TABLE I

Growth parameters in one year old acid lime seedlings, six months after inoculation (mean of 3 replicates)

Treatment	Type of inoculation of VAM	No. of leaves per seedling	Shoot height cm	Stem thickness cm	Root length cm	Shoot weight g	Root weight g
G. mosseae	T	49·5	50·3	2·13	43·8	12·5	5·1
G. etunicatus	T	47·3	49·2	1·93	47·1	11·8	4·5
G. mosseae	B	41·0	43·7	2·07	51·3	10·1	4·1
G. etunicatus	B	39·7	47·9	1·83	46·7	9·7	3·5
G. mosseae + P	T	41·0	47·3	1·93	45·5	10·3	4·5
G. etunicatus + P	T	39·0	44·5	1·90	44·8	9·7	3·3
G. mosseae + P	B	40·7	51·7	1·80	47·6	12·3	4·6
G. etunicatus + P	B	41·7	44·1	1·80	46·5	9·8	3·9
P. alone	..	39·7	42·2	1·60	42·6	9·3	3·6
Control (no treatment)		33·0	39·2	1·56	34·4	7·6	2·2
SED		0·4179	0·1432	0·0468	0·3211	0·2192	0·1268
CD		0·8780	0·3010	0·0983	0·6747	0·4607	0·2664

T—Top inoculation; B—Bottom inoculation; P—Phosphorus.

acid lime seedlings which may become suitable for grafting earlier than normal seedlings.

March 3, 1981.

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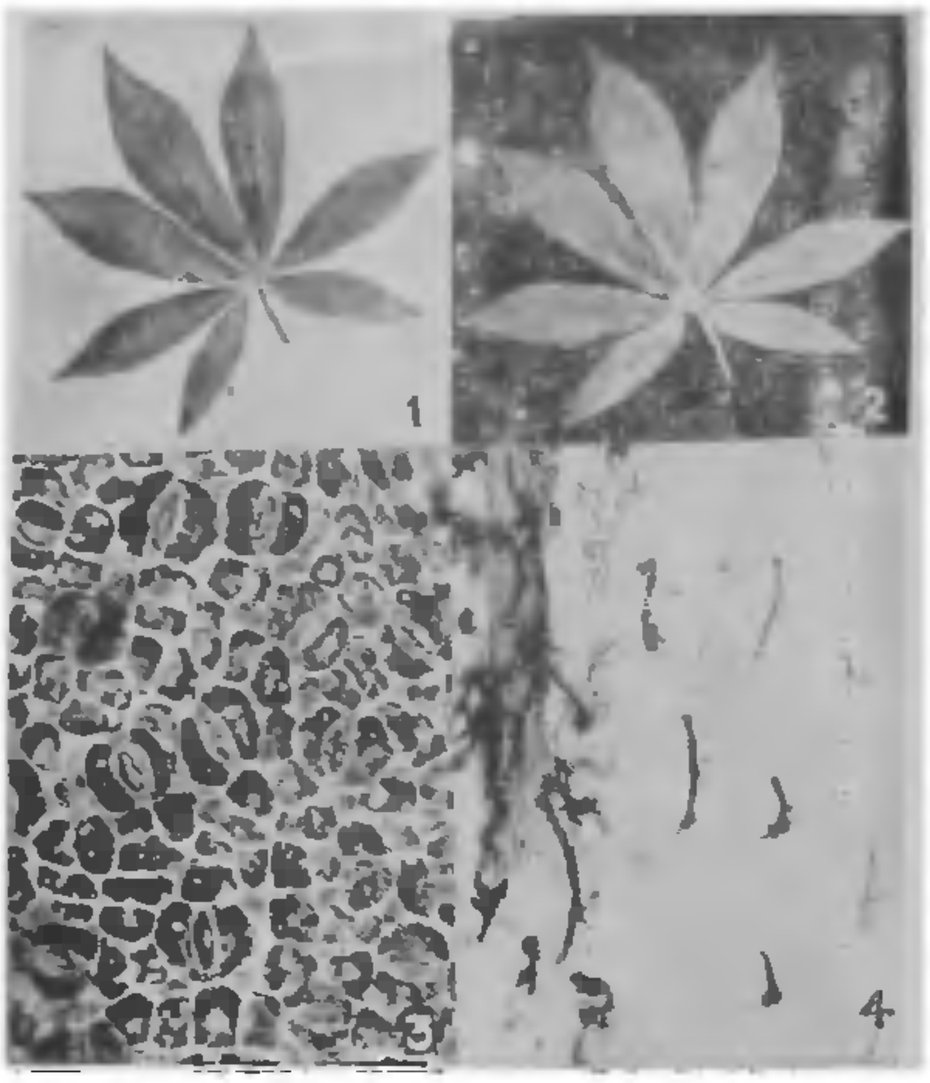
A SIMPLE AND RAPID METHOD OF SCREENING STOMATAL DISTRIBUTION AND TRICHOMES IN CASSAVA

K. VIJAYA BAI AND J. S. JOS
Central Tuber Crops Research Institute
Trivandrum 695 017, India

CASSAVA (*Manihot esculenta* Crantz) is generally raised as a rainfed crop and is presently finding increasing importance in drought prone regions. When germplasm is maintained under rainfed conditions, screening the genetic stocks for drought resistance becomes rather difficult unless they are subjected to different intensities of water stress. However, ecological anatomy of leaves is generally considered to be an indicator towards the drought resistant potential of the plants.

