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Khusboo Sahu

Ph.D., Research Scholar,
Department of Vegetable
Science, College of Agriculture,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Vijay Kumar

Head of the Department,
Department of Fruit Science,
College of Agriculture, Indira
Gandhi Krishi Vishwavidyalaya,
Raipur, Chhattisgarh, India

Jitendra Singh

Head of the Department,
Department of Floriculture and
Landscape Architecture, College
of Agriculture, Indira Gandhi
Krishi Vishwavidyalaya, Raipur,
Chhattisgarh, India

SS Porte

Senior Scientist, Department of
Soil Science and Agricultural
Chemistry, College of
Agriculture, Indira Gandhi
Krishi Vishwavidyalaya, Raipur,
Chhattisgarh, India

Corresponding Author:

Khusboo Sahu

Ph.D., Research Scholar,
Department of Vegetable
Science, College of Agriculture,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Influence of plant growth retardant on root tuber yield characters of sweet potato (*Ipomoea batatas* (L.) varieties under Chhattisgarh plains condition

Khusboo Sahu, Vijay Kumar, Jitendra Singh and SS Porte

Abstract

The experiment was carried out during *rabi* seasons of 2018-19 and 2019-20 at Indira Gandhi Krishi Vishwavidyalaya in plots of the Horticulture Research cum Instructional Farm, Department of Vegetable Science, Raipur. The experiment was laid out in Factorial Randomized Block Design with 24 treatment combinations which were replicated three times. To find out the effect of plant growth retardant on different sweet potato varieties for yield attributing characters. Among the varieties tested, Chhattisgarh Sarkarkand Priya and Cycocel 500ppm as foliar spray at 60 and 80 DAT significantly higher values of like root tuber length (cm), root tuber breadth (cm), root tuber girth (cm), number of root tuber per plant, fresh weight of root tuber per plant (g) and total root tuber yield ($q\ ha^{-1}$).

Keywords: Influence, retardant, root, potato, condition

Introduction

Sweet potato (*Ipomoea batatas* L.) is popularly known as sarkar kand it originated from Central America belong to family *convolvulaceae*. Approximately 900 different species of Convolvulaceae in 400 genera have been identified around the world. Yen (1974) [1] and Austin (1978, 1988) [3, 4] recognized 11 species in the section batatas, which includes sweet potato. The closest relative of the sweet potato appears to be *Ipomoea trifida* that is found wild in Mexico, and *Ipomoea tabascana*. It is hexaploid species with chromosome number $2n = 90$. Sweet potato is a dicotyledonous plant with tubers derived from swollen roots. It is an important starchy food crop grown in the world's tropical and sub-tropical regions. It is a perennial herbaceous plant planted as an annual vine. Sweet potato, after rice, wheat, potato, maize and cassava, is the sixth most important food crop Worldwide.

Among different vegetables; after cereals and grain legumes, tuber plant are the most important food crops. In tropical, subtropical and temperate areas, it serves as staple food for millions of individuals. These crops are known for their high calorific value and their ability to resist adverse soil and climatic conditions (Saravaiya and Patel, 2005).

The main feature of tuber crops is that these crops have high production per unit area per unit time and is expected to bridge the food shortages and malnutrition. They are tolerant to drought and can be grown even on undulated and unfertile soil. The crop has the additional advantage that due to rapid soil coverage and good rooting characteristics, it helps to reduce soil erosion. Thus, sweet potato is a particularly valuable crop for poorer farmers.

Materials and Methods

Location and season: The experiment was conducted at Indira Gandhi Krishi Vishwavidyalaya in plots of the Horticulture Research cum Instructional Farm, Department of Vegetable Science, Raipur, Chhattisgarh situated at latitude $21^{\circ}16'$ N, $81^{\circ}36'$ E and 289.56 m above mean sea level. The experiment was carried out during *rabi* seasons of 2018-19 and 2019-20. The soil is a predominantly light-textured Clay loam with a pH of 7.12. The organic matter content of the soil ranges between 0.49 to 0.60% at 0 to 20 cm soil depth.

Experimental design: The experiment was laid out in Factorial Randomized Block Design with 24 treatment combinations which were replicated three times. The experiment consisted of four varieties sweet potato varieties Indira Madhur, Indira Nandani, Sree Rethna and Chhattisgarh Sarkarkand Priya, and two plant growth retardant (i) Control (P_0), (ii) Cycocel 500ppm as foliar spray at 60 and 80 DAP (P_1).

Agronomic practices: The treatments were randomly allotted in each replication in a total 72 plots of 2 m x 1.8 m size in each accommodating 30 plants. The cutting were planted at 20 cm distance on ridges spaced at 60 cm. The crop was applied @75:50:75 NPK kg/ha in the form of urea, single super phosphate and muriate of potash, respectively. Urea was applied in two split doses, first as basal and second after the 45 days of vine planting in main field as top dressing. Full dose of phosphorus and potassium along with FYM 10 t/ha were applied as basal dose. The vine were turned and lifted during the growth period of 45 and 75 days after planting to prevent rooting from nodes.

