International Journal of Advanced Multidisciplinary Research
ISSN: 2393-8870
www.ijarm.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijamr Volume 11, Issue 9 -2024

Research Article

DOI: http://dx.doi.org/10.22192/ijamr.2024.11.09.002

Effect of integrated nutrient management on flowering, fruiting and quality attributes of Aonla (*Emblica officinalis M.*) Cv. Narendra Aonla-6

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Keywords

NPK, FYM, Azotobacter, Azospirillum, PSB (Phosphate-solubilizing bacteria).

Abstract

The experiment was conducted in Randomized Block Design (RBD) with three replications and ten treatments in the month of August 2023. A field experiment was escort to assess the effect of 100g NPK, 100g FYM, 100g FYM + Azotobacter + Azospirillum + PSB, 100g NPK + 30g FYM + Azotobacter, 75g NPK + 60g FYM + Azotobacter, 50g NPK + 90g FYM + PSB, 100g NPK + 30g FYM + Azotobacter + PSB, 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB, 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB on flowering, fruiting and quality attributes of aonla (*Emblica officinalis m.*) Cv. NA-6. Application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB enhance the flowering attributes like sex ratio, fruiting and yield attributes are fruit set, fruit retention, fruit drop, fruit yield, physical characteristics of ripe fruits, fruit size such as fruit length, fruit width, fruit weight, fruit volume and chemical properties of fresh fruits such as total soluble solids and total sugar etc.

Introduction

The Indian gooseberry or aonla belongs to family "Euphorbiaceae" and it is referred to as a wonder fruit for health Bakshi *et al*., (2015), with the chromosome number. 2n =28. Aonla also known as different names in different region like Amla, Amolphal, Amalakamu, Dhatri, Nelli, Usirika and Maryobalan. The aonla tree are hardly in nature, adapt well under varying soil conditions, have low water requirement and exhibit salt tolerance. The wastelands which do not otherwise support arable crops may be put to productive use by planting, Indian gooseberry orchards. Indian gooseberry is a subtropical plant and prefers dry subtropical climate but it can be successfully cultivated in wide range of soil and climatic condition. Aonla fruit is considered the richest source of vitamin c due to its extraordinarily high vitamin c content in comparison to other commonly existing fruits **Alkandari D. *et al*., (2019).**

The fruit are also contains82.21% water, 0.5% protein, 0.1% fat, 14% carbohydrate, calcium, phosphorous and iron in trace amount. Besides having a nutritional and medicinal value, cultivation of Indian gooseberry is also highly remunerative for small and marginal farmers. Indian gooseberry is produced yearly in 1046 thousand MT on an area of 92,000 hectares that is cultivated across the nation NHB area and production of horticulture crops: All India. (accessed on 15 February 2024);2018. In U.P. more Indian gooseberry is grown in the Pratapgarh belt's vicinity, then in the district of Ayodhya. About 1300 hectares are covered by the Indian gooseberry orchard in the Pratapgarh district. It is indigenous to India, Shri-Lanka, Cuba, Thailand, Japan, Malaysia and China **Kumar Jain *et al*., (2004).** Indian gooseberry also grows wild at the foot of the Himalayas at elevation up to 1500 meters in South India. Overall, Indian gooseberry is a valuable fruit with significant potential for use in improving human health. Aonla is used to manufacturing of azayurvedic medicines such as ashokarishta, chavanprash and triphala which are traditional specific formulations made by utilizing aonla fruit or with its powder form also **Jat M. *et al.*, (2020).**

Materials and Methods

The current investigation was carried out at the horticulture research farm of the Department of Horticulture, Janta College, Bakewar, Etawah (U.P.) 206124 during the year 2023-2024, to find out **"The effect of integrated nutrient management on flowering, fruiting and quality attributes of aonla (*Emblica officinalis M*.) Cv. Narendra Aonla-6".**The experiment was laid out in a randomized block design with ten treatments, three replication in the month of august 2023 and the statistical analysis of the data was calculated as suggested by **Gomez and Gomez (1984).** The application of NPK, FYM, Azotobactor, Azospirillum and PSB. Flowering attributes like sex ratio, fruiting and yield attributes are fruit set (%), fruit retention(%), fruit drop(%), estimated fruit yield (kg/tree), physico-chemical attributes of aonla fruits like physical characteristics of ripe fruits in fruit size such as fruit length (cm), fruit weight (g), fruit volume (cc), seed weight (g) and chemical properties of fresh fruits are total soluble solids (^{0}Brix) and total sugar (%) etc.

