

Incidence of *Hysteroneura setariae* Thomas in the North-Eastern Ghat zone of Orissa

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ABSTRACT

Infestation of Hysteroneura setariae Thomas, the rusty plum aphid, is reported for the first time from Phulbani in Kandhamal district located in the North-Eastern Ghat zone of Orissa, India during 2008-09. Apterous forms of *H. setariae* started infesting the panicles of F_1 plants of ZHU 11-26 \times DDR-121 during January, 2008 and gradually migrated to panicles of F_1 plants of Geetanjali \times ZHU 11-26 and Geetanjali \times Saria during May, 2008. The infestation site of the aphids was restricted to panicles only at the beginning and gradually spreaded to the leaves. Similarly, the alate forms of the aphid were detected after 70 days of the first appearance of apterous aphids. Ratio of winged to wingless aphids, their size and extent of damage to leaves and panicles varied with time. *Camponotus compressus* and *Solenopsis geminata* were observed attending the aphids. Under severe infestation, the aphids caused about 90% chaffiness of grains.

Key words: rice, aphid, *Hysteroneura setariae*, Phulbani, Orissa

Infestation of the rusty plum aphid, *Hysteroneura setariae* Thomas in rice has been reported from south India (David *et al.*, 1967), Orissa (Behura and Mahapatra, 1968), Delhi (Garg and Sethi, 1976) and eastern Himalayan regions (Raj Singh, 1968). Although this aphid is considered as a minor pest of rice, it has potential to cause significant yield loss. At Central Rice Research Institute, Cuttack, about 80% pots were severely damaged by this aphid in greenhouse during May, 1984 (Dani, 1986). Both adults and nymphs of this insect cause damage to plants by sucking the sap from immature grains and leaves. Grains show brown necrotic spots on moderate infestation while all spikelets become brown and chaffy when heavily infested. The honey dew secreted by aphids also invites fungal infection. This aphid mainly reproduces parthenogenetically. Nymphal development lasts for about 10 days through four nymphal instars. When the upper portion of rice plant dries up, this pest migrates to the basal portion of plant and remains in stubbles. If rice is grown in the same field during next season, the pest attacks the crop again (Dani, 1986).

Infestation of *H. setariae* in rice was noticed for the first time at Phulbani in Kandhamal district

located in the North-Eastern Ghat zone of Orissa during 2008-09. In the present investigation, studies on this aphid have been made with respect to some of its important morphological attributes, nutrition, locomotion and extent of damage.

The F_1 seedlings of the cross between ZHU 11-26 \times DDR-121 had been planted in pots within the net house during last week of October, 2007. Subsequently, F_1 seedlings of Geetanjali \times ZHU 11-26 and Geetanjali \times Saria were also planted in nearby location during third week of December, 2007. Rusty plum aphid infestation was observed soon after panicle emergence in rice. Only the apterous forms of *H. setariae* started infesting the panicles of F_1 plants of ZHU 11-26 \times DDR-121 during 1st week of January, 2008 and gradually migrated to panicles of F_1 plants of Geetanjali \times ZHU 11-26 and Geetanjali \times Saria during May, 2008. The alate forms were detected after 70 days of the first appearance of aphids. There was almost continuous availability of panicles for the aphids due to different dates of planting and ratooning of plants. Both the nymphs and adults attacked the plants and the infestation site was restricted to panicle only during first year. Ratoon crop was maintained to

observe seasonal variation in aphid infestation. Both the panicles and leaves were found to be infested in the ratoon crop during second year although the former were more preferred.

Based on the observation of 20 randomly selected panicles, the average population of rusty plum aphid was 210 panicle⁻¹ including 90 adults and 120 nymphs (Table 1). Nymphs were 0.3mm to 0.6mm in length and 0.2 to 0.4mm in breadth. The adults appeared in two forms, viz. alate and apterous forms. Nymphs were blood red to brown in colour while adults were brown to black. The winged adults moved faster with a speed of 10-20cm minute⁻¹ as compared to 5-12cm in minute⁻¹ wingless forms. The proportion of winged aphids was much less than the wingless ones with prominent seasonal variation. During 15-month study, highest proportion of winged forms appeared in November (14%) followed by August (12%) and July (10%) (Table 2). There was also variation in size of aphid in different months.

