(Table 2). Seedlings raised from seeds treated with carbendazim, TMTD and quintozene produced longer shoots in the control (Table 3). Seedlings raised from seeds treated with Carbendazim and quintozene produced large quantities of dry matter, than in the control treatment (Table 4). The vigour index values were maximum in the seedlings obtained from seeds treated with carbendazim and quintozene than from other treatments (Table 5).

Increased shoot length of rice seedlings was seen in the seeds treated with TMTD (Kannaiyan *et al* ., 1975). Brown *et al* ., (1962) observed that the application of either calcium arsenate or toxaphene + DDT had not influenced the dry weight of cotton, but methyl parathion had inreased it. Ventaka Rao *et al* ., (1970) reported that the seedling weight was higher in fungicide treatment than in untreated seeds.

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Madras Agric. J., 81(6): 299-302 June, 1994 https://doi.org/10.29321/MAJ.10.A01518

CHANGES IN N,P,K,Ca, AND Mg CONTENTS IN TOMATOES AS INFLUENCED BY DIFFERENT NUTRIENT REGIMES

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ABSTRACT

Field experiments conducted to study the effect of N (0,40,80,120 and 160 kg/ha) K (0,50 and 100 kg K_2 o/ha) and $CaCl_2$ sprays (0.0% and 0.5% $CaCl_2$) on N,P,K,Ca and Mg contents in fruits of CO.1 and CO.3 tomatoes grown in vertisol indicated that N,P,K,Ca and Mg contents were altered by the added N,K, and $CaCl_2$ sprays.

Mineral content of tomato fruits is very important from the nutritional point of view. Mineral content in tomato varied with year of cultivation (Klein et al. 1982). In this paper an attmept was made to study the effect of N,K and $CaCl_2$ sprays on the ,Ca and Mg contents in fruits of CO.1 and CO.3 tomatoes.

MATERIALS AND METHODS

Field experimetnts were conducted employing CO.1 and CO.3 tomatoes during July, 1982 and January, 1983 in vertisol. The soil of the experimental field was low in available N (200.0 kg/ha) medium in available P(16.0 kg/ha) and high in available K(120 kg/ha). Ca (11270.0 kg/ha) and Mg (8232.0 kg/ha). The soil was neutral in pH and free from salinity. The treatment details are furnished elsewhere. The crop was raised by adopting the normal package of practices. Oven dried samples of fruits collected between second and fourth pickings were analysed for the contents of N,P,K, Ca and Mg by adopting standard procedures prescribed by Piper (1966).

RESULTS AND DISCUSSION

N content

Individual as well as combined application of N and K significantly increased the N content of tomato fruits in both the years. 160kg N/ha alone in the first year and in combination with 50 or 100 kg K_2O/ha in the second year recorded the highest N content in fruit. This is in line with the work of Hanger (1979). The variety CO.3 was found to contain more N in the absence of 0.5 per cent $CaCl_2$ sprays while CO.1 . cultivar behaved differently. The variation might be due to their genetic make up.

Table I. Effect of N, K and $CaCl_2$ on Ca and Mg contents in fruit - tomato.

N - levels	Year	N0 (%)		N1 (%)		N2 (%)		N3 (%)		N4 (%)	
		Ca	Mg	Ca	Mg	Ca	Mg	Ca	Mg	Ca	Mg
N x K											
1982	K0	0.64	0.74	0.87	0.98	0.64	0.88	0.93	0.58	0.64	0.89
	K1	0.74	0.81	0.83	0.65	0.89	0.58	0.94	0.69	0.44	0.94
	K2	0.74	1.04	0.74	0.70	1.04	0.90	0.54	0.55	0.93	0.85
1983	K0	0.69	0.71	0.81	0.88	0.67	0.84	0.84	0.62	0.69	0.91
	K1	0.75	0.79	0.91	0.67	0.85	0.58	0.88	0.72	0.54	0.92
	K2	0.82	0.90	0.80	0.68	1.07	0.86	0.62	0.66	0.95	0.67
N x V											
1982	V1	0.64	0.93	0.86	0.86	0.64	0.86	0.84	0.44	0.70	0.96
	V2	0.77	0.79	0.76	0.69	1.07	0.72	0.77	0.77	0.64	0.82
1983	V1	0.62	0.88	0.88	0.81	0.68	0.81	0.81	0.53	0.80	0.89
	V2	0.88	0.73	0.80	0.67	1.05	0.71	0.74	0.80	0.66	0.77
N x F											
1982	F0	0.64	0.96	0.60	0.69	0.94	0.73	0.77	0.59	0.70	0.86
	F1	0.77	0.77	1.03	0.87	0.77	0.84	0.84	0.63	0.63	0.92
Mean											
1983	F0	0.73	0.89	0.66	0.66	0.93	0.75	0.81	0.65	0.74	0.81
	F1	0.77	0.71	1.02	0.82	0.80	0.79	0.74	0.68	0.72	0.85

