IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Role of plant growth regulators on vegetable crops.

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Abstract:

Growing regulators have enabled humans to track plant growth and have proven to be the most powerful tool in agriculturist hands for increasing yield and improving crop quality. As Indian agriculture becomes more mechanized and science Plant growth regulator technologies that have an immediate impact on crop enhancement projects and are less time intensive would result in quantifiable gains for the customer. Plant growth regulators in vegetables equips clinicians and researchers with the knowledge and expertise needed to effectively use these adaptable techniques to increase vegetable production extends the possibilities for using inputs to increase productivity and food safety, the role of plant growth regulators becomes more important. The majority of physiological processes and development in plants are regulated by the activity and association of hormones and some naturally occurring inhibitors. Plant growth regulators help to get better yield

Key words: GA3, NAA, IBA

Introduction

Since photosynthesis provides carbon and respiration provides energy for plant growth, a class of chemicals emitted by plants known as plant growth regulators control tree growth and production. These chemicals have an effect on plant operations at very low concentrations. Plant growth regulators are organic chemical substances other than nutrients and vitamins that, when added to the soil, promote plant growth. They can be available and used in different of forms, including liquid, powder, and paste. Hormones are derived from the

Greek word "hormao," which means "to induce." Timone coined the word phytohormones to describe organic compounds produced spontaneously by plants. Synthesized in one part and usually translocated to another, where minute quantities affect plant growth and other physiological functions They are referred to as phytohormones to distinguish them from animal hormones. The definition of plant growth Regulators are artificially manufactured substances that, in very small amounts, usually work at locations other than the site of processing to regulate various physiological processes that modulate plant growth and development. It is a structurally unrelated set of small molecules originating from different important metabolic pathways. In recent years, scientists have focused on the idea of regulating plant growth as the third most important factor in improving growth, yield, and efficiency through the use of plant growth regulators in a number of ways. Components of growth and yield Plant growth regulators, also known as agrichemicals of the new generation, change plant growth by causing or modifying one component of the natural growth regulatory system, resulting in increased yield. As a result, growth regulators have been called one of the most efficient ways of growing. Making of Nutrients, on the other hand, are inorganic compounds needed for normal plant growth and production. Plant breeding strategies are both time intensive and costly. They play an important role in a number of enzymatic processes, including assimilation, oxidation, and reduction reactions, as well as helping to increase biomass and pod production.

Review of literature

Okra

1. Ayub *et al* (2013) conducted an experiment on effect of spacing and plant growth regulators on plant growth and yield parameters during kharif 2015 and 2016 at the Sagdividi Farm, Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University. Seeds of okra variety named GJO 3 treated with growth regulators GA3,NAA,and IBA each at 50,100,150ppm along side control. plant growth regulators were applied as seed soaking treatment for 8 hours. A treated seeds were grown in field with three plant spacing (S1 : 45 cm × 30 cm, S2 : 60 cm × 30 cm and S3 : 60 cm × 45 cm). From this experiment he concluded that plant spacing with 60 *45 cm along side treatment

GA3 150ppm soaking seeds for 8 hrs gives good yield ,maximum plant height, stem diameter, fruit length, number of fruits and good seeds and seeds yield per plant..

