

Impact of Plant Growth Regulators on Bottle Gourd (*Lagenaria Siceraria* (Molina) Standl.) Yield

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Abstract- The effects of three plant growth regulators (PGR)—ethrel, naphthalene acetic acid (NAA), and maleic hydrazide (MH)—on bottle gourd growth traits and fruit characteristics, were investigated in an experiment. Distilled water was found to achieve the maximum fruit length, weight, and girth. MH @ 150 ppm was applied to the foliage to achieve the maximum vine length and total number of nodes per vine. Ethrel @ 100 ppm was found to be beneficial for the number of fruits per vine, fruit yield (kg/vine). These findings imply that the application of ethrel 100 ppm at 2 and 4 true leaves would result in a notable improvement in fruit characteristics and growth.

Index Terms- *Lagenaria siceraria*, Plant growth regulators, Ethrel, Naphthalene acetic acid

I. INTRODUCTION

The bottle gourd, *Lagenaria siceraria* (Molina) Standl., is a crop that is sensitive to thermoperiodism but not to light. As a result, the majority of bottle gourd cultivars are seasonal. It contains a lot of vitamin "B" and the minerals P, Ca, and Fe. Additionally, it is crucial for therapeutic usage in cases of jaundice, headaches, and urinary problems. To satisfy growing domestic demand and expand the export market overseas, bottle gourd production has significantly grown. Sex expression and ratio have a significant impact on cucurbit yield. Hermaphrodites and pistillate flowers are found in later nodes, while male flowers and greater quantities are seen in early nodes.

As a result, harvesting is delayed and yield is decreased. PGRs can be used exogenously to solve the issue. PGRs directly impact fruit set, fruit drop, male to female flower ratio, and yield (Bose et al., 1999). Consequently, using PGRs like ethrel, NAA, and MH in bottle gourd may prove to be a useful strategy for boosting productivity and ensuring a timely harvest. According to Sharma et al. (1998), spraying bottle gourd with NAA improved production, female flowers, and vine length. Because of its benefits for gynoecium development, fruit ripening, stress induction, and lateral cell expansion, ethrel is utilized for a greater number of female flowers (Taiz and Zeiger, 2002). Belhelkar et al. (2006) have documented an increase in female flowers, fruit, and yield in bottle gourds when ethrel is applied. Shoot growth is caused by MH, which promotes cell proliferation and elongation.

II. MATERIALS AND METHODS

During the summer, the field trial was carried out at the vegetable section of Shri Ram College, Muzaffarnagar, Uttar Pradesh India. This region has a tropical to sub-tropical

climate with a hint of semi-aridity, marked by extremely dry summers, moderate rainfall, and bitterly cold winters. The highest and lowest recorded temperatures for the growth season were 33.30°C and 20.60°C, respectively. The field's soil was sandy-loam, well-drained, rich in organic matter, and in good fertility.

During the agricultural season, a levelled soil surface with guaranteed irrigation capabilities and anticipated winter and summer rainfall was sowed with bottle gourd seeds. Three PGRs were utilized in the study: ethrel (2-chloroethylphosphoric acid), naphthalene acetic acid (NAA), and MH.

The field trial involved treating seeds with a 0.2% carbendazim solution for 12 hours, followed by PGR sprays at the 2 and 4 true leaf stages, for a total of 10 treatment combinations. Ten seeds were sown in each trench, maintaining plant geometry of 3.0 x 0.5 m. Before 15 days of planting, a 30-by-30-by-30 cm³ pit was dug, and 20 tons of compost, 120 kilograms of N, 60 kg of P, and 60 kg of K were applied per hectare. Harvesting was done at 50 days of experiment.

The suggested set of procedures was used to grow the typical crops. During the course of the study, data on 14 significant growth and fruit-related characters were recorded. These data were then statistically analyzed utilizing appropriate methods for various characters. The analysis of variance method for randomized block design was used (Panse and Sukhatme 1967).

Table 1: Impact of plant growth regulators on the characteristics of fruits.

Chemical	Concentration (ppm)	Fruit length (cm)	Fruit diameter (cm)	Avg Fruit weight (kg)	No. of fruit per vine	Fruit yield (Kg/vine)	Yield per plot
Ethrel	50	33.80	26.58	1.27	8.56	10.33	53.15
Ethrel	100	35.58	26.78	1.40	10.26	13.92	68.28
Ethrel	150	34.10	27.10	1.35	8.68	12.59	63.39
NAA	50	33.02	25.15	1.25	10.10	9.10	47.84
NAA	100	31.00	24.64	1.20	9.37	9.37	44.78
NAA	150	32.48	21.20	1.10	8.48	8.48	41.04
MH	50	32.48	24.80	1.23	9.69	8.69	46.12
MH	100	31.06	23.29	1.13	8.65	8.65	41.75
MH	150	29.68	20.12	1.07	7.94	7.94	38.77
Distilled water spray (control)	-	36.80	28.16	1.43	10.02	9.02	47.51

III. RESULTS AND DISCUSSION

The application of distilled water (control) resulted in a considerable increase in fruit length, with PGR maximum (36.80 cm) long fruits (Table 1). Applying distilled water resulted in the fruit's maximum diameter (28.16 cm), which had a notable impact. The application of distilled water considerably enhanced the average maximum fruit weight (1.43 kg), which was statistically comparable to Ethrel 100 ppm (1.40 kg) and Ethrel 150 ppm (1.35 kg). Fruits per vine grew dramatically with PGR, and a high of 10.26 fruits per vine was obtained with Ethrel 100 ppm. Treatment Ethrel 100 ppm (13.92 kg) had the highest fruit output (kg/vine), which was statistically comparable to treatment Ethrel 150 ppm (12.59 kg). The data showed that different treatments greatly enhanced the amount of bottle gourd fruit produced per plot. Treatment Ethrel 100 ppm produced the highest fruit output per plot (68.28 kg), which was statistically equivalent to treatment Ethrel 150 ppm (63.39 kg). Ethrel 100 ppm

application increased the number of fruits per vine (Mandai et al., 1990; Kumar et al., 2006; bottle gourd), fruit yield (kg/vine) (Parmar, 2003; sponge gourd), and yield of bottle gourd per plot (these findings are also in line with those of Arora et al., 1988; Das and Maurya, 1993; pumpkin).

IV. CONCLUSION

There were notable variations among the PGRs, according to the analysis of variance for several features. In contrast, the application of distilled water produced the maximum fruit length, weight, and girth, while the foliage application of MH @ 150 ppm produced the maximum vine length and total number of nodes per vine. It can be concluded that the application of Ethrel @ 100 ppm was beneficial for the number of fruits per vine, fruit yield (kg/vine), and days to first harvest.

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