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SEM STUDIES ON *COIX* INVOLUCRES

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ABSTRACT

A SEM study on the involucral surface of Indian *Coix* have been undertaken. Five different involucral surface types have been established based on the surface pattern. Certain status changes have been proposed.

INTRODUCTION

The genus *Coix* L. belongs to the tribe *Maydeae* of the family *Poaceae*. In India the genus is represented by three species : *C. aquatica* Roxb., *C. gigantea* Koenig ex Roxb. and *C. lacryma-jobi* L. These are monoecious grasses. The fertile spikelets are enclosed in stony involucres formed by the sheathing bracts. Morphologically these are metamorphosed leaf sheath. In India the plant was well known from Vedic period (450-1500 B.C.) and played an important role in the lives of inhabitants in many parts of the tropics, particularly among the tribes of north-eastern India and China in the days before the introduction of maize from America.

Even today, *C. lacryma-jobi* var. *ma-yuen* is cultivated in eastern Himalayas as substitute for conventional cereals and fodders. Twenty crop cereals so far have been commercially cultivated throughout the history of man. There is an urgent need to search for some less known food crops. *Coix* is one of them, the habitat of which ranges from terrestrial to aquatic.

Recently, while studying the materials of *Coix* collected from the field in connection with ethnobotany and also those in the herbarium (CAL), polymorphism in respect of the structure of the involucres, shape, size and colour in different taxa, was observed. Six different colour combination-groups of involucres are seggregated after R.H.S. Colour Chart (1966) as follows : Greyed-white (156), Orange-white (159), Greyed-orange (164, 165 and 166), Greyed-purple (168), Greyed-green (189) and Greyed (201).

Bor (1960) stressed on the shape, hardness and ornamentation of the involucres for taxonomic interpretation of the genus but he expressed doubt on the status of some of its species and infraspecific taxa. Therefore to assess their present status a detailed SEM study of the involucral surface pattern of all the sixteen involucres illustrated in Fig. 1 under *C. aquatica, C. gigantea, C. lacryma-jobi* and with its four varieties are undertaken.

METHOD

Clean *Coix* involucres are mounted on the stubs with double coated Scotch tape. The specimens are gold-coated in a Sputter-coater (Edward make) for 2 mins./20 milli amps. by the applied high voltage of 20 kV at the vacuum level of 10^{-3} mm of mercury. The surface pattern of the involucres are studied in different magnifications of ×800 and ×1600 with a SEM (Phillips PSEM 500 model) at an accelerated voltage of 25 kV and a secondary emission detector. During

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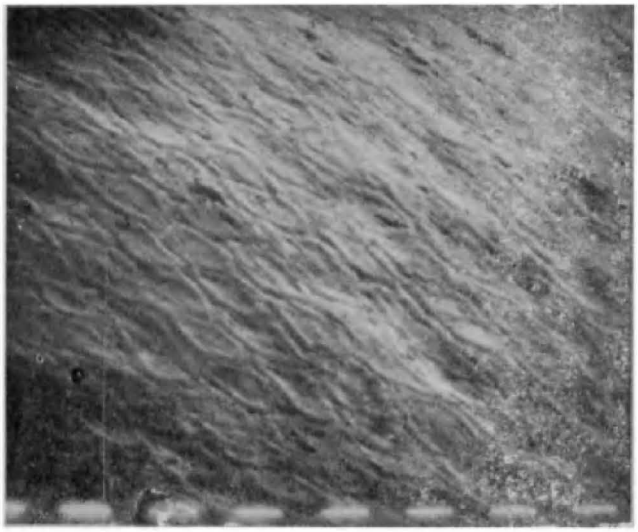
scanning the angle of tilt is kept constant at 33°.

OBSERVATIONS

Involucral Surface Types : Five involucral surface types are distinguished based on the surface texture, size, shape, ornamentations and confluency of the cells. However there are trivial variations in each group.

Type-A : Surface texture even. Rhomboidal cells lying in parallel orientation. The sharpness of the cell ornamentation is varying gradually in size, structure and confluency.



