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Effects of growth regulator and nutrients on growth parameters and yield in chilli cv. BYADAGI KADDI

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ABSTRACT

The effect of plant growth regulators (PGR's) and nutrients on growth parameters and fruit yield in Chilli indicated that the growth parameters *i.e.* AGR, CGR, RGR and NAR increased significantly in all the growth regulator and nutrient treatments. Leaf area decreased in Cycocel treatment, with an increase in the concentration of Cycocel, there was an increase in SLW. Significantly higher fruit yield was recorded in growth regulator and nutrient treated plant as compared to control and the maximum fruit yield was recorded with Cycocel (1000 ppm).

Key words : *Capsicum annum* L, Growth regulator, Growth parameters, Chilli, CCC, NAA, $ZnSO_4$, $MgSO_4$, $FeSO_4$, Miraculogy, Cytozyme.

INTRODUCTION

Chilli (*Capsicum annuum* L.) is an important spice crop and India is the largest producer of it in the world. Chilli fruits are good source of Vit. A and C. The reports on the effects of growth regulators and nutrients on yield and growth analysis aspects are scanty. One of the major factors affecting productivity of Chill is the use of proper growth regulator and nutrient at proper time to control flower and fruit drop (Fittings, 1909; Yamagar and Desai, 1987).

Relative growth rate (RGR), absolute growth rate (AGR) and net assimilation rate (NAR) are the important growth parameters influencing yield, which are dependent not only genotype but also on the environmental factors and management practices. Growth analysis technique has made substantial contribution to the current understanding of the physiological basis of yield variation in different crops and the information on the influence of growth regulators and nutrients on growth parameters in chill is meagre. Hence an investigation was planned to find out the effect of PGR's and nutrients on some growth parameters and their relationship with fruit yield in chilli var Byadagi kaddi.

MATERIALS AND METHODS

A field experiment was conducted during *kharif* 1998 on medium black soils at Agriculture College Farm, Dharwad with a Chilli variety Byadagi Kaddi. A field experiment consist of 15 treefments *viz*, CCC 500 and 1000 ppm, NAA 50 and 100 ppm, Miraculan 1000 and 2000 ppm, cytozyme 1000 and 2000 ppm. $ZnSO_4$ 0.25 and 0.50 per cent, $FeSO_4$ 0.25 and 0.50 per cent. $MgSO_4$ 0.25 and 0.50 per cent and control (water spray). The experiment was laid out in Randomized Block Design with three replications. The spraying of growth regulators and nutrients was done at 45 and 65 days after transplanting. The leaf area was determined by using leaf disc method. The data obtained on dry weight of different plant parts and the leaf area were used to compute various growth parameters like AGR, CGR, RGR, NAR and SLW. Harvesting of chillies was done at red ripe stage. Red ripe chillies were dried till the constant weight was obtained. Based on the total yield per plot from all the pickings, yield per hectare was calculated. The data on leaf area, growth parameters and fruit yield were subjected to statistical analysis as suggested by Panse and Sukhatrme (1984).

RESULTS AND DISCUSSION

It was observed that all the growth parameters studied *i.e.* AGR, RGR, CR and NAR declined with an advancement in crop growth from 75 – 90 DAT to 90 DAT – harvest in all the treatments (Table 1 and 2). Further there was an increase in all these parameters with application of growth regulators, Generally Cycocel (100 ppm) registered the higher values of growth parameters as compared other treatment indicating the superiority of this chemical in bringing about the enhanced growth.

This increase in the growth parameters at higher concentration of growth regulator could be attributed to an increase in the rate of dry matter accumulation and production of higher total dry matter. All the treatment differed significantly with respect to all the growth parameters studied. The increase in CGR and NAR due to application of Cycocel (500ppm) at 36 DAP has been reported by Banerjee and Das (1984). Similarly

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Table 1: Influence of plant growth regulator and nutrients on absolute growth and crop growth rate at different growth stages in Chilli cv. BYADAGI KADDI

Treatments	Days after transplanting			
	Absolute growth rate (g day^{-1})		Crop growth rate (g m^{-2} day^{-1})	
	75-90	90 - harvest	75-90	90 - harvest
CCC (500ppm)	2.87	1.41	7.98	3.92
CCC (1000ppm)	2.92	1.55	8.11	4.31
NAA (50ppm)	2.74	1.01	7.61	2.79
NAA (100ppm)	2.60	1.28	7.22	3.55
Miraculan (1000ppm)	2.39	1.28	6.64	3.56
Miraculan (2000ppm)	2.33	1.51	6.48	4.21
Cytozyme (1000ppm)	2.46	1.03	6.83	2.86
Cytozyme (2000ppm)	2.39	1.26	6.64	3.51
$ZnSO_4$ (0.25%)	2.89	0.75	8.03	2.09
$ZnSO_4$ (0.50%)	2.84	0.94	7.88	2.61
$FeSO_4$ (0.25%)	2.55	0.99	7.09	2.75
$FeSO_4$ (0.50%)	2.58	1.04	7.18	2.88
M_8SO_4 (0.25%)	2.41	1.05	6.70	2.91
$MgSO_4$ (0.50%)	2.42	1.12	6.72	3.10
Control	2.16	1.21	6.01	3.35
Mean	2.57	1.16	7.14	3.23
S.E. $\pm$	0.05	0.02	0.15	0.06
C.D. (P=0.05)	0.16	0.06	0.44	0.17

