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Physiological Basis of Growth, Yield and Quality of Vegetable Influenced by Chemicals or PGRs

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Summary

Physiological basis of plants which refers to which increase or stimulate the growth of the plant as well as increasing the yield with the quality. By these bases, regulate the all over the plant's growth and development. Application of PGRs increases and decreases the plant process, stimulating the favourable growth of the plant.

Significance of Chemicals or PGRs on Physiological Basis

1. Application of chemicals on plants,
2. Increase or decrease the leaf area, leaf size, leaf thickness, fruit setting, fruit weight, fruit size, increase the branches, increase the node number by reduce the internodal length, increase the root uptake, quality of fruit, increase the shelf life of commodity, etc.
3. Lastly, increase the yield of plants with the quality of fruits.

Plant Growth Regulators (Plant Hormones)

1. An organic compound and small in quantity.
2. Can be natural or synthetic.
3. It modifies or controls one or more specific physiological processes within a plant.
4. But, the sites of action and production are different.
5. If the compound is produced within the plant it is called a phytohormone
6. Substances applied externally also can bring about modifications.
7. A large number of chemicals tend to increase the yield of certain plants such as corn and sugarcane.
8. Both internal plant hormones and lab created hormones are called plant growth regulators.
9. Hormones usually move within plant from a site of production to site of action.

Role of Plant Growth Hormone in Vegetable Production

The role of plant regulators in various physiological and biochemical processes in plants is well known. Growth regulators are known to affect, Seed germination, Seed dormancy, Vegetative growth, Nodulation, Tuberization, Fruit ripening and yield, Hybrid seed production, Fruit setting and fruit size:

1. Auxin- Agricultural Uses: Rooting of the cuttings, Prevention of pre-harvest fruit drop, Parthenocarpic fruit, Fruit setting, Controls of flowering, Defoliation of the plants, Prevention of abscission, Thinning of compact fruits and Selective weed killers.

2. Gibberellins applications: Germination, Rooting, Leaf expansion, Hyponasty of leaves, Flowering, Parthenocarpy, Fruit setting & size, Fruit drop, Stem elongation, Pollen germination and Break the dormancy.

3. Cytokinins application: Cell division, Increase the Shelf life of fruits, quickening of root induction, Increasing the yield and oil content in groundnut, breaking dormancy and Delaying the senescence.

4. Application of ABA: Bud dormancy, Senescence, Abscission, Flower initiation, Stomatal physiology, Release of ethylene, Counteract GA and Stress hormone.

5. Ethylene A ripening hormone: Abscission, Natural ripening and climacteric rise, de-greening of citrus and banana, Ripening, Sex expression in cucurbits, Floral development and Mechanical harvesting.

6. Other known hormones:

a. Brassinolides: Found in the rapeseed. They promote cell elongation and cell division, differentiation of xylem tissues, and inhibit leaf abscission. Plants that are deficient in brassinolides suffer from dwarfism.

b. Salicylic acid: Activates genes in some plants that produce chemicals that aid in the defense against pathogenic invaders.

c. Jasmonates: Are produced from fatty acids and seem to promote the production of defense proteins that are used to fend off invading organisms. They are believed to also have a role in seed germination, and affect the storage of protein in seeds, and seem to affect root growth.

d. Batasins: They have been isolated from yam plants *(Dioscorea batatus)* that cause dormancy in bulbils.

7. Morphactins:

a. Which are also a group of plant growth regulators but it's not naturally.

b. Like, chlofluron, chlorflurenol, dichlorflurenol, flurelol, etc.

Use of PGRS in Vegetables

No	Name of PGRs	Conc. (mg/l)	Mode of application	Vegetable crop	Mode of action
1	Cycocel (CCC)	250-500	Foliar application	Cucurbits, Tomato, Okra	Setting of Flowering, Sex modification, Increase Yield.
		250	Seed treatment	Okra	Increase Yield, Salinity tolerant.
		250	Seedling treatment	Tomato	Resistance to virus, Fruit setting, Increase yield.
2	CIPC	5000	Storage spray	Potato	Increase shelf life.
3	PCPA	40-50	Foliar spray	Brinjal, Chilli	Promote growth, increase yield, Increase flowering and fruit setting, Retard fruit drop.
		30	Open flower dipping	Tomato	Increase fruit set during rainy season in NVPH.
4	2-4, D	2-5	Foliar spray	Tomato	Increase fruit setting and yield.
		20-50	Foliar Spray	Tomato, Brinjal	Increase growth, increase flowering and Fruit setting, Increase yield.
		2-5	Foliar spray	Brinjal	Increase flowering, Fruit setting & yield.
5	2 chloro ethyl phosphonic acid (Ethaphon, Ethrel)	100-200	Foliar spray	Cucurbits, Okra, Tomato	Increase female flowering, fruit setting, Sex modification.
		100-200	Foliar spray	Okra, Tomato	Increase Growth and yield.
		1000	Foliar spray	Tomato, Chilli	Ripening of fruit, Increase yield, control ripening.

