Effect of pre-plant soaking of corms in bio-regulators on corms and cormels Production in gladiolus (Gladiolus grandiflorus L.) Cv. Rani

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Abstract

The present experiment entitled “Effect of pre-plant soaking of corms in bio- regulators on corms and cormels production in gladiolus (Gladiolus grandiflorus L.) cv. Rani.” was carried out at the Jambuvadi Farm, Department of Horticulture, J. A.U., Junagadh (Gujarat) during 2019 to 2020. The results of the study indicated that, the pre-plant soaking of corms in bio- regulator BA @ 50 ppm was found effective for maximum corms yield (4.27 t/ha). The maximum cormels yield (2.13 t/ha) was found in pre-plant soaking of corms in bio- regulator of thiourea @ 3%. While maximum corm average weight (47.91 g) and diameter of largest corm (5.76 cm) was found in pre-plant soaking of corms in bio- regulator of GA3 @ 150 ppm.

Keywords: Gladiolus, bio regulators, GA3

Introduction

Gladiolus (Gladiolus grandiflorus L.) is one of the important bulbous flower crops. It belongs to the family Iridaceae and native to Cape region in South Africa. The word “gladiolus” is derived from the Latin word “gladius” meaning ‘a sword’ shape like leaves of the plants. It occupies fourth place of world bulbous flower plants area and is referred to as the queen of bulbous flowers. Gladiolus is highly priced in India and abroad for bright, beautiful and differently coloured flowers and is use in cut flower, herbaceous borders, beddings, rockeries, pots. It is also used in bouquet and flower arrangement having excellent keeping quality. Freshly harvested corm and cormels of gladiolus do not sprout immediately even it’s placing in favorable growing conditions because of a period of dormancy which is regulated by changes in the stages of endogenous promotory or inhibitory substances. The physiological functions inside the corms are controlled by plant bio-regulators. Plant bio-regulators are the organic chemical compounds which modify or regulate physiological processes in an appreciable measure by breaking dormancy of gladiolus corms and stimulating cell division and cell elongation in plants.

Materials and Methodology

The present investigation was carried out at the Jambuvadi farm, Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during 2019-2020. Junagadh is situated in Saurashtra region of Gujarat state. Geographically, this place is situated at 21.50 N latitude and 70.50 E longitudes with an altitude of 60 meters above the mean sea level and 80 kilometers away from Arabian sea. The soil of this region is classified as Vertic Ustochrepts. Physical and chemical properties of the soil of the experimental field were determined with pH 7.85. Medium sized gladiolus (4-6 cm diameter) corms were selected for the experimental purpose. These corms were soaked in the fungicide solutions (Carbendazim @ 0.2 per cent) for 30 min and kept for drying in shade for 24 hrs. Then these corms were soaked for 24 hrs in water (as control) and different solutions of bio-regulators [gibberellic acid (GA3), benzyl adenine (BA), ethrel and thiourea] as per treatment requirement. These treated corms were further drying for another 24 hrs and finally these were planted in the experimental plots. Planting was carried out randomly in respective plots at a spacing of 30 cm X 20 cm with a depth of 5 cm.
Moderate irrigation was given to the plots a day before planting to keep the plots moist. The experiments were planted on 3rd November 2019. Investigation was laid out in randomized block design (RBD) comprising thirteen treatments including: Gibberellic acid @ 50 ppm (T1), Gibberellic acid @ 100 ppm (T2), Gibberellic acid @ 150 ppm (T3), Benzyl adenine @ 50 ppm (T4), Benzyl adenine @ 100 ppm (T5), Benzyl adenine @ 150 ppm (T6), Ethrel @ 250 ppm (T7), Ethrel @ 500 ppm (T8), Ethrel @ 750 ppm (T9), Thiourea @ 1% (T10), Thiourea @ 2% (T11), Thiourea @ 3% (T12) and Control (T13).

Results and Discussion

Effect of plant bio-regulators on corm and cormels production

The result indicates that the pre-plant soaking of different solutions of bio-regulators had produced significant effect on corm and cormels production viz., Average weight of corm (g), diameter of largest corm (cm), yield of cormels (tons/ha) and corms yield (tons/ha).

Average weight of corm (g): The effect of different bio-regulators on average weight of corm was presented in Table-1. The maximum average weight of corm (47.91 g) in treatment T3 (GA3 @ 150 ppm). The minimum average weight of corm (24.53 g) in treatment T13 (control). GA3 showed significant variation in respect of single corm weight due to its ability to increase the number of leaves which in turn increased the photosynthesis and photosynthetic assimilates. These assimilates were transported to the daughter corms, thereby, increasing their size and weight. Supportively, lowest values for corm weight were recorded in control (Reddy et al., 2013) [11]. The early sprouting of corms resulted into an increase in number of daughter corms which increased the yield of corms more than twice, compared to non-treated corms (Padmalatha et al., 2013) [8]. Mukhopadhyay and Bankar (1986) [7], represented that the maximum weight of corms was recorded in GA3 at 150 ppm and lowest weight of corms was recorded in control.

