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PHYSIOLOGICAL AND BIOCHEMICAL EFFECTS OF MEPIQUAT CHLORIDE ON GROUNDNUT (*Arachis hypogaea*)

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ABSTRACT

Experiments were carried out to understand the physiological effects of Mepiquat Chloride (MC), 1, 1-dimethyl piperidinium chloride on groundnut (*Arachis hypogaea* L.) at different concentrations and in comparison with CCC (2-chloro ethyl trimethyl ammonium chloride). Foliar application of MC at 125 ppm on 35 DAS showed substantial increase in the nitrogen (N) content accounting for 23 per cent over the unsprayed control and 12 per cent over the CCC treatment. Phosphorus (P) and Calcium (Ca) contents were also increased, while potassium (K) was unaffected by application of MC.

KEY WORDS : Mepiquat chloride, groundnut, physiology and biochemistry

Eventhough India ranks first in total oilseed production, the productivity is less than one ton per ha. Among the several approaches to break this yield plateau in groundnut, application of growth regulators, particularly growth retardants is receiving great attention in recent times. Higher Chl concentration due to application of growth retardants has been reported in tobacco, mustard and radish. Eid *et al.* (1986) and Shah and Prathapasenan (1991) also confirmed the increase in total Chl due to MC and CCC in cotton and mungbean respectively. An increase in protein content in barley and cotton, the NRA/NO_3 ratio in sesame seedlings, N and P in peas and Ca in tomato was observed due to growth retardants. MC treated cotton plants showed greater concentrations of N, P and Ca while K was found to be unchanged (Zhang *et al.*, 1990). Though the physiological effects of MC have been studied in many other crops, reports on groundnut are scarce. More over, the chemical, MC is relatively a new chemical to India and therefore attempts were made to understand the influence of MC at different concentrations on the sequential changes in physiological and biochemical characters of groundnut which determine the final yield.

MATERIALS AND METHODS

A study was conducted during 1991 in the Department of Crop Physiology, Tamil Nadu Agricultural University, Coimbatore. Groundnut cv. Co-1 seeds were sown under irrigated condition following a spacing of 30 x 10 cm. The type of soil in the experimental field was red sandy loam with available N, P and K for 190.2, 39.5 and 558.2 kg ha^{-1} respectively. The recommended fertilizer dose of 17:34:54 kg ha^{-1} of N:P:K was applied. MC was sprayed at the concentration of 100 ppm, 125 ppm and 150 ppm on 25, 35 and 45 DAS respectively along with water spray (0 ppm) and control (no spray). CCC was sprayed as an additional treatment on 45 DAS at 100 ppm to compare its efficacy with MC. The treatments were randomised with three replications. Observations were recorded on total Chl content, soluble protein, NRA, uptake of N, P, K and Ca.

