



Chromosomal study and Medicinal uses in *Gloriosa superba* L.

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Available online at: www.isca.in, www.isca.me

Received 22nd December 2014, revised 31st March 2015, accepted 3rd May 2015

Abstract

Chromosomal study was done at mitotic and meiotic division in *Gloriosa superba* L. In the mitosis study was found 22 chromosomes metaphase. Meiosis was also done, found 11 bivalents at diakinesis/metaphase-I, chromosomes were equal (11:11) distributed at the opposite poles at anaphase-I. It is one of the most important medicinal plant species which are used in several diseases as abortion, pregnancy, infertility, rheumatism, leprosy, snake bite etc.

Keywords: *Gloriosa superba* L., mitosis, meiosis, medicinal uses.

Introduction

Gloriosa superba is belonging to the family *Liliaceae*. It is known by various vernacular names as Glory lily, Flam lily in English; Agnishikha, Garbhanute in Sanskrit; Karihari, Kalkaloi, Languli, Larhkundi in Hindi. It is an herbaceous, perennial climber plant, growing between 3.5 to 6m in length but usually trained at 1.5m above ground level. All parts of the plant especially the tubers and seeds are contained alkaloids such as colchicines and gloriosine¹. Tubers and seeds of *Gloriosa superba* are an expensive export commodity. The tubers are used traditionally for the treatment of various diseases^{2,3}. *Gloriosa superba* has the importance in medicine in recent years for the production of colchicine a promising drug on commercial scale. The aim of present study was collection of *Gloriosa superba* from different location of Madhya Pradesh and investigated its medicine uses. By the mitosis and meiosis study were understood their cytogenetic system as number, morphology and behavior of chromosomes during cell division, further will used to genetic manipulation for increasing better quality as well as quality of alkaloids.

Material and Methods

Collection of plant material: *Gloriosa superba* was collected from different location of Madhya Pradesh with the help of local people as Govt. Pachmarhi Biosphere Reserve District Hoshangabad, Ralawala sanctuary, choral, Palalpani District Indore, Village Navali, distinct Mandasore and Village Alpura Disst. Tikamgarh during 2012-13. Seeds were also collected from Raj and Company Neemach. The informations of medicinal uses were gathered from local people.

Study of Mitosis: Seeds were germinated on moist filter papers. Seeds germinated after 8-10 days, about 0.5 to 1.0 cm long root tips were cut with the help of razor. Cut root tips were pretreated with saturated solution of dichlorobenzene. Fixed in freshly prepared Conroy's fluid (absolute alcohol: acetic acid in

3:1 ratio) for at least 24 hours. Fixed root tips were taken out and hydrolyzed in 1N HCl at 60°C for 10 to 15 minutes. After hydrolysis, root tips were washed and transferred to Leucobasic fuchsine (fulgent stain) for 1 hour in dark. After 1 hour, stained root tips were taken out, washed with water and squashed in 2% acetocarmine. The pressure was applied on cover glass under several thickness of bloating paper. Slides were sealed with wax and examined for suitable metaphases and anaphases. The photomicrographs were taken with help of digital camera under oil immersion and magnified to X1000.

