

SEXUAL DIMORPHISM IN *CAESALPINIA PLATYLOBA* WATSON

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A B S T R A C T

Heterostyly and gynodioecism have been found in *Caesalpinia platyloba* Watson, and this is a new record for section *Coulteria* of the genus *Caesalpinia* L. The morphology and fertility of short-and long-style flower types are described and discussed their taxonomic significance.

Key words : *Caesalpinia platyloba*, gynodioecy, heterostyly, self-incompatibility, sexual dimorphism, and taxonomy.

INTRODUCTION

The reproductive biology of *Caesalpinia* L., species is interesting. Arroyo (1981) gave a brief account of the occurrence of dioecy, andromonoecy and heterostyly in some members of *Caesalpinia*. Sexual dimorphism (heterostyly and gynodioecy) has been observed in the species *Caesalpinia platyloba* Watson, in the plants growing at the Indian Botanic Garden, Howrah. This species, a native of Central America and Mexico is characterised by unequal calyx lobes with fimbriate, pectinate-glandular margins, belong to the section *Coulteria* of Benthams and Hooker (1865) and to the segregate genus *Brasilettia* (Britton and Rose, 1930).

MATERIALS AND METHODS

Studies were carried out with two plants of *Caesalpinia platyloba* Watson, in cultivation at the Indian Botanic Garden, Howrah from 1989 to 1992. During the flowering period (April to May) short-style and long-style flower types were collected and studied for details of morphology. Anthers were squashed separately on a slide in a drop of 2% aceto-carmines to assess pollen production. Observations on fruit and seed production by both the plants were made from May to August. Unfortunately in 1991 January the short-styled plant died, as a result further studies on the breeding system could not be carried out.

OBSERVATIONS

Morphology :

Short-styled form : Racemes 10-15 cm long with 20-35 flowers. Stamens 10, anthers versatile, dehiscing lengthwise and all fertile. Ovary 1.5-2 mm long, pubescent, stipe 2-3 mm, ovules 4; style 0.5 mm long and shorter than stamens (Fig. 2). Pods 8 12 × 3 cm, 1 - 4 seeded, mostly with immature seeds (Fig. 5a).

Long-styled form : Racemes 5 cm long with 8 15 flowers. Stamens 10, anthers somewhat smaller and sterile. Ovary 3 4 mm long, pubescent, stipe 1 mm, ovules 4; style 2 3 mm long and exceeding stamens (Fig. 3). Pods 5 8 × 2.5 cm, with 1 - 4 mature seeds (Fig. 5b).

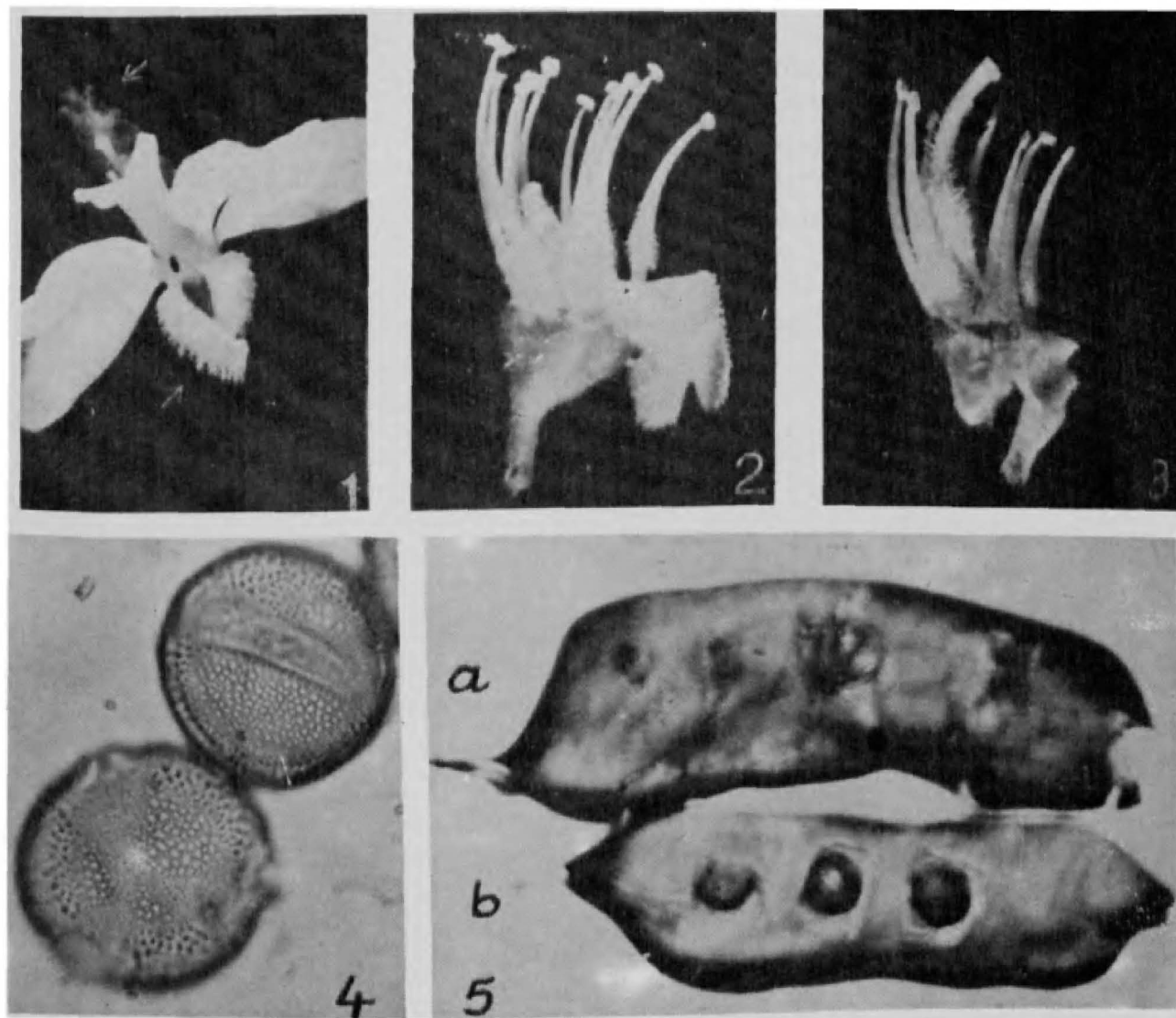
The two flower morphs are rather similar for rest of the characters.