Results and Discussion

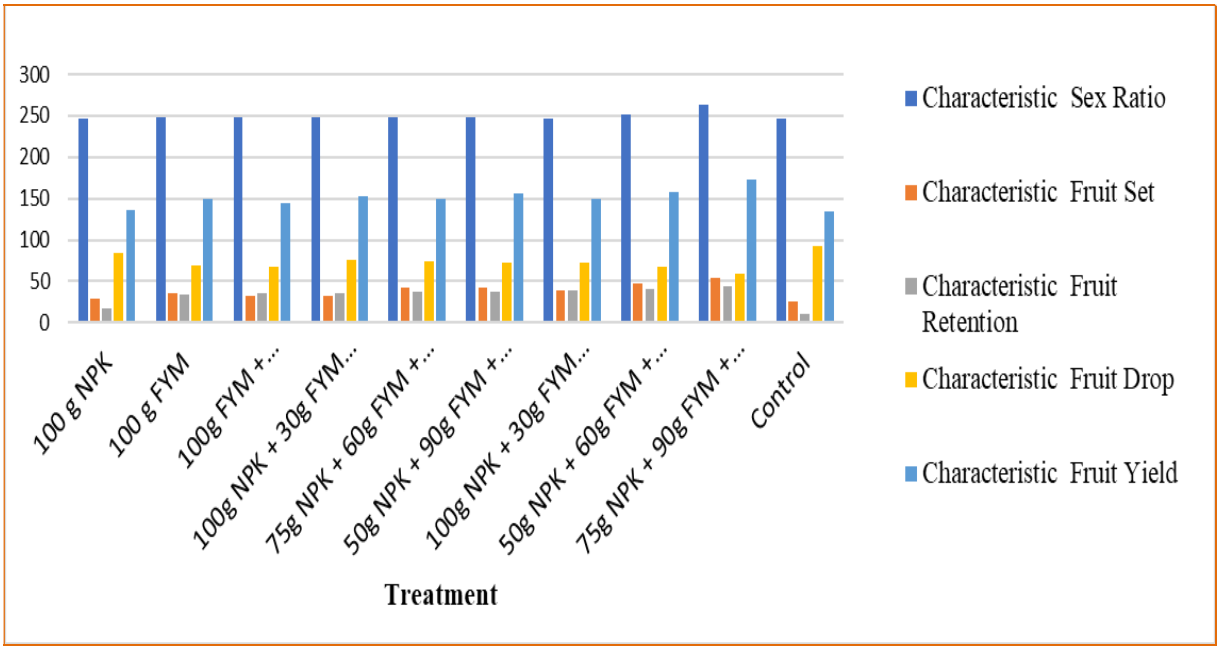
In present investigation the application of various treatments proved significantly effective in improving the sex ratio is clearly indicates in aonla on profound effect of NPK, FYM and Azotobacter, Azospirillum, PSB on the flowering in Indian gooseberry. The higher sex ratio 262.59 was observed in 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by sex ratio 251.72 was found in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB and the control showed comparatively lower sex ratio 246.70 respectively **Nayak A. k. *et al.*,(2011).**The current investigation the application of various treatments proved significantly effective in improving the percent of fruit set (%), the maximum fruit set 54.00 % was noticed in 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by fruit set 46.90 % was noticed in

50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. While, the control showed minimum fruit set 25.74 % respectively. The higher percentage of fruit retention 44.60 % was observed with the soil application in 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by fruit retention 39.90 % noticed in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. However, the minimum 10.49 % fruit retention was recorded on control plant. The percentage of fruit drop found in 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, treatment exhibited significantly minimum value 58.23 during the experiment, followed by fruit drop 67.30 % in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. Hence, 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB indicated as best treatment over rest of the treatments. However, the maximum fruit drop 91.75 % was found in control **Sharma *et al*., (2019).**Fruit yield (kg/tree) data pertaining of fruit as influenced by various treatment. The application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB was found to best treatment during the investigation, the maximum value of fruit yield was obtained 172.15 kg/tree per respectively followed by Fruit yield 158.42 kg/tree was found in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. Whereas, the minimum fruit yield was recorded 134.20 kg/tree with control respectively **Singh *et al*., (2008) and Sharma *et al*., (2019).**

Table-1: Effect of integrated nutrient management on flowering and fruiting attributes, physical and chemical characteristics of fruits in aonla (*Emblica officinalis M*.) Cv. NA-6.

