

Karyomorphological Studies In Four Populations of *Ipomoea carnea*

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Karyomorphological studies were carried out in four natural populations namely IC^N0916, IC^W1016, IC^S0917, IC^E1017 of *Ipomoea carnea*. Somatic chromosome number $2n = 30$ was observed in all the four populations. Detailed Karyotypic studies have revealed the dissimilarity in the length and quality of chromosomes. The reason behind this is the presence of asymmetrical karyotype. On the basis of total form value it was concluded that two populations out of four, are very close to each other.

INTRODUCTION

Ipomoea carnea Jacq, a native of South America, was introduced in India (Hooker, 1885) at the end of nineteenth century as a garden and hedge plant. Since then it has become weed and has spread rapidly on land and in water. The plant *Ipomoea carnea* belonging to the family Convolvulaceae is commonly called bush morning glory. Cytogenetically the species appear to be much less known. However the informations available are of preliminary nature mainly dealing with chromosomal count. (Fedorov, 1974).

It has been discovered that the evolutionary development often involves alteration in the number and structure of the chromosomes which are the physical basis of the genetic system of the species. In similar way, the performance of a population depends not only on the functional properties of genes but also on the way in which the genes are distributed to the individual genotype i.e., on the genetic structure of the population. Therefore, much can be known regarding the relation between individuals of the species by a comparative study of the chromosomes with respect to their structure and about the chromosomal polymorphism. The present communication is a detailed karyotypic account of the four populations of the species.

MATERIALS AND METHODS

Materials for the present investigation included four populations of the species *Ipomoea carnea*, the details of their locality and period of collection have been given in Table-1.

Mitotic study

For somatic chromosome studies young and healthy growing root tips were cut and pre treated with alpha bromo naphthalene for 1.5 hours and were fixed in 1 : 3 acetoalcohol (5% ferric chloride was used as mordant). Fixed root tips were stained in 2% acetocarmine and squashed in 45% acetic acid. The detailed structure of chromosomes was made out from enlarged photomicrograph of temporary preparations. Total form (T.F.%) has been calculated as given by Huziwara (1962).

$$\text{T.F.}\% = \frac{\text{sum total of small arm length}}{\text{total length of chromosomes}} \times 100$$

Given by Huziwara (1962).

OBSERVATIONS

Population IC^N0916

This population consisted of thirty plants growing near loco field in railway colony, Gaya.

Somatic chromosomes number was recorded as $2n = 30$ (Fig-1). The chromosomes of this population ranged from 1.8μ to 4.20μ in length. Details of the karyotype showed nine pairs of sub median chromosomes five pairs of median and one pair of sub terminal chromosomes in this population. The chromosome pairs are represented in Idiogram (Fig. 1A) and TF% has been given in Table-2.

Population IC^W1016

The plants of this population were scattered along road side in Kujapi area situated in western side of Gaya town.

The chromosome number was confirmed as $2n = 30$ (Fig.-2). The chromosome length varied from $1-89 \mu$ to 4.11μ . There were nine pairs of sub median, four pairs of median and two pairs of sub terminal chromosomes. Secondary constriction was observed in the ninth pair of chromosomes. The chromosomes are represented in Idiogram (Fig. 2A) and .T.F% in Table -2.

Population IC^S0917

Plants of this population were growing on barren land in Khatakchak locality of Gaya. The population consisted of twenty one plants.

The somatic chromosome number was confirmed as $2n = 30$ (Fig-3). The chromosome length in this population ranged from 1.78μ to 4.14μ which was noticeable variation in length. Karyotype analysis showed nine pairs of submedian chromosomes, five pairs of median and one pair of sub terminal chromosomes. The chromosome pairs are represented in Idiogram (Fig-3) and TF% has been shown in Table-2.

Population IC^E1017

The plants of this population were growing near Urdu Primary School, Bhusunda, Gaya. This population consisted of thirty plants.

The mitotic study of this population of plants confirmed the somatic chromosome number as $2n = 30$ (Fig-4). The chromosome length varied from 1.78 to 4.10 in length. Details of Karyotype showed nine pairs of sub median five pairs of median and one pair of sub terminal chromosomes. In the seventh pair of chromosomes secondary constriction was seen. The chromosome pairs are represented in Idiogram (Fig.4A) and TF% in Table-2.

