

Double Flowers: Rediscovery of Theophrastus's Findings

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Abstract: Present study has been carried out in the state of Punjab from 2020 to 2022. Petal and stamen variation were recorded in five species such as *Citrullus colocynthis*, *Datura innoxia*, *Solanum nigrum*, *Nicotiana plumbaginifolia* and *Vinca rosea*. Normal number of petals are five in these species but variations were recorded from four to six petals as well as in stamens. This study will be useful for researchers, scientists and geneticist for analysis of gene expression which is responsible for this variation.

Keywords: Botany, taxonomy, genetics, flowers, petals, gene

1. Introduction

Flower is considered as modified shoot of the plant. It consists of the reproductive organs such as stamens, stigma and ovary. Petals are the main part of the flower because it interacts the pollination agencies such as insect, birds, bats etc. for pollination.

Every flower have definite number of sepals, petals, stamens and carpels which distinguish the two species, genera and family. Sometime number sepals, petals and stamens show variations in number, shape and size. Variations in numbers may be more or less than the normal number.

Development of flower is a not a fixed process it is a mystery because Theophrastus was also mentioned abnormal number of petals in his book *Enquiry into Plants* (Meyerowitz et al., 1989). Abnormal development of flowers considered as double flowers by many scientists such as Gerard (1597); Masters (1869); Worsbell (1915-16) and Reynolds & Tampion (1983).

Keeping this in view. Present study was conducted for updated information about variations in angiosperm plants from the state of Punjab. This study will be useful for scientists, researchers, taxonomists, ethnobotanists etc. as an updated and wonderful information about angiosperm species.

2. Materials and methods

Study area

Present study was conducted in the state of Punjab, India. It is situated in Northern part of the country. Plant species were documented from crop fields and gardens of district Faridkot and Mohali from the years 2020 to 2022.

Plant collection and photography

Plant specimens were collected from different crop fields as well as from gardens for critical examinations. Variations in number of petals and stamens were recorded in five angiosperm species such as *Citrullus colocynthis*, *Datura innoxia*, *Solanum nigrum*, *Nicotiana plumbaginifolia* and *Vinca rosea*. Photographs of petals and stamens were clicked using mobile camera.

3. Result and Discussion

During present investigations, abnormal number of petals and stamens were reported in five angiosperm species such as *Citrullus colocynthis*, *Datura innoxia*, *Solanum nigrum*, *Nicotiana plumbaginifolia* and *Vinca rosea*. Out of these five species, four are weed species commonly occur in different crops and one is cultivated species (*Vinca rosea*). Normal number of petals and stamens are five in these five species but six petals with six stamens are observed in *Datura innoxia*, *Solanum nigrum* and *Nicotiana plumbaginifolia* (Fig.2.). In case of *Vinca rosea* number of petals ranges from four to seven (Fig.1). Number of petals are reduced from five to four in *Citrullus colocynthis*. Reynolds & Tampion (1983) suggested these variations are commonly seen in angiosperm species. According to modern study, development of each flower parts (sepals, petals, stamens and carpels) are controlled by a specific gene (Heslop-Harrison, 1963). According to Stubbe (1966), *Cycloidea* controls the development of corolla and androecium. Genetic basis flower development is studied in *Arabidopsis thaliana* by many scientists and concluded that development of each part in flower is controlled by a specific gene. AP₂ regulates AGAMOUS and controls the development of reproductive parts of the flower (Drews et al., 1991; Lenhard et al., 2001). Manniaux et al (2018) studied expression of APETALA 1 (AP1) gene for variation in number of petals in *Cardamine hirsuta*. Therefore need of the hour of examination of expression of the genes which responsible in variations in number of petals in *Citrullus colocynthis*, *Datura innoxia*, *Nicotiana plumbaginifolia*, *Solanum nigrum* and *Vinca rosea*.

