Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2020; 9(1): 911-914
Received: 01-11-2019
Accepted: 03-12-2019

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Performance of *Parching* sorghum under genotypes and nitrogen management on yield and nutrient uptake in Vidarbha condition

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Abstract
A field experiment was conducted at Agromomy Farm, Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *rabi* season of 2017-18. The experiment conducted on Performance of *Parching* sorghum under genotypes and nitrogen management on yield and uptake of nutrient in Vidarbha condition. The experiment was laid out in factorial randomized block design with two genotypes and four nitrogen management treatments replicated three times. The results revealed that the *parching* sorghum genotype Gulbhendi Local-1 was found significantly superior over the *parching* sorghum genotype of Phule Madhur regarding to yield and yield attributes at harvest stage. However, the total uptake of Nitrogen, Phosphorus and Potassium by *parching* sorghum genotypes was recorded higher in the genotype Gulbhendi Local-1 and found significantly superior over the genotype Phule Madhur. With regards to the treatment of nitrogen management an application of 125% RDN ha^{-1} in *parching* sorghum was found significantly superior in yield attributes over the other treatments of nitrogen management at harvest stage. Similarly, the treatment of nitrogen management with application of 125% RDN ha^{-1} in *parching* sorghum recorded maximum total uptake of nitrogen, phosphorus and potassium than other all treatments of nitrogen management.

Keywords: Genotypes, nutrient, management, yield, uptake

Introduction
Sorghum crop is widely grown especially in tropical and sub- tropical regions of India. As sorghum is generally cultivated in nutrient-poor soils in frequently drought-prone areas, it offers food and fodder security through risk aversion on sustainable basis. In Indian agriculture, livestock plays a vital role in the development and progress of mankind with crop production programme as a complementary enterprise. Sorghum is becoming an increasingly important fodder crop in many regions of the world. Its high resistance to drought makes it a suitable fodder crop for drier areas, especially in light of its higher productivity under limited irrigation condition compared to corn. Integrated use of different sources of plant nutrients such as organic manure and bioinoculants in combination with chemical fertilizers improve soil fertility and crop yield (Ghosh *et al.* 2003) [2].
Nitrogen has been recognized as one of the most vital limiting nutrient and as a major component of proteins, hormones, chlorophyll, vitamins and enzymes essential for plant life. Its use and demand is continuously increasing day by day, since, it is highly mobile and it is subjected to greater loss from the soil and plant system. Even under the best management practices 30-50% of the applied nitrogen is lost through different agencies (Stevenson, 1985) [9]. Growing of two crops in a year involves heavy removal of plant nutrients, which diminishes the soil fertility. The impact of increased fertilizer use on crop production has been large and important (Hossain and Singh, 2000) [3]. However, in recent years there has been serious concern about long-term adverse effect of continuous and indiscriminate use of inorganic fertilizers on deterioration of soil structure, soil health and environmental pollution (Singh, 2000) [3].
Use of organic manures alone, as a substitute to inorganic fertilizer is not profitable and will not be enough to maintain the present levels of crop productivity of high yielding varieties. Application of organic manures along with inorganic fertilizers into soil increases the productivity of the system and also sustained the soil health for a longer period (Gawai and Pawar, 2007) [1].
Nutrient management includes the intelligent use of organic, inorganic, and on-line biological resources so as to sustain optimum yields, improve or maintain the soil physical and chemical properties and provide crop nutrition packages which are technically sound, economically attractive, practically feasible and environmentally safe (Tandon, 1995) [10].

Application of organic material along with inorganic fertilizers leads increase in productivity and also sustained the soil health for longer period.

