

DESCRIPTION OF DEVELOPMENTAL STAGES AND SOME HOSTS OF
RIBAUTODELPHAX NOTABILIS LOGVINENKO (HOMOPTERA,
DELPHACIDAE) IN SHIRAZ, IRAN¹

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ABSTRACT

Ribautodelphax notabilis Logvinenko was found to infest maize, sorghum, and wheat in Shiraz, Iran. The insect has five nymphal instars. Features of the egg, morphological characteristics of the nymph, and additional features of the adults are described and illustrated.

تحقیقات کشاورزی ایران
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مشخصات مراحل رشد و بعضی از میزبانها ی زنجره
RIBAUTODELPHAX NOTABILIS LOGVINENKO
(HOMOPTERA, DELPHACIDAE) در شیراز

علی اصغر احمدی ، کرامت اله ایزدپناه و سیداحمد جعفری
به ترتیب استادیار ، استاد و تکنسین بخش گیاه پزشکی دانشگاه شیراز

خلاصه

بر اساس مطالعات انجام شده ، زنجره *Ribautodelphax notabilis* Logvinenko در شرایط مزرعه و گلخانه از گندم ، ذرت و سورگوم تغذیه کرده و زوی آنها تکثیر می یابد . این زنجره دارای پنج سن پورگی میباشد . مشخصات تخم ، مراحل مختلف دوران پورگی و حشره کامل تشریح و شکل دستگاه تناسلی خارجی نر ماده ترسیم گردیده است .

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INTRODUCTION

Ribautodelphax notabilis was originally described by Logvinenko in 1970 on the basis of 3 males and 4 females collected in Alushta, Crimean region of the USSR, in 1963 (2). As far as we know, no further studies have been made on this species. A preliminary study of this planthopper was undertaken in connection with its role in the transmission of a maize virus in Shiraz, Iran (1). In the present paper certain host plants and further areas of occurrence of *R. notabilis* are reported and the features of the egg and the morphological characteristics of the immature stages and adults are described.

MATERIALS AND METHODS

The insects used in these studies were originally collected in maize or sorghum fields in the Bajgah Experiment Station, about 15 km north of Shiraz. Planthopper colonies were developed by placing one or two adult females on young maize or wheat under plastic cages in a greenhouse. Insects from these colonies were used in various studies. To study the nymphal characteristics, young wheat seedlings were exposed to egg-laying females in the greenhouse for 24 hours. The planthoppers were then removed and the plants were transferred to an incubator at 27 C° and 40-70% RH with a 13 hr photoperiod. After emergence of the nymphs, daily samples, each consisting of five nymphs, were taken for 24 consecutive days (until adult emergence) and preserved in 70% alcohol. The length of the metathoracic femur and tibia, and the number of spines on the metathoracic leg were determined. Growth increment was calculated on the basis of these measurements. Wheat plants similarly prepared and maintained under the same conditions were used to study the characteristics and development of the egg.

RESULTS AND DISCUSSION

Natural Habitat and Hosts

R. notabilis was originally reported as a rare delphacid in the Crimean region of the USSR (2). Our studies, however, show that it is abundant in the vicinity of Shiraz, a region far away from the site of original collection. In addition to Bajgah (1), the insect was collected in Zarghan (about 30 km north of Shiraz) and Akbarabad (a village about 60 km south east of Shiraz on the road to Jahrom). Limited attempts to collect the insect in Estahban, Darab, Fassa, Firouzabad, Choram, Mamassani, Kazeroun and Boushehr were unsuccessful. *R. notabilis* infests wheat, maize and sorghum (and possibly other gramineous plants) in spring and summer and its nymphs have been collected on unspecified wild grasses and volunteer barley in winter. It causes damage directly by feeding and egg laying and indirectly by transmitting destructive viruses (1). In the greenhouse, it breeds well on wheat and maize. This species thus appears to be a pest of economic importance and to have a wider geographical distribution than originally reported.

