In the juice samples, Fe content varied significantly with the treatments. Iron content increased through soil application and foliar spray of 2% $FeSO_4$.

The data on cane yield of second crop revealed that maximum yield was obtained with 200 kg $FeSo_4$/ha soil application followed by 100 kg $FeSO_4$/ha. These results are in confirmity with the findings indicated in the Annual Report (Anonymous, 1984) of Adhoc scheme on causes and correction of chlorosis in sugarcane. Though $ZnSO_4$ when applied separately had no influence over control, application of $ZnSo_4$/ha at 50 kg/ha along with 100 kg $FeSO_4$/ha increased the yield significantly over control. Similar results were reported by Pannu *et al.* (1986).

The results on juice quality parameters indicated that sucrose content in cane was increased by foliar spray of 0.5% $ZnSO_4$ four times (30, 50, 70 and 90 days after planting) Soil application of $FeSO_4$ and foliar spray of $ZnSO_4$ increased the Fe content of juice significantly over control. Zinc content was markedly increased by soil application and foliar spray of $ZnSO_4$ and combined application of $ZnSO_4$ and $FeSO_4$.

In the leaf sheath samples (3rd to 6th leaf from top) the Fe the Zn contents were appreciably increased by the addition of the respective nutrients to soil and also on the foliage.

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COMPONENT ANALYSIS FOR FODDER YIELD IN COWPEA

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ABSTRACT

Sixteen strains of cowpea were evaluated for six fodder characters, wide range of variability was observed for plant height, green fodder yield and number of leaves. Heritability and genetic advance as percentageof mean were also high for these traits. Positive and significant genotypic correlation was noted between green fodder yield with plant height, number of leaves, leaf let length and stem girth. Pathco-efficient analysis revealed that number of leaves, leaflet length and stem girth showed high positivie direct effect on greenfodder yield. It is suggested that selection of plants with thick stem and more number of leaves will improve green fodder yield in cowpea.

Cowpea is grown for both grain and fodder, exhibiting wide range of variability. It can be raised throughout the year for fodder in Tamil Nadu and can be grown with maize as mixture crop. Information on the nature and magnitude of variability, genetic associations among fodder yield attributes, direct and indirect effects of different fodder characters are required to initiate an effective breeding programme. The present, study, therefore was undertaken to obtain information on the above aspects so that it may be utilized in breeding programmes.

Table 1. Mean, range, co-efficient of variability, heritability and genetic advance for six characters in cowpea.

Character	Range	Mean	Co-efficient		Heritability	Genetic advance % of mean
			Genotypic	Phenotypic		
Plant height	22.8-100.8	62.92	55.17	55.59	98.47	112.77
No. of leaves	12.4-22.8	16.92	18.51	19.80	86.90	35.56
Leaf-let length	11.1-13.3	12.16	4.87	5.87	66.66	8.06
Leaf-let breadth	5.6-9.1	7.83	6.33	7.35	74.19	11.24
Stem girth	5.6-8.1	7.24	8.30	9.83	70.58	14.33
Green fodder yield	40.3-105.6	75.88	28.28	29.35	92.81	56.13

MATERIALS AND METHODS

Sixteen varieties of fodder cowpea collected from different sources all over the country were grown in a randomised replicated block design with three replications. Each plot was 4 metres long and 3 meters wide. The seeds were sown in lines 30 cm apart with 15 cm between plants. Five competitive plants were selected at random at harvest for recording observations on plant height, number of leaves/plant, length and breadth of central leaflet, stem gith and green fodder yield/plant. Genetic parameters for the characters were calculated using components of variance for the expected mean squares. Genotypic and phenotypic co-efficients of variability were calculated according to Burton(1985). Heritability in the broad sense and expected genetic advance as percentage of mean was estimated from the formula given by Burton and de Vane (1953) and Johnson *et al.* (1955) respectively. Phenotypic and genotypic correlation co-efficients were estimated using the formula suggested by Miller *et al.* (1958). The path co-efficient analysis was done using genotypic correlation matrix according to Deway and Lu (1959).

RESULTS AND DISCUSSION

The genetic variability was maximum in plant height followed by green fodder yield and number of leaves (Table 1). This indicated the availability of wide range of genetic variability. Therefore selection would be most effective in isolation superior genotyper.

The heritability estimates, in the broad sense, were high for all the characters. Genetic advance was high for plant height, green fodder yield and number of leaves. To formulate an efficient breeding programme, heritability along with genetic advance

Table 2. Genotypic (G) and phenotypic (p) correlations among six characters in cowpea.

