citrus to *Aeglopsis* by means of the aphid vector (*T. citricida*) with symptoms of vein clearings. While McClean[2] transmitted tristeza to *Aeglopsis chevalieri* and *Afraegle paniculata* through aphid vector but failed to transmit the virus across the graft union.

A. marmelos and *F. limonia* cannot be included in the list of root-stocks resistant to tristeza virus as indicated by Bitters *et al.*[1]. Further, there is a possibility that these plants may serve as alternate hosts for tristeza virus under field condition.

Department of Plant Pathology,
University of Agricultural Sciences,
Bangalore 560 024,
January 12, 1979.

K. BALARAMAN.*
(Late) K. RAMAKRISHNAN.

* Present address: Department of Plant Pathology, Indian Institute of Horticultural Research, 255, Upper Palace Orchards, Bangalore 560 006.

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EFFECT OF BLUE-GREEN ALGAE AND *AZOLLA* APPLICATION ON THE AGGREGATION STATUS OF THE SOIL

THE influence of microbial inoculants on the physical properties of soils is little understood. If the degree of aggregation and its stability in water could be quantified, the effect of an inoculant on soil physical behaviour can be assessed. This is particularly relevant because soil aggregates and their arrangement influence the infiltration rate, aeration, soil temperature and thereby improve the physical environment of the crop. Blue-green algae[1–3] and *Azolla*[4–5] have been shown to make a significant contribution to the nitrogen economy of rice plants, but their effect on soil aggregation properties is little known. The water stable aggregates have been shown to be significantly increased due to algal growth in the soil (Table I)[6]. The present communication deals with the comparative effect of blue-green algae and *Azolla* application on the aggregation status of the rice soil.

TABLE I

Effect of blue-green algal inoculation on water stable aggregates

Soil type	% water stable aggregates (> 50 μ)		
	Control	Algal inoculation	% increase
Sandy loam	2·2	4·1	35
Loam	2·6	6·0	130
Silty clay loam	3·5	9·1	160

Pot trials were conducted during *kharif* 1978 with 15 kg sandy loam soil supplied with a uniform basal dressing of P_2O_5 and K_2O at the rate of 50 kg/ha to each pot. Different levels of nitrogen were applied in the form of urea as per the treatment schedule shown in Table II. Soil based dry algae containing a mixture of *Tolypothrix*, *Aulosira*, *Nostoc*, *Anabaena* and *Plectonema* at the rate of 15 kg/ha and dry *Azolla pinnata* at the rate of 1 tonne/ha were applied to the respective treatments. Five 24 day old Pusa 221

TABLE I

Comparative effect of blue-green algae and Azolla *application on the particle size distribution (> 50 μ) of the soil*

Treatments	Particle size distribution		% aggregates		% increase in > 50 μ aggregates
	> 250 μ	50–250 μ	> 250 μ	50–250 μ	
Sand (> 50 μ)	0·5	44·5	..	..	..
Control	1·2	46·8	0·7	2·3	..
Algae	1·5	48·0	1·0	3·5	50
Azolla	1·0	47·0	0·5	2·5	..
60 kg N/ha	0·7	46·6	0·2	2·1	..
60 kg N/ha+Algae	1·6	49·0	1·1	4·5	70
60 kg N/ha+*Azolla*	0·8	47·2	0·3	2·7	..

rice seedlings were transplanted into each pot and the crop was harvested after 12 weeks. Ten grams of soil samples from each treatment were taken in a 100 ml stoppered bottle and shaken with 25 ml distilled water for 16 h in a mechanical (end-to-end) shaker. The size distribution of aggregates in the soil sample after this treatment was found to be identical[7] to that of the ultrasonic vibration method[8]. After shaking, the suspension was passed through a 250 μ and 50 μ sieve. The aggregates were evaluated after drying them at 105° C.

Table II demonstrates that the water stable aggregates (> 50 μ) have increased by 50–70% due to blue-green algal inoculation, while no improvement in the aggregation status was observed with *Azolla* application. Major cause for aggregate stabilization in soils has been attributed to the cementation action of the polysaccharides released from the root and plant residues[10]. Simple and complex polysaccharides are known to be liberated by blue-green algae[9]. Filamentous blue-green algae as they grow in the soil will exert pressure on the soil particles and thus stabilize the resulting aggregates with the help of the polysaccharides liberated. On the contrary, *Azolla*, applied as a dead organic matter, provides only nitrogen to the crop on mineralization and does not help in improving the status of soil aggregation.

Division of Microbiology,
I.A.R.I.,
New Delhi 110 012,
March 5, 1979.

PAROMITA ROYCHOUDHURY.
B. D. KAUSHIK.
G. S. R. KRISHNAMURTHY.
G. S. VENKATARAMAN.

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GENETICS OF HETEROPHYLLY IN *CANAVALIA*

HETEROPHYLLY, the occurrence of more than one type of leaf on the same plant has widespread distribution in angiosperms. A variety of physiological factors has been shown to influence the expression of heterophylly in a number of cases (Allsopp[1]). Two heterophyllus plants were observed in an otherwise normal trifoliately compound leaved F_2 population of *Canavalia ensiformis* D.C. × *C. virosa* W. & A. Heterophyllus segregants also appeared in some of the F_3 families. This paper reports the results of the genetic analysis of heterophylly.

