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VARIABILITY IN THE SEED COAT PATTERN OF *CANAVALIA* DC. (FABACEAE-PAPILIONOIDEAE) WITH SPECIAL REFERENCE TO PROVENANCE AND SEED COLOUR

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Spermoderm pattern of seeds of six *Canavalia* DC. Species namely *C. gladiata* DC,. *C. ensiformis* DC., *C. Virosa* (Roxb.) W&A, *C. maritima* Aubl., *C.lineata* DC. and *C. obtusifolia* showed recognizable variations in their testa ornamentation. In *C. gladiata* micro-morphological variations are observed within the texa if collected from different geographical regions of India. Though spermoderm pattern of seed of a species is a constant character, the variations against different provenances might be due to some environmental factors. Similarly in *C. virosa* there is significant variations in seed coat patterning of different coloured seeds. It proves that in a species different coloured seed has its own ornamentation. It is obvious that the gene responsible for colour synthesis in seed coat is also responsible for its ornamentation.

Keywords : *Canavalia*; Micro morphology; Spermoderm pattern; Variability.

Introduction

Canavalia DC. is important non-conventional wild papilionoid legume. It comprises about 50 species with tropical and sub-tropical distribution. The species consist of annual or perennial climbers and small erect plants. Most of its species are known for their high yield and high protein seeds. They provide plentiful green manure forage and also have some phytochemical and medicinal values[1-3].

Scanning electron microscopy of spermoderm pattern had demonstrated various level of existence of diversity with taxonomic significance[4-7]. Many investigators used morphological characteristics of seeds such as shape and surface pattern as a distinguishing parameter for species, genera and varieties[8-10]. According to the recent study gene responsible for pigment synthesis in seed coat also affects, seed coat-ornamentation[11]. In this preliminary study, attempts have been made to work out micro morphological variations present in diffirent species of *Canavalia*. In the two species (*C. gladiata. C. virosa*) variations related to seed colour and provenance have been taken into consideration to distinguish the taxa of a species, which were not reported so far.

Materials and Methods

For the present study, mature dry seed samples of six species of *Canavalia* were taken from different natural Indian climate. Of the six, two species - (i) *C. gladiata* had two coloured seed growing naturally in four different habitats of India i.e. Lucknow (Uttar Pradesh), Bhagalpur (Bihar), Raigarh (Madhya Pradesh) and Sambalpur (Orissa) and (ii) *C. virosa* had three coloured seeds collected from two different habitats of India i.e. Lucknow and Bhagalpur. Three seeds of each species were selected randomly, cleaned with 90% alcohol, dried and a portion immediately adjacent to the hilum was mounted on brass stub. Scanning was done under Scanning Electron Microscope (Philips XL-20) at an accelerating voltage 10 kV.

Observations

Critical examination of seed surface of six species revealed a significant diversity in their structure. Seeds of *C. gladiata* of four different states of India showed significant micro morphological variations except some affinities in between the seed s of Raigarh (Madhya Pradesh) and Bhagalpur (Bihar). Similarly, in sees of *C. virosa* of Lucknow (Uttar Pradesh) and Bhagalpur also had significant variablity in respect to shape of the epithelial cells. The cells were indistinct in some places due to thick deposition (Fig. 2 A, B, C). In *C. virosa* of Lucknow both mottled with brown and black seeds had different topography. Black seeds showed compressed foveolate pattern with irregular and discontinuous cell boundaries in

