YIELD MAXIMIZATION OF GHERKIN (*Cucumis anguria* L.) USING PLANT GROWTH REGULATORS

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Abstract

Yield maximization of gherkin (*Cucumis anguria* L.) using plant growth regulators was carried out during February – April 2016. The plants of gherkin variety "Chandini RZ'' were subjected to nine treatment combinations *viz.*, T_1 - Control, T_2 - NAA 50 ppm + Ethrel 200 ppm, T_3 - NAA 100 ppm + Ethrel 200 ppm, T_4 - GA_3 50 ppm + Ethrel 200 ppm, T_5 - GA_3 75 ppm + Ethrel 200 ppm, T_6 - BA 10 ppm + Ethrel 200 ppm, T_7 – BA 20 ppm + Ethrel 200 ppm, T_8 - Ethrel 200 ppm, T_9 - Ethrel 300 ppm. The effect of chemicals on yield characters (number of fruits per plant, fruit weight, fruit length, fruit yield per plant, fruit yield per hectare) were recorded. Plant which received the application of NAA 100 ppm + Ethrel 200 ppm in the treatment (T_3) gave the highest yield per plant (267.52 g). The increased in yield was attributed to more leaf area, advancement of female flowering, increased pistillate flower production, narrowed sex ratio, increased fruit set percent and higher fruit weight.

Key words: Gherkin, plant growth regulators, yield

Introduction

Gherkin *(Cucumis anguria*) commonly known as bur cucumber, bur gherkin, cackrey, gooseberry gourd, maroon cucumber, West Indian gherkin, and West Indian gourd, is a native of tropical Africa, grown in Brazil and to a limited extent in Central America, West Indies and southern states of USA (Herklots, 1972). It is a cucurbitaceous vegetable crop of 90 days duration whose raw young fruits are harvested and pickled immediately after harvesting in brine, natural vinegar or acetic acid. It is similar and related to the common cucumber (*Cucumis sativus*). The gherkin plant has palmately lobed leaves with toothed edges and can reach 2.5 metres (8 feet) in length. It bears small unisexual flowers and produces furrowed prickly fruits about 5 cm (2 inches) long and ovoid to oblong. The immature fruits are used for pickling. They also have eaten as a cooked vegetable and also used in curries (Purseglove, 1969).The fruits and seed possess cooling properties. The fruit is also used as an astringent and antipyretic. Application of plant growth regulators may enhance the yield of gherkin. Growth regulators are known to have an effect on the producer of earliest flower, yield, ratio of male/female flower, number of fruits, and weight of fruit.

Materials and Methods

The experiment was carried out in the vegetable research unit of the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai nagar, Tamil Nadu. It is geographically situated in at 11°24' North latitude and 79°4' East longitude situated at an altitude of + 5.79 m above Mean Sea Level. The gherkin variety "Chandini RZ" was chosen for the investigation. The experiment was laid out in Randomized Block Design with three replications and nine treatments viz., T_1: Absolute control,T2: NAA 50 ppm + Ethrel 200 ppm,T3: NAA 100 ppm + Ethrel 200 ppm,T4: GA3 50 ppm + Ethrel 200 ppm.T5: GA3 75 ppm + Ethrel 200 ppm,T6: BA 10 ppm + Ethrel 200 ppm,T7: BA 20 ppm + Ethrel 200 ppm,T8: Ethrel 200 ppm,T9: Ethrel 300 ppm.

Results and Discussion

Use of Plant growth regulators might be a useful alternative to increase crop production. Initiation of flower bud, development of flowers and fruits are controlled by physiological process. In many agricultural plants, these processes can often be used to alter by proper application of plant growth substances. Foliar spray of NAA influencing parameters like number of branches per vine, number of days taken for first male and female flower, number of male flowers, number of female flowers with highest yield (Mangave *et al.*, 2016). NAA can increase the fruit set ratio, prevent fruit dropping and promote sex ratio in plants (Raoofi *et al*., 2014).