		20	Seed treatment	Bitter gourd	Increase female flower and Yield.
6	Ethylene chloro Hydrin	20 g	Steam treatment	Potato, EFY, Sweet potato	Breaking Dormancy.
7	GA3	1	Dipping (for 1 hour)	Potato	Breaking dormancy.
		10	Foliar Spray	Water melon, Tomato	Sex modification, Fruit setting, Increase yield.
		20	Dipping (for 10 min)	Parwal	Increase storage life upto 8 days.
		25	Foliar spray	Capsicum	For Fruit setting.
		400	Seed treatment	Okra	Germination.
		40-100	Seed treatment or Foliar spray	Okra, Tomato, Brinjal	Seed germination, Increase Fruit setting and yield.
8	IAA	10-15	Seed treatment or Foliar spray	Fenugreek, Palak, Okra, Tomato, Brinjal, Cow pea, Onion	Increase seed germination, Fruit setting and yield.
9	IBA	0.2%	Seedling dipping	Cabbage, Cauli - flower	Setting of seedling and better growth and development.
		25-100	Foliar spray	Lettuce, Chinese cabbage	Increase growth and Yield.
		250	Foliar spray	Cow pea	Increase Pod setting and yield.
10	MH	25	Foliar spray	Pea	Increase growth and development.
		50-150	Foliar spray	Cucurbits	Increase flowering and fruit setting, Modification of sex and Increase yield.
		2500-3000	Foliar spray	Onion, Garlic	Increase storage life.
		50-200	Foliar spray	Cow pea	Setting of pod and Increase Yield.
		0.1 %	Dipping for 10 min.	Yam	Sustain the dormancy.
11	Mixtalol	2	Foliar spray	Tomato, Brinjal, Chilli, Potato	Increase Flowering, fruit setting and yield.
12	MENA (Methyl Ester of Nepthalin Acetic Acid)	5000	Tuber dipping	Potato	Increase storage life.
13	NAA	0.2%	Seedling dipping	Cabbage, Cauli-flower Tomato, Brinjal, Onion	Setting of seedlings, increase growth and yield.
		20	Seed treatment	Okra	Seed germination.
		50	Foliar spray(3 spray) 1st March,	Parwal	Increase fruit setting and yield.

			1st April, 1st May		
		50	Foliar spray	Capsicum	Fruit setting.
		50-75	Seed treatment or Foliar spray	Okra, Brinjal, tomato, Chilli, Onion, Cucurbits	Increase seed germination, growth, yield, increase flowering and fruit setting, retard flower drop.
		100	Foliar spray	Cabbage, Cauli-flower	Increase growth and yield.
14	Napthoxy Acetic acid (NOAA)	25-100	Seed treatment or foliar spray	Okra, Tomato	Increase seed germination, growth and Yield.
15	2-4-5, T	75-125	Foliar spray	Potato	Increase storage life
16	AgNO3	500	Foliar spray	Cucumber	Increase male flower in female line.
17	Silver thiosulphate	400	Foliar spray	Musk melon	Increase male flower in female line.
18	2-3-5, Tri Io Benzoic Acid (TIBA)	25-50	Foliar spray	Cucurbits	Flower setting and sex modification.
19	Tri contenole	20	Foliar spray	All vegetables	Increase flowering, growth and development.
20	Thiourea	1000	Tuber dipping (for 1 hour)	Potato, EFY	Breaking dormancy.
21	Zeatin	1-2	Foliar spray	All vegetables	Increase fruit setting, growth and development.
22	Thai diajuron	2-5	Foliar spray	Brinjal, Tomato, Chilli, Okra	Increase growth and development and fruit setting.
23	Kinetin	50	Fruit dipping (for 10 min)	Parwal	Increase storage life upto 8 days.
24	ABA	20-50	Foliar spray	Brinjal, Tomato, Okra	Tolerant to drought.
		10-20	Foliar spray	Cucurbits	Sex modification and increase yield.

Conclusion

Lastly concluded that, by the applications of plant growth regulators and other chemicals stimulate the expecting growth of the plants. Also increase or decrease the plant growth as per the demand of the markets. Also increase the shelf life of fruits and its physical appearance. Regulate the plant processes as per our needs. But, time of applications, methods of application and concentration of PGRs are appropriate for the plants.

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