Type—A. *C. lacryma-jobi* var. *stenocarpa* (Fig. 1. -0.) ×800

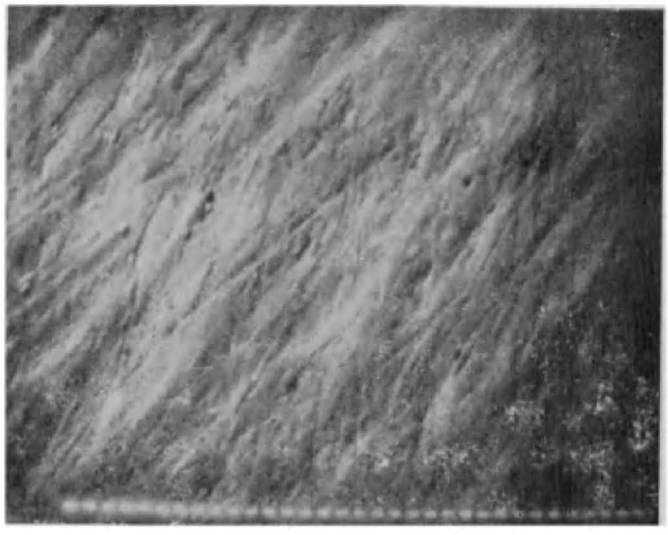
Type—B. *C. lacryma-jobi* var. *ma-yuen* (Fig. 1.-J.) ×800

Type-B : More or less complete confluency of the cells are observed.

Type-C : In between Type-A and Type-B where the confluency of cells is slightly less than Type-B.

Type-D : In between Type-C and Type-B.

Type—C. *C. gigantea* (Fig. I.-B.) ×1600



Type—D. *C. lacryma-jobi* var. *monilifer* (Fig. I.-L.) ×1600

Type-E : Surface texture uneven. Greater degree of confluency within partially distinct rhomboidal cells lying in parallel orientation as in Type-A.

