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Floral Pigments from *Bombax insigne*: an Endemic Tree Species of East-Asia

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ABSTRACT

Bombax L. belonging to the family Malvaceae (Bombacaceae) and distributed throughout the world. It is represented by two species *B. ceiba* L. (syn. *B. malabaricum* DC.) and *B. insigne* Wall. *B. insigne* is restricted to East Asia. There are two populations of *B. insigne*, one with scarlet flowers and another with cream yellow flowers. Flavonoids are responsible for the pigmentation of flowers in two populations of *B. insigne*. The population with scarlet flowers contain anthocyanin as flowering pigment and lacks anthoxanthin. While population, with cream yellow flowers bears anthoxathin as flowering pigment and lacks anthocyanin completely.

Keywords: *Bombax*, Flavonoids, anthocyanin, anthoxathin

I. INTRODUCTION

The genus *Bombax* L. belonging to the family Malvaceae (Bombacaceae) with about 8 species distributed in world[1]. In India two species of Bombax are found i.e. *B. ceiba* L. (syn. *B. malabaricum* DC.) and *B. insigne* Wall. *B. ceiba* is found throughout tropical and subtropical region of the world whereas the *B. insigne* is restricted to East Asia - India, Nicobar and Andaman Islands, Myanmar, Laos, Vietnam.

Bombax ceiba L. is a large, deciduous tree growing wild on the roadsides and it flowers from January to March. The flowers are large, numerous, fascicled near branch-ends, actinomorphic, red and the stamens are numerous. The colour of flower in *B. ceiba* is due to presence of flavonoids[4]. Flowers usually appear when the trees are leafless, before production of leaves. At this time birds visit flowers to extract nectar and pollinate the flower[5,6]. Recently Bhattacharya and Sudhendu worked on flower morphology, anthesis, pollen production, foraging nature of flower visitors, in vitro pollen germination and stigma receptivity of *B. ceiba*[2].

Another species of *Bombax* is *B. insigne* Wall. It is found to be common on the lateritic plateaus of Konkan region of Ratnagiri district of Maharashtra and it flowers from November to January. We have noticed two kinds of populations of *B. insigne*, one with scarlet flowers and another with cream yellow flowers. There is no report of pigments responsible for flower colour in *B. insigne*. Therefore we have attempted to find out the pigments responsible for flower colour in different individuals of *B. insigne*.

II. MATERIALS AND METHOD

Flowers of *B. ceiba* and two populations of *B. insigne* were collected during December, 2016 from Rajapur tahsil of Ratnagiri district of Maharashtra. Flowers were dried in hot air oven at 60 ^{0}C for three days. Dried flowers were crushed by using mortar and pestle to make powder. 1% aqueous extract of flower

is prepared by dissolving 1g floral powder in distilled water. The aqueous extract of flower was tested in vitro for the presence of anthocyanins and anthoxanthins with 0.1 N HCl and 0.1 N NaOH.

III. RESULTS

The flower colour in *B. ceiba* is due to presence of anthocyanins, a kind of flavonoids. Anthocyanins are purple red pigments and are mainly responsible for the red colour of petals. Antocyanins change colour in response to change in pH. Anthocyanins turn red in acidic medium and green in alkaline medium. We tested the flowers of *B. ceiba* for presence of anthocyanins and it showed positive results (Table 1), (Figure 1).

Two populations of *B. insigne* were also tested for Anthocyanins. The scarlet flowered population of *B. insigne* showed positive anthocyanin test. The other population of *B. insigne* having cream yellow flowers showed negative anthocyanin test. Therefore this population lacks anthocyanins completely. When yellow flowered population of *B. insigne* was analysed for change in colour due to change in pH they produced totally different results. They produced white colour in acidic medium and dark yellow colour in alkaline medium. This clearly indicates the presence of anthoxanthins and absence of anthocyanins (Table 1), (Figure 1).

IV. CONCLUSION

Pigmentation of flowers in species of genus *Bombax* due to presence of flavonoids[4]. They are found in stem, leaves, flowers and fruits of variety of plants. Flavonoids are chemically polyphenols and produced as secondary metabolites. They are water soluble and stored in vacuoles. Flavonoids are classified into different types as flavones, flavonols, flavonones, anthocyanins and anthoxanthins. Except for anthocyanins and anthoxanthins remaining types of flavonoids are colourless. Anthocyanins and anthoxanthins impart colour to flowers.

In the present study *B. ceiba* flowers showed presence of anthocyanins. The scarlet flowered population of *B. insigne* showed presence of anthocyanins only while cream yellow flowered population showed presence of anthoxanthins only. Hence, for the first time we are reporting the presence of anthocyanins and anthoxanthins from the scarlet flowered population and cream yellow flowered population of *B. insigne* respectively (Table 1), (Figure 1).

Table: 1. The effect of acid and alkali on the flowers of *Bombax insigne* and *B. ceiba*

Species	Test	Observation	Inference
Bombax insigne (Scarlet flowered population)	Petals extract + acid (0.1 N HCl)	Red colour	Anthocyanins present
	Petals extract + alkali (0.1 N NaOH)	Dark green colour	Anthocyanins present
B. insigne (Cream yellow flowered population)	Petals extract + acid (0.1 N HCl)	White colour	Anthoxanthins present
	Petals extract + alkali (0.1 N NaOH)	Dark yellow colour	Anthoxanthins present
B. ceiba	Petals extract + acid (0.1 N HCl)	Red colour	Anthocyanins present
	Petals extract + alkali (0.1 N NaOH)	Green colour	Anthocyanins present

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Figure legends:

Figure 1. Bombax insigne: **a**, scarlet flower. **b**, petal extract in aqueous, acid & alkali; Bombax insigne: **c**, cream yellow flower. **d**, petal extract in aqueous, acid & alkali; Bombax ceiba: **e**, flower. **f**, petal extract in aqueous, acid & alkali.