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## Effect of different plant growth regulators on growth and establishment of star gooseberry (*Phyllanthus acidus* L.)

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#### Abstract

An experiment was conducted at the central research farm, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad (U.P.) during (November 2017- April 2018) to study the "Effect of different Plant Growth Regulators on Growth and Establishment of Star Gooseberry (*Phyllanthus acidus* L.)" Experiment was laid out in randomized block design with 13 treatments replicated thrice. Considering the present investigation, it is concluded that the treatment T<sub>10</sub> (GA<sub>3</sub> 200 ppm) was found the best in terms of maximum plant height, stem diameter, plant canopy, number of leaves, length of shoot and first sprouting days of star gooseberry. It is very beneficial for health due to high medicinal and nutritional value. Other hand star gooseberry propagated by cutting, it is multiply by this method in small area. The farmer increase his income due to multiplication of star gooseberry in a small area.

**Keywords:** Effect of different plant growth, establishment, star gooseberry

#### Introduction

Star gooseberry (*Phyllanthus acidus* L.) belongs to family Euphorbiaceae. It is a closely related species of Indian gooseberry (*Embllica officinalis* or *Phyllanthus emblica*). It is found in the different parts of the world viz. Malaysia, Madagascar, Malayan islands and Mizoram. India has emerged as a major stake holder in the global horticulture scenario accounting for 10.9 % of the world fruit production, with the total fruit production of 92918 million tons from 6373 thousand hectares (NHB, 2017). In India, there is a wide spread adoption of star gooseberry cultivation in Andhra Pradesh, Karnataka, Maharashtra and it is expected that more area would be covered under this crop since it has proved its economic viability even in marginal and degraded lands.

Fruits are green at first, but when they mature become pale yellow to nearly white when fully ripe. Fruits do not get any deterioration in their quality under ambient temperature conditions (Kundan Kishore, 2005) [2]. Star gooseberry fruit contains 75-80% pulp, 4.5 5 °Brix total soluble solid, 2.2-2.4 % acidity and 35-40 mg/ 100g vitamin C/ 100g of fruits. Star gooseberry fruits used to cure various ailments in the Indian system of medicine. It possesses pronounced antibilious, laxative and diaphoretic properties. It is also used in the treatment of diarrhoea, jaundice and cough. (Bose and Mitra, 1900).

Star gooseberry (*Phyllanthus acidus* Skeels) is a promising new crop in India and it has many nutritional value as well as significant economic value. However practically very little work has been carried out on the use of growth regulators in star gooseberry crop. Therefore, there is a need to evaluate the effect of different plant growth regulators in vegetative growth of star gooseberry plant for establishment. Plant needs PGRs for its quick growth.so my thesis work may be useful to the farmer for establishing new fruit crop effectively by using plant growth regulators at effective concentrations.

#### Materials and Methods

The experimental site is situated at of latitude of 20° and 15° north and longitude of 60° 3" East and at an altitude of 98 meters above mean sea level (MSL). The maximum temperature of the location reaches up to 46°C- 48°C and seldom falls as low as 4°C- 5°C. The relative humidity ranged between 20 to 94 percent. The average rainfall in this area is around 1013.4 mm Annually. The soil of experimental area had sand 60%, Silt 26%, Clay 14%, pH 7.2, Soil EC. (dSm-1) at 250C is 0.28, organic carbon 0.35%.

**Table 1:** Treatment combination

Treatment	Growth Regulators
T <sub>0</sub>	Control
T <sub>1</sub>	BA 500 ppm
T <sub>2</sub>	BA 1000ppm
T <sub>3</sub>	BA 1500ppm
T <sub>4</sub>	Ethrel 1000 ppm
T <sub>5</sub>	Ethrel 2000 ppm
T <sub>6</sub>	Ethrel 3000 ppm
T <sub>7</sub>	GA <sub>3</sub> 100 ppm
T <sub>8</sub>	GA <sub>3</sub> 150 ppm
T <sub>9</sub>	GA <sub>3</sub> 200 ppm
T <sub>10</sub>	Thiourea 500 ppm
T <sub>11</sub>	Thiourea 750 ppm
T <sub>12</sub>	Thiourea 1000 ppm

## Results and Discussion

The salient features of the results obtained are summarized as below:

1. Plant height increases with application of T<sub>9</sub> (GA<sub>3</sub> 200 ppm). The treatment combination of T<sub>9</sub> (GA<sub>3</sub> 200 ppm) showed maximum plant height (24.14 cm) and minimum plant height (18.83 cm) was observed with control.
2. Maximum stem diameter (4.50 mm) was recorded with T<sub>9</sub> (GA<sub>3</sub> 200 ppm) and minimum stem diameter (2.33 mm) per plant was noticed in control.
3. Maximum number of leaves (27) was recorded with T<sub>9</sub> (GA<sub>3</sub> 200 ppm) and minimum number of leaves (17.67) per plant was noticed in control.