Treatments	Characteristic				
	Sex Ratio	Fruit Set	Fruit Retention	Fruit Drop	Fruit Yield
100 g NPK	246.92	28.38	17.71	84.60	136.65
100 g FYM	248.64	35.16	34.75	69.80	148.60
100g FYM + Azotobacter + Azospirillum + PSB,	247.96	32.42	35.08	68.00	143.60
100g NPK + 30g FYM + Azotobacter	247.72	31.65	35.56	75.19	152.90
75g NPK + 60g FYM + Azotobacter	247.62	41.95	36.80	73.70	149.90
50g NPK + 90g FYM + PSB	248.20	42.70	36.800	71.75	156.06
100g NPK + 30g FYM + Azotobacter + PSB	245.58	39.30	38.20	71.90	149.90
50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB	251.72	46.90	39.90	67.300	158.42
75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB	262.59	54.00	44.60	58.23	172.15
Control	246.70	25.74	10.49	91.75	134.2

Fig.-1: Effect of integrated nutrient management on flowering and fruiting attributes, physical and chemical characteristics of fruits in aonla (*Emblica officinalis M.*) Cv. NA-6.

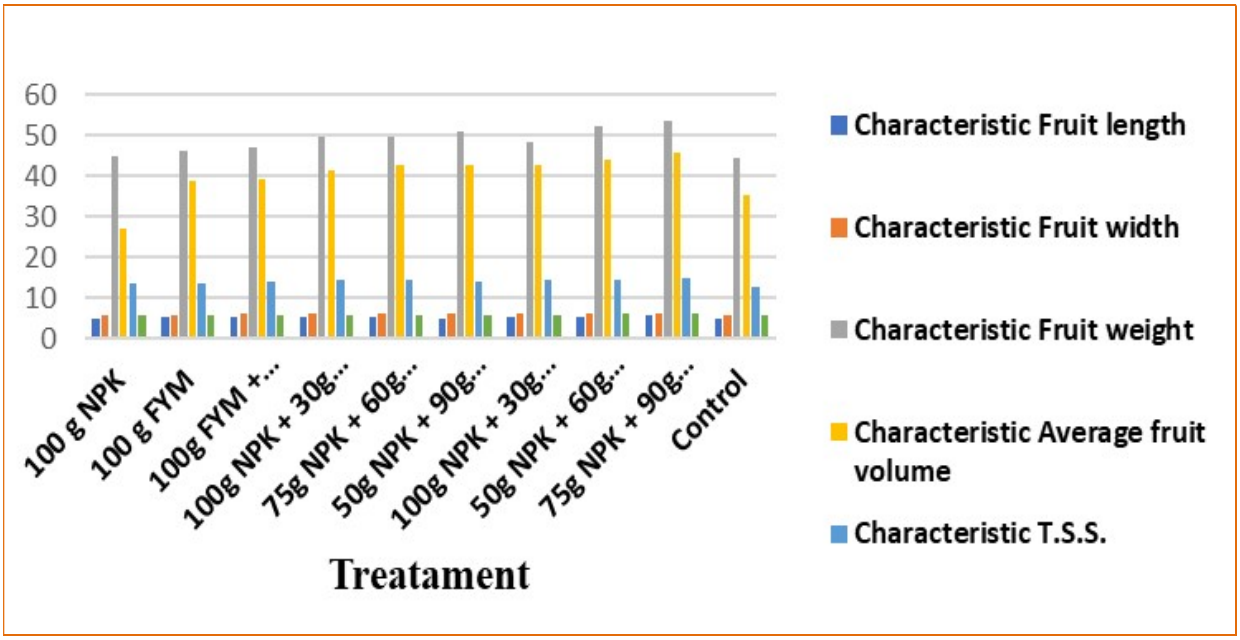


The maximum fruit length 5.50 cm was recorded with the application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB followed by fruit length 5.40 cm was found in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. Whereas minimum fruit length 4.80 cm was recorded in control plant. The highest width of fruit is 6.20 cm was recorded during the experiment respectively with the application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by fruit width 6.15 cm was found in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. Hence, the minimum fruit width 5.85 cm was obtained with the control plant.The maximum fruit weight is 53.60 g was recorded during the experiment with the application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by fruit weight is 52.40 g was noticed in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. Hence, the minimum fruit weight is 44.20 g was obtained with the control plant.The highest fruit volume was in 45.70 cc was recorded with the application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by fruit volume 43.85 cc was found in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB during investigation. Hence, 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB was reported to be substantially better than all the treatment except control. The lowest value of the fruit volume 35.05 cc was recorded in control during the experimental year with the use of normal water. T.S.S. data pertaining of fruit as influenced by various treatment. The application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB was found to best treatment during the investigation, the maximum value of T.S.S. was obtained 14.95 ^{0}Brix respectively followed by T.S.S. 14.45 ^{0}Brix was found in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB. However, the minimum value of T.S.S. 12.80 ^{0}Brix was recorded with control respectively these findings are similar to **Jamra *et al*., (2018) and Singh *et al*.,(2008)**.The below data clearly indicated that the highest total sugars content was 6.08 % was recorded with the application of 75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB, followed by total sugars 5.95 % was obtained in 50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB during the experiment. While, the lowest value of the total sugars 5.65 % was recorded in control during the experimental year.