2. Y.L. Bhagaru *et al* (2013) conducted a experiment on effect of seed soaking and foliar sprays of plant growth regulators on germination, growth and yield of okra (Abelmoschus esculentus L.) var. Parbhani Kranti.The treatment comprised of the 2 concentrations seed soaking of GA3 (50 and 100 ppm) and cycocel (100 ppm and 150) and foliar spray of cycocel (250, 500, 750, 1000 ppm) at 30 and 45 days after sowing and control. Foliar spraying of cycocel @750 and 1000ppm at 30 and 45 DAS found most effective germination, high germination percentage, reduction in plant height, increase number of leaves, branches, leaf area, increase in fruit set, early flowering, yield.
3. Avinash *et al* (2011) reported that Foliar spraying of GA3 at 150 ppm increases the internodal length, first flowering, first flowering, fruit set. fruit yield and IAA increase the quantity of branches and IAA at 100ppm increase. Okra variety 'Akola Bahar' was sown at 60cm x 30cm spacing during Kharif season with a net plot size of 4.5m2. The experiment was laid call at Randomized Block Design with three replications and thirteen treatments including plant growth regulators as GA3 (50, 100, 150, 200ppm), IAA (25, 50, 75, 100ppm), NAA (10, 20, 30, 40ppm) and one control (water soaked and foliar spray). Each treatment comprised seed soaking followed by foliar spray 30 DAS
4. C.N. Patil *et al* (2014) reported that gibberellin 50 ppm plant height, number of internodes and length of internodes, seed treatment As concerned to reproductive and quality parameter viz., length of dried pod, weight of seeds per pod, yield per plant and yield per plot and weight of 100 seeds, the treatment GA at 50 ppm showed significantly superior performance over remaining all other treatments. Effect of seed treatment with gibberellin and maleic hydrazide on growth, seed yield and quality of okra cv. PARBHANI KRANTI. , seed treatment with maleic hydrazide at 80 ppm gave more number of branches and number of leaves per plant exhibit significantly maximum number over remaining all other treatments.
5. Munda *et al.* (2000) reported that the applications of various concentration of growth hormones viz, GA and NAA on different parameter of Okra seeds revealed that GA 100 ppm as seed treatment was

found to be best where, seeds per pod, weight per pod, weight of seed per plant, size of seed, 100-seed weight and seed yield per ha was significantly superior over remainder of the treatment

6. Naruka and Paliwal (2000) revealed that the consequences of gibberellin (GA) and NAA, both at 25, 50 and 75 ppm, on okra cv. Pusa Sawani were studied in Rajasthan, India during 1996. the rise in GA and NAA levels resulted during a corresponding increase in plant height, number of leaves per plant, main stem girth, days taken to 50% flowering, number of fruits per plant, mean fruit weight and yield
7. Vijayaraghavan (2000) revealed that the okra cv. MDU-1 seeds were treated with 25, 50 or 75 ppm each of IAA or gibberellin or 20, 40 or 60 ppm benzyl adenine. Seed treatment with 50 ppm gibberellin produced the very best germination percentage, seedling establishment, total dry matter, harvest index fruits/plant and therefore the highest fruit yield of 15.7 t/ha. The control yield was 8.07 t/ha
8. Hussaini and Babu *et al* (2004) reported that the growth regulators gibberellin (GA3; 100 or 200 ppm), NAA (20 or 40 ppm) and maleic hydrazide (500 or 1000 ppm) were sprayed to plants 4 times at 15-day-intervals starting at 15 days after sowing. Plants treated with 200 ppm GA3 recorded the best plant height (100.87 cm), pod weight (15.00 g), pod length (15.33 cm), and yield per plant (0.116 kg) and per ha (13.65 kg). the amount of flowers per plant (17.50), number of pods per plant (11.83), and number of seeds per pod (53.83) were greatest in plants sprayed with 40 ppm NAA. the amount of days to 50% flowering was lowest with 20 (35.00) and 40 ppm NAA (35.17).
9. Kumar and Sen (2004) revealed that the values of plant height, number of branches, number of nodes on the most axis, number of fruits per plant, fruit yield per plant and yield/ha were higher with seed soaking in 50 ppm gibberellin.

TOMATO

10. Prasad *et al.* (2013) examined tomato for GA3 levels (20, 40, 60, and 80 ppm) and NAA levels (20, 40, 60, and 80 ppm) (25, 50, 75, 100 ppm). they found that using GA3 and NAA increased the share of fruit set, number of fruits per plant, and fruit yield dramatically as compared to the control. the appliance of GA3 at 80 ppm resulted within the highest fruit yield (48.36 t/ha), followed by NAA at 100 ppm.

