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The Biology and the Host Range of *Orosius albicinctus* Dist. (Homoptera: Cicadellidae), the Vector of Sesame Phyllody Disease

D. SUNDARARAJU[1] and S. JAYARAJ[2]

Studies on the biology and the host range of *Orosius albicinctus* Dist., the vector of Sesamum phyllody disease were made under field and insectary conditions. The mean duration of egg stage varied from 6 to 11 days, the total nymphal period 14 to 17 days and longevity of adults from 20 to 67 days in different seasons. The sesame MLO did not have any adverse effect on the longevity and fecundity of the vector. The vector bred successfully on 17 species of plants, among them seven species of plants viz., *Crotolaria juncea* L. *Sesamum laciniatum* Klein, *Solanum melongena* L., *Sphaeranthus indicus* L., *Gyandropsis pentaphylla* DC, *Cleome viscosa* L., and *Trichodesma indicum* RB., were utilised successfully for breeding under field conditions. It oviposited on *Arachis hypogaea* L., *Cajanus cajan* L., *Gossypium hirsutum* L., and *Abutilon indicum* G. and the nymphs perished without attaining maturity. It neither oviposited nor survived for long periods on 43 species of plants belonging to 12 families.

The sesame phyllody disease appears year after year in almost all sesame growing areas of the country. Besides sesame, the disease is prevalent in 52 species of plants in Delhi region (Sahambi, 1970). The casual agent was proved to be a mycoplasma like organism (MLO) (Cousin *et al.* 1970; Choopanya, 1973). Vasudeva and Sahambi (1955) reported that the vector of this disease is *Deltocephalus* sp. and Ghauri (1966) subsequently identified the same vector as *Orosius albicinctus* Dist. Bindra and Singh (1970) studied in detail the biology and the bionomics of the vector under Punjab conditions and no information is available on the host range and biology of this important vector under South Indian conditions. Hence the present studies were undertaken under insectary and field conditions.

MATERIALS AND METHODS

Batches of the adults of *Orosius albicinctus* were collected from different localities during September 1973 in Madurai, Ramanathapuram and South Arcot districts of Tamil Nadu, from disease - free sesame crops and were confined on healthy plants in cages to ascertain their non-viruliferous nature. The insects which gave the negative results in disease transmission alone were used for further mass culturing on sunhemp (*Crotolaria juncea* L.) which is one of the preferred alternate host plants.

1—2 : Department of Agricultural Entomology, Tamil Nadu Agricultural University, Madurai-625 104.

Biology: The duration of egg stages during different months was studied by confining gravid mated females for a period of 24 hours in glass chimney cages. The nymphs hatched out on each day by 8.00 a.m were counted and removed. To study the duration of nymphal stage, the nymphs hatched out in the same day were reared in groups upto adults in different months and the newly formed adults were sexed.

The longevity of ten males and ten females was observed in different months till death. The effect of MLO on fecundity and longevity of female insect was also studied by pairing continuously the 30 newly emerged adult viruliferous females with known number of non-viruliferous males. The fecundity was assessed by counting the total number of nymphs emerged and the longevity of adults was assessed from the day of emergence of adults till their death.

Host range studies: Sixtyfour different species of plants belonging to 19 families were tested to determine the host plant and by observing the natural breeding.

RESULTS AND DISCUSSION

Biology of the sesame phyllody vector: The biology of vector was studied in different months of 1974-75 and it was found that the egg period was shortest (6.41±0.50) during June 1974 and longest (10.72±0.84 days) during December 1974 (Table I). The average nymphal period was minimum (14.73±0.45 days) in March 1974 and maximum (17.4±0.72) during November (1974) (Table II). However, the difference in male and female nymphal period was not significant. The highest longevity of males (67.5±3.7 days) and females (67.3±4.7 days) was recorded in the insects which emerged as adults in September and lowest longevity of male (20.3±5.6 days) and female (20.1 ±4.9) was observed in insects which reached the adult stage in June. The difference in the longevity of the male and female was not significant. Bindra and Singh(1970) studied the biology of the same insect under Punjab conditions and found that the egg period varied from 6.2±0.2 days in June to 95.8±0.2 days in December and the total nymphal period varied from 11.6± 0 3 (June-July) to 105.3±2.8 days (in December-March). The total longevity of female varied from 12.2±1.1 days (August) to 91.0±6.0 days (December-March). It is obvious that

TABLE I. Duration of egg stage of *Orosius albicinctus* Dist. in different months.