Table-2: Effect of integrated nutrient management on physical and chemical characteristics of fruits in aonla (*Emblica officinalis M.*) Cv. NA-6.

Treatments	Characteristic					
	Fruit length	Fruit width	Fruit weight	Average fruit volume	T.S.S.	Total sugars
100 g NPK	4.95	5.88	45.01	26.80	13.45	5.70
100 g FYM	5.05	5.90	46.10	38.81	13.70	5.85
100g FYM + Azotobacter + Azospirillum + PSB	5.10	5.95	46.80	39.30	13.85	5.80
100g NPK + 30g FYM + Azotobacter	5.25	6.06	49.40	41.20	14.30	5.77
75g NPK + 60g FYM +	5.28	6.10	49.81	42.50	14.35	5.85
50g NPK + 90g FYM + PSB	4.88	6.02	50.71	42.81	13.85	5.90
100g NPK + 30g FYM + Azotobacter + PSB	5.35	5.94	48.30	42.60	14.20	5.75
50g NPK + 60g FYM + Azotobacter + Azospirillum + PSB	5.40	6.15	52.40	43.85	14.45	5.95
75g NPK + 90g FYM + Azotobacter + Azospirillum + PSB	5.50	6.20	53.61	45.70	14.95	6.083
Control	4.80	5.85	44.20	35.05	12.80	5.65

Fig.-2: Effect of integrated nutrient management on physical and chemical characteristics of fruits in aonla (*Emblica officinalis M.*) Cv. NA-6.



References

Alkandari D., Sarfraz H. and Sidhu J.S. (2019), Development of a functional food (pan bread) using aonla fruit powder. *J. Food Sci. Technol.*4:2287–2295.

Bakshi P., Wali V.K. and Jasrotia A. (2015),Evaluationof different aonla (*Emblica officinalis)* cultivars under rainfed conditions of lower Shivalik foothills of Himalayas. *Indian J. Agric. Sci.,*8:1210.

Gomez, K.A. and Gomez, A.A. (1984), Statistical procedures of agricultural research (2nd edition), *John wiley and Sons. Inc. New York*. 108-227.

Jamra R., Kanwar J., Dubey R and Tiwari R, (2018), Effect of integrated nutrient management practices on physical, biochemical properties and yield of aonla ((*Emblica officinalis Gaertn.) Int. J. of Chemical Studies*, 6(2): 1256-1258.

Jat M., Shivran J. and Jat R.P. (2020), Commercial products of aonla fruits, increasing the value addition. *J. Pharmacogn. Phytochem.,*10:1331–1337.

Kumar Jain S. and Khurdiya D.S. (2004),Vitamin C Enrichment of Fruit Juice Based Ready-to-Serve Beverages through Blending of Indian Gooseberry(*Emblica officinalis* Gaertn.) Juice. *Plant Foods Hum. Nutr.,*69:63–66.

Nayak AK, Sharma DK, Singh CS, Mishra VK, Singh G and Swarup A. (2011),Diagnosis and recommendation integrated system approach for nitrogen, phosphorus, Potassium and zinc foliar diagnostic norms for aonla (*Emblica officinalis m.)* in central Indo-gangetic plains. *Journal of plant nutrition*., Feb 2; 34(4): 547-556.

Sharma, A., Prasad, D., Chaurasiya, R., Goyal, G., Bhadauria, A. S., Tiwari, S., Singh, A.P. and Yadav, A. (2019), Influence of foliar application of Zinc, Calcium and GA_3 on fruit drop, yield and quality attributes of aonla cv. NA-7. *Int J. Curr. Micobiol. App. Sci.* 8: 135-146.

Singh, A. Yadav, A.L., Yadav, D.K. and Misra, S.K. (2008), Effect of integrated nutrient management on yield and quality of aonla (*Emblica officinalis Gaertn*.) Cv. NA- 10, Plant Archives, 8(1): 473-474.

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DOI:10.22192/ijamr.2024.11.09.002	

How to cite this article:
Keerti, Gagan Verma, Shivank and P.K. Rajput. (2024). Effect of integrated nutrient management on flowering, fruiting and quality attributes of Aonla (*Emblica officinalis M*.) Cv. Narendra Aonla-6. Int. J. Adv. Multidiscip. Res. 11(9): 18-23.
DOI: http://dx.doi.org/10.22192/ijamr.2024.11.09.002