The Pharma Innovation Journal 2018; 7(8): 201-204

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(8): 201-204

www.thepharmajournal.com
Received: 01-06-2018
Accepted: 03-07-2018

Garima Joshi
GBPUAT, Pantnagar
Uttarakhand, India

Aaradhana Chilwal
PAU, Ludhiana Punjab, India

Correspondence
Aaradhana Chilwal
PAU, Ludhiana Punjab, India

Influence of integrated nutrient management on yield and yield attributing characters of baby corn (*Zea mays* L.)

Garima Joshi and Aaradhana Chilwal

Abstract
In race towards high production and profit from agriculture, the farmers are adopting abnormal production technologies like heavy and injudicious use of chemical fertilizers that have reduced the factor productivity, besides, eroding biodiversity and enhancing environmental pollution. Therefore, its an urgent need to optimize the integrated nutrient management in different crops including baby corn. The present study was thus carried out during *Kharif* season 2015 at the Instructional Dairy Farm (IDF), Nagla, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand to evaluate the influence of integrated nutrient management on yield and yield attributing characters of baby corn. In yield attributing characters, different integrated nutrient management practices produced significant values of baby corn length at 1st pick, 2nd pick and on the average value of baby corn length. The 100% NPK+*Azot+Azos* produced the longest baby corn at 1st pick, while at 2nd pick, the longest baby corn were produced at 75% NPK+*Azot+Azos*. The girth of the baby corn did not affect significantly by different integrated nutrient management practices except the average values where 75% NPK+*Azot+Azos* and 100% NPK+*Azot+Azos* gave significantly higher girth of baby corn. Significantly higher baby cob yield was recorded at application of 100% NPK+*Azot+Azos* that remained non-significant with 75% NPK+*Azot+Azos*. Both the treatments produced 6.7% and 6% higher baby cob yield, respectively than 100% NPK application. The baby corn yield was recorded significantly higher at 100% NPK+*Azot+Azos* that remained non-significant with 75% NPK+*Azot+Azos* and it had 7.9 and 3.5% greater baby corn yield than 100% NPK and 75% NPK+*Azot+Azos*, respectively. The green fodder yield was found highest with application of 100% NPK+*Azot+Azos* that remained non-significant with all the treatments except control. Thus the integrated use of nutrients including low cost biofertilizers proved to be beneficial for sustaining crop productivity.

Keywords: Azotobacter, azospirillum, baby corn length, baby corn girth, baby cob

Introduction
Maize is the third most important staple food crop in the world after wheat and rice but in term of productivity, it ranks first followed by rice, wheat and other millets. Presently baby corn is gaining popularity among Indian farming communities mainly due to its short duration, high market rate, nutritive value and also its multiuse. It responds to higher doses of fertilizer that may normally cause lodging in other cereal crops. Thus nutrient management is a very important aspect for proper growth of baby corn. The higher baby corn production requires 180:38.7:74.7 kg NPK ha^{-1} (Singh *et al*., 2010) [11]. Similarly, Singh *et al*. (2009) [10] also reported from inorganic sources produced higher baby corn than integration of either 75% or 50% N along with 25% or 50% FYM, respectively. Lone *et al*. (2013) [5] reported higher baby corn production at 150% RDF (225:90:60 kg NPK/ha). It is therefore advised to apply nutrients in an integrated manner which is also reported by different scientists. It has also been reported that integrated use of nutrients including low cost biofertilizers, organic manures and chemical fertilizers and also other nutrient sources like crop residues, sewage and sludge, industrial effluents etc. are not only beneficial but also sustain the soil and crop productivity. (Ranjan *et al*, 2013, Mahajan *et al*, 2007 and Dadarwal *et al*, 2009) [8, 6, 1]. Therefore, integrated nutrient management (INM) refers to judicious application of different nutrient sources in balanced proportion for sustaining soil and crop productivity. Golami *et al*. (2009) [3] reported that the grains number increased with seed priming with *Azotobacter* in maize. Zaidi and Khan (2005) [12] suggested that seed priming with PGPR increased biological yield and increase in biological yield with *Azotobacter* inoculation indicated the favorable response of wheat to seed priming with *Azotobacter*. Khan *et al*. (2008) [4] reported that use of organic