Table 1.Effect of plant growth regulators on yield of Gherkin

S.no.	Number of fruits per plant	Individual fruit weight (g)	Fruit yield (g) per plant	Fruit yield (t) per hectare
T_1	15.46	3.38	52.01	1.73
T_2	25.58	5.36	137.01	2.74
T_3	37.59	7.13	267.52	9.10
T_4	22.54	4.86	109.04	3.63
T_5	30.26	6.08	183.23	6.12
T_6	26.95	5.57	150.02	5.01
T_7	33.94	6.61	224.31	7.46
T_8	19.71	4.36	85.01	2.85
T_9	17.91	3.87	69.02	2.30

Highest number of fruits per vine was recorded in the treatment of NAA 100 ppm + Ethrel 200 ppm . The data recorded on number of fruits per plant showed the significant differences between the treatments and it ranged from 15.46 to 37.59. The maximum number of fruits per plant was recorded in T_3 and it was followed by T_7 (33.94) and T_5 (30.26) where the application was BA 20 ppm + Ethrel 200 ppm and GA_3 75 ppm + Ethrel 200 ppm where as T_1 (control) produced the least number of fruits per plant (15.46) on this character. Similar results were observed by Hilli *et al.* (2010) application of NAA (100) ppm increased the number fruits per vine as compared to control in cucumber. Higher yield per vine might be due to increased female flower production which leads to more number of fruit per vine and diversion of photosynthates from vegetative growth to reproductive phase. Similarly, increase in number of fruits per vine may be due to the more phsysiological activation for the development of flowers and fruits, ultimately leading to higher yield.

The data recorded on fruit weight showed the significant differences between the treatments and it ranged from 3.38 g to 7.13g. The higher fruit weight was recorded in T_3 (7.13g) which received the application of NAA 100 ppm + Ethrel 200 ppm and it was followed by T_7 (6.61g) and T_5 (6.08g) where the application was BA 20 ppm + Ethrel 200 ppm and GA_3 75 ppm + Ethrel 200 ppm where as T_1 (control) produced the lowest fruit weight was recorded (3.38g) on this character.

Highest fruit yield per plant was recorded in the treatment of NAA 100ppm + Ethrel 200 ppm and it was followed by T_7 (224.31g) and T_5 (183.23g) where the application was BA 20 ppm + Ethrel 200 ppm and GA_3 75 ppm + Ethrel 200 ppm where as T_1 (control) produced the lowest fruit yield per plant (52.01g)Crane and Overbeek (1965) suggested that the sole function of fertilized ovules or seeds in relation to growth of fruits was to synthesize one or more hormones which initiate and maintain metabolic gradient along which foods can be transported from other parts of plant to the fruit. Accleerated transport, coupled with efficiency of utilizing photosynthetic products might have resulted in increased yield.

The data recorded on fruit yield per hectare ranged from 1.73 tonnes to 9.10 tonnes.The highest fruits yield per hectare was recorded in T_3 (9.10 tonnes) which received the application of NAA 100 ppm + Ethrel 200 ppm and it was followed by T_7 (7.46 tonnes) and T_5 (6.12 tonnes) where the application was BA 20 ppm + Ethrel 200 ppm and GA_3 75 ppm + Ethrel 200 ppm where as T_1 produced the lowest fruit yield per hectare (1.73 tonnes) on this character.Higher yield are probably responsible for more number of fruits because auxins are known to cause physiological modification in plants mainly on flowering, increased fruit set, enlargement and development of fruits, source - sink relation and growth regulators bring certain changes there would lead to greater accumulation of photosynthates and their distribution to the developing ovules. Kshirsagar *et al.* (1995) reported increased yield per plant might be due to the increase in pistillate flowers production which results in more number of fruits per plant.Among the plant growth regulator treatments, the plant treated with NAA 100 ppm + Ethrel 200 ppm (T_3) recorded the highest yield which is followed by the treatment (T_7) BA 20 ppm + Ethrel 200 ppm. The results on various biometric traits revealed that the increased yield was mainly contributed by increased number of female flowers, fruit set percent, number of fruits per plant , fruit yield per plant, fruit diameter and fruit weight.

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