Character		Plant height	Leaflet length	Leaflet breadth	Stem girth	Green fodder yield
No. of leaves	G	0.741**	-0.001	0.407	0.552*	0.945**
	P	0.710**	-0.011	0.329	0.459	0.917
Plant height	G		0.006	0.232	0.448	0.738**
	P		0.024	0.231	0.409	0.714**
Leaf-let length	G			0.92**	0.156	0.083
	P			0.777**	0.201	0.130
Leaf-let breadth	G				0.570*	0.554*
	P				0.507	0.480
Stem girth	G					0.777**
	P					0.670

*P = 0.05, **P = 0.01

Table 3. Direct (underlined) and indirect effects of different characters on green fodder yield in cowpea

Character	No. of leaves	Plant height	Leaflet length	Leaflet breadth	Stem girth	Genotypic correlation with Green fodder yield
No. of leaves	0.799	0.005	-0.003	-0.095	0.239	0.945**
Plant height	0.592	0.006	0.001	-0.054	0.193	0.738**
Leaf-let length	-0.001	0.001	0.233	-0.216	0.066	0.083
Leaf-let breadth	0.325	0.001	0.216	-0.233	0.245	0.554*
Stem girth	0.442	0.003	0.036	-0.133	0.429	0.777*

Residual effect = 0.133

should be considered (Johnson *et al.* 1955). In the present study, green fodder yield, plant height and number of leaves recorded high mean, high heritability and high value for genetic advance. This indicated that these traits are predominantly governed by additive gene effects (Panse, 1957) and selection would be more effective for genetic improvment of green fodder yield.

In general, genotypic correlation co-efficients were found to be higher than their phenotypic correlations (Table 2). Plant height showed positive and significant association with number of leaves and stem girth. Leaflet length had positive and significant correlation with leaflet breadth which in turn had correlation with stem girth. Among the character studied, number of leaves, plant height, leaflet breadth and stem girth showed positive and significant association with green fodder yield. Dangi and Paroda (1974) observed positive association between number of leaves and stem girth with green fodder yield and Tyagi *et al.* (1978) between number of leaves and green fodder in cowpea.

Path co-efficient analysis indicated that positive association of number of leaves with green fooder yield was because of its high positive direct effect as well as indirect effect viz. plant height and stem girth although the indirect effects viz. leaflet length and breadth were negative but small (Table 3). Direct effect of plant height was low and positive and indirect effect through number of leaves, leaflet length and stem thickness was positive. Leaflet length which had non-significant positive association with green fodder yield showed positive direct effect and indirect effects *viz* number or leaves and stem girth. The indirect effects through plant height and leaflet breadth were negative and large enough and have not only nullified the direct effect but have made the association non-significant. Leaflet breadth showed negative direct effect eventhough indirect effects *viz* othwe characters were positive. The correclation between stem girth and green fodder yield was positive and significant. The direct effect of stem girth was positive and indirect effects *viz* other characters except leaflet length were positive indicating its worthiness for considering as a component character for selection. Dangi and Paroda (1974) reported number of leaves as important component character of green fodder in cowpea. In the present study, number of leaves and stem girth showed maximum contributions towards green fodder yield and should therefore be given importance in the selection of genotypes for more green yield in cowpea.

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PROTECTION OF SEEDS OF PEARL MILLET FROM INFESTATION BY THE WEEVIL SITOPHILUS ORYZAE LINN.

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ABSTRACT

The persistant effect of the insecticides and fungicides on S. oryzae was studied for a period of five months by introduction of adults of S. oryzae at the commencement of the experiment and subsequently at monthly intervals. Among the three insecticidal seed treatments, malathion and HCH were significantly superior to activated kaolin in effecting the mortality of the weevil pest over a storage period of five months. Among the three fungicidal seed treatments, thiram and carbendazim + thiram were significantly better than carbendazim in causing mortality of S. oryzae. The standard treatment DDT+thiram was found to be superior to the other treatments in causing greater mortality of S. oryzae by its persistant effect.

INTRODUCTION

The weevil *Sitophilus oryzae* Linn causes severe losses to the pearl millet seeds in storage. Mixing seeds with insecticides or their meterials as methods of protection from damage by insects during storage has been adopted by several workers. Ramakrishnan and Narayanaswamy (1963) reported that sorghum seeds mixed with DDT 10 per cent at 1:300 were protected for a period of one year from redgrain beetle. Pai *et al* (1985) observed that malathion 0.5 to 1.0 per cent used to impregnate jute bags yielded cant per cent kill of *S. oryzae* up to 120 days. Salunk he (1985) reported that sorghum seeds treated with DDT at 50, malathion at 50 and fungicide captan at 200 ppm resulted in good protection against *S. oryzae*. The present study reports the efficacy of insecticides and fungicides as seed protectants by causing mortality of *S. oryzae* during storage.

MATERIALS AND METHODS

Sundried pearl millet seeds of cultivar Co7 were treated with HCH 10% dust malathion 4% dust and activated Kaolin (insecticides) at 10g per kg of seed and carbendazim at 2g per kg, thiram at 6g per kg and and carbendazim at 2g + thiram at 6g per kg (fungicides) alone and in combinations with both insecticides and fungicides. In the combination treatments with insecticides and fungicides were treated first and 24 hours later with insecticides and the seeds were stored in cloth bags. A standard slurry treatment of DDT 5% WP at 200 mg with 2g of thiram per kg of seed as recommended in the crop production guide 1985 of TNAU was also included (Anon. 1985). In the slurry method seeds were treated with chemicals in a flask in which 0.125g of gum and 5ml of water per kg of seed were added and shade dried for one day. One lot of seed was left

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