

PERFORMANCE OF DIFFERENT FODDER PEARL MILLET VARIETIES TO VARIED LEVEL OF NITROGEN UNDER WESTERN MAHARASHTRA

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SUMMARY

Good quality green fodder production is very important in dairy farming. For the green fodder farmers grow B N hybrid, Maize, Sorghum, Cowpea, Lucerne etc. These are fodder crops require high irrigation water compared to Pearl millet. Fodder pearl millet is dual purpose crop which can be consumed as green fodder by livestock and grain by human. Pearl millet can be cultivated on light to medium soil with less amount of water. It is an ideal crop with high tillering ability, high dry matter production, high protein content (9-11 %) with excellent growth habit, high palatability and better nutritive value. Among the different varieties tested variety namely 16ADV0055 was recorded significantly higher green fodder yield of 554.60q/ha followed by varieties BAIF Bajra-1 and Dev-1 with 521.80 and 519.68 q/ha respectively. In case of nitrogen levels 90kg Nitrogen/ha was found significantly superior over the 60kg and 30 kg nitrogen/ha. Significantly maximum green fodder yield of 467.93q/ha was recorded with application of 90kg N/ha followed by 60kg N/ha with green fodder yield of 431.72 q/ha. Significantly higher dry matter yield of 84.37q/ha was recorded by the variety 16ADV0055 which was found at par with Dev-1 and BAIF bajra-1 with value of 81.22 q/ha and 77.88 q/ha dry matter yield. Maximum dry matter yield of 71.62 q/ha was obtained with application of nitrogen @ 60 kg/ha which was found at par with application of nitrogen @90kg/ha. In case of crude protein yield, variety Dev1 was recorded significantly maximum CP yield of 8.63 with application of nitrogen @ 90 kg/ha which was found at par with variety 16 ADV0055 with 8.61 q/ha CP yield.

Key words: Forage pearl millet, Nitrogen level, green fodder yield, Dry matter yield and crude protein yield

India has a livestock population of 535.8 million, which is the largest in the world (Bhakar *et al.*, 2020). This sizeable livestock population plays a multitude of roles of ensuring food security, poverty alleviation, evading climate change and engaging women in agriculture in a large number (Smith *et al.*, 2013). Nitrogen is macro nutrient which is important in vegetative growth of crop increase in yield. The different varieties were evaluated for their performance under varied levels of nitrogen. Total area under forage cultivation was only 4 percent in India. Fodder is cultivated on approximately 5 per cent of the gross cropped area in the country, which has remained nearly same over the last few decades reported by Roy *et al.*, 2019. The efforts are being made to increase the fodder production by developing new high yielding varieties and advanced production technologies.

The green fodder of pearl millet is leafy, palatable and very nutritious feedstock for cattle ensuring good milk yield. Unlike sorghum, pearl millet cultivars are free of HCN content, and anti-nutritional factor which

is detrimental to the animal health also reported by Shashikala *et al.*, 2013. Nitrogen is one of the basic plant nutrients essential for profuse growth. As pearl millet is a cereal crop, it responds well to nitrogen because nitrogen is one of the main essential plant nutrients for profuse growth and high yield (Singh *et al.*, 2014). Many new improved varieties of fodder pearl millet have come up, therefore it is necessary to study the response of these varieties to fertilizers especially for nitrogen to harvest potential yield.

Keeping these points in view, the present study was conducted to find out a suitable fodder pearl millet variety and optimum nitrogen level for higher green fodder yield.

MATERIAL AND METHODS

An experiment was conducted on fodder Pearl millet at BAIF's, Central Research Station, Urulikanchan, Pune (MS) during *Kharif* 2021. Annual rainfall is about 400 mm and during the crop growth stage 292 mm rainfall was received. Experiment

consisted of 21 different treatment combinations comprising seven Pearl millet varieties (V_1 : Giant bajra-1, V_2 : JPM-18-7, V_3 : BAIF Bajra-7, V_4 : RBB-1, V_5 : BAIF bajra-1, V_6 : Dev-1 and V_7 : 16ADV0055) and three nitrogen levels (N_1 : 30 kg/ha, N_2 : 60 kg/ha and N_3 : 90 kg/ha).