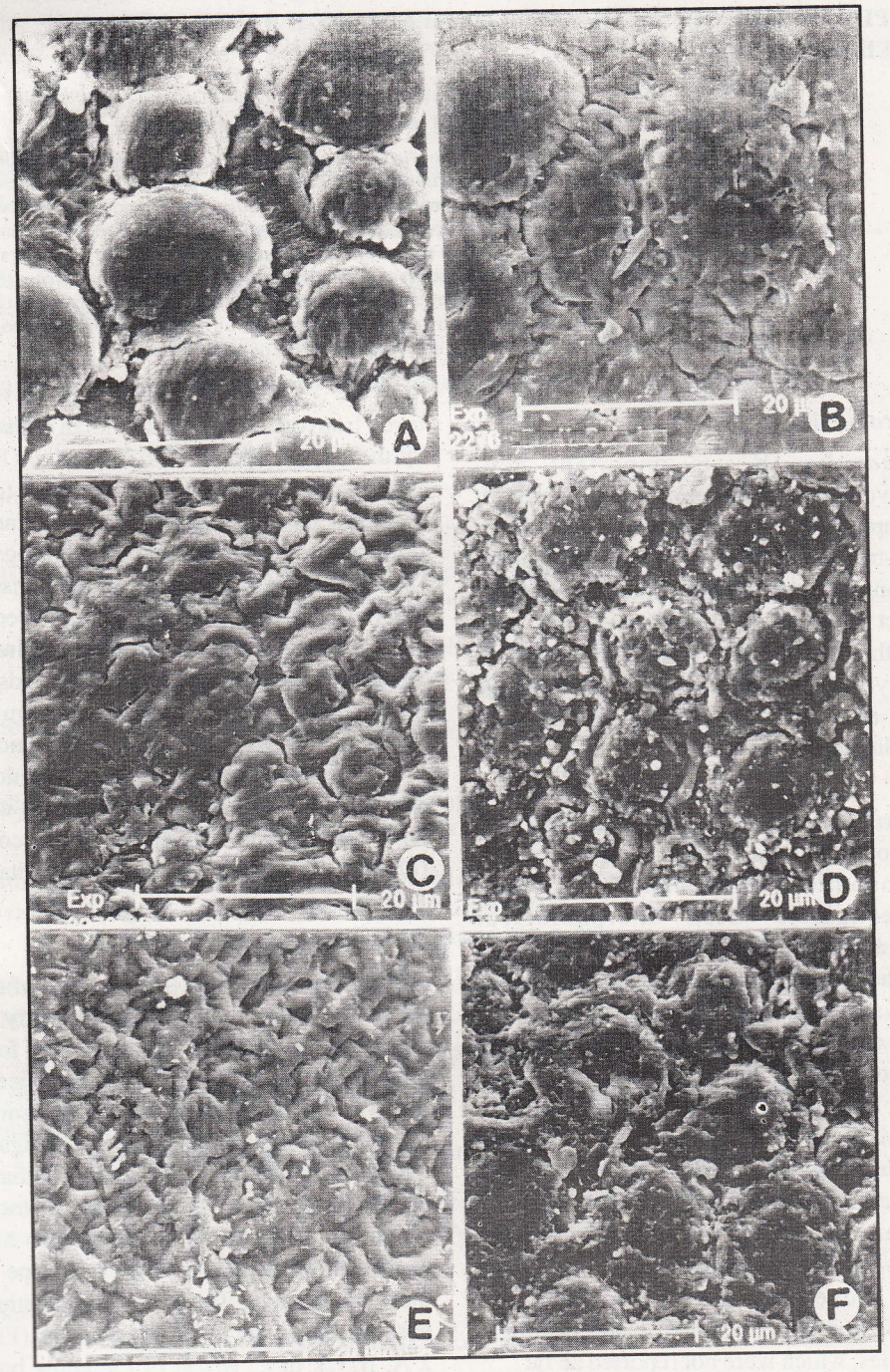

Fig. 1A-F Micro morphological characteristics of seeds of *Canavalia* species A-C. *gladiata* (Bihar). B-C. *gladiata* (M.P.). C-C. *gladiata* (Orissa). D-C. *gladiata* (U.P.). E-*C. ensiformis*. F-*C.lineata*.