Description of Developmental Stages

The egg. The egg is cylindrical, curved, measuring 0.20 x, 0.80 mm on average, with rounded ends, somewhat narrower at the anterior. The chorion is transparent and smooth. The newly laid egg is hyaline. However, a pigment spot appears at the anterior pole of the yolk on the second day. The spot moves to the posterior pole as a part of the embryo abdomen. The appearance and movement of the pigment spot are as described in *Saccharosydne saccharivora* (Westw.) (3). The normal oviposition site in maize and wheat leaf is the lower surface of the midrib, close to the auricle. The eggs may also be inserted into the stem. About 53% of the eggs on wheat were deposited in pairs (Fig. 2A) and 47% were laid singly.

The eggs are buried in the tissue, with the anterior pole just protruding beyond or flush with the epidermis. Whitish necrotic spots develop on the midrib as a result of oviposition.

One to two days prior to eclosion, the compound eyes, the division between the thorax and abdomen, and the legs are clearly visible. At this time the color of the egg is pale yellow with the orange abdominal spot and red eye spot in distinct contrast. The incubation period was 11 ± 1 days.

The nymph. As in other delphacids, obvious morphological changes occurred in the nymph during its development, such as increase in size, increase in spinosity of the metathoracic tibia and tarsus, differentiation of wing buds, increase in sensorization of the antennae and changes in pigmentation. Most workers have used the first two or three of these characters for recognition of different instars (3).

Size: The length of the metathoracic femur and tibia were measured on nymphs preserved in 70% alcohol. The data obtained fell into five discrete classes, indicating the presence of five nymphal instars (Tables 1 and 2). The ratio femur or tibial length of the instar $n+1$ /femur or tibial length of the instar n (the growth increment) was fairly constant, agreeing with Dyar's law (4).

Spinosity of metathoracic tibia and tarsus: Spines of the metathoracic tibia and tarsus were counted on 210 nymphs. The numbers obtained were the most distinctive feature for instar recognition. The tibia has two spines, one near the base and the other near the middle, from the 2nd to the 5th instar. The number of spines on distal ends of the tibia and on the tibial spur were different in different instars (Table 3). The tarsi were two-segmented in the 1st to the 4th and three segmented in the 5th instar.

The adult. The adult was described and the male genitalia were featured by Logvinenko (2). Further details are given below (Fig. 1 and 2 B).

Table 1. Length of the metathoracic femur of the nymph of *Ribautodelphax notabilis* Logvinenko.

Instar	Length (mm)		Growth increment
	mean \pm S.F.	range	
1	0.16 \pm 0.003	0.13 - 0.18	-
2	0.22 \pm 0.002	0.20 - 0.23	x1.37
3	0.31 \pm 0.003	0.28 - 0.33	x1.40
4	0.44 \pm 0.004	0.41 - 0.48	x1.41
5	0.63 \pm 0.003	0.60 - 0.63	x1.43

Table 2. Length of the metathoracic tibia of the nymph of *Ribautodelphax notabilis* Logvinenko.

Instar	Length (mm)		Growth increment
	Mean \pm S.E.	range	
1	0.22 \pm 0.003	0.18 - 0.23	-
2	0.29 \pm 0.003	0.28 - 0.31	x1.31
3	0.41 \pm 0.003	0.40 - 0.43	x1.41
4	0.61 \pm 0.011	0.54 - 0.63	x1.48
5	0.86 \pm 0.003	0.85 - 0.88	x1.40

Table 3. Number of spines on metathoracic tibiae and tarsi of the nymph of *Ribautodelphax notabilis* Logvinenko.

Instar	Tibia			Tarsal segment	
	Proximal and medial	Distal	spur	First	Second
1	0	3	1	4	0
2	2	3	1	4	0
3	2	4-5	1-5	5	0
4	2	5	5-10	6	0-2 [†]
5	2	5	10-17	7	4

[†]Four specimens out of 20 had one or two spines in the center of the second segment.

Vertex practically square, basal compartment broader at hind marginal than greatest length (2.2:1). Frons elongate, subparallel-sided, in middle line longer than wide at widest part (nearly 2.2:1), widest at level of ocelli, slightly tapering apically distad of widest part. Antennae with basal segment longer than broad at apex (2.6:1), rather compressed laterally, carinate below, second segment slightly compressed, 1/5 length of the first segment.