A number of factors are known to be associated with drought hardiness in plants[1,2]. The number of stomata per unit area in the leaf, the number of stomata which actually remain open under the field conditions, the capacity of stomata to respond quickly to water stress and the distribution of hairs are some of the important factors which determine the drought resistance of the varieties. As a preliminary measure, the germplasm was screened for stomatal distribution and hairiness. However, the difficulties experienced in obtaining satisfactory epidermal peelings impeded quick screening of germplasm thus necessitating the development of a simple technique for rapid screening for stomatal distribution and trichomes in this crop.

The desired leaflet is smeared with Fevicol—a synthetic adhesive resin having SH bond. The adhesive should be applied only as a thin film on the surface of the leaf. The smeared leaflet is allowed to dry for about an hour. Later, the film of the adhesive can easily be peeled off (Figs. 1, 2) and directly studied under the microscope. The stomatal distribution, its size and shape can be elegantly studied from the impressions on the adhesive peelings and the observations are comparable in all respects with the norma



FIGS. 1–4. Fig. 1. Normal leaf. Fig. 2. Fevicol impression of the leaf. Fig. 3. Stomatal distribution from Fevicol impression, × 300. Fig. 4. Hairiness recorded from the impression, × 75.

epidermal peelings. The casting of leaf impressions in silicon rubber, followed by replicas cast with cellulose acetate film[3], is more time consuming and also reported to be unsuitable for plants with small stomata[4].

By adopting the adhesive peeling technique, 64 genetic stocks have been studied. A wide variation of stomatal distribution ranging from 30·3 to 73·7 per unit area (278·2 to 676·8 per mm²) in different clones has been established (Fig. 3). The adhesive peelings further revealed the presence of hairs in varying degrees on the leaf surface (Fig. 4). The occurrence of varieties with dense hairs may also indicate drought resistance and possible pest resistant characteristics.

While it may be possible to determine the stomatal distribution in two or three clones per day through conventional epidermal peelings, as much as 20 clones can easily be screened by adopting the present technique. The possibility of achieving the impressions of stomata simultaneously and that too without affecting the leaf environment and without detaching the leaf from the plant further help in the physiological studies on the behaviour of stomata under different field conditions. The adhesive peelings can be indefinitely stored in an album for future reference.

The authors are grateful to Shri P. K. Thomas, Director, for encouragement. The help rendered by Shri C. S. Antonisamy is gratefully acknowledged.

April 24, 1981.

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LITTLE KNOWN FEATURES IN THE EPIDERMOLOGY OF *CISSUS QUADRANGULARIS* L.

K. JANARDHANAN, V. GOPAL AND K. K. LAKSHMANAN

Botany Department, Madras University Post-Graduate Centre, Coimbatore 641 041, India

WHILE investigating the structure and histochemistry of epidermis of 23 succulent species belonging to diverse plant groups, several interesting features of epidermis, especially in the organisation of stomata have been observed in *Cissus quadrangularis* L. (Vitaceae). A survey of the literature[1–8] shows that the abnormal stomata, reported here, have not been reported in any member of Vitaceae.

Stained permanent epidermal peels of stem and leaf were obtained following the method of Mohan Ram and Vijay Laxmi-Nayyar[3]. In addition, paradermal, transverse and longitudinal sections also were taken. Measurements of stomata were made with the help of a pre-calibrated ocular micrometer.

The epidermal cells are polygonal and cutinised. Thin and dense cuticular striations often radiate from convex side or very rarely from all sides of guard cells of stomata and extend to other surrounding epidermal cells (Figs. 1 and 2). Often stem epidermal cells exhibit papillate cuticular projections (Fig. 18). Earlier, the occurrence of cuticular striations on epidermal cells has been reported in many species of *Cestrum*[4], in few members of Asclepiadaceae[5] and in *Bombax ceiba*[6]. The stomata are anomocytic surrounded by 4–7 epidermal cells (Figs. 3 and 5) and the guard cells are subsunken in leaf (Figs. 6 and 7) and sunken in stem (Fig. 19). Nonetheless, frequently the following deviations from normal organisation of stomata have been recorded. (1) Stomata surrounded by 3 epidermal cells (Fig. 4); (2) Stomata with different sizes (stomatal polymorphism) measuring 33 × 27 μm, 30 × 25 μm and 26 × 22 μm (Figs. 5, 3 and 8 respectively); (3) Contiguous stomata (polar contiguous stomata, Fig. 16 and lateral contiguous stomata, Fig. 1);