www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(12): 1734-1736

www.thepharmajournal.com
Received: 03-09-2021
Accepted: 10-11-2021

Khadadiya MB
Department of Agronomy, Navsari Agricultural University, Navsari, Gujarat, India

Patel AP
Associate Professor, Department of Agronomy, College of Agriculture, N.A.U., Waghai, Gujarat, India

Desai LJ
Research Scientist, Centre for Research on IFS, S.D.A.U, Sardarkrushinagar, Gujarat, India

Patel UJ
Department of Agronomy, NMCA, N.A.U., Navsari, Gujarat, India

Desai NB
Department of Agronomy, NMCA, N.A.U., Navsari, Gujarat, India

Corresponding Author:
Khadadiya MB
Department of Agronomy, Navsari Agricultural University, Navsari, Gujarat, India

Effect of integrated nutrient management on yield and economics of summer pearlmillet (*Pennisetum glaucum* L.) under south Gujarat condition

Khadadiya MB, Patel AP, Desai LJ, Patel UJ and Desai NB

Abstract
A field experiment was conducted at Collage Farm, N. M. Collage of Agriculture University, Navsari, Gujarat, during summer season of 2018 to study the effect of integrated nutrient management on summer pearlmillet under south Gujarat condition. Two levels of manure (no compost and vermicompost @ 10 t ha^{-1}), three fertilizer levels (no RDF, 75 per cent RDF and 100 per cent RDF) and two levels of biofertilizer (no seed inoculation and seed inoculation with *Azotobacter* @ 2 ml/kg seeds) were compared. Application of vermicompost @ 10 t ha^{-1} recorded significantly higher grain and straw yield of pearlmillet. Increase in grain and straw yield was also noticed with 100% RDF. Seed inoculation with *Azotobacter* found significantly higher grain and straw yield as compared to without seed treatment. In economic consideration, it was found that integration of vermicompost along with 100% RDF and *Azotobacter* seed treatment gave higher net realization per hectare (Rs. 110066 /ha) but significantly higher B:C ratio (2.56) was observed with the application of vermicompost along with 75% RDF and *Azotobacter* seed treatment.

Keywords: Pearlmillet, INM, yield, economics

Introduction
Fertilizer use especially N, P and K is considered as a corner stone in any drive for increasing the pearlmillet yield. But the continuous use of micronutrient free high analysis NPK fertilizers in the intensive cropping system with diminishing use of organic manures has resulted in the depleting of micronutrients from the soil reserve. Integration of organics with inorganics has been found to be quite promising not only in maintaining higher productivity but also in providing greater stability in crop production (Nambiar and Abrol, 1992) [5]. Application of organic manures may also help to check the emerging deficiency of nutrients other than N, P and K, Further; it brings economy and efficiency in fertilizers. The INM affects the Physical, Chemical and Biological environment of the soil and thus preserve the soil health. As such the goal of sustainable production could be achieved without any disastrous effect on soil and environment. Considering the above facts, present investigation was carried to find out the effect of integrated nutrient management on productivity and economics of pearlmillet.

Materials and Methods
A field experiment was carried during the summer season of 2018 on the College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari. The soil of experimental field was clayey in texture, having pH 7.8 with normal electrical conductivity (0.36 dsm^{-1}), low in organic carbon content (0.72%), Low in available nitrogen (150.23 kg ha^{-1}), medium in available phosphorus (49 kg ha^{-1}) and fairly rich in available potassium (307.81 kg ha^{-1}). The treatments consisted of two levels of manure (no compost and vermicompost @ 10 t ha^{-1}), three fertilizer levels (no RDF, 75 per cent RDF and 100 per cent RDF) and two levels of biofertilizer (no seed inoculation and seed inoculation with *Azotobacter* @ 2 ml/kg seeds). These treatments were evaluated in randomized block design with factorial concept (FRBD) and replicate three times. Nitrogen and Phosphorous was applied in the form of Urea and Di-ammonium phosphate @ 120, 60, 00 NPK kg ha^{-1}. The whole amount of phosphorous half quantity of nitrogen as per treatment was applied at the time of sowing as basal dressing and rest half of nitrogen was applied at the tillering stages. Vermicompost (10 t ha^{-1}) was applied as basal dressing. *Azotobacter* was applied as seed treatment @ 2 ml per kg seeds.