The experiment was laid in Split Plot Design with three replications. A full dose of phosphorus and potash was given at the time of sowing. Nitrogen was split into two parts and half dose of each level was applied at time of sowing and remaining was given 30 DAS. The crop was harvested at 50% flowering stage for green fodder yield. Weight was recorded and expressed in kg/ha and then converted into green fodder yield (q/ha). At the time of harvesting fresh sample of each treatment was analyzed in laboratory for the estimation of dry matter content and crude protein content. Dry matter yield (q/ha) was taken from samples of fresh weight after complete drying or on the basis of the moisture content in biomass at cutting, putting fresh samples in oven at 72 °C for 24 h. Dried samples were used for analyzing the forage nutritive value in term of crude protein (CP) using standard method (A.O.A.C, 1990). Data were processed in Microsoft excel 2010 and analyzed using opstat software. The least significant difference test was used to compare among different treatments at 5% level of significance ($P < 0.05$).

RESULT AND DISCUSSION

Effect of different treatment combinations on yield parameters

The yield parameters like green fodder, dry matter and crude protein yield was influenced by different nitrogen levels and pearl millet varieties. Increase in the nitrogen application gave higher green fodder yield in all the varieties. In case of varieties, 16ADV0055 variety recorded significantly maximum green fodder yield of 554.19 q/ha. The varieties, BAIF Bajra-1 and Dev-1 was found at par with green fodder yield of 521.80 and 519.68 q/ha respectively. Significantly higher dry matter yield of 84.37q/ha was recorded by variety 16ADV0055 and Dev-1 variety was found at par with dry matter yield of 81.22q/ha followed by BAIF Bajra-1 with yield of 77.88q/ha. Similarly maximum crude protein yield was observed in variety Dev-1 with 8.63q/ha and variety 16ADV0055 was found at par having yield of 8.61q/ha. The lowest green fodder yield 285.88q/ha was recorded by variety RBB-1 whereas lowest dry matter and crude protein yield of 51.50 and 4.82 q/ha respectively was recorded by

variety JPM-18-7. The differences in yield parameters were may be due to genetic potential of the varieties as well as the growth performance. Among the different nitrogen levels, application of 90kg nitrogen per hectare recorded significantly higher green fodder and crude protein yield of 467.93q/ha and 7.15q/ha respectively followed by 60kg nitrogen/ha with 431.72q/ha green fodder and 6.35q/ha of crude protein yield. The higher dry matter yield 71.62 q/ha was recorded by the application of 60kg nitrogen/ha whereas as 90kg nitrogen/ha was found at par having yield of 70.29q/ha. Similar results were reported by Singh *et al.* (2012), that that application of higher dose of nitrogen increases the yield. Sheoran *et al.* (2016) reported that, the probable reason for such a positive effect of nitrogen application might be due to the poor nitrogen status of the experimental field and response of forage pearl millet to nitrogen application, the results were in conformity with the findings of Damame *et al.* (2013), Manjanagouda *et al.* (2017), Shekara *et al.* (2015) and Shekara *et al.* (2020).

