(Alm) were recorded as other erosion indices[9,10] The data were subjected to statistical analysis.

Simple correlations were worked out between run-off soil loss and various rainfall erosion indices described earlier such as EI_5, EI_{15}, EI_{30}, EI_{60}, total kinetic energy of rainfall, $KE > 1$, Alm and total rainfall. The coefficient of determination (r^2) obtained from the analysis is presented in tables 3 and 4. It may be noted that, in the case of run-off (table 3), the maximum correlation was exhibited by Alm index (mean $r^2 = 0.8074$). This shows that Alm index can predict the run-off better than other indices. In the case of soil loss (table 4), maximum correlation was exhibited by EI_{30} index (mean $r^2 = 0.8592$). This shows that EI_{30} can predict the soil loss better than other indices. Corroborative results were reported by other workers[11,12]. In Dehra Dun EI_{30} explained 54% of variation in soil loss whereas in Ootacamund EI_5 was found to be superior to EI_{30} index. In our study, Alm index best explained run-off while EI_{30} was the best index for soil loss. Such variations were also observed by earlier workers[3].

Regression equations were worked out with the best fitted indices for predicting run-off and soil loss from the various treatments and are presented below.

Run-off

Treat. 1 : $y = 0.343\,x + 0.828$
Treat. 2 : $y = 0.181\,x + 0.511$
Treat. 3 : $y = 0.099\,x + 0.121$
Treat. 4 : $y = 0.048\,x + 0.306$
Treat. 5 : $y = 0.618\,x + 2.128$

where y represent run-off in mm and x represent Alm units.

Soil loss

Treat. 1 : $y = 0.0628\,x + 0.238$
Treat. 2 : $y = 0.0191\,x - 0.122$
Treat. 3 : $y = 0.0078\,x + 0.025$
Treat. 4 : $y = 0.0055\,x + 0.033$
Treat. 5 : $y = 0.1957\,x - 0.872$

where y represent soil loss in t/ha and x represent the number of EI_{30} index in metric units.

In conclusion, these equations can be used to predict soil and water losses from the slopy fields of identical farming situations. However, corrections are necessary for factors such as length of slope, soil erodibility and slope gradient, for its wider application. The equations also suggest the efficiency of groundnut intercrop in controlling soil and water losses from cassava plots. Use of the equation for calculating run-off and soil loss for the entire cropping season will be more accurate than its use for individual rain storms.

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SEM STUDIES ON SPORES OF *RICCIA FROSTII* AUST.

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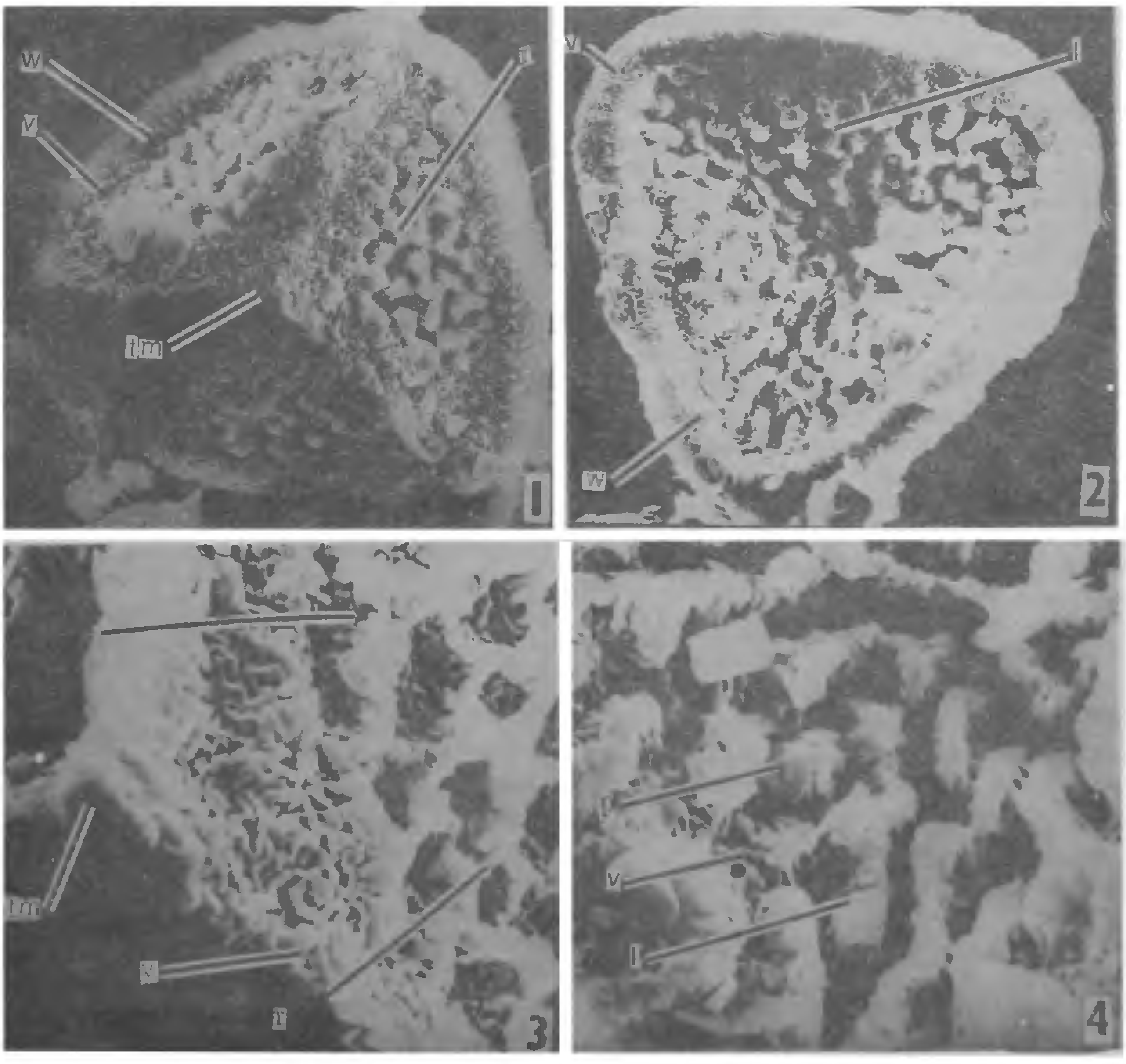
LIGHT microscopic (LM) details of the spores of *R. frostii* have been studied[1,2]. SEM details are presented in figures 1–4.