Male with frons black or dark brown between carinae; disc below eyes and genae dark brown with irregular yellowish spots close to subgenal suture; clypeus light brown; subgenae dark brown; antennae with basal segment and base of second segment black, remaining dark brown to yellow; pronotum yellow with blackish area behind eyes and two black or brown spots between lateral carinae. Scutellum black; posterior and sometimes lateral margin light yellow; carinae

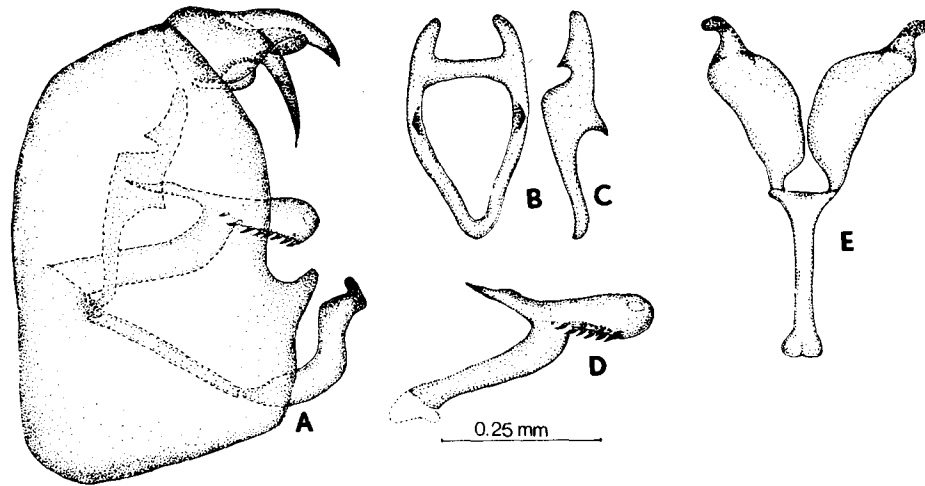


Fig. 1. *Ribautodelphax notabilis* Logvinenko: A, male genitalia, left side; B, suspensorium, posterior view; C, suspensorium, lateral view; D, aedeagus, left side; E, styli

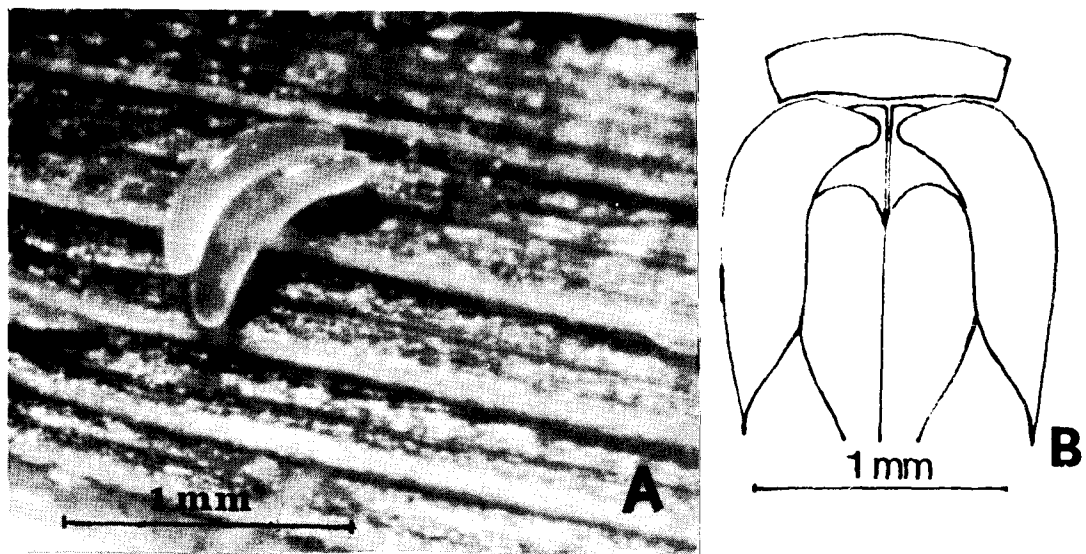


Fig. 2. *Ribautodelphax notabilis* Logvinenko: A, egg, removed from wheat tissue; B, base of ovipositor, ventral view.