Month	Mean Temp (°C)*	Duration of egg stage (days) mean ± S.D.
March, 1974	26.6	9.33 ± 0.59
April	28.6	8.27 ± 0.44
May	31.7	7.60 ± 0.76
June	32.4	6.41 ∓ 0.50
July	29.3	7.31 ± 0.50
August	29.6	7.54 ± 0.49
September	27.6	8.52 ± 0.51
October	26.9	8.59 ± 0.50
November	26.5	9.78 ± 0.70
December	24.4	10.72 ± 0.84
January, 1975	25.9	9.90 ± 0.75
February	27.3	9.36 ± 0.55

* Mean temperature during the respective incubation period.

TABLE II. Nymphal and adult longevity of *Orosius albicinctus* Dist. during different months.

Months	Mean temp. (°C)*	Mean nymphal period (days)			Mean temp. (°C)**	Mean adult longevity (days)	
		Male	Female	Mean ± S.D.		Male	Female
March, 74	26.5	14.63 ± 0.51	14.80 ± 0.41	14.73 ± 0.45	28.3	39.6 ± 5.4	36.3 ± 4.1
April	28.9	15.16 ± 0.84	15.12 ± 0.84	15.15 ± 0.83	31.6	28.2 ± 3.8	28.2 ± 3.4
May	30.7	15.00 ± 0.84	15.53 ± 1.11	15.30 ± 1.18	31.1	21.6 ± 2.3	22.8 ± 4.9
June	31.2	14.62 ± 0.75	15.38 ± 0.88	15.12 ± 0.85	31.5	21.3 ± 2.6	20.1 ± 4.9
July	29.5	15.00 ± 0.68	15.07 ± 0.76	15.03 ± 0.71	29.6	41.6 ± 3.2	37.8 ± 3.2
August	29.6	16.12 ± 0.60	16.16 ± 0.84	16.15 ± 0.75	28.1	48.4 ± 4.8	47.4 ± 3.6
September	27.9	16.63 ± 0.51	16.93 ± 0.70	16.81 ± 0.65	26.7	67.5 ± 3.7	67.3 ± 4.7
October	27.5	15.61 ± 0.51	16.33 ± 0.71	15.90 ± 0.65	—	—	—
November	26.7	17.50 ± 0.76	17.33 ± 0.72	17.40 ± 0.72	—	—	—
December	24.4	17.33 ± 0.87	17.44 ± 0.89	17.38 ± 0.85	25.9	49.6 ± 3.6	42.7 ± 5.6
January, 75	24.5	16.70 ± 1.16	16.61 ± 0.96	16.65 ± 1.03	27.0	38.4 ± 9.3	36.1 ± 4.5
February	27.6	16.25 ± 0.87	16.71 ± 1.14	16.50 ± 1.01	—	—	—

* Mean temperature during respective nymphal period

** Mean temperature during respective adult longevity period.

the differences in the duration of life history stages observed in these two different localities were due to differences in environmental conditions.

No significant difference was observed in the number of progeny from the non-viruliferous and viruliferous females. The mean fecundity and longevity of 21 non-viruliferous females was found to be 55.75±16.22 eggs and 38±5.93 days respectively, whereas the mean fecundity and longevity of eight viruliferous females was observed to be 55.90±17.58 eggs and 33.87±2 80 days respectively. It was also observed that the females in both cases started ovipositing when 7-8 days old. This indicated that no pathogenic and adverse effect was exerted by the phyllody MLO on its vector and it is in concurrence with the studies of Sahambi (1970).