Pearlmillet variety (GHB – 732) was used as test crop.

Result and Discussion

Manure

Significant effect of vermicompost was observed on yield and economics of pearlmillet. A significant increase in grain yield (5035 kg ha^{-1}) and straw yield (11134 kg ha^{-1}) of pearlmillet was observed due to application of vermicompost @ 10 t ha^{-1} as compared to no compost. This may be attributed to balanced and complete nutrition for plant growth and development. Similar results were also obtained by Chaudhary *et al.* (2012) [2] and Chaudhary *et al.* (2015) [1] in pearlmillet.

The maximum net realization of Rs. 79230 ha^{-1} was accrued under application of vermicompost @ 10 t ha^{-1} (M_2) with the BCR of 2.13. The minimum net realization of Rs. 34959 ha^{-1} obtained under no compost with BCR of 2.09. This is due to the higher yields of pearlmillet produced in the treatment of vermicompost @ 10 t ha^{-1}. Similar economics benefit of vermicompost was reported by Narolia and Poonia (2011) [6] in pearlmillet.

Fertilizer

The grain and straw yield of pearlmillet showed a constant increase with increasing levels of fertility. The highest grain yield (4310 kg ha^{-1}) and straw yield (9479 kg ha^{-1}) of pearlmillet was recorded with F_3 (100% RDF) which was significantly higher over no RDF and its counterpart of 75% RDF. This might be due to better growth of crop resulting from higher nutrient supply. These findings are in close conformity with those of Varia and Sadhu (2012) [15] in pearlmillet, Khan *et al.* (2015) [4] in sweet sorghum.

The highest net returns of Rs. 74901 ha^{-1} were incurred under application of 100 per cent RDF (F_3) with the BCR of 2.42. Whereas, the lowest net realization Rs. 27287 ha^{-1} was noted under no RDF (F_1) with BCR of 1.56. This might be due to higher grain and straw yields of pearlmillet gained from F_3 treatment. The results resembled with Singh *et al.* (2012) [11] in sorghum and Singh and Chauhan (2014) [12] in pearlmillet.

Biofertilizer

An appraisal of data presented revealed that the biofertilizer significantly influenced the grain yield and straw yield of pearlmillet. The higher grain yield (3904 kg ha^{-1}) and straw yield (8704 kg ha^{-1}) found with seed inoculation with *Azotobacter* (B_2). This could mainly be ascribed to the increased availability of the nitrogen to the plants through biological nitrogen fixation in rhizosphere by *Azotobacter* that caused better root development. The observations are in conformity with those reported by Sipai *et al.* (2014) [13], Rinku *et al.* (2014) [8] and Singh *et al.* (2016) [10] in pearlmillet.

Seed inoculation with *Azotobacter* (B_2) secured more net return of Rs. 64931 ha^{-1} with BCR of 2.27, while less net return of Rs. 49259 ha^{-1} recorded under no compost (B_1) with the BCR of 1.96. *Azotobacter* holds considerable promise and its low production cost as well as produced higher yield. These result in conformity with the findings those of Sipai *et al.* (2014) [13] and Togas *et al.* (2015) [14] in pearlmillet.

Interaction

The interaction effect between manure and fertilizer on grain and straw yield was significant. Remarkably the higher grain yield (5871 kg ha^{-1}) and straw yield (12560 kg ha^{-1}) was recorded under treatment combination M_2F_3 (Vermicompost @ 10 t ha^{-1} + 100 per cent RDF). Interaction M_2F_3 was remained at par with M_2F_2. Whereas, the lowest grain yield and straw yield was obtained under treatment combination of M_1F_1 (No compost + No RDF). This may be attributed to balanced and complete nutrition of plant growth with judicious combination of organics and inorganics. These results are in line of the result of those reported by Sheoran and Rana (2005) [9] in sorghum and Pawar and Patil (2007) [7] in maize.