manure (FYM, poultry manure, green leaf) on sweet corn field resulted in significant increase of yield attributes i.e., grain number per cob, cob length and diameter. Prasad and Prasad (1996) reported that application of compost 5 t ha^{-1} with 55, 41 and 27 kg NPK ha^{-1} recorded 31.1 q ha^{-1} and 135, 85 and 68 kg NPK ha^{-1} resulted in 42.8 q ha^{-1} yield of maize. Sarita *et al.* (1997) noticed that application of fertilizer along with FYM (5 t ha^{-1}) for a target yield of 50 q ha^{-1} recorded significantly higher seed yield of maize (4.8 t ha^{-1}). Application of 10 t FYM ha^{-1} along with 250:125:62.5 kg N, P_2O_5 and K_2O recorded higher maize grain yield with residual effect on yield of groundnut crop in maize-groundnut sequence (Dev, 1998). Little research work has been done so far on integrated nutrient management including use of biofertilizers alone or in combination of chemical fertilizers and its effect on productivity baby corn. It is therefore necessary to optimize the integration of biofertilizers and chemical fertilizers to maximize productivity of baby corn in *Tarai* region of Uttarakhand. Looking to the above fact, the present investigation was planned to determine the effect of integrated nutrient management on yield and yield attributing characters of baby corn.

Material and methods

The experiment was conducted at the Instructional Dairy Farm (IDF), Nagla, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, Uttarakhand, India. The Instructional Dairy Farm is located in the *Tarai* belt of Shivalik range of Himalayas with humid sub-tropical type of climate at latitude of 29°N and longitude of 79.3°E and situated at an altitude of 243.84 m above the mean sea level. The climate of the *Tarai* region is broadly humid sub-tropical with harsh winter and hot dry summers. The soil of the experimental field was slightly silty clay loam (Nagla series, Mollisol) in texture, from dark greyish brown to dark grey in humus with weak, fine to medium granular structure.

Eleven treatments were tested in a Randomized Block Design 3 replications the treatments were Control (no application), 50% NPK, 100% NPK(180:60:40), Seed treatment with Azotobacter @200g/10Kg seeds, Seed treatment with Azospirillum @200g/10Kg seeds, Seed treatment with Azospirillum + Azotobacter, 50% NPK + Seed treatment with Azotobacter, 50% NPK + Seed treatment with Azospirillum, 50% NPK+ Seed treatment with Azospirillum + Azotobacter, 50% NPK+ Seed treatment with Azospirillum + Azotobacter and 100%NPK+seed treatment with Azospirillum + Azotobacter. The variety sown was V.L. Baby corn-1 – released from Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, Uttarakhand.

Results and discussion

Yield Attributes

Length of baby corn

The length of the baby corn was found significantly higher with 100% NPK+*Azot*+*Azos* and 75% NPK+*Azot*+*Azos* at 1st and 2nd picking, respectively but both were non-significant to each other. At 1st pick, 100% NPK+*Azot*+*Azos* had significantly equal corn length with 100% NPK, 50% NPK+*Azot*, 50% NPK+*Azot*+*Azos* and 75% NPK+*Azot*+*Azos*, while at 2nd pick, 75% NPK+*Azot*+*Azos* remained non-significant with 100% NPK, 50% NPK at combined application of biofertilzers either of *Azotobacter*, *Azospirillum* or combined applicaton and 100% NPK+*Azot*+*Azos*. The average baby corn length recorded significantly equal at both 75% NPK+*Azot*+*Azos* and 100% NPK+*Azot*+*Azos* and remained significantly at par with 100% NPK, 50% NPK+*Azos*, 50% NPK+*Azot* and 50% NPK+*Azot*+*Azos*.