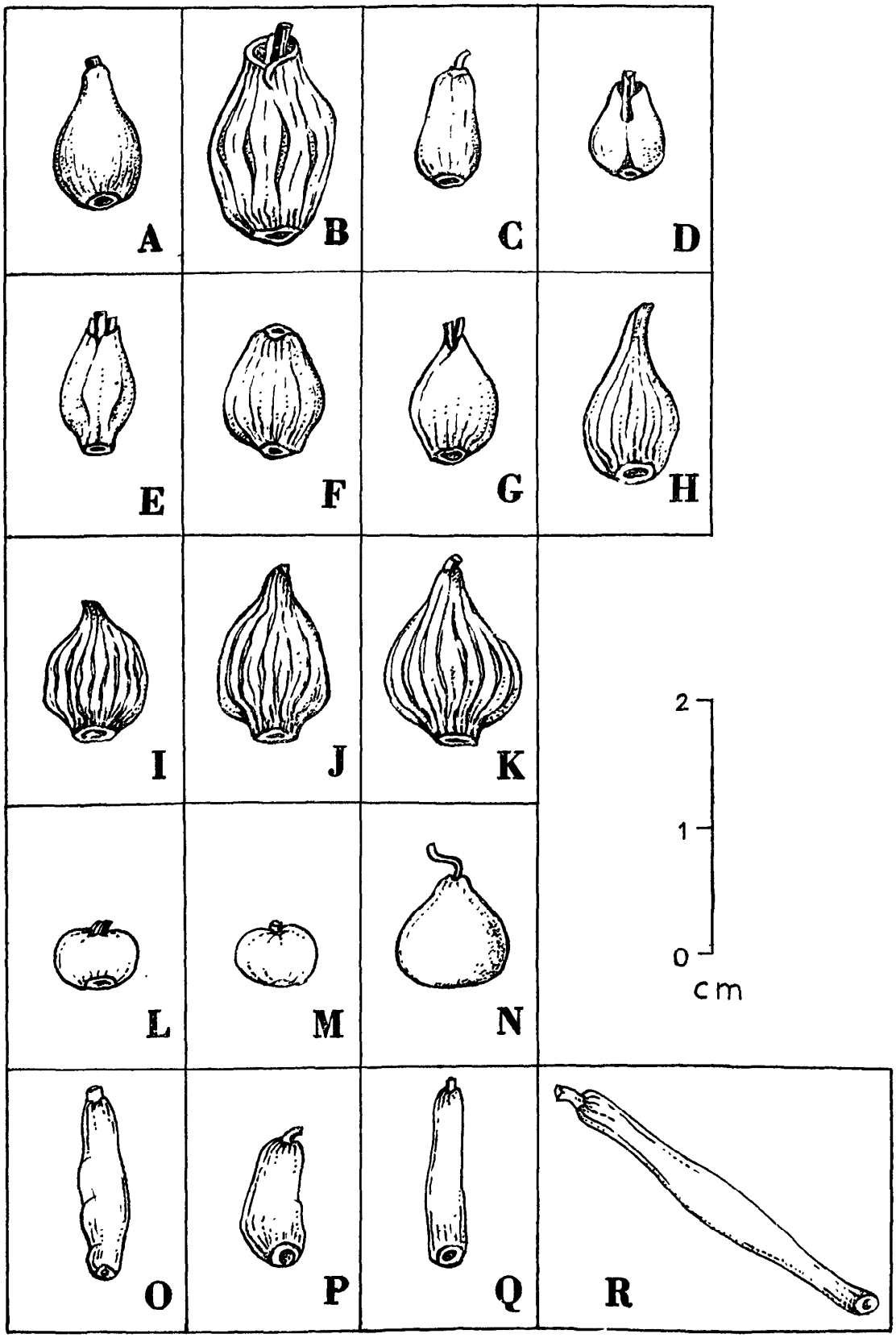


Fig. 1. A. *C. aquatica* Roxb., B. *C. gigantea* Koenig ex Roxb., C-H. *C. lacryma-jobi* L. var. *lacryma-jobi*, I-K. *C. lacryma-jobi* L. var. *ma-yuen* (Romanet) Stapf, L-N. *C. lacryma-jobi* L. var. *monolifer* Watt, O-R. *C. lacryma-jobi* L. var. *steno carpa* Stapf.

Colour of the involucres :
O.-Greyed-white (156/D) ; I.-Orange-white (159/A) ; N.-Orange-white (159/C) ; A.-Greyed-orange (165/A); B.-Greyed-orange (165/ C-D); D and E.- Greyed-orange (165/C); H.-Greyed-orange (165/B-C); J.-Greyed-orange (165/A); L-and Q.-Greyed-orange (165/A-B); G.-Greyed-orange (166/B-C); M.-Greyed-orange (166/D) ;C and F.- Greyed-green (189/D) ; K.-Greyed (201) and Greyed-orange (165/A) ; P.-Greyed-white (156/D) and Greyed- orange (165/B) ; R.-Greyed-orange (164/D-165/C) and Greyed-purple (168/D).

DISCUSSION AND CONCLUSION

C. lacryma-jobi var. *lacryma-jobi* differs from *C. lacryma-jobi* var. *stenocarpa* in having ovoid involucres, whereas in the latter it is rather elongated, cylindrical or roughly bottle shaped. But from the standpoint of involucral surface pattern they can all be grouped together under the Type-A with a single exception (Fig. I. R.) included under Type-E. Thus a separate status of the above taxa appears questionable. However the only exceptional member differs from any of the above in having distinctly larger involucre ranging from 20-30 mm in length in spite of usually upto 15 mm. A different variety is proposed on the basis of the above materials.

C. lacryma-jobi var. *ma-yuen* is characterised by often globose non-striated involucre Here the surface pattern is grouped under Type-B.

C. lacryma-jobi var. *monilifer* is characterised by often globose non-striated involucre and flattened on one side. Here the surface pattern is grouped under Type-D.

C. aquatica grows in aquatic habitats and has 2n=10 (Reeves and Mangelsdorf, 1935 ; Mangelsodorf and Reeves, 1939 ; Larsen, 1963 and Koul, 1965). *C. gigantea* grows in semiaquatic to moist situations and has 2n=10 (Nagabushana Rao Sindhe, 1975) ; 20 and 40 (Janaki Ammal, 1945 ; Larsen, 1963) and 40 (Nirodi, 1955 ; Koul, 1965 a, b) indicating natural polyploidy. Bor (1960) remarks "*C. aquatica* Roxb. has since Roxburgh's time been considered to be a variety of *C. gigantea* Roxb. and they are certainly very difficult to separate in the herbarium, but since the habit of each is different and each has a different chromosome number, I have decided that *C. aquatica* Roxb. is worthy of specific rank". Then again he states "*C. gigantea* differs from *C. aquatica* in habit and a number of ill defined characters. It should not be difficult to devise experiments to show whether *C. aquatica* is really distinct or if it is only a habitat form". Thus he was indeed doubtful whether these are actually two distinct species. In the exsicc. he cited Duthie 8493, M.P. ; Stocks s.n., Concan and Wallich 8624 (C), Madras ; Collett 51, Burma ; Herb. Rottl., Ceylon for the species *C. aquatica* and *C. gigantea* respectively. The authors examined the microfiche of Wallich 8624(c) and 8625 (Fl. Brit. India 7 : 100. 1897) and found a justifiable difference in the size of the involucre. The authors also examined the sheets of General Collett 40, Burma (1887) ; Dr. King 7212 (1885, Flora of Malaya Peninsula) and Searight Esq. 67, Java (1904) at CAL. of *C. gigantea* where the involucres are quite big, as drawn in the Fig. I.B. The authors also marked that there is a range of size variations among the involucres of *C. gigantea.* The involucral surface pattern can be grouped together under the same Type-C. So we are of the opinion that *C. aquatica* Roxb. is hardly satisfying a species status rather than a varietal one.

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