Highest net realization of Rs. 110705 ha^{-1} obtained with treatment combination of vermicompost @ 10 t ha^{-1} + 100 per cent RDF + seed inoculation with *Azotobacter* ($M_2F_3B_2$) followed by treatment combination of vermicompost @ 10 t ha^{-1} + 75 per cent RDF + seed inoculation with *Azotobacter* ($M_2F_2B_2$) and no compost + 75 per cent RDF + seed inoculation with *Azotobacter* ($M_1F_2B_2$) were secured Rs. 110066 and 50067 ha^{-1} net return, respectively. However, the lowest net returns Rs. 9045 ha^{-1} was noted with treatment combination $M_1F_1B_1$. The highest BCR (2.56) were obtained with treatment combination vermicompost @ 10 t ha^{-1} +75 per cent RDF + seed inoculation with *Azotobacter* ($M_2F_2B_2$) followed by $M_2F_3B_2$ and $M_1F_2B_2$ were secured 2.54 and 2.53 BCR, respectively. However, the lowest BCR 1.31 was noted with treatment combination $M_1F_1B_1$. The results resembled with Divya *et al.* (2017) [3] in pearlmillet.

Table 1: Grain yield, straw yield, net returns and BCR of pearlmillet as influenced by integrated nutrient management

Treatments	Grain yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Net returns (Rs. ha^{-1})	BCR
(A) Manure (M)				
No compost (M_1)	2215	5329	34959	2.09
Vermicompost @ 10 t/ha (M_2)	5035	11134	79230	2.13
S.Em. +	78.43	197.65	-	-
C.D. at 5%	230.04	579.70	-	-
(B) Fertilizer (F)				
No RDF (F_1)	2505	6091	27287	1.56
75 per cent RDF (F_2)	4060	9125	69096	2.34
100 Per cent RDF (F_3)	4310	9479	74901	2.42
S.Em. +	96.06	242.08	-	-
C.D. at 5%	281.74	709.98	-	-
(C) Biofertilizer (B)				
No seed inoculation (B_1)	3346	7760	49259	1.96
Seed inoculation with *Azotobacter* (B_2)	3904	8704	64931	2.27
S.Em. +	78.43	197.65	-	-
C.D. at 5%	230.04	579.70	-	-
Significant interaction	M × F	M × F	-	-
C.V. %	9.18	10.19	-	-

Table 2: Economics of pearlmillet as influenced by interaction of manure, fertilizer and biofertilizer

Sr. No.	Treatment Combinations	Yield (kg/ha)		Net realization (Rs. ha^{-1})	BCR ratio
		Grain yield	Straw yield		
1	$M_1F_1B_1$	1239	3382	9045	1.31
2	$M_1F_1B_2$	1659	4310	21470	1.72
3	$M_1F_2B_1$	2143	5007	31659	1.97
4	$M_1F_2B_2$	2752	6478	50067	2.53
5	$M_1F_3B_1$	2770	6466	49444	2.47
6	$M_1F_3B_2$	2728	6331	48072	2.43
7	$M_2F_1B_1$	3231	7570	29428	1.44
8	$M_2F_1B_2$	3891	9103	49205	1.73
9	$M_2F_2B_1$	5182	12021	84595	2.20
10	$M_2F_2B_2$	6163	12992	110066	2.56
11	$M_2F_3B_1$	5509	12113	91383	2.27
12	$M_2F_3B_2$	6233	13007	110705	2.54

Table 3: Interaction effect of manure and fertilizer on grain and straw yield of pearlmillet

