

FIRST REPORT OF WHORL MAGGOT INFESTATIONS IN RICE IN LOUISIANA AND TEXAS



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ABSTRACT

A rice insect pest is reported for the first time in Louisiana and Texas. The insect is a shore fly (Diptera: Ephydriidae) belonging to the genus *Hydrellia*. Although the name of the species is currently being researched, the insect has tentatively been referred to as a rice whorl maggot because of similar injury it causes to rice plants as that by a shore-fly species in Asian countries. The only shore-fly species previously known to infest commercial rice in the United States is the rice leaf miner, *Hydrellia griseola* (Fallén), which often is considered a minor pest. Whorl maggots were first observed sporadically during the 2003 rice growing season in both Louisiana and Texas. In 2004 several rice fields in Louisiana were seriously injured by the insect. Field observations indicate that plant injury tends to occur in young rice from emergence until the tillering stages. Injury is caused by immature stages of the insect and is described as large, elongated lesions along the margins of emerging leaves. The maggot mines the leaf or rasps the leaf surface before the leaf unfolds. As the leaf expands, yellow damaged areas are more visible. Affected young leaves usually break off or display a ragged appearance. The maggot continues to feed on the whorl tissue and enters the stem of developing tillers. Affected seedling plants are either killed by one or more larvae or plant growth is reduced resulting in stunted plants. In 2004, the maggots were observed in rice fields in Louisiana in Acadia, St. Landry, Vermilion, Jeff Davis and Concordia parishes and in Texas in Calhoun, Wharton and Jefferson counties.

INTRODUCTION

Several shore flies (Diptera: Ephydriidae) belonging to the genus *Hydrellia* have been reported and described from numerous hosts in the United States (Deonier 1971, 1998). In addition, two shore-fly species, *H. balciunasi* Bock and *H. pakistanae* Deonier, were introduced from Australia and Asia, respectively, for the biological control of the submersed weed hydrilla (*Hydrilla verticillata* (L.f.) Royle) in Florida and Texas with limited success (Grodowitz et al. 1997, Buckingham and Okrah 1993). Both introduced species failed to grow in rice during the host plant testing period (Buckingham and Okrah 1993).

Hydrellia griseola (Fallén) is one of the most widely occurring species of shore flies in the United States and the only species collected from cultivated rice (*Oryza sativa* L.) in this country (Deonier 1971). Rice-infesting ephydriids in the Americas are typically referred to as rice leaf miners and are considered minor sporadic pests of rice (Pantoja et al. 1993). Rice leaf miners known to infest rice in the New World include *H. griseola*, *H. wirthi* Korytkowski, *H. deonievi* Rambajan, and *H. spinicornis* Cresson (Pantoja et al. 1993). From these species, *H. griseola* and *H. spinicornis* are known to occur in the United States; however, only *H. griseola* was collected from United States rice.

During the past few decades, rice in the United States has been relatively free from major serious attacks by *H. griseola*. An outbreak of *H. griseola* occurred in California in 1953 which resulted in 10 to 20 percent damage to California's rice crop and a loss estimated at \$16 million (Grigarick 1959, Deonier 1971). *H. griseola* was first observed in rice fields in Louisiana in 1978 and in Texas in 1982 (Way et al. 1983). Damage by *H. griseola* in Texas in 1982 was reported as significant, regardless of location (Way et al. 1983). However, the species is considered only a sporadic problem in Louisiana (Ring et al. 1999). There are no additional reports of other *Hydrellia* species affecting commercial rice production in the United States.

Reports of Suspected *Hydrellia* Species New to U.S. Rice Fields

During the rice growing seasons of 2003 and 2004, simultaneous observations in Louisiana by B. A. Castro and Texas by M. O. Way revealed a maggot of an undetermined species causing injury to rice seedling plants. Adults of the suspected insect were reared from affected seedling plants containing larvae collected from rice in Louisiana and Texas and were sent to Dr. Wayne N. Mathis, Department of Entomology, Smithsonian Institution, Washington D.C. for identification in October 1994. Preliminary identification of adult males (structures of the male genitalia) confirmed this species belongs to the genus *Hydrellia* but ruled out *H. griseola*. Although the determination of the species name still is being investigated, it was also confirmed that specimens from Louisiana and Texas have identical genitalia characteristics. Therefore, the insect is suspected to be a new undescribed pest among currently known United States rice insects and the same species may be present in Louisiana and Texas.