Girth of baby corn

In general, the girth of baby corn was recorded almost equal at 75% NPK+*Azot*+*Azos* and 100% NPK+*Azot*+*Azos* that remained non-significant with 100% NPK and 50% NPK coupled with seed treatment with biofertilizers. The corn girth was recorded non-significant among control, seed treated with *Azotobacter* and *Azospirillum* but combined seed treatment with biofertilizer gave higher girth at all the stages. Similarly chemical fertilizer application coupled with biofertilizer gave higher baby corn girth than alone application of chemical fertilizer. The average value remained non-significant among 50% NPK and 50% NPK + seed treatment with biofertilizers either alone or combined seed treatment.

The increased N levels increased the yield attributes by better uptake of the nutrients and increased translocation of photosynthates from source to sink in baby corn and resulted into higher cob length, girth and weight of baby corn. The data pertaining to yield attributes is given in table 1.

Yield

Baby cob

The baby cob yield recorded significantly higher with 100% NPK+*Azot*+*Azos* at 1st pick and remained non-significant with 75% NPK+*Azot*+*Azos*, 50% NPK+*Azot*, 50% NPK+*Azot*+*Azos* and 100% NPK. At 2nd pick, the highest value was noticed with 75% NPK+*Azot*+*Azos* that remained statistically at par with 100% NPK, 100% NPK+*Azot*+*Azos* and 50% NPK with either of *Azotobacter*, *Azospirillum* or combined application of biofertilizers. At 3rd pick, the highest baby cob yield was found with application of 75% NPK+*Azot*+*Azos* that remained statistically at par with 100% NPK, 100% NPK+*Azot*+*Azos* and 50% NPK+*Azot*+*Azos*. At 4th pick as well as total baby cob yield, 100% NPK+*Azot*+*Azos* produced significantly higher baby cob yield that was statistically at par with 75% NPK+*Azot*+*Azos*. At 5th pick, The baby cob yield was found significantly higher with application of 75% NPK+*Azot*+*Azos* that was non-significant with 100% NPK+*Azot*+*Azos*. The treatment 100% NPK+*Azot*+*Azos* produced the highest baby cob yield that was 6.7% and 0.7% greater than 100% NPK and 75% NPK+*Azot*+*Azos*, respectively.

Baby Corn

The baby corn yield was found significantly higher with application of 100% NPK+*Azot*+*Azos* at 1st pick and remained non-significant with 75% NPK+*Azos*+*Azot* and 50% NPK with either of *Azot*, *Azos* or combined and 100% NPK. The similar trend was observed during 2nd picking. At 3rd pick, the highest baby corn yield was noticed with 75% NPK+*Azot*+*Azos* that remained statistically at par with 100% NPK and 100% NPK+*Azot*+*Azos* treatments. At 4th pick, 100% NPK+*Azot*+*Azos* produced higher baby corn yield that was significantly similar to 75% NPK+*Azot*+*Azos*. At 5th pick, the baby corn yield again recorded significantly higher at application of 100% NPK+*Azot*+*Azos* that was non-significant with 100% NPK as well as 75% NPK+*Azot*+*Azos*. The total baby corn yield was recorded significantly higher with application of 100% NPK+*Azot*+*Azos* that remained significantly at par with 75% NPK+*Azot*+*Azos* and it had 7.9 and 3.5% greater baby corn yield than 100% NPK and 75% NPK+*Azot*+*Azos*, respectively.

Green Fodder Yield

Significantly higher green fodder yield was recorded with application of 100% NPK+*Azot+Azos* that was statistically at par with 100% NPK, 50% NPK + seed treatment with biofertilizers and 75% NPK+*Azot+Azos* and it also produced 2.4% and 3.2% greater green fodder yield than 100% NPK and 75% NPK+*Azot+Azos*, respectively. The treatments where seed was treated with either of *Azotobacter*, *Azospirillum* or combined, produced non-significant green fodder yield but combined seed treatment produced greater green fodder yield followed by seed treatment with *Azotobacter* and had 4.5% and 16.1% greater green fodder yield than seed treatment with *Azotobacter* and *Azospirillum*, respectively.

The yield improvement through application of biofertilizers might be due to increased availability of nutrients, particularly N, P and micronutrients, increase in microbial activity, production of growth promoting substances and plant-soil-microbes interaction. The data pertaining to baby cob yield is given in table 2. Table 3 gives the data of baby corn yield and green fodder yield.

