

Effects of SADH and CCC on Growth and Yield of Hybrid Tomato

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Growth and yield responses of a hybrid tomato Karnataka, to varying concentrations of Alar and Cycocel, applied at three different stages of plant growth and their combinations, were evaluated during *kharif* 1974. The treatments generally reduced plant height, but increased stem diameter, number of branches and total yield of fruits per plant. The effects were directly proportional to the concentrations and were significantly greater when the plants were treated at nursery stage compared to those treated at later stages of their growth or untreated plants.

Growth retardants were found to control growth and development of plants. Among them SADH (Succinic acid, 2, 2-dimethyl hydrazide) and CCC (2-chloroethyl trimethyl ammonium chloride) appeared to divert larger proportions of photosynthates from the vegetative phases towards the productive phases (Read and Fieldhouse, 1970; Irulappan and Muthukrishnan, 1973). This report relates to the responses of growth and yield of hybrid tomato, Karnataka, to varying concentrations of SADH (Alar-85) and CCC (Cycocel-50) applied at different stages of plant growth.

MATERIALS AND METHODS

The investigations were carried out during *kharif* (June-November) 1974 in red sandy loam (pH: 5.5-5.8). A split plot design was adopted maintaining Alar concentrations viz., 2000, 3000, and 4000 ppm, and Cycocel concentrations viz., 500, 1000 and 2000 ppm as

main plots. The sub-plots comprised of application in seven possible combinations as given below :

- S₁ : At nursery stage-four weeks after germination or two weeks before transplanting,
- S₂ : two weeks after transplanting,
- S₃ : six weeks after transplanting,
- S₄ : (S₁+S₂), S₅(S₁+S₃), S₆(S₂+S₃) and S₇(S₁+S₂+S₃).

A separate plot of untreated plants was included under each main plot treatment. The treatment units were replicated twice with ten plants in each. The gross plot of size 48.4×17.20 m was divided into two blocks which in turn were divided into three main plots with a net area of 4.03×17.20 m for each chemical separately. A spacing of 90×60 cm in a net plot of size 3.0×1.8 m was adopted, and the package of practices recommended by Attavar and Bhat (1972) were followed.

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The plants were thoroughly sprayed with solutions of growth retardants in the forenoon, and three randomly selected plants were considered for recording observations. Data on plant height, stem diameter, number of branches and yield of fruits were recorded.

RESULTS AND DISCUSSION

1. **Plant height:** Different concentrations of both Alar and Cycocel significantly reduced plant height. While the effects among the concentrations of Alar were at par, higher the concentration of Cycocel greater was the reduction in height. Treating the seedlings at nursery stage had significantly greater effects compared to treating the plants at later stages (Table).

It was thus, evident that young seedlings responded greater than the older plants to growth retardant treatments (Tiessen, 1962; Read and Fieldhouse, 1970). Kuraishi and Muir (1963) postulated that the restrictions of height growth might be due to reduction in diffusible auxin levels caused by the growth retardants. Sachs *et al.* (1960), however, observed that the reduction in plant height was mainly due to shorter internodes caused by restricted cell division and elongation in the sub-apical meristem caused by the treatments.

2. **Stem diameter:** Alar and Cycocel treatments at different concentrations significantly increased stem diameter compared to that of control. Alar at 3000 and 4000 ppm, although were at par between them, significantly

increased stem diameter over 2000 ppm. Higher concentrations of cycocel also had significantly greater effects in increasing stem diameter (Table). Treatments at nursery stage were significantly more effective in increasing the stem diameter. Similar results were obtained by Bryan (1970) and Read and Fieldhouse (1970) on tomato. Cathey (1964) postulates that the increase in stem diameter might be due to the possible stimulation of cell division in the cambium but with retarded cell elongation. Increased stem thickness may be a sign of a greater storage of carbohydrates that is likely to influence flower initiation (Aung and Kelly, 1966).