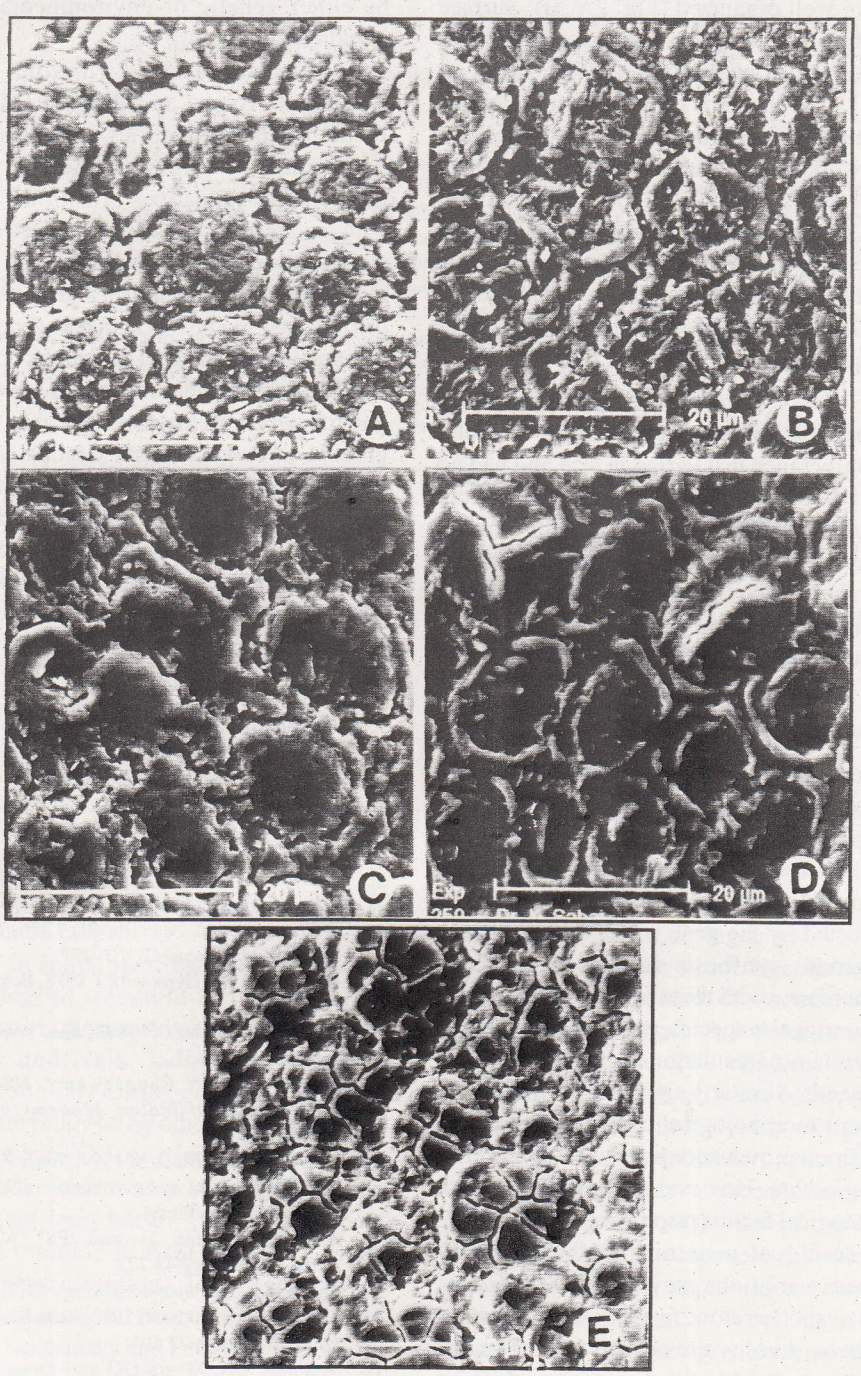

Fig. 2A-E Micro morphological characteristics of seeds of *Canavalia* species. A-*C. virosa* (Black) B-*C. virosa* (Mottled). C-*C. virosa* (Brown). D-*C. maritima* E- *C. obtusifolia.*

comparison to mottled seeds where they were well organized (Fig. 2A, B). Surface pattern of *C. lineata* was more or less similar to *C. virosa* of Bhagalpur (Fig. 1F & Fig. 2C). The pattern of *C. ensiformis* was rugulate with superimposed reticulate network all over the surface (Fig. 1E). There was much similarity in the surface pattern of *C. maritima, C. virosa* (black seeded) and *C. gladiata* of Uttar Pradesh except the heavy deposition all over the surface of *C. gladiata* which suppressed the cell structure in some places (Fig. 1 D & Fig. 2A, D).

In *C. obtusifolia* surface pattern was somewhat foveolate covering by globular protuberance that varied in size and had no cell boundaries. Heavy deposition and cracks in reticulate manner were present all over the seed surface. The pattern had some similarity with *C. gladiata* of Bhagalpur and Raigarh except the presence of network of cracks over the surface (Fig. 1A, B & Fig. 2 E).

Discussion

Seed diversity in respect to colour and provenance is very important and also applicable to genetic engineering and breeding programmes. Recent studies showed that seed coat ornamentation affected by the gene is responsible for the pigment synthesis in sees coat[11-14]. In accordance with these reports; present study also suggests species, existance of diversity in testa ornamentation in respect to colour of seeds. Similarly significant variations in micro morphological characters related to diffirent provenance have been observed in *C. gladiata*. However there might be some ecological factors responsible for variations in seed coat patterning in these species. These variations may be of evolutionary interest. Therefore further observations on genetic divesity are needed to find out the gene responsible for the polymorphism in seeds of the same species of different provenance. In the present study, variations in micro morphological characters of seed of *C. gladiata* of different provenance could be either genetic or environmental or a combination of both.

The seeds of *C. gladiata* from Bhagalpur (Bihar) and Raigarh (Madhya Pradesh) have similarities in their surface patterning. It might be due to some geographical similarities in both the states. Although seeds of *C. gladiata* collected from a particular habitat had constant micro morphological characteristics. However, it is obvious that seed patterning was genetically governed in the species. The changes occurred against different habitat might be due to environmental factors that probably persist generation to generation. Gradually these environmental changes made the seed surface structures of the species of a particular provenance, a constant genetic feature. Similar studies are further needed in rest of the species of *Canavalia* to discuss the extent of variability present in this genus.

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