RESULTS AND DISCUSSION

Among the treatments, application of MC 125 ppm on 35 DAS recorded highest soluble protein content of 8.93 mg g^{-1} at harvest stage accounting for 33 per cent higher value over the unsprayed control and 10 per cent over the CCC treatment (Table 1). The higher photosynthetic efficiency of MC treatment was thus shown by soluble protein, a measure of RuBP carboxylase activity. The present findings corroborate the results of Krishchenko *et al.* (1983) and El-Tahawi *et al* (1983) in barley and *Phaseolus vulgaris* respectively where, application of CCC resulted in higher amont of soluble protein. Reports of Hedin *et al.* (1988) also revealed that application of both MC and CCC to cotton increased the soluble protein content. Both the growth retardants MC and CCC were able to increase the Chl considerably (Table 2). When compared to CCC, MC at 125 ppm resulted in higher amount of Chl (1.796 mg g^{-1}) which was 20 per cent more than the CCC treated plants. It is possible that the Chl synthesis was enhanced by growth retardants because the chlorophyllase enzyme which is responsible for chlorophyll degradation might have been inhibited leading to higher accumulation of Chl. The works of Bashist (1990) are also in line with the present study, that foliar application of growth retardants increased the Chl content associated with higher Hill reaction. The higher NRA observed in the early stage was found to decrease towards the maturity of crop. MC at 125 ppm on 35 DAS recorded higher NRA (10.39 g NO_2 g^{-1} h^{-1}) while the control and CCC treatment showed an activity of 9.49 g NO_2 g^{-1} h^{-1} and 10.05 g NO_2 g^{-1} h^{-1} respectively (Table 3). The maximum NRA observed in the plants treated with MC at 125 ppm on 35 DAS might be due to the increased availability of nitrate for reduction by the enzyme. Bashist (1990) stated that higher sugar content in the CCC treated plants might be responsible for the higher NRA/NO_3 uptake ratio. The study on the influence of GRs on the N content indicated that N was highly influenced by MC treatment than CCC. Among the treatments, application of MC at 125 ppm on 35 DAS showed remarkable increase in the N content of the plant accounting for an increase of 23 per cent over the unsprayed control and 12 per cent over the CCC treatment. The effect of MC and CCC on P content of the plants revealed that P content was maximum in the plants treated with MC at 125 ppm on 35 DAS (73.84 mg g^{-1}), accounting for an increase of 16% over the CCC treatment. The influence of GRs on the total K content showed that none of the treatments increased K in plants. As far as Ca was concerned, the GRs were found to influence the uptake of Ca. The Ca content was maximum in plants treated with MC at 125 ppm on 35 DAS and was followed by 150 ppm and 100 ppm treatments. Among the treatments, application of MC at 125 ppm on 35 DAS recorded higher Ca content of 664.78 mg g^{-1} which accounted for an increase of 10% over CCC treatment (Table 4). In the

Table 1. Effect of MC on soluble protein at harvest stage (mg g^{-1})

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	6.25	7.22	7.94	7.57	7.24
35	6.27	8.64	8.93	8.87	8.17
45	6.27	8.12	8.52	8.21	7.78
Mean	6.26	7.99	8.46	8.21	
	CCC	8.06	Control	6.24	
C.D (0.05)	D	C	DXC		
	0.29	0.34	0.58		

Table 2. Effect of MC on total chlorophyll at harvest stage (mg g^{-1})

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	1.28	1.40	1.46	1.43	1.39
35	1.28	1.70	1.79	1.73	1.63
45	1.27	1.52	1.59	1.56	1.48
Mean	1.28	1.54	1.62	1.57	
	CCC	1.49	Control	1.27	
C.D. (0.05)	D	C	DXC		
	0.01	0.01	0.03		

Table 3. Effect of MC on NRA at harvest stage (g NO_2 g^{-1} ha^{-1})

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	9.51	9.46	9.74	9.71	9.60
35	9.52	10.21	10.39	10.28	10.10
45	9.58	10.08	10.16	10.10	9.98
Mean	9.53	9.91	10.09	10.03	
	CCC	10.05	Control	9.49	
C.D. (0.05)	D	C	DXC		
	0.06	0.07	0.12		

Table 4. Effect of MC on uptake (mg g^{-1})

Nitrogen

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	733.62	785.42	799.76	800.41	779.80
35	735.63	841.67	895.73	842.66	828.92
45	732.52	800.18	812.32	807.98	788.25
Mean	733.92	809.90	835.94	817.01	
	CCC	800.12	Control	728.12	
C.D. (0.05)	D	C	DXC		
	1.56	1.80	3.12		

Phosphorus

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	58.76	60.22	73.05	61.29	60.83
35	59.37	69.44	73.84	71.20	68.46
45	58.62	65.77	67.38	65.41	64.29
Mean	58.91	64.14	68.09	65.96	
	CCC	63.65	Control	58.46	
C.D. (0.05)	D	C	DXC		
	0.44	0.51	0.88		

Potassium

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	393.44	394.18	393.48	393.94	393.76
35	392.98	395.46	394.17	394.38	394.25
45	393.91	395.12	394.80	393.96	394.45
Mean	393.44	394.92	394.14	393.76	
	CCC	395.11	Control	394.38	
C.D. (0.05)	D	C	DXC		
	NS	NS	NS		