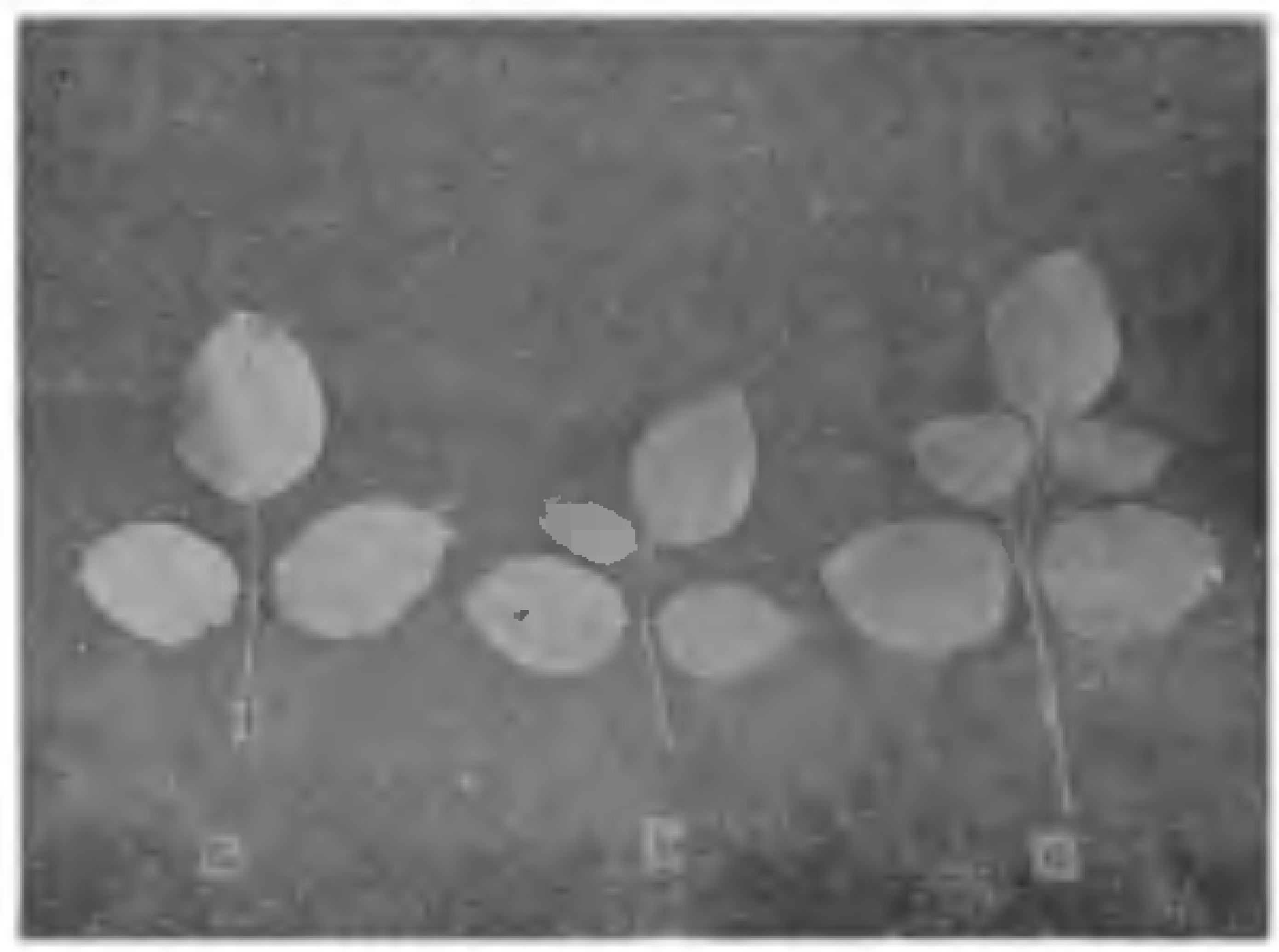

FIG. 1. Leaves of heterophyllus plant, (*a*) normal trifoliate, (*b*) quadrifoliate, (*c*) pentafoliate.

Heterophyllus plants observed in this study had normal trifoliate, quadrifoliate and pentafoliate leaves (Fig. 1) on the same branch with more frequency of trifoliate leaves. There was no definite sequence of production of the three types of leaves and this behaviour was similar in all the branches of the plants. *Canavalia ensiformis*, *C. virosa* and their F_1 had normal trifoliate leaves. Selfed seeds of F_1 were used to grow F_2 population and selfed seeds of randomly selected 51 normal trifoliate leaved F_2 plants were sown to raise F_3 families. The F_2 population was examined for heterophylly at full maturity of crop and inheritance was worked out. Validity of F_2 results were confirmed by studying F_3 generation. Goodness-of-fit of the observed to the expected number of F_2 and F_3 normal and heterophyllus plants was tested by the chi-square method.

Normal trifoliate leaved species *C. ensiformis* and *C. virosa* when crossed produced F_1 with all normal trifoliate leaves. The F_2 population, segregated into 190 normal leaved and 2 heterophyllus plants. This segregation was in agreement with 63 : 1 ratio as calculated X^2 of 0·338 gave P value between 0·50 and 0·70 (Table I). Different types of behaviours observed in 51 F_3 families raised from selfed seeds of randomly selected F_2 plants were consistent with that of the expected trihybrid ratio of 37 : 6 : 12 : 8 : 1