INFLUENCE OF TEMPERATURE ON DEVELOPMENTAL STAGES OF MUTANT FORM (CURLED) OF DROSOPHILA MELANOGASTER (DIPTERA: DROSOPHILEDEA)

S. A. Choudhary
Department of Zoology, Govt. College for Women, Gandhi Nagar, Jammu, India

Developmental stages of mutant form (Curled) of Drosophila melanogaster were studied at temperature between 10±5°C to 35±5°C. The development time from egg to adult was averaged 21.50, 17.50, 10.00, 6.00, and 4.00 days and average percentage of survival was 54.00, 76.00, 90.00, 78.00, and 54.00 at 15, 20, 25, 30, and 32°C respectively. The optimum temperature for development was 25°C.

Temperature, a climatic factor has not only influence on the development, longevity, mortality etc but also on fecundity and sex ratio of Drosophila melanogaster. Drosophila is the most extensively studied and one of the best genetically understood organism in the world. The Drosophila is particularly attractive to genetic study because it has very large chromosomes in the nuclei of larval salivary gland cells allowing researchers to gain information regarding gene mapping, chromosomes' structure and gene expression. The flies are ideal laboratory subjects because they have short life cycle (10-14 days), easy to rear and mutation occurs normally in small population. Therefore this experimental insect has been studied at different temperatures for finding optimum temperature for the development. The optimum temperature plays important role in mass rearing technique of experimental insects. In the past various authors attempted studies related to temperature and development in different insects.

MATERIALS AND METHODS

Effect of temperature on the developmental stages of mutant form (Curled) Drosophila melanogaster has been studied by maintaining temperatures at 10±5°C, 15±5°C, 20±5°C, 25±5°C, 32±5°C and 35±5°C in BOD incubator and artificial food medium consisting of Corn flour, Agar, Sugar, Yeast, Nepagin, Proponic acid, 70% Alcohol and distilled water which was prepared according to the method by Aziz et al. Each of the developmental stage (egg, larva, pupa and adult) of mutant Drosophila was kept at above mentioned temperatures to observe their survival and reproduction. The experiment was initiated with neonates (0-12 hours old). Experiments were replicated five times and in each lot ten individuals were taken.

RESULTS AND DISCUSSION

The results are represented in Table and Figure 1, 2 and 3. The larval period was 0.00, 11.00, 9.00, 7.00, 4.00, 2.00 and 0.00 days while pupal period was 0.00, 6.00, 4.00, 2.00, 1.6, 1.3, and 1.1 days at temperatures 10±5°C, 15±5°C, 20±5°C, 25±5°C, 30±5°C, 32±5°C and 35±5°C respectively. The egg hatching period observed at above temperatures was 0.00, 5.00, 4.50, 2.40, 1.5, 1.30, and 0.00 days respectively. At 10±5°C and 35±5°C no larval development was possible. The pupal development was possible even at 35°C (Figures 1, 2 and 3). The optimum temperature recorded for development and survival was 25±5°C.

Kajita and Drake studied the development from egg to adult of Cotesia chilonis and Cotesia flavipes at two constant temperatures of 25°C and 80°C and noted that Cotesia chilonis and Cotesia flavipes required 17.40 days and 15.50 days and 18.20 days and 15.20 days respectively. Optimum temperature for development of Chilonus blacburni was studied by Jackson et al. Wherein they reported the range of optimum temperature between 30°C and 32°C. While in the present study optimum temperature for development of mutant (Curled) Drosophila melanogaster was 25±5°C. Sathe and Nikam studied the development of Cotesia flavipes on Chilo partellus. They noted that neither larval nor pupal development was possible at 10±50C and 35±50C; same situation was noticed in mutant (Curled) Drosophila melanogaster on artificial diet. Sathe and Nikam further reported that development of Cotesia flavipes was possible from 15±5°C and 32±5°C. Very similar trend of development was noticed in present mutant form Curled Drosophila melanogaster.

Egnoff and Watson studied the influence of temperature on adult Bracon kirkpatricki, they selected constant temperatures 20°C, 25°C, 30°C, 32°C and 35°C and correlated with fecundity, survival of individuals and intrinsic rate of increase. They
Table 1: Effect of different temperatures on developmental stages of mutant strain (Curled) *Drosophila melanogaster*.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Temp. (±5°C)</th>
<th>Average incubation period (Days)</th>
<th>Average Larval period (Days)</th>
<th>Average Pupal period (Days)</th>
<th>Average period for complete development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>5.00</td>
<td>11.00</td>
<td>6.00</td>
<td>21.50</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>4.50</td>
<td>9.00</td>
<td>4.00</td>
<td>17.50</td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>2.40</td>
<td>7.00</td>
<td>2.00</td>
<td>10.00</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>1.50</td>
<td>4.00</td>
<td>1.60</td>
<td>6.00</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td>1.30</td>
<td>2.00</td>
<td>1.30</td>
<td>4.00</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>0.00</td>
<td>0.00</td>
<td>1.10</td>
<td>-</td>
</tr>
</tbody>
</table>

reported that largest increase occurred between 20°C to 25°C in the constant temperature regimes. Above 25°C continued to rise to a peak value at 32°C followed by slight decline at 35°C. In the present study, development of mutant strain of *Drosophila* from egg to adult and survival was studied and 25°C was found as optimum temperature for development and survival. Sathe and Nikam\(^{11}\) reported that there was no larval as well as pupal development at 10±5°C and 35±5°C in *Cotesia orientalis*. Likely, in
percentage of survival and in the rate of development were much higher at 25°C than at other temperatures, 15°C, 20°C, 30°C and 32°C. Similarly, Sathe investigated optimum temperature of 25°C for the development of *Cotesia divrmi*. In the present study development was seen between 15°C and 32°C in the larval form. However, pupae can successfully develop into adult at 35°C but no larval development was possible at 35°C.

REFERENCES