Insect Description

Larvae are small, white or yellowish legless maggots of approximately 5-7 mm in length (Fig. 1). Pupae are elongate, tapered at both ends and brown colored (Fig. 2). Adults are small gray to dark gray colored flies of about 2-3 mm in length (Fig. 3).

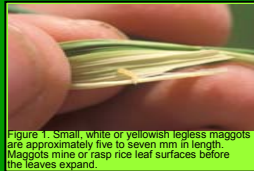


Figure 1. Small, white or yellowish legless maggots are approximately five to seven mm in length. Maggots mine or rasp rice leaf surfaces before the leaves expand.



Figure 2. Pupae are elongate, tapered at both ends and brown colored.



Figure 4. Large elongated lesions along the margins of the leaf.



Figure 6. Maggot inside rice tiller.



Figure 8. Shore-fly adult on affected rice leaf.



Figure 9. Injured rice plants distributed in large patches in the center or along the margins of the field.



Figure 3. Adults are small gray to dark gray colored flies of about two to three mm in length.



Figure 5. Affected young leaves usually break off or display a ragged appearance.



Figure 7. Pupa inside rice tiller, near the collar of the leaf.



Figure 10. "Rice whorl maggot" observed affecting rice fields in Louisiana: Acadia (1), St. Landry (2), Vermilion (3), Jefferson Davis (4) and Concordia (6) parishes, and Texas: Calhoun (6), Wharton (7) and Jefferson (8) counties in 2004.

Injury to Rice Plants

Field observations indicate that plant injury tends to occur in young rice from emergence until the tillering stages. All damaged fields were from late planted rice (i.e. planted in May and June in central and southeast Louisiana). The observed injury to plants resembles that of the rice whorl maggot, *H. philippina* Ferino, which affect rice production in Asian countries (Mueller 1970, Dale 1994) but is not known from rice areas in the western hemisphere. Injury is caused by immature stages of the insect and is described as large, elongated lesions along the margins of emerging leaves (Fig. 4). The maggot mines the leaf or rasps the leaf surface before the leaf unfolds (Fig. 1). As the leaf expands, yellow damaged areas are more visible. Affected young leaves usually break off or display a ragged appearance (Fig. 5). The maggot continues to feed on the whorl tissue and enters tillers of developing plants (Fig. 6). It was common to find one or two maggots in a single tiller. However, in one affected field, five larvae were observed in the same tiller. Affected seedling plants are either killed or plant growth is severely retarded. Pupation occurs inside the affected tiller, near the collar of the leaf (Fig. 7). It is common to observe adult flies resting on the leaves of affected plants (Fig. 8). Field damage was distributed in large patches either in the center or along the margins of the field (Fig. 9). There does not seem to be a clear varietal preference and differences among seeding methods have not been studied. Yield losses were not estimated in 2004. However, an undetermined yield loss may be the result of reduced plant density from plant death. In addition, surviving plants may have uneven and retarded growth and reduced tiller production compared to those in unaffected parts of the field. Stunted plants may be subsequently drowned once a flood is added to the field. Plants in a reduced stand density may be easily overcome by weeds.

Pest Distribution

The whorl maggot was reported causing serious injury to rice plants in seven fields in Louisiana. Fields were located in Acadia, St. Landry, Vermilion, and Jefferson Davis parishes. Larvae and adults also were observed in rice fields in Concordia parish. In Texas, the insects were reported from Calhoun, Wharton and Jefferson counties, which are spread throughout the Texas Rice Belt (Fig. 10). In Texas, damage appeared to be associated with thin rice stands.

Future Work

Efforts are being conducted to determine the true identity of this insect pest. Field inspections will be conducted during the next rice growing season to determine the distribution in rice fields and to assess any economic impact on rice production. Research on biology and management also are being planned under field conditions.

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