Effect of different treatment combinations on growth parameters

The growth performance of different pearl millet varieties was influenced by various nitrogen levels. Variety, Dev-1 was recorded maximum plant height of 203.33cm whereas, rest of varieties found at par except RBB-1 and BAIF Bajra-7 which records 171.37cm and 166.74cm respectively. 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 were in conformity with the findings of Midha *et al.* (2015). Higher number of leaves, leaf length (cm) and leaf width (cm) was recorded by the variety, BAIF Bajra-1 with 10.31, 85.52 and 4.21 respectively which was followed by variety Dev-1 with 9.30 leaves per plant and 73.18, 3.43 leaf length (cm) and leaf width (cm) respectively. In case of nitrogen levels, plant growth characters were increased with higher level of nitrogen application. The maximum plant height (cm), number of leaves per plant, number of tillers per plant, leaf length (cm) and leaf width (cm) was recorded at application of 90kg nitrogen/ha with 191.97, 9.30, 3.14, 73.27 and 3.73 respectively. Whereas, lower growth characters were recorded in application of 30 kg nitrogen/ha. Bramhaiah *et al.* (2018) reported that, increase in number of tillers per plant with successive doses of nitrogen might be owing to the role of nitrogen in cytokinin synthesis, which increases cell division and elongation, thereby resulting in higher number of tillers per plant.

TABLE 1
Effect of different treatment combinations of yield and growth parameters of pearl millet varieties

| Treatment | Green fodder yield (q/ha) | Dry fodder yield (q/ha) | Crude protein yield (q/ha) | Plant height (cm) | No. of leaves/plant | No. of tillers/plant | Leaf length (cm) | Leaf width (cm) |
|------------------------|---------------------------|-------------------------|----------------------------|-------------------|---------------------|----------------------|------------------|-----------------|
| Varieties | | | | | | | | |
| Giant bajra (V1) | 445.61 | 68.24 | 6.63 | 185.11 | 9.26 | 2.52 | 70.04 | 3.59 |
| JPM-18-7 (V2) | 352.82 | 51.50 | 4.82 | 185.74 | 9.04 | 4.00 | 66.74 | 3.63 |
| BAIF bajra-7 (V3) | 330.64 | 52.29 | 5.21 | 166.74 | 8.67 | 4.11 | 60.55 | 4.44 |
| RBB-1 (V4) | 285.88 | 62.24 | 6.15 | 171.37 | 8.26 | 3.04 | 59.59 | 3.04 |
| BAIF Bajra-1 (V5) | 521.80 | 77.88 | 5.73 | 193.24 | 10.31 | 2.69 | 85.52 | 4.21 |
| Dev-1 (V6) | 519.68 | 81.22 | 8.63 | 203.33 | 9.30 | 2.85 | 73.18 | 3.43 |
| 16ADV0055 (V7) | 554.60 | 84.37 | 8.61 | 192.59 | 8.37 | 2.56 | 74.52 | 3.19 |
| SEm± | 12.92 | 2.02 | 0.21 | 8.43 | 0.35 | 0.47 | 2.87 | 0.40 |
| CD @ 0.05% | 40.26 | 6.30 | 0.65 | 18.56 | 0.77 | 1.04 | 6.32 | 0.88 |
| Nitrogen level | | | | | | | | |
| 30 kg Nitrogen/ha (N1) | 390.79 | 62.84 | 6.12 | 181.56 | 8.75 | 3.07 | 69.52 | 3.59 |
| 60 kg Nitrogen/ha (N2) | 431.72 | 71.62 | 6.35 | 182.45 | 9.03 | 3.11 | 67.27 | 3.61 |
| 90kg Nitrogen/ha (N3) | 467.93 | 70.29 | 7.15 | 191.97 | 9.30 | 3.14 | 73.27 | 3.73 |
| SEm± | 11.03 | 2.61 | 0.19 | 3.54 | 0.22 | 0.23 | 2.01 | 0.09 |
| CD @ 0.05% | 32.12 | 5.37 | 0.55 | 7.29 | NS | NS | 4.14 | NS |

CONCLUSION

This study revealed significant variation among the pearl millet varieties for green fodder, dry fodder and crude protein yields. Among the different nitrogen levels maximum green fodder, and crude protein yield was found with application of 90kg nitrogen/ha whereas, maximum dry matter yield was recorded by 60 kg nitrogen/ha. The pearl millet varieties 16ADV0055, BAIF Bajra-1 and Dev-1 exhibited high green fodder, dry fodder, and crude protein yield potential.

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