Conclusion

The study concluded that combined application of chemical fertilizers and biofertilizers is responsible for higher productivity of baby corn due to positive effects of biofertilizers on soil properties, microbial activity, nutrient availability and by production of growth promoting substances.

Table 1: Effect of integrated nutrient management on length and girth of baby corn

Treatment	Baby corn length (cm) (I) and Baby corn width (cm) (II)											
	1st pick		2nd pick		3rd pick		4th pick		5th pick		Average	
	I	II	I	II	I	II	I	II	I	II	I	II
Control	6.4	3.5	6.5	3.9	7.1	4.3	7.8	4.4	7.5	4.1	7.1	4.0
Azotobacter	7.3	3.7	7.2	4.2	7.9	4.4	8.2	4.5	8.1	4.3	7.7	4.2
Azospirillum	7.1	3.6	7.2	4.1	7.7	4.3	8.1	4.5	7.8	4.2	7.6	4.1
Azot +Azos	7.4	3.7	7.6	4.4	7.9	4.4	8.3	4.6	7.9	4.3	7.8	4.3
50% NPK	7.7	3.8	7.6	4.4	8.1	4.5	8.6	4.6	8.5	4.3	8.1	4.3
100% NPK	8.5	4.1	8.6	4.7	8.7	4.8	9.0	5.0	8.7	4.5	8.7	4.6
50% NPK + *Azotobacter*	8.0	4.1	8.4	4.5	8.6	4.6	8.9	4.7	8.4	4.3	8.5	4.5
50% NPK +*Azospirillum*	7.9	3.8	8.2	4.5	8.4	4.5	8.7	4.7	8.8	4.3	8.4	4.4
50% NPK + *Azot+ Azos*	8.3	4.1	8.5	4.5	8.7	4.7	8.9	4.7	8.4	4.4	8.6	4.5
75% NPK + *Azot+ Azos*	8.6	4.3	8.9	4.7	9.1	4.9	9.0	5.4	8.7	4.5	8.9	4.8
100% NPK + *Azot + Azos*	8.8	4.3	8.7	4.8	8.8	5.0	9.3	5.2	8.9	4.6	8.9	4.8
SEm±	0.3	0.4	0.3	0.3	0.6	0.3	0.7	0.3	0.4	0.2	0.2	0.2
LSD (p=0.05)	0.8	ns	0.7	ns	ns	Ns	ns	ns	ns	ns	0.6	0.4

Table 2: Effect of integrated nutrient management on baby cob yield at harvest

Treatment	Baby cob yield (kg/ha)					
	1st pick	2nd pick	3rd pick	4th pick	5th pick	Total
Control	311	490	706	819	583	2910
Azotobacter	456	843	1254	1400	718	4671
Azospirillum	542	808	1111	1428	775	4665
Azot +Azos	623	877	1293	1449	766	5008
50% NPK	694	1207	1400	1544	799	5644
100% NPK	1065	1407	1681	1873	1083	7108
50% NPK + *Azotobacter*	1002	1370	1530	1711	873	6486
50% NPK +*Azospirillum*	977	1361	1345	1588	845	6116
50% NPK + *Azot+ Azos*	1028	1396	1616	1738	928	6706
75% NPK + *Azot+ Azos*	1058	1500	1813	1970	1194	7535
100% NPK + *Azot + Azos*	1097	1476	1794	2053	1167	7587
SEm±	37.3	52.1	70.2	53.2	36.1	103.3
LSD (p=0.05)	110	153	207	158	106	307

Table 3: Effect of integrated nutrient management on baby corn yield and green fodder yield at harvest

