



EFFECT OF OXYTOCIN APPLICATION ON GROWTH AND YIELD OF PARTHENO-CARPIC CUCUMBER UNDER PROTECTED ENVIRONMENTS

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ARTICLE INFO

Article History:

Received 15th September, 2017

Received in revised form 25th

October, 2017

Accepted 23rd November, 2017

Published online 28th December, 2017

Key words:

Oxytocin, cucumber, vegetables, miracle hormone

ABSTRACT

A study was conducted at CSKHPKV, Palampur on parthenocarpic cucumber variety Kingstar under protected environments on oxytocin application. Oxytocin was applied in cucumber through six methods @ 1ml/plant viz: Root treatment, Foliar spray, Injection at stem, injection at fruit, injection at peduncle and injection at blossom end. The results were compared with the Control (no application of oxytocin) treatment and it was observed that it is not easy to inject oxytocin at stem, peduncle and blossom end. The results obtained did not show any increase in the fruit size of the parthenocarpic cucumber.

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INTRODUCTION

Importance

Oxytocin is a neuro-hypophysial peptide that is produced in the paraventricular nuclei of the hypothalamus. Oxytocin is stored in the posterior pituitary. It is mammalian hormone and it is used as drugs in veterinary services. This oxytocin is composed of 9 amino acids with a disulfide bond and a semi-flexible carboxylated tail. One of the Oxytocin degradation product is citrate adducts, which is formed as citrate buffer. This hormone was first found to be partial to female smooth muscle reproductive physiology, but its function like neurotransmitter, which involved in neuropsychiatric disorders sexual/social behavior and is also vital in reproductive physiology of male. In the Oxytocin-like peptide, mesotocin, a peptide found in some fishes, marsupials, reptiles, amphibians and non-mammalian tetrapods, the leucine at residue is substituted for isoleucine. Oxytocin brings out the regulatory effects by binding specific cell surface receptors via a phosphoinositide signaling pathway. Oxytocin, a schedule H drug, is cheap and readily available.

It is a highly potent and valuable drug and its usefulness in human as well as veterinary medicine is well established. Continuous efforts to get the drug banned by many NGO's/Farm leaders have failed as the Health Ministry and its Drugs Technical Advisory Board (DTAB) consider that the

demand is not genuine (C. Chandravati et al. 2016). The government on this issue has clearly stated in the Lok Sabha by the Minister of State for Health and Family Welfare, Mr N.T. Shanmugam, on November 30, 1999; in response to Parliament question No. 309 (IDMA Bulletin XXXI (II) March 21, 2000). Accordingly, the drug would be available to the user only against the prescription of a registered medical/veterinary practitioner so that its indiscriminate use or misuse is checked. However, since totally baseless and unscientific reports regarding the harmful effects of oxytocin and the milk from oxytocin treated cattle continue to appear in the media, it is important that the public should be educated about true facts, Press Information Bureau, GOI ministry of health & family welfare, 2013 (The Tribune, October-2017).

Oxytocin use in animals

According to Veterinary scientists oxytocin is secreted endogenously in all mammals for induction and maintenance of labour as well as for initiation of milk let-down in the female. Since it is a peptide hormone, it disappears rapidly within two to six minutes from the blood stream due to the action of various enzymes. Synthetic oxytocin is, therefore, used quite commonly in human as well as veterinary medicine. It is the drug of choice to induce rhythmic contractions of the uterus and augment uterine contractions during desultory labour. It is prescribed to control and prevent bleeding after childbirth and abortion. Oxytocin is also used for the induction of therapeutic abortion and management of inevitable or incomplete abortion. Equally important is its clinical use for promotion of milk ejection in lactating women who experience

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difficulty in breast feeding and for treating cases of breast engorgement and mastitis.

