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The Effect of Phytohormones on the percentage of seed germination in Tomato (Lycopersicon esculantum Mill)

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Abstract

The seed germination percentage experiments were carried out in plant physiology lab, Department of Botany, Hindu P.G. College, Moradabad, U.P. The experiment on germination recorded the significant effect of phytohormones on germination percentage. GA_3 showed significantly superior germination in all the concentrations as compared with Cycocel and Ethephon in Cv-Pusa20, Arka Vikas, Pusa ruby, S-152. All the concentration of GA_3, Ethephon, Cycocel showed significant an increment in germination percentage compare to control in all four varieties.

Keywords – Phytohormones, Tomato, GA_3, Ethephon, Cycocel

Introduction

Gibberellins, Cycocel and Ethephon are natural phytohormones of wide occurrence in plants and involved in a variety of plant growth and development processes. In natural course seed germination is obviously the most effective method of plant reproduction. The plant growth regulators (PGRs) exhibit spectacular responses during the seed germination root development and over all plant growth. Production of plant growth by microorganisms in soil is reviewed recently. These phytohormones can affect the development of seeds in soil and the effect could be pronounced. Tomato (family Salonaceae) is one of the main cash crops and processed fruit in the world. This investigation presents the effects of pretreatment of seeds with phytohormones on root elongation of germinating seedlings of tomato the most crucial stage in the overall plant development. Tomato is an important cash crop in India.

Literature on the effects of phytohormones and regulators on various aspects of growth has been reviewed by Thimann (1972). Physiological and biochemical effects of exogenous application of phytohormones have been reviewed by steward and Shantz (1959). Wain and Fawcelt (1969), Pratt and Groeschl (1969) and Cathey (1964). Effect of phytohormones and growth regulators on agriculturally useful crops, particularly with reference to their Agricultural and economic uses have been given by Van Overbeak (1952).

Materials and methods

All chemical employed in this investigation were of analytical grade supplied by BDH (India) Unless specified otherwise. Dehydrated absolute ethyl alcohol was supplied by Bengal Chemical Company, India. Etheral was supplied by Duchem, U.S.A., Gibberellic acid supplied by CDH (Central Durg house) (P) Ltd. Post Box No. 7138, New Delhi-110002.

Seeds of Tomato cultivars Pusa ruby, S-152, Arka Vikas, Pusa-120 were obtained from Agronomy department of G.B. Pant University of Agricultural and Technology, Pantnagar.

The experiment petreplate culture for screening of Pusa-120 and others varieties has been carried out. The seed were collected uniform size and shape and ten seeds counted. The seeds were sterilized with 0.1% $HgCl_2$ for 5 minutes and after this seeds were soaked for 12 hours at 10, 25, 50, 100, 200, 400, 800 mg/l concentration of GA_3, Cycocel and Ethephon solutions. After the soaking seeds were transferred into petreplate kept in B.O.D. at room temperature (30-35^{0}C) for germination. Regular and uniform moisture is maintained by distil water and the first germination calculate was taken after 8th days and after 15 days of soaking. Jamil and Rha (2007) reported that GA_3 enhance seed water uptake germinating and early seeding growth in sugar beet.

Results and discussion

The experiment on germination recorded the significant effect of phytohormones on the germination

Table 1: Effect of phytohormones on the percentage of seed germination in different cultivars of Tomato

Treatments		Germination (%)			
Phyto hormones	Conc. (ppm)	Arka Vikas	Pusa-120	Pusa ruby	S-152
Control	D.W.	58.15	75.30	64.20	65.10
Cycocel	10	66.80	84.30	73.20	76.90
	25	66.11	83.70	72.70	76.35
	50	65.20	83.40	72.30	76.00
	100	64.30	83.00	71.18	75.80
	200	64.00	82.50	70.90	75.00
	400	63.70	81.70	70.40	74.32
	800	63.80	81.00	70.10	70.00
Gibberelic acid 86.12	10	79.87	97.03	82.92	
	25	80.12	97.27	83.16	86.78
	50	80.53	97.28	83.50	87.12
	100	80.86	98.01	84.73	87.92
	200	81.19	98.34	84.73	88.00
	400	81.53	98.66	85.42	88.64
	800	82.00	98.80	85.92	88.90
Ethophon	10	62.16	80.21	69.20	77.10
	25	61.18	78.16	67.22	76.82
	50	60.02	77.20	65.12	75.12
	100	58.66	76.73	64.30	74.00
	200	57.60	76.20	63.22	73.50
	400	55.20	75.42	58.70	72.10
	800	50.30	65.30	57.00	70.00
C.D. at 5%		2.10	2.70	2.30	2.50

* Significant at 5% probability level
Statistically not analysed

percentage in different concentrations in all the four cultivar i.e. Pusa-120, Arka Vikas, Pusa ruby, S-152. All the concentrations of Cycocel showed significant an increment in germination percentage over control in all the four varieties (Table 1). The maximum percentage (84.30%) was recorded in Pusa-120 followed by S-152 (76.35%) and Pusa ruby (70.90%) and Arka Vikas (63.80%) in different concentrations of Cycocel, Ethephon showed a decline in germination percentage with increasing concentrations. The maximum percentage (80.21%) was recorded in 10 mg/l and minimum percentage (65.30%) was observed in 800 mg/l in Pusa-120. Minimum percentage (50.30%) was recorded in Arka Vikas at 800 mg/l. GA_3 showed the significant ($P<0.05$) effect on germination percentage with increasing concentrations in all the varieties. The maximum percentage (98.80%) was observed in 800 mg/l in Pusa-120 while lower concentration (10, 25, 50, 100, 200) showed a decline trend of percentage in germinating of seeds. Mwale et al., (2003) reported the effect of seed priming on germination field emergence, growth and flowering in Sunflower.

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