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Research Article

Effect of Bio Stimulants and Growth Regulators on Growth and Yield of Snake Gourd (*Trichosanthes anguina*) cv. PKM 1.

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ABSTRACT

An investigation was conducted to study the effect of different growth regulators viz., NAA and Ethrel along with different bio stimulants viz., Panchakavya, Humic acid, Vermiwash on sex modification, growth and yield of snake gourd (Trichosanthes anguina) at Department of Horticulture, RVS Padmavathy College of Horticulture, Sempatti. The experiment was laid out in Randomized Block Design with nine treatments with three replications. Treatments (9) consisted of (T_1) - Control, (T_2) – Panchakavya (3%), (T_3) – Humic acid (0.3%), (T_4) – Vermiwash (3%), (T_5) – NAA (100 ppm), (T_6) – NAA (200 ppm), (T_7) – Ethrel (50 ppm), (T_8) – Ethrel (100 ppm) and (T_9) – Ethrel (250 ppm). Based on the observation recorded on the various growths, yield parameters of snake gourd crop; it was found that the growth regulators treatments were significantly superior over the control. The plant growth regulators treatment with 250 ppm ethrel (T_9) registered the highest values of growth characters like vine length and inter nodal distance at different phases of crop growth. The yield parameters viz., fruit length, average fruit weight, number of fruits per vine, yield per vine, number of seeds per fruit were maximum with the application of 250 ppm ethrel (T_9). The application of bio stimulants with 3 % panchakavya (T_2) were significantly increased stem length, fruit length, fruit girth and average fruit weight of snake gourd.

Keywords: *Growth regulators, Bio stimulants, Growth, Yield and Chilli.*

INTRODUCTION

Snake gourd is originated in India / Indo Malayan region / the Indian Archipelago (Gopalan et al., 1982 and Khatun*et* al., 2010). The genus *Trichosanthesis* native to Southern and Eastern Asia, Australia and Islands of the western Pacific. The genus *Trichosanthes* comprises about 100 species, of which a few have been domesticated in Asia, snake gourd being the most important. Two varieties are distinguished within *Trichosanthes anguina.* They are the wild var. *anguina* occurring from India, Sri Lanka and China, through South-East Asia, to northern Australia, and the cultivated var. *anguina* (L.). It is an important crop grown in Tamil Nadu. The fruits are tasty and nutritious.

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The immature fruits are used as vegetable and is important as a good source of minerals like Ca, Mg, P, fibres and other nutrients to make the food wholesome and healthy (Rahman et al., 2002). It has very high medicinal value. The plant is regarded as blood purifier and used in curing skin diseases. Some medicinal uses of snake gourd include treatment of jaundice, heart problems, fever and alopecia.

Plant growth regulators are the chemical substances, when applied in small amounts modify the growth of plant usually by stimulating part of the natural growth regulatory system. About sixty plant growth regulators are now commercially being used and several of them have reached considerable importance in crop production. The growth regulators include both growth promoters and retardants which have been shown to modify the canopy structure and other yield attributes. Keeping the above points in view, field studies are carried out with the following objectives.

- To study the effect of bio stimulants and growth regulators on growth attributes of snake gourd.
- To study the effect of bio stimulants and growth regulators on yield attributes of snake gourd.

MATERIALS AND METHODS

A field study was carried out at the department of horticulture, RVS Padmavathy College of Horticulture, Sempatti, Dindigul during 2019. The experiment was laid out in Randomized Block Design with nine treatments with three replications. The field was ploughed to fine tilth and a general dose of farmyard manure was incorporated at the time of last ploughing. Pits of 60 cm diameter and 30-45 cm depth are taken. Seeds are sown at 4-5 per pit, since the seeds take a long time to germinate due to very hard seed coat, soaked the seeds in water over night before sowing. Row to row spacing of 1.5 – 2.5 m and plant to plant spacing of 60-120 cm are advocated for snake gourd. According to treatment structures Panchakavya (3%), Humic acid (0.3%), Vermiwash (3%), NAA (100 ppm), NAA (200 ppm), Ethrel (50 ppm), Ethrel (100 ppm), Ethrel (250 ppm) were sprayed during 2 to 4 leaf stage in different treatment combinations. Each treatment plot constituted twelve plants, of which five plants were identified and labeled for stage wise morphological observation.