Spores 42–46 μm in diameter, yellow to dark brown, anispolar, triangular. Proximal surface with a prominent raised tri-radiate mark (figure 1:tm) with more or less three equal faces; lamellate-lamellae distinct at the middle portion on a small area, less raised, comparatively smaller than distal surface, few curved, joining with neighbouring ones to form reticulations (figures 1, 3:r); vermiculate-vermiculae all over the surface (figures 1, 3:v); winged-wing 2.5 μm broad with only fine vermiculae, lamellae absent; tri-radiate mark vermiculate, lamellae absent. Distal surface convex; lamellae numerous, straight to irregularly curved, scattered densely all over the surface except at wing (figure 2:l); papillae few, found among lamellae (figure 4:p); vermiculae all over the surface of spores; wing (figure 2:w) with only fine vermiculae (figure 2:v).

The spores of *R. frostii* show double sculpturing. Basically the spore is lamellate and lamellae are present all over the surface except on wings and tri-radiate mark. These could also be observed under light microscope. Besides, some papillae-like projections have also been observed. In addition, SEM studies showed vermiculate sculpturing present all over the surface including wings, tri-radiate mark, lamellae, papillae and reticulations.



Figures 1-4. 1. Spore in proximal surface (× 2000); **2.** Spore in distal surface (× 2000); **3.** Tri-radiate mark on proximal surface (× 6000); **4.** A part of distal surface (× 6000) (l—lamellae; p—papillae; r—reticulation; tm—tri-radiate mark; w—wing).

Most of the species of *Riccia* have larger spores with reticulate exine[2] except *R. frostii*, a species with smooth-walled rhizoids[1], in which the spores are smaller having vermiculae, lamellae, a few papillae and reticulations. Similar but spinate spores have been reported in foliose Jungermanniales which are thought to be the probable ancestors of Marchantiales[3]. Though according to Schuster[4] the complex spore wall ornamentaion found in large spored Marchantiae should not be expected in foliose Jungermanniales, present observations suggest *R. frostii* to be more close to Jungermanniales in its wholly smooth walled rhizoids and smaller size of spores with similar ornamentation pattern.

Specimen examined: The vouched specimens have been deposited in the herbarium of Environment Research Centre, Feroze Gandhi College, Rae Bareli. ERC 33/85. Loc.: On the bank of River Ganga at Dalmau, Date: October 7, 1985; Coll. and Det.: D. C. Pandey, A. Kumar and A. K. Sinha.

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AMOMUM SUBULATUM, A NEW HOST FOR *PHAKOPSORA ELLETARIAE* (RACIB.) CUMMINS FROM SIKKIM

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LARGE cardamom (*Amomum subulatum*) is an important spice and medicinal crop, cultivated commercially in Sikkim. During a survey of plant diseases in Sikkim a rust disease was found to be common on large cardamom plantations of the State in areas 1800 m above M. S. L. The disease was mostly observed during May and June on the lower leaves of the plants in the form of numerous, minute, brown uredosori on the lower surface of the leaves. In the early stages of development, the uredosori were surrounded by chlorotic haloes. In severe cases, the whole leaf blade was covered by uredosori causing premature drying of the leaves.

On the basis of the sympotoms and morphological characters the causative fungus was indentified as *Phakopsora elletariae* (Racib.) Cummins. A perusal of the literature[1] indicates that the fungus has not been earlier reported and therefore this is a new specific record from India. The diseased specimens have been deposited in CMI, Kew, England under reference No. I.M.I. 280009.

The authors are grateful to the Director, CMI Kew, England for help in indentifying the fungus.

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A NEW VARIETY OF *HOPEA PONGA* (DENNST.) MABBERLY (DIPTEROCARPACEAE) FROM COORG DISTRICT, KARNATAKA

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SOME populations of *Hopea ponga* (Dennst.) Mabberly were observed and collected from Coorg District, Karnataka which on critical studies revealed certain characters which are different from the typical variety. These specimens were also compared at the herbaria of Botanical Survey of India at MH, CAL and BSI but did not match. Hence, this interesting taxon is now described with illustrations as a new variety.

Hopea ponga (Dennst.) Mabberly var. *cauveriana* Keshav. et Yog. var. nov.

Affinis *Hopea ponga* (Dennst.) Mabberly var.