Treatment	Baby corn yield (kg/ha)						Green fodder Yield (t/ha)
	1st pick	2nd pick	3rd pick	4th pick	5th pick	Total	
Control	60 (7.1%)	114 (13.3%)	254 (29.7%)	324 (37.8%)	104 (12.1%)	856	12.82
Azotobacter	71 (6.3)	202 (18.0%)	337 (30.0%)	387 (34.6%)	125 (11.1%)	1121	14.29
Azospirillum	59 (6.1%)	161 (16.6%)	279 (28.8%)	362 (37.4%)	108 (11.1%)	968	12.85
Azot +Azos	126 10.1%)	212 (17.1%)	364 (29.2%)	404 (32.4%)	139 (11.2%)	1244	14.93
50% NPK	151 (10.5%)	322 (22.2%)	389 (26.9%)	434 (30.0%)	150 (10.4%)	1445	16.26
100% NPK	274 (14.3%)	388 (20.2%)	479 (25.0%)	544 (28.4%)	233 (12.1%)	1918	22.50
50% NPK + *Azotobacter*	254 (14.8%)	374 (21.7%)	429 (25.0%)	490 (28.5%)	172 (10.0%)	1720	21.29
50% NPK +*Azospirillum*	247 (14.8%)	373 (22.4%)	428 (25.7%)	449 (27.0%)	168 (10.1%)	1665	19.45
50% NPK + *Azot+ Azos*	264 (14.7%)	383 (21.4%)	457 (25.5%)	500 (27.8%)	191 (10.6%)	1795	21.96
75% NPK + *Azot+ Azos*	257 (12.8%)	404 (20.2%)	529 (26.5%)	585 (29.3%)	223 (11.2%)	1997	22.29
100% NPK + *Azot + Azos*	283 (13.7%)	410 (19.8%)	517 (25.0%)	603 (29.1%)	256 (12.4%)	2069	23.01
SEm±	12.4	15.7	18.1	17.8	14.9	35	1.22
LSD (p=0.05)	37	46	54	53	44	104	3.60

() - refers to percent values of baby corn production

References

1. Dadarwal RS, Jain NK, Singh D. Integrated Nutrient Management in baby corn (*Zea mays* L.). Indian J Agric. Sci. 2009; 79(12):1023-1025.
2. Dev G. Balanced fertilizer use increases crop yield and profit. Better Crops Int. 1998; 12(2):25-28.
3. Golami A, Shahsavani S, Nezara S. The effect of plant growth promoting rhizobacteria (PGPR) on germination, seedling growth and yield of maize. Proceedings of World Academy of Science. Phosphate solubilizing bacteria and their role Engineering and Technology. 2009; 37:2070-3740.
4. Khan HZ, Malik MA, Saleem MF. Effect of rate and source of organic material on the production potential of spring maize (*Zea mays* L.). Pakistan J Agric. Sci. 2008; 45(1):40-44.
5. Lone AA, Allai BA, Nehvi FA. Growth, yield and economics of Baby Corn (*Zea mays* L.) as influenced by Integrated Nutrient management Practices. African J Agric. Reas. 2013; 8(37):4537-4540.
6. Mahajan S, Kanwar SS, Kumar P, Sharma SP. Long term effect of mineral fertilizers and amendments on microbial dynamics in an alfisol of western Himalayas. Indian J Microbio. 2007; 47:86-89.
7. Prasad K, Prasad D. Fertilizer requirements for specific yield targets of maize based on soil testing in Alfisols. J Indian Soc. Soil Sci. 1996; 44:332-333.
8. Ranjan JK, Ahmed N, Das B, Ranjan P, Mishra BK. Green technology for production of baby corn (*Zea mays* L.) under north-west Himalayan conditions. International J Chem Tech Reas. 2013; 5(2):880-885.
9. Sarita J, Suri VK, Verma TS. Response of rainfed maize to integrated nutrient management based on targeted yield concept in a Typic Haplustalf. J Indian Soc. Soil Sci. 1997; 45(3):603-605.
10. Singh MK, Singh RN, Singh SP. Effect of Integrated Nutrient Management on Growth, Yield and Yield Attributes of Baby Corn (Zea mays).Vegetable Science. 2009; 36(1):77-79.
11. Singh MK, Singh RN, Yadav MK, Singh VK. Integrated nutrient management for higher yield, quality and profitability of baby corn (*Zea mays* L.). Indian J Agron. 2010; 55(2):100-104.
12. Zaidi A, Khan MS. Interactive effect of rhizospheric microorganisms on growth, yield and nutrient uptake of wheat. J Plant Nutrition. 2005; 28:2079-2092.