Pollen biology :

All stamens collected from the long-styled flower (Fig. 3) are without pollen grains, while stamens of the short-styled flowers (Fig. 2) are fertile and produced 800 900 pollen grains per anther. Pollen 3-zonocolporate, prolate spheroidal, 40 × 39 μm (34 44 × 33 42 μm); exine reticulate and 3 μm thick (Fig. 4).

Fruit biology :

Short-styled morph and long-styled morph are growing side by side, and so cross-pollination



Figs. (1-5) 1 Flower with fimbriate calyx lobes (arrowed). 2. Short-styled flower 3. Long-styled flower. 4 Pollen grains, $\times 750$. 5. a. Pod of short-styled flower (seeds exposed). b. Pod of long-styled flower (seeds exposed).

between them could occur naturally. Both types of plants produced pods, but the majority of the pods derived from short-styled flowers did not produce mature seeds even two months after fruit set, most of them are found to be almost empty with 1 - 4 rudimentary seeds (Fig. 5a). In contrast all pods produced by the long-styled plant contained 1 - 4 mature seeds (Fig. 5b).

Since the death of short-styled morph there is no fruit setting on the long-styled morph, though it is flowering every year.

DISCUSSION

Dioecy in the genus *Caesalpinia* L., was first observed by Linnaeus (1754) in the species *C.*

bonduc. In recent years Gillis and Procter (1974) observed dioecy in *Caesalpinia major* and *C. murifruta*. All the above species with dioecy belong to the subgenus *Guilandina* (Gillis and Procter, 1974). The present report of heterostyly and gynodioecy in *C. platyloba* extends this breeding system to another section, *Coulteria*, of *Caesalpinia* L.

From the present study it is apparent that in *C. platyloba*, the long-styled flowers are functionally female because of male-sterility, thus showing a tendency towards dioecy. The short-styled flowers, though hermaphrodite, seem to function largely as males, since they have a very limited fruit and seed production. Further the

presence of 1 - 4 rudimentary seeds in the pods of short-styled morph (Fig. 5a) indicate operation of post-fertilization self-incompatibility system. It is of interest that the 'female' inflorescences are few-flowered, while the 'male (bisexual)' ones are many-flowered, which is a common feature in dioecious taxa (Bawa, 1980 and 1984). Sexual dimorphism in *C. platyloba* seems to have evolved in two directions one towards heterostyly and self-incompatibility and the other towards dioecy.

Taxonomic Significance :

Isely (1975) while describing *C. platyloba* Watson from United States (introduced in to gardens) found a degree of variation in the pubescence and flower size in Mexican specimens and stated that " distinctions among species related to *C. platyloba* are uncertain and the group requires revision". The finding of flower dimorphism and other variations between short-style and long-style forms in *C. platyloba* suggest that it will be worth while to make a detailed study of floral biology in *Caesalpinia platyloba* and allied species in addition to herbarium determinations, otherwise it may lead to description of separate species for female and male individuals.

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