Oxytocin is used universally in the livestock industry to increase let-down of milk and expulsion of retained placentas after delivery. The hormone is also used to aid delivery in young animals when the female has been in labour for an extended period. It is also employed frequently as an adjunct to antibiotic therapy for the treatment of mastitis in milch cattle. Oxytocin is, thus, a highly efficacious life-saving drug that cannot and should not be dispensed with on the basis of false notions and scientifically unsound charges against its use. The reports on the harmful effects of milk produced by oxytocin-treated dairy cattle are quite misleading and not based on scientific facts. Whether secreted endogenously in response to natural stimuli or administered exogenously, oxytocin produces the desired effect within minutes and gets metabolised rapidly leading to inactive products. Till date, there is not a single report which demonstrates the presence of this hormone in the milk. Those who imagine that it may escape the action of degrading enzymes and seep into milk in traces should also realise that in such a situation, all the breast-fed infants and newly born calves must be constantly exposed to these traces of oxytocin in mother's milk all the time without facing any health hazards whatsoever. The reason is that if at all ingested orally along with milk, oxytocin is bound to be digested like other proteins and peptides due to action of gut enzymes and gastric acids and cannot be absorbed from the intestines to reach the blood circulation again. Likewise, there is no question of milk produced by oxytocin-treated cattle being harmful to those who consume it regularly. First, due to its being unstable at room temperature, traces of oxytocin would be inactivated simply on storage and boiling of milk. Secondly, it would not escape the digestive system of the person who consumes it.

Case studies in animals

The results of a study carried out by scientists of the Department of Animal Science at Cornell University, Ithaca, New York, published in the Journal of Dairy Science in 1991 clearly show that the administration of oxytocin at a dose as high as 20 IU, at each milking twice daily, not only increases the milk yield substantially but also maintains greater persistency during lactation without changing the composition of milk. The daily administration of oxytocin for 305 days apparently had no effect on the health of the treated cows, particularly on the length of the oestrous cycle. So far as the dairy owners restrict the use of exogenous oxytocin to the recommended dose (1-3 IU. per milking) for the complete recovery of milk already produced and available in the mammary glands, there should be no reason for any alarm whatsoever.

Another study carried out at the Dairy Cattle Physiology Division of the National Dairy Research Institute, (NDRI), Karnal, Haryana, also supports the above findings. According to NDRI scientists, the perception that the use of oxytocin for milk let-down in pregnant animals may cause abortion is also unscientific, since oxytocin receptors remain absent throughout pregnancy and appear only towards the end of the gestation period.

On the basis of scientific facts stated earlier, it would not be wrong at all to use oxytocin in appropriate doses on dairy cattle to facilitate increased milk let-down, particularly in a

country like India where there is so much of a gap between demand and supply of milk. The current tirade and misinformation campaign against the use of oxytocin for milk let-down in dairy cattle is highly unjustified and should be stopped forthwith.

Use of oxytocin in vegetables

Recently, there is a lot of hue and cry all over the country regarding oxytocin use in vegetables. Electronic and print media are reporting misuse of oxytocin in vegetables particularly in cucurbits to increase the size of the fruits at a very fast rate. Consumers are worried over such rumours and are in dilemma whether to eat cucurbits purchased from the market or not. Though various researchers have claimed in their experiments that it does not affect the cucurbits at all and media reports are only aggravated/ manipulated to make the news sensational.

MATERIALS AND METHODS

The present investigation was undertaken in a modified naturally ventilated quonset polyhouse at the Experimental Farm of Department of Vegetable Science and Floriculture, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur during spring summer season in 2017. The details of materials used and methods employed in the present study are presented below:-

Experimental site

Location

Different rootstocks and grafting methods of bell pepper were evaluated in a modified naturally ventilated quonset polyhouse (25×10m) at Experimental Farm, Department of Vegetable Science and Floriculture which is situated at 32° 6' N latitude and 76° 3' E longitude at an elevation of 1290.80 m above mean sea level with East-West orientation which falls under mid hill zone of Himachal Pradesh. It was an ideal polyhouse with essential features like double door, side and top ventilation, drip and fogging facility and internal shading with 50% green agro UV stabilized shade net.

Climate

The climate of the area is generally sub-temperate and semi-humid characterized by cold winters. Generally, May and June are the hottest months and December and January are the coldest ones.

