

## Chromosomal Studies on Two Species of Ornamental aphids (Homoptera: Aphididae) from Patiala, Punjab (India)

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### Abstract

The present paper contains the karyological details of two vegetable aphids viz., *Aphis gossypii* Glover (2n=8 chromosomes) and *Lipaphis erysimi* Kalténbach (2n=8, 9, 10 chromosomes). The aphid samples were collected from different ornamental crops from different places of Patiala, Punjab. The prepared slides were analysed for chromosomal details such as diploid chromosome numbers, abnormal numbers, actual lengths of chromosomes, their total chromatin length (TLC) and their karyotypes. The chromosomal details are provided here for both the species.

**Keywords.** *Aphid, Total chromatin length (TLC), Karyotype*

### 1. Introduction

Aphids are small sap-sucking soft bodied insects and members of the super family Aphidoidea. They are among the most destructive insect pests on cultivated plants in temperate regions. About 450 aphid species have been recorded from crop plants of which 100 species have successfully exploited the agricultural crops to the extent of significant economic levels.<sup>1</sup> The Indian agriculture is currently suffering an annual loss of about 863884 million rupees due to insect pests.<sup>2</sup> Therefore it was necessary to carry out the study of aphids in details.

### 2. Material and Methods

Aphids were collected from different

host plants from different localities. For identification of aphids, key developed was used.<sup>3</sup> For chromosomal studies, somatic embryonic tissues were dissected out from apterous parthenogenetic females by puncturing the posterior end of the abdomen. Only the young embryos were used for chromosome studies, as cells in these embryos were mostly in divisional stages. The embryos were given pretreatment in 0.7% sodium citrate for 30 min. After pretreatment, the embryos were fixed in glacial acetic-ethanol (1:3) for 15 min. The embryos were then placed on a glass slide in a drop of 45% acetic acid for 5 min. The cover slip was placed on the material put on the glass slide with one edge of cover slip extending outside the slide and tapped gently with the blunt end of forceps.

| Aphid species           | Host plant                    | Period of collection | Place of collection |
|-------------------------|-------------------------------|----------------------|---------------------|
| <i>Aphis gossypii</i>   | <i>Hibiscus rosa-sinensis</i> | Feb, 2018            | Patiala, Punjab     |
| <i>Lipaphis erysimi</i> | <i>Brassica campestris</i>    | Dec, 2018            | Patiala, Punjab     |

Cover slips were dislodged off the slide with a sudden jerk with the help of sharp edge of a razor blade and then both slides and cover slips were air dried. Staining of chromosome slides and cover slips was done in 2% Giemsa for 30 min. Permanent slides were made by dipping the air dried slides and cover slips in xylene and then mounting in Dibutyl Phthalate Xylol (DPX). The slides were kept in an oven at 60°C for overnight. The slides were observed under a binocular microscope and photomicrographs were taken. Well spread metaphase plates were selected for chromosomal measurements. Actual lengths of chromosomes were measured using an ocular micrometer. From actual length data, total complement length (TCL) was calculated. The relative lengths were calculated as the percentages of total complement length.

### 3. Results and discussion

#### 3.1. *Aphis gossypii*

Aphids of this species collected from the Hibiscus rosa-sinensis were green. The diploid chromosome number was found to be 8 (Figures 1 and 2). The actual length of chromosomes ranged from  $2.16 \mu\text{m} \pm 0.09$  to  $3.65 \mu\text{m} \pm 0.13$ . The total complement length was  $23.09 \mu\text{m} \pm 0.43$ . The relative length of chromosomes ranged from  $9.92 \pm 0.43$  to  $16.72 \pm 0.16$ . Idiogram shows a gradual decrease in the size of chromosomes (Figure 3).

#### 3.2. *Lipaphis erysimi*

Aphids of this species were yellowish green, small sized, often with white wax bloom. The diploid chromosome number was found to be 8 (Figure 4, 5 and 6). The length of

chromosomes ranged from  $2.02 \mu\text{m} \pm 0.13$  to  $4.22 \mu\text{m} \pm 0.24$  and the total complement length being  $24.87 \mu\text{m} \pm 1.38$ . The relative length of chromosomes ranged from  $6.50 \pm 0.43$  to  $13.57 \pm 0.80$ . Idiogram shows one long pair and others show gradual decrease in the size of chromosomes. Aphids of this species were yellowish green, small sized, often with white wax bloom. The diploid chromosome number was found to be 8 (Figure 4, 5 and 6).



Figure 1.

Figure 2.

Figure 3.

**Figures 1–3.** Karyotypes of aphids. 1–3. *A. gossypii* 1. Somatic chromosomes. 2. Karyotype. 3. Idiogram.



Figure 4.

Figure 5.

Figure 6.

**Figures 4–6.** Karyotypes of aphids. 4–6 *Lipaphis erysimi*. 4. Somatic chromosomes. 5. Karyotype. 6. Idiogram.

### 4. Conclusion

*Aphis* is the largest genus containing nearly 500 species.<sup>4</sup> So far, about 55 species belonging to this genus have been investigated cytologically.<sup>5,6&7</sup> Specie *Aphis gossypii* Glover included in the present investigation reveal the chromosome number of 8. As in species of *Aphis*, *L. erysimi* also has diploid chromosome number 8. Few studies reported the same number in *L. pseudobrassicae*.<sup>8,9</sup> However, the variations in

the diploid chromosome number such as 6, 8, 9, 10 and 12 in this species have been found and stated that these variations are due to fusion and fragmentation of chromosomes.<sup>5</sup>

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