Table 2: Influence of plant growth regulators and nutrients on relative growth rate and net assimilation rate of different growth stages in Chilli cv. BYADAGI KADDI

Treatments	Days after transplanting			
	Relative growth rate (g g^{-1} day^{-1})		Net assimilation rate (g m^{-2} day^{-1})	
	75-90	90 - harvest	75-90	90 - harvest
CCC (500ppm)	0.022	0.008	0.00063	0.00033
CCC (1000ppm)	0.023	0.008	0.00066	0.00037
NAA (50ppm)	0.021	0.006	0.00051	0.00021
NAA (100ppm)	0.020	0.007	0.00047	0.00026
Miraculan (1000ppm)	0.019	0.007	0.00046	0.00027
Miraculan (2000ppm)	0.018	0.009	0.00043	0.00030
Cytozyme (1000ppm)	0.019	0.006	0.00048	0.00022
Cytozyme (2000ppm)	0.019	0.007	0.00046	0.00027
$ZnSO_4$ (0.25%)	0.023	0.004	0.00057	0.00017
$ZnSO_4$ (0.50%)	0.022	0.005	0.00055	0.00020
$FeSO_4$ (0.25%)	0.021	0.006	0.00050	0.00022
$FeSO_4$ (0.50%)	0.021	0.006	0.00049	0.00023
M_8SO_4 (0.25%)	0.020	0.007	0.00047	0.00024
$MgSO_4$ (0.50%)	0.020	0.008	0.00046	0.00025
Control	0.020	0.008	0.00047	0.00028
Mean	0.020	0.007	0.00051	0.00025
S.E. $\pm$	0.0003	0.0007	0.00001	0.00001
C.D. (P=0.05)	0.0010	0.0020	0.00003	0.00004

Madalageri (1996) observed as improvement in NAR (5.3%) of spraying growth retardants against unsprayed control in TPS genotypes.

In general leaf area increased upto 90 DAT and decreased there after till harvest. Significant differences were noticed with regard to leaf area among the growth regulators treatments at all the stages. However, Cycocel treatment significantly reduced the leaf areas as compared

Table 3 : Influence of plant growth regulators and nutrients on leaf area and specific weight at different stages in fruit yield in Chilli cv BYADAGI KADDI

Treatments	Days after transplanting				
	Leaf area (cm^2 $plant^{-1}$)		Specific leaf weight (mg cm^{-2})		Fruit Yield Kg ha^{-1}
	75	90	75	90	
CCC (500ppm)	3210	6122	4.32	5.39	1189
CCC (1000ppm)	3116	5925	4.39	5.41	1475
NAA (50ppm)	3921	6991	4.01	5.20	1152
NAA (100ppm)	4123	7106	3.98	5.18	1175
Miraculan (1000pm)	3821	6892	4.08	5.06	1130
Miraculan (2000ppm)	4023	7092	4.06	5.02	1139
Cytozyme (1000ppm)	3751	6746	4.14	5.26	1113
Cytozyme (2000ppm)	3865	6815	4.18	5.29	1118
$ZnSO_4$ (0.25%)	3715	6711	4.16	5.28	1119
$ZnSO_4$ (0.50%)	3780	6786	4.21	5.32	1140
$FeSO_4$ (0.25%)	3810	6790	4.20	5.31	1073
$FeSO_4$ (0.50%)	3877	6990	4.22	5.37	1087
M_8SO_4 (0.25%)	3691	6810	4.18	5.26	1054
$MgSO_4$ (0.5%)	3772	6845	4.20	5.32	1076
Control	3522	6412	4.13	5.23	933
Mean	3733.1	6735.5	4.16	5.26	1131.53
S.E. $\pm$	45.2	83.5	0.02	0.03	41.63
C.D. (P=0.05)	131.0	242.0	0.05	0.08	120.60

to other treatments (Table 3). Though there was increase in the number of branches, but still there was a decrease in the leaf area due to application of Cycocel, which could be mainly attributed not only to decrease in the plant heights but also due to decreased cell division and cell expansion. Studies have indicated that leaf area was reduced due to application of growth retardants (Madalageri 1996).

The data indicated that there was a significant increase in SLW due to application of Cycocel (1000 ppm) indicating the increase of leaf thickness (Table 3). The SLW was more at 90 DAT, from there it started declining towards harvest, which could be due to reduced chlorophyll degradation and protease activity and promoted synthesis of soluble proteins and photosynthetic enzymes in sunflower (Goswami and Srivastava, 1987).

The application of CCC and NAA resulted in significant increase of fruit yield as compared to other treatments (Table 3). Among the various growth regulators the per cent increase in yield was maximum with Cycocel (1000ppm) (58.0%) as compared to control. The higher yield could be attributes to an increase in the per cent distribution of dry matter to the fruits, increase in leaf thickness and also an increase in the growth parameters which resulted in an increase in the number and size of the fruits. Banerjee and Das (1984) and Madalageri (1996) have also reported an increase in the yield and yield components due to application of growth regulators. It is thus, inferred from the present study that fruit yield can be increased with use of growth regulators, particularly CCC (1000 ppm), CCC (500 ppm) and NAA (100 ppm).

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