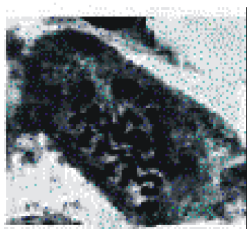


Fig.-1

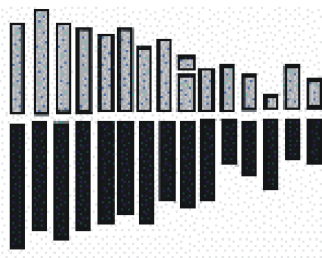


Fig.-1A

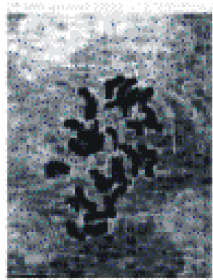


Fig.-2

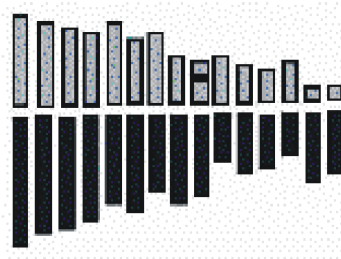


Fig.-2A

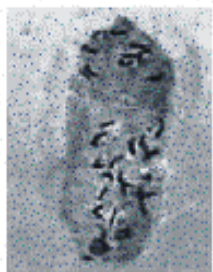


Fig.-3

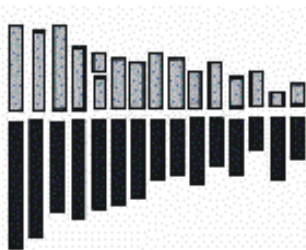


Fig.-3A

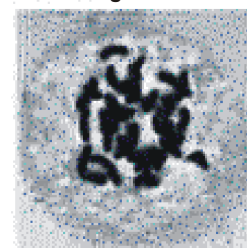


Fig.-4

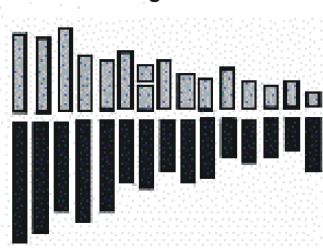


Fig.-4A

Fig. 1 to Fig. 4A showing mitotic metaphase and Idiograms of Populations IC^N0916, IC^W1016, IC^S0917, IC^E1017 respectively

TABLE - 1

List of materials with locality and period of collection

| Name of species | Population | Locality | Period of collection |
|-----------------------------|----------------------|---------------------------------|----------------------|
| <i>Ipomoea carnea</i> Jacq. | IC ^N 0916 | Loco field Railway colony, Gaya | 16 Sept., 2016 |
| | IC ^W 0916 | Kujapi, Gaya | 10 Oct., 2016 |
| | IC ^S 0917 | Khatakchak, Gaya | 18 Sept., 2017 |
| | IC ^E 1017 | Urdu Primary School, Bhusunda | 25 Oct., 2017 |

TABLE - 2

Chromosomes of diferent populations of *Ipomoea carnea* Jacq

| Population | 2n | Range of chromosome length in μ | Total chromosome length | T.F.% |
|----------------------|----|-------------------------------------|-------------------------|--------|
| IC ^N 0916 | 30 | 1.81 – 4.20 μ | 90.22 μ | 43.31% |
| IC ^W 0916 | 30 | 1.89 – 4.11 μ | 85.04 μ | 41.40% |
| IC ^S 0917 | 30 | 1.78 – 4.14 μ | 88.32 μ | 43.20% |
| IC ^E 1017 | 30 | 1.78 – 4.10 μ | 84.50 μ | 44.40% |

DISCUSSION

A critical study of the morphology of the somatic chromosomes has been done in four populations of *Ipomoea carnea* namely IC^N0916, IC^W1016, IC^S0917, IC^E1017. Chromosomes of these population varied in their absolute as well as relative size. The range of chromosome length showed wide range of variation, the smallest being 1.78 μ in length while the largest chromosome pair was 4.20 in length. It was also interesting to find that submedian chromosomes were dominant in all the populations. Similar reports have also been observed by Rane *et al.* (2012). Here it may be presumed that repatterning of chromosomes involving unequal translocation or pericentric inversion in addition to elimination or accusation of heterochromatine are the probable reasons behind the diversification among the Karyotype (Trivedi & Sinha, 1986).

Total form value indicate that the karyotype is not completely symmetrical. It seems that the populations under study are in the process of establishing themselves at the particular habitat. On the basis of total form value it can be concluded that the two populations namely IC^N0916 having T.F. as 43.3% and IC^S0916 having 43.2% are close to each other, while rest two have diverged from the mentioned two populations. Stebbins (1958) and Jackson (1971) have discussed chromosome asymmetry in higher plants which pertains to longevity, habitat and genetic variability. According to them in a population which becomes adjusted to unstable habitat, the heterozygous condition may be highly adaptive. This condition seems to be applicable in the present study.

REFERENCES

- Fedorov, A. A. 1974, Chromosome number of flowering plants. Reprint by Otto Koeltz science publication, n- 624. Koenigstein/ Germany
- Hooker, J. D. 1885, The flora of British India 4 : 196-216.
- Huziwara, T., 1962, Karyotype analysis in some genera of Compositae VIII. Further studies in the chromosome of Aster Anier. J. Bot 49 : 110-119.
- Jackson, R. C., 1971, The Karyotype systematic Ann. Rev and Syst. 2 : 327 - 368.
- Rane, V. A., Patel Behnaz. B., George Jacinta, 2012, Karyotypic analysis of ten species of *Ipomoea* Jacq. Cytologia 77 (2) : 239 - 249.
- Stebbins, G. C. 1958, Longevity, habitat and the release of genetic variability in the higher plants. Cold spring harbor symposium Quant. Biol 23 : 365-378.
- Trivedii, R. N. and A. K. Sinha, 1986, Karyomorphological studies in three populations of *Solanum surattense*, a weed, Cytologia 51 : 157-161.