During first year, rusty plum aphid infested only the grains and panicle rachis but the infestation spread to flag leaf and subsequently to other upper leaves in the second year (Table 2). The number of aphids infesting the lower side of leaves was almost 10 times of the upper side. Similarly, congregation of

aphids was more at the base of the panicle due to availability of tender grains. Considering single grain, aphid population was found to be more at the base as well as on the side of grain not exposed to sunlight. Over 70% aphids were found concealed inside panicle (not exposed to outside) adhering tightly to rachis and unexposed parts of grain. The aphids did not prefer matured grains. There was a drastic drop in aphid population after maturity of grains and only few aphids were found infesting the leaves.

The ant species associated with the aphids were *Camponotus compressus* (Fabr.) and *Solenopsis geminata* (Fabr.). Both the species of ants were never found at one time. Although *Camponotus compressus* was found from end of October, 2008 to January, 2009, it disappeared completely in February, 2009 replaced by and *Solenopsis geminata*. Black ants was . Soil at the base of plant was the habitat for black ants and the disturbance of soil by black ants caused death or severe damage to young tillers. Although the appearance of ants was expected to be due to honeydew secreted by aphids, a slow decline in aphid population was noticed due to presence of ants. This might be due to frequent movement of ants over the whole panicle hindering congregation of aphids. Average aphid population panicle⁻¹ at peak infestation varied from 180 in

Table 1. Seasonal variation in aphid morphology

Month	Site of infestation	Alate forms (%)	Average adult size* apterous	Alate from
January,08	Panicle	0	2.5mm×1.7mm	-
February, 08	Panicle	0	2.1mm×1.2mm	-
March,08	Panicle	0.08	2mm×1.2mm	1.5mm×0.8mm
April,08	Panicle	0.04	2mm×1.2mm	1.3mm×0.6mm
May,08	Panicle	0	1.5mm×0.6mm	-
June,08	Panicle	0	2.5mm×1.8mm	-
July,08	Panicle	10	3.2mm×2mm	2mm×1mm
August,08	Panicle	12	3.5mm×2.2mm	2.1mm×1.1mm
September,08	Panicle	0	3mm×2mm	-
October,08	Panicle	0	3mm×2mm	-
November,08	Panicle	14	3mm×2mm	-
December,08	Panicle, leaves & stem	3	3mm×2mm	2mm×1mm
January,09	Panicle & leaves	1.0	2.5mm×1.5mm	1.5mm×0.8mm
February,09	Panicle & leaves	3.5	1.5mm×1mm	1mm×0.5mm
March,09	Leaves	2	1.2mm×0.8mm	1mm×0.4mm

* Mean values based on ten observations

Table 2. Chaff formation in different crosses due to severe aphid infestation

Parents	Aphid population/Panicle* in absence of ants*	% chaff in the absence of ants	Aphid Population/ panicle* in presence of ants	% chaff in presence of ants
Geetanjali × ZHU 11-26	180	88.0	142	51
Geetanjali × Saria	156	91.0	178	47
ZHU 11-26 × DDR-121	242	90.0	164	46

* at peak stage of infestation

Geetanjali × ZHU 11-26 to 242 in ZHU 11-26 × DDR-121 in absence of ants, and 142 in Geetanjali × ZHU 11-26 to 178 in Geetanjali × Saria in presence of ants (Table 3). However, it was observed that grain filling considerably improved when ants were present. The % chaff in Geetanjali × ZHU 11-26, Geetanjali × Saria and ZHU 11-26 × DDR-121 were 88%, 91% and 90%, respectively in absence of ants and 51%, 47% and 46%, respectively in the presence of ants.

REFERENCES

- Behura BK and Mahapatra S1968. Studies on the Aphidae of India. II. On the morphology of *Hysteroneura setariae* Thomas. *Prakruti Utkal University Journal of Science*. 5(2):63-81
- Dani RC 1986. Occurrence of Carolina (*Hysteroneura setariae* Thomas) on rice in green houses. *Proc. 2nd National Symposium on Recent Trends in Aphidological studies, Modinagar* (Ed. S.P.Kurl): 55-56
- David SK, Rajasingh SG and Narayan K 1967. The rusty plum aphid, *Hysteroneura setariae* Thomas in south India. *Journal of Bombay Natural History Society*. 64:380-381
- Garg AK and Sethi GR1976. Occurrence of rusty plum aphid, *Hysteroneura setariae* Thomas in Delhi. *Entomologists Newsletter*. 6(3):27
- Raj Singh SG 1968. Yet another aphid to ravage our grain crops. *Indian Farming*. 18 (3):20-21