Treatment combinations:

T_1 – Control
T_2 – Panchakavya (3%)
T_3 – Humic acid (0.3%)
T_4 – Vermiwash (3%)
T_5 – NAA (100 ppm)
T_6 – NAA (200 ppm)
T_7 – Ethrel (50 ppm)
T_8 – Ethrel (100 ppm)
T_9 – Ethrel (250 ppm)

Observations

Observations were recorded on the following biometrical characters and yield characters of snake gourd. The mean values were subjected to statistical analysis.

Sampling procedure

Five plants were selected at random and labeled for recording observations on growth parameters *viz.*, vine length, stem girth, inter nodal length, fruit length, fruit girth, average fruit weight, number of fruits per vine and yield per vine, fruit yield per hectare and number of seeds per fruit.

RESULT AND DISCUSSION

Application of foliar spray (T_9) ethrel 250 ppm significantly increased the vine length (194.36, 340.25 and 481.36 cm at 30, 60, 90 DAS), inter nodal length (8.33 cm at final harvest stage), number of seeds/ fruit (91.15), number fruits/ vine (30.05), yield/ vine (7.78 vine/kg.) and fruit yield/ha (22.54 t/ha.) of snake gourd (*Trichosanthes anguina*) cv.PKM 1.

Application of foliar spray (T_2) panchakavya (3 %) significantly increased the stem length (1.84, 3.59, 4.69 cm at 30,60, 90 DAS), fruit length (154.25 cm), fruit girth (19.55 cm) and average fruit weight (638.15 cm) of snake gourd (*Trichosanthes anguina*) cv.PKM 1.

In many crops like cucurbitaceous ones, these processes can often be altered to human benefit by proper application of plant growth regulators and bio stimulants. The concept that plant growth and development are regulated by a substance produced in minute quantities is one organ that elicits a response in another was first suggested by Julius von Sachs, the father of plant physiology. The term plant growth regulators (PGRs) cover the broad category of organic substances (other than vitamins and nutrients) that in minute amounts, promote, inhibit, or otherwise modify physiological processes (Wareing & Phillips, 1978). The PGRs, where endogenous (phytohormones) or exogenous, elicit essentially the same plant responses. Presently, PGRs are used to control a host of physiological processes in crop production, including flowering and fruiting (fruit set and parthenocarpy), partitioning of assimilate, germination, growth suppression and post harvest ripening (Weaver, 1975).

Mishra et al. (1976) reported that in cucumber maximal suppression of staminate flowers was obtained by the application of 400 ppm of ethrel. In case of fruit yield and yield components like number of pistillate flowers, fruit numbers plants-1, fruit size and fruit weight were increased in *Trichosanthes anguina* plants by the application of ethrel at 50 to 150 ppm. The best result was obtained with ethrel at 150 ppm (Ramaswamy et al., 1976). In *Luffa acutangula* seedlings treated with 500, 1000 or 2000 ppm of ethrel, Patnaik et al. (1974) reported that ethephon treated plants produced pistillate flowers only, but the number of fruits and total yield were inferior to those of untreated plants. Verma et al. (1980) reported that ethrel treatments (50, 100, 150 and 200 ppm) were the most effective in increasing the number of female flowers, producing the largest number of fruits and greatest fruit weight plant-1 in cucumber. They further reported that all the treatments reduced the number of male flowers.

The increase in the number of branches per plant might be attributed to the activation of cell division and cell elongation in the axillary buds which had a promoting effect in increased number of primary branches and secondary branches by the auxin which is present in panchagavya. The application of panchagavya would have induced the endogenous synthesis of native auxins resulting in an early active growth. Interaction with the synthesis of native cytokinins in the root cells and its transport at later stages to axillary buds, thereby leading to the formation of more branches. This is quite obvious by the rapid increase in the number of branches of the crop in panchagavya treated plants as compared to a slower rate of increase in the control. Similar results were obtained by Sridhar (2003) in *Solanum nigrum* by the application of panchakvya 3 %.