Results and Discussion

Yield parameters

The data on the yield parameters *viz.*, root tuber length (cm), root tuber girth (cm), root tuber breadth (cm), number of tuber per plant, fresh weight of tuber per plant (g) and total root tuber yield per plant ($q\ ha^{-1}$) as influenced by varieties and plant growth retardant on yield characters of sweet potato.

Root tuber length (cm)

Among the varieties, the maximum root tuber length (18.44 cm) was recorded in Chhattisgarh Sarkarkand Priya whereas significantly maximum root tuber length (17.18 cm) was recorded in Cycocel 500 ppm as foliar spray at 60 and 80 DAT than control. Similar trends are observed by Mohamed Yassin and Anbu (1996) [6] reported that root length were increased by foliar application of CCC at 1000 ppm in radish. Similar finding are Samy *et al.* (2014), Gupta *et al.* (2018) in Sweet potato.

Root tuber breadth (cm)

Among the varieties, the maximum root tuber breadth (6.20 cm) was recorded in Chhattisgarh Sarkarkand Priya whereas significantly maximum root tuber breadth (5.04 cm) was recorded in Cycocel 500ppm as foliar spray at 60 and 80 DAT compared with control. Similar trends are observed by Abdul Vahab and Mohan Kumaran (1980) [2] in sweet potato and they found that CCC 500 and 1000 ppm increased tuber diameter.

Root tuber girth (cm)

Significantly maximum root tuber girth (15.71 cm) was recorded in Chhattisgarh Sarkarkand Priya. Among different

plant growth retardant, the maximum root tuber girth (14.47 cm) was recorded in Cycocel 500ppm as foliar spray at 60 and 80 DAT compared with control. Similar response of CCC in increasing the girth of root tuber was earlier reported by Abdul Vahab and Mohan Kumaran, in sweet potato, Mohamed Yassin and Anbu in radish.

Number of root tubers per plant (g)

The data regarding number of root tuber per plant was significantly influenced with different varieties and plant growth retardant. Among different varieties, the highest number of root tuber per plant (5.95) was recorded in Chhattisgarh Sarkarkand Priya. Among different plant growth retardant, significantly maximum number of root tuber (5.41) was recorded in Cycocel 500 ppm as foliar spray at 60 and 80 DAT than control. In present study, the increase in the tuber number due to growth regulator attributed for increase in tuber yield. These results were in accordance with findings of Abdul Vahab and Mohan Kumaran (1980) [2] in Sweet potato and found that CCC 500 ppm increased the number of tubers per vine.

Fresh weight of root tuber per plant (g)

Among the varieties, the maximum fresh weight of root tuber per plant (318.4 g) was recorded in Chhattisgarh Sarkarkand Priya. Among different plant growth retardant, the maximum fresh weight of root tuber per plant (282.5 g) was recorded in Cycocel 500ppm as foliar spray at 60 and 80 DAT than control. Similar results are observed by shedge *et al.* (2008) [10] in sweet potato.

Total root tuber yield ($q\ ha^{-1}$)

The data regarding total root tuber yield per plant was significantly influenced with different varieties and plant growth retardant. Among different varieties, the highest root tuber yield per plant ($200.88\ q\ ha^{-1}$) was recorded in Chhattisgarh Sarkarkand Priya. Among different plant growth retardant, the maximum root tuber yield per plant ($194.54\ q\ ha^{-1}$) was recorded in Cycocel 500ppm as foliar spray at 60 and 80 DAT compared with control. These findings are in consonance with the reports of Seema sarkar and Sarma (2008) [9] and shedge *et al.* (2008) [10] in sweet potato and they found that CCC 500 ppm recorded the highest tuber yield per vine.

Table 1: Varietal response of sweet potato to plant growth retardant on yield characters

	Root tuber length (cm)	Root tuber breadth (cm)	Root tuber girth (cm)	Number of tuber per plant	Fresh weight of tubers per plant (g)	Root tuber yield per plant ($q\ ha^{-1}$)
Varieties						
Indira Madhur	16.92	3.58	11.61	4.68	224.1	174.71
Indira Nandani	16.59	4.29	12.10	4.94	256.2	189.02
Sree Rethna	15.44	5.91	14.81	5.62	310.2	197.17
Chhattisgarh Sarkarkand Priya	18.44	6.20	15.71	5.95	318.4	200.88
SE m±	0.25	0.05	0.14	0.06	3.05	1.96
CD (P=0.05)	0.73	0.14	0.39	0.17	8.67	5.57
PGR						
Control	17.36	4.89	12.65	5.18	271.9	186.35
500ppm	17.94	5.10	14.47	5.41	282.5	194.54
SE m±	0.14	0.03	0.10	0.04	2.16	1.39
CD (P=0.05)	0.38	0.10	0.28	0.12	6.13	3.94

Conclusion

Based on the results obtained, it can be concluded that,

Chhattisgarh Sarkarkand Priya was found to be superior for yield characters. Among plant growth retardant, Cycocel

500ppm as foliar spray at 60 and 80 DAT has improved the yield attributing characters like root tuber length (cm), root tuber breadth(cm), root tuber girth(cm), number of root tuber per plant, fresh weight of root tuber per plant(g), total root tuber yield per plant (q ha⁻¹).

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