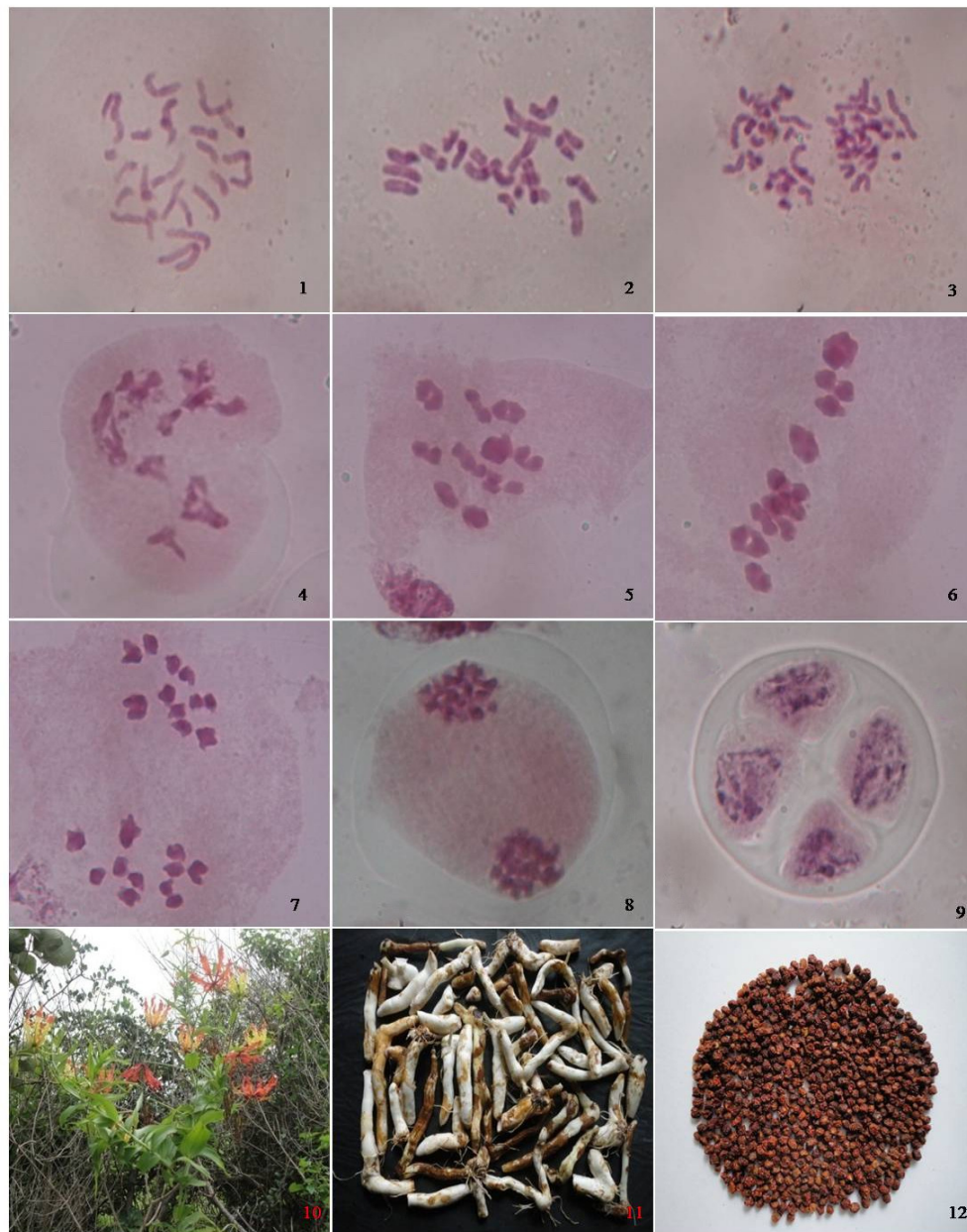
Study of Meiosis: For meiosis studies, few young flower buds of appropriate size were collected from plants and fixed in Conroy's fluid. Anthers were separated, teased in a drop of 2% iron acetocarmine on a clean slide and squashed under a cover glass. PMCs were analyzed for suitable stages of meiosis. Slides with well spread cells and clear chromosomes were selected for scoring and photomicrography was taken from temporary slides. Photos were captured with help of digital camera. The photomicrographs of meiosis were taken under oil immersion (X100) and magnified to X1000.

Results and Discussion

Gloriosa superba is one of the most endangered species among the medicinal plants⁴. Tubers are rich source of colchicine which used in plant breeding studies to produce polyploidy and medicinal uses^{5,6}. In the present investigation *Gloriosa superba* was reported from sex localities of Madhya Pradesh. It occur sandy-loam soil, associated with *Lantana cembra*, *Carissa carandas*. The chromosomes are a definite number, shape and size in particular species, it can be easily studied during cell division. Very few workers had done cytogenetic study of *Gloriosa superba*. Mitosis was done and found 22 chromosomes⁷. Meiosis was done meiosis and found 11 bivalents at diakinesis^{8,9}. In the present study both mitosis and meiotic division was done and found same results. In the mitosis 22 chromosomes were found metaphase (figure-1 and 2). At the

anaphase, chromosomes were equal distributed in opposite poles (figure-3). In the meiosis 11 bivalents were found at diakinesis/metaphase-I (figures- 4 to 6). At the anaphase/telophase-I/II, chromosomes were equal distributed 11:11 at opposite pole (figures-7 to 9). The medicine information was collected through questionnaire and discussions among the local practitioners in their local language. Our questionnaire allowed descriptive responses on the plant prescribed, such as part of the plant used in medicinal. Roots are smeared over the palms and feet of a pregnant woman, delivery of child becomes easier. Tuber grind, mix in ghee, prepare tablet, taken twice a day for

abortion. Powder with mustard oil is applied twice a day on the joints, affected with arthritis reduces pain. Tuber paste is applied externally for various skin diseases as Leprosy, wounds. It is effective against infertility, intermittent fevers, epilepsy, snake bite, insect bites also. Tuber powder is given to the cattle in stomach disorder. Flower paste is given with warm water and applied over palms and shown to cattle facing pain (Anthrax). Tubers crushed and applied over toes of cattle and are fed with decoction of Tubers mix in grass is given to the cattle for increasing milk production (figures-10 to 12).



Figures-1 to 12

1-3. Mitotic division, 1. Late Prophase, 2. Metaphase (22 Chromosomes), 3. Anaphase. 4-9. Meiotic division. 4-5. Diakinesis (11 Bivalents), 6. Metaphase-I, 7. Anaphase-I, (11:11 Bivalents). 8. Telophase-I, 9. Telophase-II (~X1000), 10-12 Medicinal parts, 10. Leaves and Flowers. 11. Tubers, 12. Seeds

Conclusion

Cytogenetic study of present investigation will be helpful to understand the number, morphology and meiotic chromosomal behavior which are useful in cyto-taxonomy and also beneficial for further research in cytogenetic. Medicine uses will be helpful to conservation of traditional knowledge.

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