Diameter of largest corm (cm): Pre-planting soaking of corm in different bio regulators solution had significant effect on diameter of largest corm is presented in Table-1. In all treatment the maximum diameter of largest corm (6.22 cm) was obtained in T3 (GA3 @ 150 ppm). While, T13 (control) registered in minimum diameter of largest corm (4.47 cm). In case of corm weight, which was significantly affected by gibberellic acid as compared to other treatments, diameter of corms increased proportionately with increasing corm weight in GA3 treatments. Gibberellins lead to increased cell division and cell growth apparently which lead to increased elongation of root and enhances corm diameter (Stewart and Jones, 1977) [13]. According to Kumar et al. (2009) [5] GA3 increases more vegetative growth like leaves which increased the photosynthetic assimilates which is directly responsible to corm characters like increasing corm size as well as their diameter. The findings of Bhalia and Kumar (2007) [2] and Dogra et al. (2012) [3] are in conformity with the present findings. Baskaran et al. (2009) [1] and Kumar and Singh (2005) also reported GA3 produces better quality of corms in gladiolus as compared to their control treatment.

Yield of corms (tons/ha): Higher concentration of T12 (thiourea @ 3%) was found effective in increasing the yield of corms (2.13 t/ha). While, the minimum yield of corms (0.34 t/ha) was observed in treatment T13 (control). This may be because ability of GA3 to increase the number of leaves which increased the photosynthetic assimilates and these assimilates are transported to the resulting cormels, thereby increasing their weight. The result is in conformity with the work of Kumar et al. (2009) [5].

Corms yield (tons/ha): The effect of various plant bio-regulators on corms yield was presented in Table-1. The results of the experiment revealed that variation in corms yield due to the various plant bio regulators were statistically significant. Plants from T3 (BA @ 50 ppm) produced the maximum corms yield (4.27 t/ha). Whereas, the minimum corms yield (1.13 t/ha) was produced in plant grown from without bio regulator treatment of T13 (control). Pre-plant soaking of corms in solutions of PGRs altered the interested variables in gladiolus plants. Application of benzyl adenine induced the multiple shoots and also increased the yield of corms which actually enhanced the multiplication rate of corms more than twice, compared to non-treated corms (Yasar et al., 2015) [14]. The positive effect of cytokinins in increasing the yield of underground structures has been reported by Pogroszew ska et al. (2007) [9] in Allium. It also promoted cell division and anabolism, which might have been resulted into an increase in number of daughter corms which ultimately increases corms production. The result is in conformity with the work of Ram et al. (2002) [10], Sharma et al. (2006) [12], Baskaran et al. (2009) [1] and Khan et al. (2013) [4] in gladiolus.

Table 1: Effect of plant bio-regulators on vegetative growth parameters

| Treatment | Treatment details | Average weight of corm (g) | Diameter of largest corm (cm) | Yield of cormels (tons/ha) | Corm yield (tons/ha) |
|-----------|-------------------|-----------------------------|------------------------------|---------------------------|---------------------|
| T1        | GA3 @ 50 ppm      | 41.24                       | 5.39                         | 0.86                      | 3.03                |
| T2        | GA3 @ 100 ppm     | 41.24                       | 5.19                         | 1.32                      | 4.12                |
| T3        | GA3 @ 150 ppm     | 47.91                       | 6.22                         | 1.92                      | 4.04                |
| T4        | BA @ 50 ppm       | 31.56                       | 5.56                         | 1.02                      | 4.27                |
| T5        | BA @ 100 ppm      | 32.20                       | 5.39                         | 0.71                      | 3.16                |
| T6        | BA @ 150 ppm      | 35.20                       | 5.42                         | 1.08                      | 3.15                |
| T7        | Ethrel @ 250 ppm  | 33.01                       | 6.01                         | 0.97                      | 2.81                |
| T8        | Ethrel @ 500 ppm  | 30.58                       | 5.74                         | 0.94                      | 2.93                |
| T9        | Ethrel @ 750 ppm  | 36.09                       | 5.60                         | 0.99                      | 3.02                |
| T10       | Thiourea @ 1%     | 35.68                       | 5.44                         | 1.19                      | 2.81                |
| T11       | Thiourea @ 2%     | 41.28                       | 5.70                         | 1.46                      | 3.05                |
| T12       | Thiourea @ 3%     | 40.34                       | 5.29                         | 2.13                      | 4.11                |
| T13       | Control           | 24.53                       | 4.47                         | 0.34                      | 1.13                |
| S.Em.±    |                   | 2.504                       | 0.104                        | 0.076                     | 0.176               |
| C.D. at 5%|                   | 7.30                        | 0.30                         | 0.22                      | 0.50                |
| C.V.%     |                   | 11.97                       | 3.28                         | 11.55                     | 9.27                |
Conclusions
On the basis of results obtained in the present investigation, it can be concluded that the higher concentration of thiourea @ 3% was most effective in increased yield of cormel. While, lower concentration of benzyl adenine @ 50 ppm was the most effective to increased yield of corms.

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