11. Kumar *et al.* (2014) investigated tomato production, yield, and quality using various GA3 levels. T5 had the best fresh fruit weight (kg/plant), followed by T4 (3.12 kg) (2.96 kg). Furthermore, T5 (1.88 mg/100 gm and 4.95 oBrix) had more vitamin C (mg/100 gm) and TSS (oBrix), followed by T4 (1.74 mg/100 gm and 4.70 oBrix).
12. Rahman *et al.* (2015) used two summer tomato varieties, BARI Hybrid Tomato-4 and BARI Hybrid Tomato-8, to perform an experiment on various levels of GA3 and 4- chlorophenoxy ethanoic acid (4-CPA). they found that V2T3 had the very best yield (27.28 t/ha) from the interaction effect of variety and plant growth regulators, whereas V1T0 had the bottom. therein case, the variability was BARI Hybrid Tomato-8, which produced the very best yield when GA3 and 4-CPA were applied together at a degree of 60 ppm.
13. Luitel *et al.* (2015), who experimented on 2, 4-D and located a rise in tomato yield under protected conditions. they found that spraying 5 ppm 2,4-D on flowers resulted within the most fruit set (55.0 percent), followed by 10 ppm. However, at 10 ppm 2,4- D spray, the utmost total fruits/plant (14.8) were made. Furthermore, they found the very best fruit yield/plant (587.9 g) at 10 ppm which was followed by 5ppm.
14. Hasanuzzaman *et al,* 2015 found the utilization of GA3 at 125 ppm resulted in an improved Plant height, number of leaves per plant, number of branches per plant, and dry matter tomato stem and root material
15. Khan *et al*. (2006) demonstrated that GA3 plays a crucial role in tomato fruit set, leading to a better number of fruits per plant, greater fruit size, and better final yield. When treated with GA3, they also saw a rise within the phosphorus, nitrogen, and potassium content of the leaves, also as a rise within the lycopene content of the tomato fruit. Also after the GA3 treatment ended, there was a beneficial impact on petal elongation.

16. According to Bokode *et al.* (2006), a tomato procedure with a 50ppm concentration of GA3 resulted in the greatest plant height. GA3 at 50 ppm was found to be more successful in early flowering to 50% flowering.
17. Sultana (2013) reported that applying GA 50 ppm increases plant height, number of leaves, number of flower clusters per plant, number of flowers per cluster, number of fruit clusters per plant, fruit diameter, weight of fruit yield per plant, and tomato yield.
18. Orzlek and Kaplan (2006) discovered that combining GA3 and Nutra-Phos 3-15 was antagonistic, resulting in substantially lower fruit yield and delayed maturity. However, the GA3 and Nutra-Phos 3-15 treatments alone yielded more fruit than the mixture, with no effect on fruit maturity as compared to the control.

Chilli

19. According to Natesh *et al.,(* 2005) among the plant growth regulators sprayed at the flowering point, GA3 @ 100 ppm substantially increased plant height (85.7 cm) and amount of branches per plant (30.3), accompanied by GA3 @ 50 ppm and NAA @ 20 ppm in chilli cv. Byadgi Kaddi .
20. As per Singh *et al.,* 2012 , the maximum plant height was observed in NAA at 50 ppm sprayed at flower initiation and 20 days later from the first spray in both capsicum cultivars, California Wonder and Solan Bharpur (114.38 and 111.66 cm, respectively). Similarly, the highest number of secondary branches was reported in NAA at 50 ppm in both capsicum cultivars
21. Gare *et al,* (2017) investigated the impact of plant growth regulators on rainfed chilli growth, yield, and yield attributing characters in the Kolhapur district of Maharashtra. The NAA was foliar sprayed at 6, 8, and 10 weeks after transplanting, and the foliar spray of NAA @ 60 ppm resulted in slightly higher fruit set percentage (84.2 percent), led by NAA @ 50 ppm (80.8 percent).
22. Shel and Nath (2016) investigated the effect of NAA on chilli by spraying the crop with various concentrations of NAA 35 and 45 days after transplanting and discovered that increasing all concentrations of NAA has a positive effect on early flower initiation. When NAA was added at a concentration of 20 ppm, flowering began almost one week earlier (68 days) than when no NAA was applied.