Host range studies : Sixty four different species of plants belonging to 19 families were tested to determine the host range. The vector successfully bred on 17 species of plants, among them seven species were utilized for breeding under natural conditions (Table III). On four species of plants viz., *Arachis hypogaea* L., *Cajanus cajan*, L., *Gossypium hirsutum* L. and *Abutilon indicum* G., the adults oviposited and survived from 7 to 13 days but the nymphs survived upto the maximum of 6 days without

attaining maturity. The adults survived without oviposition from one to 12 days on 43 species of plants belonging to 12 families viz, *Phaseolus mungo* Roxb, *Phoaseolus aureus* Roxb., *Vigna sinensis*. *Tephrosia purpurea* Pers., *Tephrosia spinosa* Pers., *Alysicarpus rugorus* D. C., *Clitoria ternatea* L., *Cassia occidentalis* L., *Mimosa pudica* L., *Trianthema portulacastrum* L., *Elephantopus scaber* L., *Ageratum conyzoides* L., *Acanthospermum hispidum* D. C., *Eclipta alba* Hoask, *Tridax procumbans* L, *Flaveria australasica* H., *Coccinia indica* W & A, *Momordica charantia* L., *Ipomaea sepiaria* K., *Datura fastuosa* L., *Solanum xanthocarpum* S., *Solanum nigrum* L., *Physalis minima* L., *Ocimum sanctum* L., *Ocimum senum* S, *Boerheavia diffusa* L., *Digera arvensis* F., *Achyranthus aspera* L., *Euphorbia hirta* L., *Euphorbia prostrata* A., *Phyllanthus madaraspatensis* L., *Phyllanthus niruri* L., *Croton sparciflorus* M., *Acalypha indica* L., *Ricinis communis* L., *Cyperus rotundus* L., *Echinochloa colona* L., *Cynodon dactylon* Pers., *Dactylactenium aegyptium* B., *Pennisetum typhoides* Rich. *Eleusine coracana* Gaertn, *Sorghum vulgare* Pers. and *Oryza sativa* L.

It is also noteworthy that the weed plant *Sphaeranthus indicus* L. found abundantly in the fallow rice fields and the weeds viz. *Gyandropsis pentaphylla* D. C. and *Cleome viscosa* L.

TABLE III. Host plants suitable for breeding of *Orosius albicinctus* Dist.

Name of the plant species	Family	Maximum survival of adults (days)	Nymphal period (days)
Sesamum indicum L.	Pedaliaceae	> 25	15
Sesamum occidentale (H & R)	-do-	7	29
Sesamum alatum Thonn	-do-	> 25	21
Sesamum laciniatum Klein	-do-	> 25	16
Solanum melongena L.	Solanaceae	> 25	16
Sphaeranthus indicus L.	Asteraceae	> 25	15
Vernonia cinerea Less.	-do-	> 25	16
Vicoa indica Ds	-do-	> 25	15
Gyandropsis pentaphylla Dc	Capparidaceae	> 25	16
Cleome viscosa L.	-do-	> 25	16
Brassica campestris L.	Cruciferae	13	17
Amaranthus spinosus L.	Amaranthaceae	21	16
Amaranthus viridis L.	-do-	24	17
Portulaca oleracea L.	Portulacaceae	11	18
Corchorus olitorius L.	Tiliaceae	14	19
Trichodesma indicum RB	Boraginaceae	> 25	15
Crotolaria juncea L.	Leguminosae	> 25	16

were also found to be common during all seasons as garden land and waste land weeds. These species of plants may serve as the important reservoir host plants during the off season under natural conditions and these species of plants as hosts to this vector were not reported earlier. Though the above mentioned weeds were not host plants for phyllody disease, atleast they may harbour viruliferous leaf hoppers during off season. Bindra and Singh (1970) recorded seven and eight species of plants under laboratory and field conditions respectively utilised by this vector for breeding. As the sesame phyllody disease is prevalent throughout the year on *Crotolaria juncea* L., *Sesamum occidentale* (H. & R.) and *Sesamum alatum* Thonn in this locality and as the phyllody MLO had no adverse effect on the vector, it is possible that the viruliferous insects will be available throughout the year by having sustenance over these species of plants. Since the vector and the phyllody disease are having a variety of host lants it will be rather difficult to develop effective control measures.

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