**Table 2:** Effect of different plant growth regulators on growth and establishment of star gooseberry (*Phyllanthus acidus* L.)

Notation	Treatments	Plant height (cm)	Stem diameter (mm)	Number of leaves	Plant canopy north to south	Plant canopy east to west	Shoot length (cm)	Days to first sprouting
T <sub>0</sub>	Control	18.83	2.33	17.67	13.00	13.20	11.67	56.67
T <sub>1</sub>	BA 500 ppm	20.29	3.00	22.67	13.37	13.60	11.82	51.67
T <sub>2</sub>	BA 1000ppm	23.09	3.23	23.00	13.43	13.67	13.67	47.00
T <sub>3</sub>	BA 1500ppm	23.23	3.43	23.33	13.57	13.97	14.22	46.00
T <sub>4</sub>	Ethrel 1000 ppm	23.29	3.47	23.67	14.07	14.10	18.00	45.67
T <sub>5</sub>	Ethrel 2000 ppm	23.33	3.80	24.00	14.20	14.17	18.20	44.67
T <sub>6</sub>	Ethrel 3000 ppm	23.35	3.83	24.33	14.27	14.30	18.50	43.67
T <sub>7</sub>	GA <sub>3</sub> 100 ppm	23.85	4.28	26.33	14.57	14.60	20.80	35.00
T <sub>8</sub>	GA <sub>3</sub> 150 ppm	23.91	4.30	26.67	14.67	14.70	20.83	33.67
T <sub>9</sub>	GA <sub>3</sub> 200 ppm	24.14	4.50	27.00	14.73	14.83	23.17	27.67
T <sub>10</sub>	Thiourea 500ppm	23.37	3.90	25.00	14.28	14.50	18.83	42.00
T <sub>11</sub>	Thiourea 750ppm	23.58	4.00	25.67	14.37	14.53	19.83	38.00
T <sub>12</sub>	Thiourea1000ppm	23.76	4.23	26.00	14.47	14.57	19.65	37.00
	F-Test	S	S	S	S	S	S	S
	S. Ed. ±	1.36	0.52	2.31	0.44	0.41	1.57	6.44
	C.D. (P= 0.05)	2.80	1.07	4.77	0.92	0.85	3.24	13.29

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4. Maximum plant canopy from north to south (14.73 cm) was recorded with T<sub>9</sub> (GA<sub>3</sub> 200 ppm) and minimum plant canopy from north to south (13 cm) per plant was noticed in control.
5. Maximum plant canopy from east to west (14.83 cm) was recorded with T<sub>9</sub> (GA<sub>3</sub> 200 ppm) and minimum plant canopy from east to west (13.20 cm) per plant was noticed in control.
6. Maximum shoot length (23.17 cm) was recorded with T<sub>9</sub> (GA<sub>3</sub> 200 ppm) and minimum shoot length (11.67 cm) per plant was noticed in control.
7. Minimum days for first sprouting (27.67 days) was recorded with T<sub>9</sub> (GA<sub>3</sub> 200 ppm) and maximum days for first sprouting (56.67 days) per plant was noticed in control.

## Conclusion

Considering the present investigation, it is concluded that the treatment T<sub>10</sub> (GA<sub>3</sub> 200 ppm) was found the best in terms of maximum plant height, stem diameter, plant canopy, number of leaves, length of shoot and first sprouting days of star gooseberry. It is very beneficial for health due to high medicinal and nutritional value. Other hand star gooseberry propagated by cutting, it is multiply by this method in small area. The farmer increase his income due to multiplication of star gooseberry in a small area.

Thus it is recommended to apply the growth regulators for better growth and establishment at initial stage of star gooseberry seedlings.