40 kg $ha^{-1}$ | 6.16 | 17.58 | 1.86 | 147.00 | 1855 | 3862 | 32.39 |
| $N_4$-60 kg $ha^{-1}$ | 6.48 | 19.08 | 2.03 | 152.42 | 1921 | 3949 | 33.71 |
| SEm ± | 0.14 | 0.38 | 0.06 | 1.96 | 27 | 50 | 0.50 |
| CD (P=0.05) | 0.42 | 1.09 | 0.18 | 5.65 | 77 | 143 | NS |
| Interaction (D x N) | | | | | | | |
| SEm ± | 0.29 | 0.75 | 0.13 | 3.91 | 53 | 99 | 1.0 |
| CD (P=0.05) | NS | NS | NS | NS | NS | NS | NS |

**References**


1. Amanullah J, Khan I, Amanullah SA, Sohail A. Sowing dates and sowing methods influence on growth, yield and yield components of pearl millet under rainfed conditions. Journal of Environment and Earth Science. 2015; 5(1):2224-3216.
2. Dapake PP, Chaudhari PM, Ghodke SK, Patil MR. Effect of sowing time and nutrient management on growth, yield and quality of pearl millet cv. Dhanshakti under rainfed condition. Contemporary Research in India. 2016; 7(3):2137-2231.
3. Gavit HD, Rajemahadik VA, Bahure GK, Jadhav MS, Thorat TN, Kasture MC. Effect of establishment techniques and sowing time on yield and yield attributes of proso millet (*Panicum miliaceum* L.). International Journal of Current Microbiology and Applied Sciences. 2017; 6(5):1523-1528.
4. Indiastat.2020.https://www.indiastat.com/agriculture-data/2/agricultural production/225/stats.aspx
5. Lakshmi PM, Jaison S, Muthukumar T, Muthukumar M. Assessment of metal accumulation capacity of *Brachiaria ramosa* collected from cement waste dumping area for the remediation of metal contaminated soil. Ecological Engineering. 2013; 60:96-98.
6. Miller P, Lord E. Florida cow-calf management. (2nd Edn.), Forages Univ of FL, UF/IFAS Extension, 2007.
7. Mubeena P, Halepyati AS, Chittapur BM. Effect of date of sowing and nutrient management on nutrient uptake

and yield of foxtail millet (*Setaria italica* L.). International Journal of Bio-resource and Stress Management. 2019; 10(1):092-095.
8. Nagaraju AP, Mohan Kumar HK. Performance of finger millet (*Eleusine coracana* (L.) Gaertn.) Varieties on sowing dates and methods of establishment. Mysore J Agric. Sci. 2009; 43(2):208-212
9. Panse VG, Sukhatme PV. Statistical methods for Agricultural workers, ICAR, New Delhi, 1978.
10. Raundal PU, Patil Vidya U. Response of little millet varieties to different levels of fertilizers under rainfed condition. International Advanced Research Journal in Science. 2017; 4(8):55-58.
11. Roopa OM. Nutritional evaluation and development of ready-to-cook mixes from browntop millet (*Panicum ramosa*) M.sc. Thesis. University of Agricultural Sciences, Bengaluru, India, 2015.
12. Sheahan CM. Plant guide for browntop millet (*Urochloa ramosa*). USDA- Natural Resources Conservation Service, Cape May Plant Materials Center, Cape May, 2014.