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# Cytomorphological Studies of Artificially Induced Tetraploids of *Catharanthus pusillus*

By

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## Summary

Artificially induced tetraploids of *Catharanthus pusillus* show enhanced plant parts. Meiosis in both diploids and polyploids was normal. In tetraploids multivalents were observed in comparatively high frequency. Pollen fertility of tetraploids was 88.18%.

*Catharanthus pusillus* is erect annual herb commonly occurring as a weed. It belongs to family Apocynaceae. Alkaloids obtained from this plant are poisonous and cause depression of heart. This paper presents investigations of diploid and artificially induced polyploids of *C. pusillus*.

## Material and Method

Tetraploids were produced by treating 2''—3'' seedings of diploid plants with 0.2% colchicine. 2 days treatment of 6 hrs. daily was sufficient to produce tetraploids. For Cytological studies buds were fixed in 1 : 3 acetic alcohol, fortixed with iron, for 24 hrs. Acetocarmine squashes were made and slides were made permanent by ethanol-butanol schedule.

## Observations

Morphology: Comparative study of morphology of diploids and tetraploids is presented in Table 1. Tetraploids show increase in the size of different plant parts.

Cytology: Diploid: Chromosome number was 2 n = 16. Frequency of ring bivalents was 3.7 per cell with the variation of 2 to 5. Frequency of rod bivalents was 4.2 per cell with the variation of 3—6. Chiasma frequency

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was 11.7 per cell. At A I segregation was found to be regular in most of the cases. In one cell 7/9 segregation was observed. Bridge and late separating bivalent were observed in some cases. A few sporad with 5 spores were seen. Pollen fertility was 97%.

Tetraploid: Chromosome number of artificially induced tetraploids was 4 n = 32. Frequency of ring and chain quadrivalents was found to be 1.55 and 0.05 per cell. The number of quadrivalents varied from 0—5 in a cell (Fig. 1). Frequency of bivalents was 5.2 per cell. Varying from 3—8.

Table I

Comparison of morphological characters of diploids and tetraploids of *Catharanthus pusillus*

| S. No. | Characters | Diploid | Tetraploid |
|---|---|---|---|
| 1. | Height of the plant (cm) | 45.0 | 41.0 |
| 2. | Length of leaf petiole (cm) | 0.5 | 0.6 |
| 3. | Length of leaf blade (cm) | 6.0 | 6.5 |
| 4. | Breadth of leaf blade (cm) | 2.0 | 2.3 |
| 5. | Length of guard cells (μ) | 25.89 | 35.332 |
| 6. | Breadth of guard cells (μm) | 5.62 | 7.59 |
| 7. | Length of stomatal aperture (μm) | 15.532 | 21.406 |
| 8. | No. of stomata per field | 16.64 | 8.74 |
| 9. | Pollen size (μ) | 41.92 | 53.68 |
| 10. | Length of flower (cm) | 1.5 | 1.7 |
| 11. | Spread of flower (cm) | 0.5 | 0.7 |
| 12. | Length of corolla tube (cm) | 1.1 | 1.3 |
| 13. | Length of sepal (cm) | 0.2 | 0.2 |
| 14. | Length of petal (cm) | 0.25 | 0.3 |
| 15. | Length of follicles (cm) | 3.0 | 3.0 |

Frequency of rod bivalent was 7.1 per cell, varying from 1—12. Inivalent frequency was 1 per cell with the variation of 0—4. At A I (Fig. 2) and subsequent stages lagging bivalent, chromosome etc. were observed in some cells. The number of spores in a sporad varied from 4—8. Pollen fertility was 88.18%.

## Discussion

Cytology of diploid plants was normal. There was not much difference in the frequency of ring and rod bivalents. In articificially induced tetraploids fairly high frequency of quadrivalents was observed. In tetraploids of *C. roseus* multivalent frequency was very low (Raghuvanshi & Chauhan 1969). Normally studies of natural occurring polyploids and artificially

induced polyploids of family Apocynaceae revealed that very low multivalents condition was prevalent. Multivalents were absent in natural occurring triploids of *Tabernaemontana divaricata* and *Plumeria alba* (RAGHUVANSHI & CHAUHAN 1969, 71) and also in artificially induced tetraploids of *Thevetia peruviana*. However, multivalents were found to occur in low frequency in artificially induced polyploids of *Catharanthus roseus*, tetraploids of *I. divaricata* (CAHUHAN & RAGHUVANSHI 1971) and *Nerium indicum*. Fairly high multivalent frequency was observed in polyploids of *Rauvolfia serpentina* and *R. canescens*.

Generally in autopolyploids meiosis is disturbed due to the presence of multivalents and various spindle anomalies. But in *C. pusillus* although multivalents are present, they do not interfere in normal separation at anaphase. Spindle also function normally. All this lead to fertile polyploids. High fertility of autopolyploids is also reported in maize (RANDOLF 1935).

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Fig. 1. 5 quadrivalents and 6 bivalents.
Fig. 2. A I showing lagging and unequal segregation.