Materials and design

The experimental material and design used for the present study are presented hereunder:

Experimental material

The experimental material for the present study comprised of seven treatments including control (distilled water). Commercial hybrid 'Kingstar' was used in the study. The following treatments were used in the study: T1 (Root Treatment), T2 (Foliar Spray), T3 (Injection at Stem), T4 (Injection at fruit), T5 (Injection at Peduncle), T6 (injection at blossom end), T7 (distilled water- control).

Experimental layout and design

Twenty one treatments were planted in Randomized Block Design having 3 replications in a 25 X 10 m modified naturally ventilated quonset polyhouse.

RESULTS AND DISCUSSION

To assess the effects of oxytocin use in cucurbits a study was conducted at CSKHPKV, Palampur on parthenocarpic cucumber variety Kingstar under protected environments. Oxytocin was injected in parthenocarpic cucumber through six methods @ 1ml/plant viz: Root treatment, Foliar spray, Injection at stem, injection at fruit, injection at peduncle and injection at blossom end. The results were compared with the Control (no application of oxytocin) treatment and it was observed that it is not easy to inject oxytocin at stem, peduncle and blossom end. The injected dose immediately comes out of the plant system. It can be easily applied to roots, fruits and as a foliar spray. The results obtained from the present study have been presented in Table (1):

Table 1 Effect of Oxytocin on Growth and Yield of Parthenocarpic Cucumber under protected conditions

Treatments	Days to 50% flowering	Number of marketable fruits/plant	Marketable fruit yield/plant (kg)	Harvest duration (days)	Plant height (cm)
Root Treatment (T1)	17.33	31.66	2.73	40.00	323.33
Foliar Spray (T2)	16.66	31.66	2.70	38.66	303.33
Injection at Stem (T3)	17.33	25.33	2.20	36.00	358.33
Injection at fruit (T4)	19.33	31.33	2.79	40.00	351.66
Injection at Peduncle (T5)	18.66	24.33	2.10	36.00	353.33
Injection at Blossom end (T6)	16.66	25.66	2.21	35.00	293.33
Control-Distilled water (T7)	18.00	30.00	2.57	37.00	316.66
CD (P=0.05)	NS	4.86	0.39	2.83	42.035

There was no significant effect on days to 50 % flowering. There were significant differences in number of fruits per plant. Maximum number of fruits per plant were recorded (31.66) in T1 (Root treatment) and T2 (Foliar spray) which were statistically at par with T4 (injection at fruit) and Control (distilled water). Minimum number of fruits per plant (24.33) was found in Injection at Peduncle (T5) treatment. Highest yield per plant (2.79 kg/plant) was recorded in T4 (injection at fruit) treatment which was statistically at par T1 (Root treatment). Lowest yield per plant (2.10 kg/plant) was recorded in Injection at Peduncle (T5) treatment.

Root Treatment (T1) and Injection at fruit (T4) treatment showed maximum harvest duration (40.00) which was statistically at par with Foliar Spray (T2) 38.66 days. Injection at Blossom end (T6) recorded minimum harvest duration 35.00 days and was at par with Control-Distilled water (T7) 37.00. Plant height was highly affected by different treatments. Treatment T3 (Injection at Stem) recorded maximum plant height of 358.33 cm, followed by (353.33) treatment T5 (Injection at Peduncle). Similar results were also reported by Pritam Kalia (2011) and Netrapal Singh *et al.* 2011.

Summary: The growth hormone which was highlighted as “Miracle Hormone” to increase the fruit size of the cucurbits overnight is a Myth. It does not increase the fruit size in cucurbits rather it deteriorates the quality of the fruits and growth of the injected plants. Farmers and growers should not waste their time, energy and money to gain quick results by using Oxytocin as it will not increase the fruit size as claimed in few media reports. They should use other beneficial growth regulators duly evaluated and recommended for improvement in growth, yield and quality of the vegetables.

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How to cite this article:

Pardeep Kumar *et al* (2017) 'Effect of Oxytocin Application on Growth And Yield of Parthenocarpic Cucumber Under Protected Environments', *International Journal of Current Advanced Research*, 06(12), pp. 8106-8108.
DOI: <http://dx.doi.org/10.24327/ijcar.2017.8108.1290>