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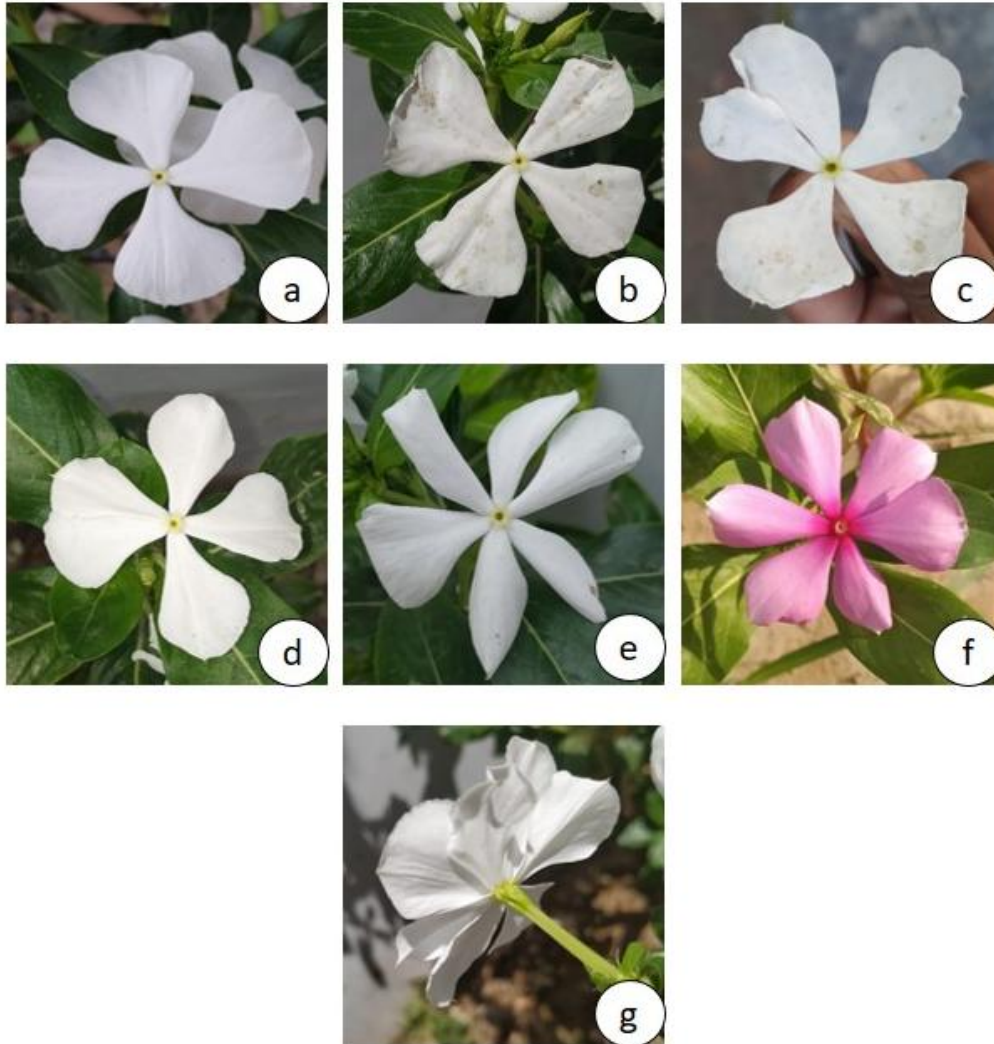


Figure 1: Variations in petals of *Vinca rosea*. (a-g). a-Regular four petals; b-Irregular four petals; c-d-Irregular five petals; e- Regular six petals in white corolla; f-Regular six petals in Pink Corolla; g- Overlapping of seven petals.



Figure 2: Variations in petals and stamens of *Nicotiana*, *Solanum*, *Datura* and *Citrullus* (a-e). a-Regular six petals in *Nicotiana plumbaginifolia*; b- Regular six petals in *Solanum nigrum*; c-Regular six Stamens in *Solanum nigrum*; d-e- Regular six petals and stamens in *Datura innoxia*. f- Normal five petals in *Citrullus colocynthis* (Male flower); g- Abnormal petals (four) in *Citrullus colocynthis*.