23. According to Kar *et al*, (2016) spraying GA3 at 50 ppm at 60 DAT resulted in the greatest plant height (62.35 cm), led by NAA at 40 ppm (58.86 cm). They discovered that the use of 2, 4-D reduced development compared to the control. In chilli, the application of 2, 4-D @ 5 ppm resulted in the greatest number of branches (8.33), followed by regulation (7.68).
24. Arora *et al.*, (2014) investigated the impact of 2,4-D and NAA concentrations and methods of application on plant development, flowering, yield, and quality in summer season chilli (Capsicum annum L.) cv. Pant C-1 and discovered that 45 ppm of NAA substantially increased plant height (68.6 cm), primary branches (7.80), and number of leaves per plant (2193.20)
25. Raj *et al.*, (2016) investigated the impact of growth regulators on the growth and yield of chilli. The growth regulators were added as a foliar spray 30 and 60 days after transplanting. NAA @ 75 ppm (38.26 days) had the earliest flowering, followed by GA3 @ 60 ppm (38.72days)
26. According to Tapdiya *et al.*, (2018) NAA 40 ppm was found to have the largest fruit set percentage (44.11 percent) among the various growth regulators and its concentrations In chill, 30 ppm (43.47 percent).
27. Mahindre *et al.*, (2018) concluded that NAA could also be answerable for a rise in photosynthetic activities at intervals the plant, which can lead to augmented development of carbohydrates and connected merchandise, which can be answerable for a rise in development. Fruit size and weight of chile square measure ultimately answerable for improved chile yield

Brinjal

28. Sharma, M. *et al* (2006) conducted a experiment impact of Plant Growth Regulators on growth and Yield of eggplant at Khajura, Banke on eggplant cvs. Pusa Purple Long (PPL) and Pusa Purple Cluster (PPC) as main plot issue at Khajura, Banke district throughout summer-rainy season of 2004. The sub-plot treatments composed of water (control), 40 ppm NAA, 10 ppm GA3, 2 ppm 2,4-D, three hundred ppm ethephon, thirty ppm staff of life and five ppm triacontanol. Higher fruit yield was detected at forty ppm NAA than 10ppm GA3 and thirty ppm staff of life.
29. Moniruzzaman *et al.* (2014) used a mix of growth regulators, as well as GA3 (30, 40, and fifty ppm) and NAA (20, 40, and sixty ppm), yet as 2 variants, urban center Begun-5 and urban center Begun -10.

the appliance of NAA @ forty ppm resulted within the highest share of long and medium titled flowers, leaf chemical process, variety of fruits per plant, and fruit yield (45.50 t/ha). Since transplant, the variability urban center Begun-5 took forty days to flower, whereas urban center Begun-10 took a hundred days to flower. NAA @ forty ppm together with urban center Begun-5 resulted within the highest long-styled flower share, variety of fruits/plant, and fruit yield (49.73 t/ha).

Potato

30. Alexios *et al*, (2006) finished that the appliance of GA3 sixty days when transplant augmented plant height however had no impact on tuber variety, weight, or dry matter material not affected. Delayed application of GA3 ends up in the initiation of a high proportion of up tubers before harvest, yet as associate improvement in physiological age of tubers
31. Awati *et al*, (2016) reported that Foliar application of ethrel at 250 ppm was productive in modifying the makeup of the plant, increasing plant height, shoot diameter, per plant variety of tubers, and total tuber yield as compared to the ability

Conclusion:

The use of plant regulators in horticulture is a growing development with numerous benefits. The method of using plant growth regulators in horticulture yields positive outcomes. However, further research and weights, as well as discussions on the subject, are needed before concluding that the use of plant growth regulators in horticultural plants can be a challenge for everyone. And most of the time farmers don’t have practical knowledge how plant regulators used in fields

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