Materials and Methods

Field study investigation entitled, **"**Performance of *Parching* sorghum under genotypes and nitrogen management on yield and uptake of nutrient in Vidarbha condition'' during *rabi* season of 2017-18. Experiment conducted on the plot no. 66 of the experimental field of Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The soil was clay loam in texture, moderate in organic carbon, available nitrogen, available phosphorus and fairly rich in available potash. The climate of the area is semi-arid characterized. Maximum temperature varies from 32.7 to 41.1 °C and minimum temperature from 14 to 20 °C during the growing period. Average relative humidity in the *rabi* season was ranged from 27 to 82% in morning hours and from 7 to 26% in evening hours. Rate of evaporation was higher during 8th to 13th MW than normal. It was lower during 1st MW than normal. Whereas the rainfall was received 7th, 10th and 11th meteorological weeks with one rainy day in 10th meteorological week.

The experiment was laid out in factorial randomized block design with two genotypes and four nitrogen management treatments replicated three times. Thus, there were in all eight treatment combinations. The treatments comprises of two *parching* sorghum genotypes viz., G_1-Phule Madhur, G_2-Gulbhendi Local-1 and four nitrogen management treatments viz., N_1-125% RDN ha^{-1} through urea (100 kg N ha^{-1}), N_2-100% RDN ha^{-1} through urea (80 kg N ha^{-1}), N_3-50% RDN ha^{-1} through urea + 50% RDN ha^{-1} through vermicompost and N_4-100% RDN ha^{-1} through vermicompost. The nitrogen management carried out as vermicompost was applied to soil before sowing as per treatments. Entire P2O5 and K2O were applied as basal by placement and covered with the soil. Nitrogen was applied as per treatments in two equal splits; as basal at the time of sowing and splits at 30 DAS. The quantity of vermicompost 1335 and 2670 kg ha-1 was used to supply 50% and 100% RDN, respectively. The rest of dose of P2O5 and K2O was managed through single super phosphate (SSP) and Murrate of Potash (MOP), respectively. The crop was sown on 4th November 2017.

Results and discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

Table 1: Mean days to maturity, seed yield (q ha^{-1}) and dry fodder yield (q ha^{-1}) of parching sorghum as influenced by various treatments

Treatments	Days to maturity	Seed Yield (q ha^{-1})	Dry fodder yield (q ha^{-1})
Factor A- Genotypes			
G_1-Phule Madhur	120.75	29.02	230.83
G_2-Gulbhendi Local-1	119.58	41.54	346.57
SE(m)±	0.22	0.88	5.79
CD at 5%	0.67	2.68	17.57
Factor B-Nitrogen management			
N_1-125% RDN ha^{-1} through urea	122.00	42.44	316.35
N_2-100% RDN ha^{-1} through urea	119.17	32.41	281.63
N_3-50% RDN ha^{-1}+50% RDN ha^{-1} as VC	120.33	38.07	291.92
N_4-100% RDN ha^{-1} through VC	119.17	28.20	264.91
SE(m) ±	0.31	1.25	8.19
CD at 5%	0.95	3.79	24.85

Effect of genotypes

The data presented in Table 1, revealed that the days to maturity stage, seed yield (q ha^{-1}) and dry fodder yield (q ha^{-1}) were significantly affected due to *parching* sorghum genotypes. The *parching* sorghum genotype Phule Madhur required significantly highest number of days to maturity stage (120.75 DAS) than the genotype Gulbhendi Local-1(119.58 DAS) of *parching* sorghum. The results are in conformity of Shinde *et al*. (2016) [6].

Similarly, the results revealed that the seed yield (q ha^{-1}) and dry fodder yield (q ha^{-1}) at harvest among different genotypes of *parching* sorghum was found to be significant. The genotype Gulbhendi Local-1 recorded maximum seed yield (q ha^{-1}) and dry fodder yield (q ha^{-1}) and found significantly superior over the genotype Phule Madhur. The genotype Gulbhendi Local-1 recorded seed yield (41.54 q ha^{-1}) and dry fodder yield (346.57 q ha^{-1}) over the genotype Phule Madhur seed yield (29.02 q ha^{-1}) and dry fodder yield (230.83 q ha^{-1}). The genotype Phule Madhur grain contain more spongy tissue and leads to shrinkage of grain as moisture depleted which resulted in lower seed yield.