		K0 (%)		K1 (%)		K2 (%)	
		Ca	Mg	Ca	Mg	Ca	Mg
K x V							
1982	V1	-	0.88	-	0.66	-	0.89
	V2	-	0.75	-	0.81	-	0.72
1983	V1	-	0.89	-	0.66	-	0.81
	V2	-	0.70	-	0.81	-	0.70
K x F							
1982	F0	0.65	0.78	0.82	0.67	0.72	0.85
	F1	0.84	0.85	0.72	0.80	0.88	0.77
1983	F0	0.70	0.78	0.83	0.69	0.79	0.79
	F1	0.78	0.81	0.74	0.78	0.91	0.72

		F0 (%)		F1 (%)	
		Ca	Mg	Ca	Mg
V x F					
1982					
1982	V1	0.71	-	0.75	-
	V2	0.74	-	0.86	-

Note S.E. and C.D. for Ca and Mg contents in fruit - Tomato

Particulars		S.E		Ca (%)	CD = (P=0.05)
		1982	1983	1982	1983
Main effect					
N levels		0.02	-	0.06	-
K levels		-	0.02	-	0.08
Variety		0.01	0.03	0.03	0.06
F levels		0.01	-	0.01	-
Interaction effects					
N x K		0.03	0.06	0.10	0.18
N x V		0.03	0.05	0.08	0.15
N x F	F at N	0.02	0.05	0.08	0.15
	N zt F	0.02	0.05	0.08	0.15
K x V		-	-	-	-
K x F	F at K	0.02	0.04	0.06	0.11
	K at F	0.02	0.04	0.06	0.11
V x F	F at V	0.01	-	0.05	-
	V at F	0.01	-	0.05	-

CO.1 recorded higher N content than Co.3 both at 50 and 100 kg K_2O/ha. In the absence of $CaCl_2$ sprays, added k was found to increase the N content in the fruit.

P content

Combined application of N and K lowered the P content of tomato fruit in both the years. This is in accordance with the findings of Sharma and Singh (1973).CO.3 registered more P content at 80 kg N/ha. The content of P in CO.1 fruit was not markedly altered by the added N. The combination of 80 kg N/ha and 0.5 per cent $CaCl_2$ sprays registered more P content in fruits irrespective of the years of study. In the absence of added K, CO.1 and in the presence of 50 kg K_2O/ha CO.3 recorded more P content in the fruit. In the absence of added K, 0.5 per cent $CaCl_2$ sprays gave more P content in fruit. CO.1 registered higher P content due to 0.5 percent $CaCl_2$ sprays and CO.3 exhibited a reverse trend due to varietal behaviour.

K content

Combined application of 80 kg N/ha and 100 kg K_2O/ha recorded more K content in fruit especially during 1982. The interaction of N and variety indicated that both CO.1 and CO.3 registered the highest K content in fruit due to the application of 80 kg N/ha. In the presence of 80 kg N/ha 0.5 per cent $CaCl_2$ sprays also enhanced the K content in fruit. CO.3 recorded higher K content in fruit at 50 kg K_2O/ha than CO.1 while the varieties registered higher K content in the absence of 0.5 per cent $CaCl_2$ sprays.

Ca content

At lower levels of added N, the Ca content in fruit was higher than at higher levels of added N. Application of 100 kg K_2O/ha registered more Ca content compared to other levels. This is in line with the work of Tiedjens and Wall (1938). CO.3 registered higher Ca content in fruit than CO.1 indicating varictal variation. Application of 0.5 per cent $CaCl_2$ sprays significantly increased the Ca content in fruit and it was more prominent in the first year.

At low levels of N, added K was found to reduce the Ca content in fruits while at higher or intermediate levels of N, added K had increased the Ca content in fruit-combined application of 80 kg N/ha and 100 kg K_2O/ha recorded the highest Ca content in fruit. At the highest level of N, the varieties did not differ in Ca content of fruit but at the lower level of N (40 kg/ha) CO.1 and at intermediate level of N (80 kg/ha) CO.3 recorded more Ca content in fruit. At lower level of N (40 kg/ha) 0.5 per cent $CaCl_2$ sprays significantly increased the Ca content in fruit. The highest level of added N depressed the Ca content in fruit. This might be due to higher incorporation of N in fruit which could have contributed the antagonistic effect between NH_4^+ and Ca^{++}

Mg content

Application of 120 kg N/hs registered lower Mg content as compared to 40 and 80 kg N/ha. High level of N application behaved differently. The reason might be due to increased dry matter production which could have resulted in physiological dilution.