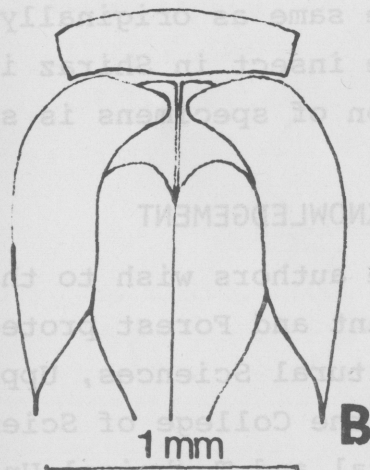
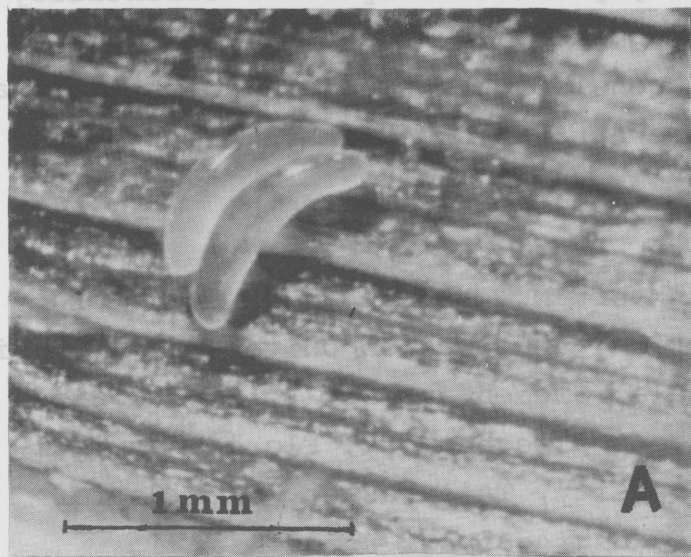


Fig. 2. *Ribautodelphax notabilis* Logvinenko: A, egg, removed from wheat tissue; B, base of ovipositor, ventral view.

shiny. Sclerites of lower surface of thorax brown to fuscous. Legs heavily suffused with yellowish brown except coxae and trochanter which are black to light brown. Tegmina hyaline, veins brown with minute fuscous granules. Male genitalia as figured.

Female with integument considerably lighter than in male. Frons yellowish or heavily suffused with brown; below eyes and genae, subgenae, and clypeus light yellow, sometime suffused with brown. Antennae with basal segment and base of second segment dark brown, the remainder yellow to light brown. Pronotum light yellow, suffused with brown laterally behind eyes; scutellum light yellow with 2 parallel brownish bands; posterior margin whitish.

Pregenital sternite (7th) well developed, blackish, with or without median pallid line; base of first valvifer of ovipositor produced in a rounded lobe mesally, inflected ventrad; first valvulae symmetrical at base.

Size: Male average length 2.4 mm, tegmen 2.9 mm. female average length 2.8 mm, tegmen 3.2 mm.

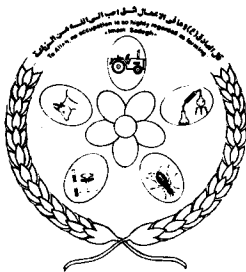
Remarks: The structure of the male genitalia in *R. notabilis* Logvinenko in the Shiraz population sampled is essentially the same as originally reported (2). However, the size of the insect in Shiraz is considerably smaller and the coloration of specimens is somewhat variable within the species.

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LITERATURE CITED

1. Izadpanah, K., A.A. Ahmadi, S. Parvin, and S.A. Jafari. 1983. Transmission, particle size, and additional hosts of the rhabdovirus causing maize mosaic in Shiraz, Iran. *Phytopath. Z.* 107: 283-288.
2. Logvinenko, V.N. 1970. New and little known leafhoppers of the family Delphacidae (Homoptera, Auchenorrhyncha) from southern districts of the USSR. *Ent. Rev. Washington* 49: 386-391.
3. Metcalfe, J.R. 1969. Studies on the biology of sugarcane pest *Saccharosydne saccharivora* (Westw). (Hom. Delphacidae). *Bull. Ent. Res.* 59:393-408.
4. Wigglesworth, V.B. 1963. The principles of insect physiology. Methuen, London, 741 p.



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