Effect of nitrogen management

The data presented in Table 1, revealed that days required to maturity stage in *parching* sorghum were significantly influenced due to different nitrogen management treatments. Application of 125% RDN ha^{-1} recorded significantly highest number of days to maturity stage (122 DAS) over all the treatments. This might be due to nitrogen increases the vegetative growth of plant and which postponed the reproductive stage of plants. The treatments with application of 50% RDN ha^{-1} through urea and 50% RDN ha^{-1} through vermicompost, 100% RDN ha^{-1} and 100% RDN ha^{-1} through vermicompost required (120.33), (119.17) and (119.17) DAS, respectively.

The data presented in Table 1, revealed that seed yield (q ha^{-1}) as well as dry fodder yield (q ha^{-1}) showed that different nitrogen management treatments were found to be significant in *parching* sorghum. The treatment of nitrogen management with application of 125% RDN ha^{-1} recorded higher seed yield (q ha^{-1}) as well as dry fodder yield (q ha^{-1}) at harvest. The treatment of nitrogen management with application of 125 per cent RDN ha^{-1} significantly superior over the application of 50% RDN ha^{-1} through urea +50% RDN through vermicompost ha^{-1}, 100% RDN ha^{-1} and 100% RDN ha^{-1} through vermicompost, respectively. The treatment of nitrogen management with application of 125% RDN ha^{-1} recorded higher seed yield (42.44 q ha^{-1}) as well as dry fodder yield (316.35 q ha^{-1}) at harvest.

The increased in yield might be due to increased grains per panicle which resulted in higher panicle weight. The increased dimensions of yield contributing character might be due to increased availability of nutrients. With integrated use of organic and inorganic fertilizers along with micronutrient application which favoured the luxuriant growth and development of crop which ultimately reflected in yield. The reason for higher yield recorded by the treatment receiving higher quality of nitrogen may be attributed to mostly with the lucrative consumption of applied nitrogen and other applied environmental resources by the fodder sorghum crop which resulted in maximum biomass yield. Increase in fodder yield with increased dose of nitrogen was mainly associated with greater plant height, number of leaves $plant^{-1}$ and stem diameter. The results obtained during this investigation are in agreement with the findings of Tomar and Agarwal *et al*. (1993) [11], Pawar *et al*. (1996) [4], Rathod *et al*. (2002) [5], Trivedi *et al*. (2010) [12] and Singh *et al*. (2012) [8].

Table 2: Mean uptake of nitrogen, phosphorous and potassium by *parching* sorghum as influenced by various treatments

Treatments	Nitrogen uptake (kg ha^{-1})	Phosphorous uptake (kg ha^{-1})	Potassium uptake (kg ha^{-1})
Factor A- Genotypes			
G_1-Phule Madhur	128.11	81.69	123.12
G_2-Gulbhendi Local-1	223.40	95.12	161.70
SE(m)±	3.36	0.60	3.37
CD at 5%	10.20	1.82	10.21
Factor B- Nitrogen management			
N_1-125% RDN ha^{-1} through urea	213.29	109.70	161.00
N_2-100% RDN ha^{-1} through urea	161.59	82.40	144.99
N_3-50% RDN ha^{-1}+50% RDN ha^{-1} as VC	187.57	95.70	138.74
N_4-100% RDN ha^{-1} through VC	140.57	65.81	124.91
SE(m) ±	4.75	0.85	4.76
CD at 5%	14.42	2.57	14.45

Effect of genotypes

The data presented in Table 2, revealed that the nitrogen, phosphorous and potassium uptake of *parching* sorghum is significantly influenced by the genotypes of *parching* sorghum. The significant difference in nitrogen, phosphorous and potassium uptake of *parching* sorghum was recorded among the different *parching* sorghum genotypes after harvest. Among the *parching* sorghum genotypes Gulbhendi Local-1 showed significantly higher nitrogen, phosphorous, potassium uptake over the genotype Phule Madhur after harvest.