Combined application of N and K significantly altered the Mg content in fruit. At higher level of N, added K had no marked effect on the Mg content in fruit in the first year but in the second year, application of 50 kg K_2O/ha registered higher Mg content in fruit. The cultivar CO.1 registered higher Mg content in fruit than CO.3 under all levels of N except 120 kg N/ha. At 40 kg N/ha application of 0.5 per cent $CaCl_2$ sprays significantly increased the Mg content in fruit . At 50 kg K_2O/ha, CO.3 registered higher Mg content than CO.1.

In the absence of 0.5 per cent $CaCl_2$ sprays, application of 100 kg K_2O/ha exerted noticeable increase in Mg content. Application of 0.5 per cent $CaCl_2$ sprays also tended to enhance the Mg content both in the absence as well as in the lowest level of added K.

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Madras Agric. J., 81(6): 302-305 June, 1994

GENETIC ANALYSIS OF FOODER YIELD AND QUALITY CHARACTERS IN SORGHUM (*Sorghum bicolor* (L) Moench)

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ABSTRACT

Three lines were crossed with fourteen testers and resultant fortytwo hybrid combinations and their parents were evaluated for combining ability for fodder yield and their component characters. Observations were recorded on fodder yield and quality characters. Non-additive gene action was predominent for all the characters except for palnt height. Among the lines, 2077 A expressed its superior *per se* performance for plant height, number of leaves, total soluable solids crude protein yield and dry matter production M 35-1 and K7 showed its superiority in *gca* effects, *sca* effects, the crosses 2077 A x FS 35-1, 2077 A x FS 1, 2219 A x FS1 and 2219 A x 35-1 were best. On the basis of gene action and combining ability appropriate improvement programme for the traits associated with fodder yield has been suggested.

Sorghum is cultivated mainly to obtain grains for human consumption and fodder as a cattle feed. In other countries like USA. Brazil, sweet fodder sorghums are used for syrup and alcohol and in African countries they are also used for forage and silage. Studies by Ross *et al.*, (1983) demonstrated that improvement of fodder traits by breeding for a genotype that combines the good fodder traits will be of much value. The nature of breeding system, breeding value of the population handled, genetic basis of the trait and the methods of selection will greatly aid the breeder in his task. The analysis was carried out to assess the breeding value of the selected parents,, combining ability and gene action for each of the characters.

MATERIALS AND METHODS:

The sorghum materials chosen for the present study consisted of three lines and fourteen testers. All the hybrids and parents were raised in a randomised block design replicated three times. The experiment was carried out at the Agricultural Research Station, Kovilpatti during rabi season of 1985. Observarions were recorded on six characters and data were analysed separately for the combining ability thorugh line x tester method of analysis developed by Kempthorne (1957). The analysis of variance and mean square expectation were worked out *(Rao et al.* 1968).

RESULTS AND DISCUSSION

Analysis of variance showed significant differences among hybrids, lines, testers and line x tester were significant for all the characters studied (Table 1). The estimation of vaiance due to general and specific combining ability revealed that specific combining ability effects were higher for

Table 1. Analysis of variance.

Source	DF	Plant height	Number of leaves	Leaf shoot ratio	Total soluble solids (TSS)	Crude protein	Dry matter production
Replication	2	143.5	0.11	4.61	0.88	4.493	2.14
Hybrids	41	5189.9**	6.88**	290.06**	64.88**	57.590**	5369.72**
Line	2	5890.0**	56.10**	187.10**	175.15**	260.290**	29886.82**
Tester	13	14018.2**	6.15**	583.5**	31.23**	88.940**	5453.76**
Line x Tester	26	721.9**	3.46**	151.3**	48.23**	26.470**	3441.78**
Error	116	49.1	0.02	22.3	0.27	1.850	119.20
σ^2 GCA		362.04	1.08	9.17	2.15	5.79	557.98
σ SCA		224.3	1.37	43.00	15.98	8.31	1108.10
σ GCA : SCA		1.11 : 1	0.79 : 1	0.21 : 1	0.13 : 1	0.69 : 1	0.51 : 1

* Significant at five per cent level **Significant at one per cent level