Treatments	Grain yield (kg ha^{-1})			Straw yield (kg ha^{-1})		
	Fertilizer (F)			Fertilizer (F)		
Manure (M)	F_1	F_2	F_3	F_1	F_2	F_3
M_1	1449	2447	2749	3846	5742	6399
M_2	3561	5672	5871	8337	12507	12560
S.Em. ±	135.85			342.35		
C.D. at 5%	398.44			1004.07		

References

1. Choudhary R, Yadav LR, Parihar S. Effect of vermicompost and fertility levels on growth and yield of pearl millet (*Pennisetum glaucum* L.). Annals of Arid Zone 2015;54(1&2):59-61.
2. Choudhary R, Yadav LR, Shivran AC, Parihar S. Effect of vermicompost and fertility levels on growth, yield, nutrient uptake and net returns in pearlmillet (*Pennisetum glaucum*). Indian Journal of Agricultural Sciences, 2012;8:1428-1430.
3. Divya G, Vani KP, Babu PS, Suneetha Devi KB. Impact of cultivars and integrated nutrient management on growth, yield and economics of summer pearl millet. International Journal of Applied Science and Pure Science and Agriculture 2017;3(7):64-68.
4. Khan MAA, Rajesh P, Reddy APK, Krishna A. Nutrient management in different millet crops under pongomia based agrisilvi system in semi-arid region of Telangana Stat, India. International Journal of Tropical Agriculture 2015;33(2):1661-1667.
5. Nambiar KKM, Abrol IP. Long term fertilizer experiment in India. An overview. Fertilizer News 1992;34(4):11-26.
6. Narolia RS, Poonia BL. Growth dynamics, yield and economics of pearl millet (*Pennisetum glaucum*) as influenced by vermicompost and fertilizers. Annals of Arid Zone 2011;50(2):145-149.
7. Pawar RB, Patil CV. Effect of vermicompost and fertilizer level on soil properties, yield and uptake of nutrients by maize. Journal of Maharashtra Agricultural University 2007;32(1):11-14.
8. Rinku Shekhawat PS, Kumawat N, Rathore PS, Yadav PK, Om H. Effect of nitrogen levels and biofertilizers on growth and yield of pearl millet (*Pennisetum glaucum* L.) under north western Rajasthan. Annals of Agriculture Research in New Series. 2014;35(3):311-314.
9. Sheoran RS, Rana DS. Relative efficacy of vermicompost and farmyard manure integrated with inorganic fertilizers for sustainable productivity of sorghum (*Sorghum bicolor* L. Moench.). Acta Agronomica Hungarica 2005;53:303-308.
10. Singh D, Raghuvanshi K, Pandey SK, George PJ. Effect of biofertilizers on growth and yield of pearlmillet (*Pennisetum glaucum* L.). Research in Environment and Life Sciences 2016;9(3):385-386.
11. Singh P, Sumeriya HK, Solanki NS. Effect of Fertilizer Levels on Productivity and Economics of Elite Sorghum (*Sorghum bicolor* (L.) Meonch) Genotypes. Madras Agricultural Journal 2012;99(7-9):567-569.
12. Singh SB, Chauhan SK. Productivity and economic of pearl millet as influenced by integrated nutrient management. Annals of Plant and Soil Research, 2014;16(4):365-585.
13. Sipai AH, Jat JS, Nakrani BR, Gadhavi S. Integrated nutrient management in bajra. An Asian Journal of Soil Science 2014;9(1):155-157.
14. Togas R, Yadav LR, Choudhary SL, Shisuvinahalli GV. Effect of *Azotobacter* on growth, yield and quality of pearlmillet. Journal of Pharmacognosy and Phytochemistry 2015;6(4):889-891.
15. Varia SD, Sadhu AC. Influence of row ratios and fertility levels on yield attributes and yield of pearlmillet – greengram intercropping system and nutrient status of the soil. International Journal of Forestry and Crop Improvement 2012;3(2):144-146.