Effect of nitrogen management

The data presented in Table 2, revealed that nitrogen, phosphorous and potassium uptake of *parching* sorghum was significantly influenced due to nitrogen management after harvest. Among different nitrogen management treatments exhibited significant effect on nitrogen, phosphorous and potassium uptake by *parching* sorghum after harvest. The nitrogen management treatment comprising of application of 125% RDN ha^{-1} recorded higher uptake of nitrogen, phosphorous and potassium over all other treatments of nitrogen management as 50 per cent RDN through urea + 50 per cent RDN through vermicompost ha^{-1}, 100 per cent RDN ha^{-1} and 100 per cent RDN ha^{-1} through vermicompost, respectively.

Conclusion

The *parching* sorghum genotype Gulbhendi Local-1 exhibited significantly superior yield attributes at maturity stage as well as uptake of nitrogen, phosphorous and potassium. The nitrogen management treatment with application of 125 per cent RDN ha^{-1} through urea exhibited significantly superior yield attributes as well as uptake of nitrogen, phosphorous and potassium by *parching* sorghum, respectively.

References

1. Gawai PP, Pawar VS. Nutrient balance under INMS in sorghum-chickpea cropping sequence. Indian Journal of Agricultural Research. 2007; 41(2):137-141.
2. Ghosh PK, Bandhyopadhyay KK, Tripathi KM, Hati KM, Mandal KG, Mishra AK. Effect of integrated management of farmyard manure, phosphocompost, poultry manure and inorganic fertilizer for rainfed sorghum (*Sorghum biocolor*) in vertisols of central India. Indian Journal of Agronomy. 2003; 48(1):48-52.
3. Hossain M, Singh VP. Fertilizer use in Asain agriculture: implications for sustaining food security and the environment. Nutr. Cycl. Agroecosys. 2000; 57:155-169.
4. Pawar KB, Kalbhor HB, Khonde BK, Patil PL. A study on combined effect of Azotobacter and Azospirillium with nitrogen on yield of sorghum. Journal of Maharashtra Agricultural Universities. 1996; 21(3):403-406.
5. Rathod ND, Meghani MN, Dudhat MS. Response of forage sorghum (*Sorghum bicolor*) to different levels of nitrogen and phosphorus. Forage Research. 2002; 28(1):16-18.
6. Shinde MS, Awari VR, Patil VR, Gadakh SR, Dalvi US, Chavan UD, *et al*. Phule madhur (RSSGV-46): a sweet grain rabi sorghum variety for tender grain processing. International Journal of Science, Environment and Technology. 2016; 5(3):1362-1369.
7. Singh RB. Environment consequences of agricultural development: a case study for the green revolution state of Haryana, India. Agriculture, Ecosystems & Environment. 2000; 82:97-103.
8. Singh Bahadur, Kaushik MK, Mundra SL, Solanki NS. Effect of seed rate and nitrogen on growth and yield of summer fodder sorghum [*Sorghum bicolor* (L.) Moench] Internat. J. Forestry & Crop Improv. 2012; 3(2):109-111.
9. Stevenson FJ. The Nitrogen Cycle in Soil: Global and Ecological Aspects. In: Cycles of Soils, Stevenson, F.J.,

(Ed.). Wiley Int. Sci. Pub., New York, USA, 1985, 106-153.

10. Tandon. Major nutritional constraints to crop production and the soil fertility management studies in different Agro-climatic regions of Asia. In: Proc. Int. Potash Inst. Colloq. Potassium in Asia: Balanced fertilization to increase and sustain agriculture production. Chiang Mai Thailand IPL, Basel, 1995, 43-72.
11. Tomar GS, Agarwal SB. Biofertilizer (Azosprillium) as an alternative source of nitrogen for enhancing fodder production. Forage Research. 1993; 24:217-219.
12. Trivedi J, Mundra SL. Response of fodder sorghum genotypes to nitrogen fertilization in southern Rajasthan. Forage Res. 2010; 36 (2):115-117.