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VEGETATIVE GROWTH OF GINGER (*ZINGIBER OFFICINALE* R) AS INFLUENCED BY CYCOCEL, ETHREL AND KINETIN

B. K. JAYACHANDRAN and P. SETHUMADHAVAN

College of Agriculture, Vellayani, Kerala

Ginger *(Zingiber officinale R.)* is one of the valuable spices and medicinal plants that has not yet been subjected to much systematic studies. The average yield of ginger in Kerala is not promising to maintain its present position in the international trade and hence, there is urgent necessity for increasing the yield by all possible means.

Growth regulators have been successfully used for altering growth and enhancing yield in many root and tuber crops. Cycocel (2-chloroethyl trimethyl ammonium chloride) has been used in *Solanum tuberosum* L. (Choudhuri *et al.*, 1976) and in *Manihot esculenta* Crantz. (Gupta, 1976; Muthukrishnan *et al.*, 1976). Ethrel (2-chloroethyl phosphonic acid) has been used in *Ipomoea batatas* Lam. (Muthukrishnan *et al.*, 1974; Shanmugam and Srinivasan, 1974), and in *Manihot esculenta* Crantz. (Muthukrishnan *et al.*, 1976). The role of Kinetin (6-furfuryl amino purine) in vegetative growth was illustrated by Leopold and Kriedemann (1975). Possibility of using growth regulators in ginger has not been explored systematically and hence the present investigation.

Materials and Methods

The experiment using 3 growth regulators, viz., Cycocel (100, 500 and 1000 ppm) Ethrel (50, 100 and 200 ppm) and Kinetin (10, 50 and 75 ppm) was laid out in a simple Randomised Block Design with 3 replications. Rhizome bits of ginger, variety Rio-de-Janeiro were sown on raised beds of 1 m width and 3 m length (2 beds per plot) at a spacing of 25x25 cm during April, 1977. Fertilizer application and all other cultural operations were done as per the commended package of practices for ginger. Foliar sprays of growth regulators at 3 times were given starting from 70th day after planting at an interval of 15 days.

The growth characters viz., height of the plant, number of tillers per clump, number of leaves per clump and girth of the main aerial shoot were recorded at 30 day intervals starting from 90 days after planting. Leaf area was calculated at 210th day after planting by linear measurements using the relationship $y=0.7153\ x-1.7362$ where y is the leaf area and x the product of length and breadth.

Results and Discussion

The mean values for different growth characters as affected by treatments are presented in Table 1. Growth regulators in general were found not to have any significant effect on height in ginger except Ethrel which appeared to inhibit height at 120 days after planting. However this was not persistent as shown by the height measurements at 180 days after planting. The possible reason for the temporary arrest of growth may be due to inhibition of auxin transport (Morgan and Gausman, 1966) or due to the interference with auxin synthesis (Leopold and Kriedemann, 1975) by the chemical.

Table 1 Growth characters of ginger (height, number of tiilers, girth, number of leaves and leaf area)

Treatments	Mean height of plant at 180 days after planting (cm)	Mean No. of tillers per clump at 180 days after planting	Mean girth of the main aerial shoot at 180 days after planting (cm)	Mean No. of leaves per plant at 180 days after planting	Mean leaf area per plant at 210 days after planting (cm^2)
Control	66.41	19.61	2.73	259.04	8494.59
Waterspray	67.47	22.36	3.02	216.00	8953.71
Cycocel 100 ppm	67.26	23.93	2.50	267.13	10470.34
Cycocel 500 ppm	69.97	19.18	2.67	223.20	8719.92
Cycocel 1000 ppm	69.44	27.29	2.43	325.20	9349.62
Means of levels of Cycocel	68.89	23.47	2.53	371.84	9513.29
Ethrel 50 ppm	64.01	20.64	2.73	261.99	9005.46
Ethrel 100 ppm	64.46	25.60	2.96	297.07	8220.76
Ethrel 200 ppm	63.46	39.43	2.53	430.40	14009.84
Means of levels of Ethrel	63.98	28.56	2.74	329.82	10412.02
Kinetin 10 ppm	60.24	19.66	2.87	232.24	7722.75
Kinetin 50 ppm	63.23	18.63	2.83	233.62	7466.46
Kinetin 75 ppm	66.25	18.51	2.60	214.23	7114.34
Means of levels of Kinetin	63.24	18.93	2.77	226.69	7434.52
CD (0.05) for comparison between treatments	NS	5.51	0.29	58.36	3138 17
CD (0.05) for comparison between growth regulators	NS	2.30	0.17	31.53	1811.83

Effect of Ethrel in inducing tillering was significant and tillering increased with increasing concentrations of the chemical. At 200 ppm the increase was 76 per cent more than the control. The result is in agreement with the findings of Muthukrishnan *et al.,* (1974) who observed increased production of laterals with increasing concentrations of Ethrel in sweet potato. Promotion of tillering and lateral growth was due to the suppression of apical dominance (Hradilik, 1974). Cycocel was effective in increasing tillers only at the highest concentration while Kinetin showed no effect.

Girth of the main aerial shoot was decreased by the application of Cycocel at 1000 ppm while all other treatments did not have any effect. Reduction of girth by Cycocel may be due to the increased number of tillers induced by the treatment. Marked increase in the number of leaves and leaf area was exhibited by Ethrel at 200 ppm and this was due to increased tillering induced by the treatment. Cycocel at the highest concentration increased the leaf number while the decrease in leaf number and area by Kinetin application was negligible.

From the investigation it appears that the vegetative growth in ginger has been enhanced by Ethrel while the overall effect of Cycocel in increasing vegetative growth was not marked and Kinetin showed no significant change in vegetative growth. The result of the waterspray treatment illustrates that the treatment has no effect in modifying growth.

സംഗ്രഹം

ഇഞ്ചിച്ചെടിയുടെ വളർച്ച സൈക്കോസൽ എതൂൽ, കൈനറിൻ എന്നീ ഹോർമോണുകളാൽ എങ്ങനെ നിയന്ത്രിക്കാം എന്ന പരീക്ഷണം കാർഷിക കോളേജിൽ 1977-ൽ നടത്തി. പരീക്ഷണഫലങ്ങളിൽനിന്നും എതൂൽ വളർച്ചകൂട്ടുന്നതായും സൈക്കോസൽ ചിനപ്പുകളേയും ഇലകളേയും വർദ്ധിപ്പിക്കുന്നതായുംകണ്ടു. എന്നാൽ കൈനറിൻ ഇഞ്ചിച്ചെടിയുടെ വളർച്ചയെ സാരമായി ബാധിക്കുന്നതായി കണ്ടില്ല.

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