Table 1: Effect of bio stimulants and growth regulators on vine length (cm) at different growth stages of snake gourd *(Trichosanthes anguina)* cv. PKM 1.

Treatments	Vine length (cm)		
	30 DAS	**60 DAS**	**90 DAS**
T_1	135.24	260.57	410.89
T_2	148.97	279.36	424.35
T_3	142.57	247.26	407.41
T_4	157.69	290.97	412.22
T_5	161.58	296.25	437.14
T_6	175.97	283.97	422.29
T_7	187.69	321.36	417.09
T_8	181.36	337.50	479.35
T_9	194.36	340.25	481.36
Mean	165.05	295.28	432.46
SEd	**0.34**	**0.53**	**0.47**
CD(P=0.05)	**0.71**	**1.11**	**0.97**

Table 2: Effect of bio stimulants and growth regulators on stem girth (cm) at different growth stages of snake gourd *(Trichosanthes anguina)* cv. PKM 1.

Treatments	Stem girth (cm)		
	30 DAS	60 DAS	90 DAS
T_1	1.49	2.37	3.74
T_2	1.84	3.59	4.69
T_3	1.59	3.41	4.19
T_4	1.60	3.05	4.10
T_5	1.67	3.11	4.28
T_6	1.70	2.97	3.97
T_7	1.68	2.55	4.02
T_8	1.59	3.34	4.25
T_9	1.73	3.47	4.44
Mean	1.65	3.10	4.20
SEd	**0.07**	**0.15**	**0.21**
CD(P=0.05)	**0.015**	**0.33**	**0.43**

Table 3: Effect of bio-stimulants and growth regulators on fruit length (cm), fruit girth (cm) and average fruit weight (g) of snake gourd *(Trichosanthes anguina)* cv. PKM 1.

Treatments	Fruit length(cm)	Fruit girth (cm)	Average fruit weight (g)
T_1	109.87	14.35	329.23
T_2	154.05	19.55	638.15
T_3	147.45	17.54	478.25
T_4	131.34	15.07	403.00
T_5	117.25	15.25	389.08
T_6	124.36	16.35	439.75
T_7	120.35	18.35	527.75
T_8	130.69	17.54	589.00
T_9	137.32	18.64	607.05
Mean	130.30	16.96	489.03
SEd	**0.23**	**0.03**	**1.76**
CD(P=0.05)	**0. 49**	**0.06**	**3.68**

Table 4: Effect of bio-stimulants and growth regulators on number of fruits /vine, yield/ vine, yield/ hectare and number of seeds per fruit of snake gourd *(T. anguina)* cv. PKM 1.

Treatments	Number of seeds per fruit	Number of fruits per vine	Yield per vine (kg)	Fruit yield (t/ha)
T_1	60.16	18.07	4.84	13.54
T_2	62.75	22.13	6.69	21.25
T_3	64.95	24.02	6.08	17.25
T_4	78.25	24.05	5.93	18.64
T_5	80.52	26.02	6.37	16.35
T_6	71.95	26.01	6.84	18.94
T_7	84.25	25.04	6.91	19.35
T_8	85.75	29.12	5.43	20.87
T_9	91.15	30.05	7.78	22.54
Mean	24.944	6.32	18.63	75.53
SEd	**0.625**	**0.01**	**0.04**	**0.1179**
CD(P=0.05)	**1.257**	**0.03**	**0.09**	**0.2370**

CONCLUSION

On the basis of this study, it is concluded that the efficient plant growth and remunerative higher yield of snake gourd can be obtained by adopting different level of bio stimulants and growth regulators *i.e.*, application of plant growth regulators treatment with 250 ppm ethrel (T_9) registered the highest values of growth characters like vine length and inter nodal distance at different phases of crop growth. The yield parameters *viz.*, fruit length, average fruit weight, number of fruits per vine, yield per vine, number of seeds per fruit were maximum with the application of 250 ppm ethrel (T_9). The application of bio stimulants with 3 % panchakavya (T_2) were significantly increased stem length, fruit length, fruit girth and average fruit weight of snake gourd.

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