Calcium

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	381.82	605.97	596.78	596.22	545.19
35	382.28	659.40	664.78	662.43	592.22
45	381.98	624.88	632.77	631.92	567.88
Mean	382.02	630.08	631.44	630.19	
	CCC	601.76	Control	381.77	
C.D. (0.05)	D	C	DXC		
	9.37	10.77	18.65		

present study, MC at 125 ppm on 35 DAS recorded the maximum N and P content as well as Ca. K was not disturbed by any of the treatments. The results of the present study are in agreement with the works carried out by Knavel (1969) who reported that CCC treated plants had more N, P and Ca but less K than the control plants. Zhang *et al.* (1990) also reported that application of MC resulted in greater concentration of N, P and Ca while K was found to remain unchanged as in the case of control plants. The changes in the nutrient content of the plants might possibly due to anti metabolite function of GRs, which in turn resulted in changing of root permeability and cation exchange capacity of the roots leading to higher amount of N and P in plants. The higher status of N and P is believed to be responsible for more chlorophyll, more palisade cells per unit area of leaf tissue and the combination of these factors accounted for the darker green foliage (Knavel, 1969).

Table 5. Effect of MC on pod yield (kg ha^{-1})

	Concentration (ppm)				
	0	100	125	150	Mean
DAS					
25	1863	1956	2058	2038	1978
35	1886	2334	2611	2581	2353
45	1859	2113	2233	2171	2094
Mean	1869	2134	2300	2263	
	CCC	2104	Control	1833	
C.D. (0.05)	D	C	DXC		
	9.04	11.08	9.04		

D : DAS; C : Concentration

Higher soluble protein, chlorophyll, nitrate reductase activity and higher uptake of N, P and Ca had significant effect on pod yield. Foliar application of MC at 125 ppm on 35 DAS registered the maximum pod yield of 2611 kg ha^{-1} by showing an increase of 42 per cent over control and 24 per cent over CCC treated plants (Table 5). Several workers reported similar increase in yield due to application of growth retardants. It was reported that 500 ppm of CCC increased the pod yield of groundnut. Gajendra Giri and Gangasaren (1987) showed that plants treated with CCC at 200 ppm exhibited higher yield than the untreated control in groundnut.

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ASSESSMENT OF KNOWLEDGE AND SKILL GAINED BY FARM WOMEN THROUGH INSTITUTIONAL TRAINING

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ABSTRACT

A study was conducted to know the impact of training on knowledge and skill in paddy cultivation of farm women who had undergone a training on Farmers Training Institute, Hebbal, Bangalore. The mean knowledge score difference was observed to be 2.92 from before and after training conducted. The knowledge gain was observed as high in case of 47.17 per cent trainees. The factors like education, land holding, mass media participation and innovativeness were found significant relationship with the knowledge gain. Whereas skill acquired due to training, it was observed that 41.51 per cent had high skill acquired and the characteristics like social participation, land holding, decision-making and innovativeness were found significant relationship with their skill acquired.

KEY WORDS : Knowledge, skill gain, institutional training, farm women, pre training, post training

Women play a vital role in agriculture but there is lack of focus on farm women. It was felt that there is a need for training farm women Consequently, the training programmes were started in Karnataka during the year 1982 under Women and Youth Training Extension Project (WYTEP) specially to impart training to farm women and youth. The huge costs and efforts involved in these training programmes call for periodic evaluation to determine the effectiveness of the training. It is not precisely known whether the training imparted to farm women is effective or not. If so, what extent trainees acquire knowledge and skill about improved practices. Thus, the present study was an attempt to study the impact of training on knowledge and skill in paddy cultivation on farm women with a view of its performance in the field as well as to know the strong and weak points in the programme and pave the direction to continued improvement among farm women which influence on the use pattern in their fields.

MATERIALS AND METHODS

The present study was conducted in one of the Farmers Training Centres in Bangalore District of Karnataka State. This institute is purposely selected with a view that all the facilities and resources available to the institute to cater the needs of training. Fifty-three farm women trainees who