3. **Number of branches:** Higher the concentration, greater were the effects in increasing the number of branches (Table). The number of branches were significantly increased by the growth retardant treatments given at nursery stage, or with repeated sprays, over those given at later stages alone and control. The restriction of the apical dominance brought about by the treatments could result in the accelerated development of the axillary buds into new shoots (Hinson and Hanson, 1962) providing extra sites for more inflorescences. Similar results were also recorded on tomatoes by Bryan (1970).

4. **Yield of fruits:** Yield of fruits per plant was significantly increased by the growth retardants particularly at higher concentrations, the increase being directly proportional to the concentrations (Table). For

TABLE. Effect of Alar and Cycocel on tomato hybrid

Alar Concentration (ppm)	Plant height (cm)	Stem diameter (cm)	Number of branches	Yield per plant (kg)	Cycocel concentration (ppm)	Plant height (cm)	Stem diameter (cm)	Number of branches	Yield per plant (kg)
2000	147.90	1.51 ^{a*}	7.54	4.98 ^{a*}	500	157.11 ^{c*}	1.42 ^a	7.45 ^{a*}	4.70 ^a
3000	138.76	1.59 ^b	8.16	5.38 ^b	1000	151.02 ^b	1.51 ^b	7.85 ^b	4.99 ^b
4000	136.66	1.60 ^b	8.28	5.41 ^b	2000	138.92 ^a	1.57 ^c	8.06 ^b	5.30 ^c
Stage of growth									
S ₁	133.47 ^b	1.70 ^c	8.55 ^c	5.61 ^c	S ₁	143.69 ^a	1.58 ^b	8.11 ^c	5.24 ^c
S ₂	148.88 ^c	1.41 ^b	7.27 ^b	4.96 ^b	S ₂	153.38 ^b	1.40 ^a	7.38 ^b	4.76 ^b
S ₃	157.16 ^d	1.36 ^a	6.98 ^a	4.65 ^a	S ₃	160.72 ^c	1.36 ^a	6.99 ^a	5.58 ^a
S ₄	131.27 ^b	1.70 ^c	8.72 ^c	5.58 ^c	S ₄	142.74 ^a	1.59 ^b	8.27 ^c	5.22 ^c
S ₅	135.21 ^b	1.68 ^c	8.55 ^c	5.52 ^c	S ₅	145.11 ^a	1.58 ^b	8.11 ^c	5.15 ^c
S ₆	150.61 ^c	1.41 ^b	7.33 ^b	4.91 ^b	S ₆	154.94 ^b	1.39 ^a	7.38 ^b	4.79 ^b
S ₇	127.80 ^a	1.70 ^c	8.72 ^c	5.56 ^c	S ₇	142.55 ^a	1.59 ^b	8.27 ^c	5.22 ^c
Control	164.48	1.32	6.94	4.54	Control	163.58	1.32	6.88	4.52

C.D. at 5 per cent

Concentrations	N.S.	0.06	N.S.	0.13	5.29	0.02	0.22	0.19
Stages	...	3.96	0.04	0.10	2.89	0.05	0.36	0.10
Concentrations × Stages	...	5.26		0.17	3.80			0.09
Control vs. Concentrations		6.05	0.03	0.30	4.20	0.03	0.28	0.12
Control vs. Stages		3.61	0.04	0.29	2.77	0.05	0.35	0.07

* Means followed by a common letter do not differ significantly at P=0.05

favourable effects, the plants could be treated while they are at early stage rather than at later stages when the growth retardant sprays are likely to cause flower drop. Increased yields were recorded by several earlier workers employing Alar or Cycocel in treating tomato plants, mostly at seedling stages (Read and Fieldhouse, 1970; Irulappan and Muthukrishnan, 1973). The increase in fruit yield of treated plants could be due to the cumulative effects of greater stem diameter, additional sites for more inflorescences, and finally greater utilization of photosynthates diverted for the production.

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