Proc. Fla. State Hort. Soc. 1997 Paper No. 128

Business Phone: 561-746-3740 Program Section: Vegetables

THRIPS, a Computerized Knowledgebase for the Identification and Management of Thrips Infesting Vegetables in the United States.

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Abstract A computerized knowledgebase was developed to enable vegetable producers, field technical staff, extension personnel, and other non-entomologists to identify the species of economically important thrips infesting vegetable crops. Thrips infest a wide variety of vegetable crops annually throughout the U.S. They damage produce by their direct feeding and egglaying activities, and reduce crop vigor and productivity through transmission of tomato spotted wilt virus. The software includes details of thrips biology and economic importance, and species-by-species management guidelines. Graphic and textual identification keys are presented, which guide the user through the necessary steps to identify common thrips species either in the field or in the laboratory. Information is also provided on monitoring and management techniques as well as collecting and preservation methods.

Introduction

Vegetable growers in all parts of the U.S. annually face the risk of crop damage or loss to thrips. This risk has increased over the years with the introduction of new pest species, either by movement of infested plant material or by natural migration. Introduced thrips pests can cause devastating losses, such as those suffered when *Thrips*

palmi Karny invaded Homestead, FL in 1990-91, and thus require early detection and appropriate treatment. Movement of the thrips-borne disease, tomato spotted wilt virus, into vegetable crops is a threat and knowledge of the thrips species infesting susceptible crops is a valuable first step in disease management. In the absence of these problems, sound management of thrips can rely on biological control agents or judiciously applied insecticides. In all the above cases, growers and others involved in making pest management decisions need information on the identity of the thrips and beneficial insects inhabiting their fields.

Several printed guides to the thrips have been published over the years (Palmer, 1989; Stannard, 1968). These have been designed largely for entomologists, and usually require a level of expertise beyond the scope of most agricultural professionals. The thrips knowledgebase described here was designed to bring the information needed to identify and manage thrips in vegetable crops to growers, consultants, extension agents, and other agricultural professionals who may lack the training or skills to make full use of the more technically oriented guides. A computerized format was chosen based on two criteria: 1) the results of in-house thrips identification training efforts, which indicated that learning is enhanced by plentiful illustrations and detailed explanation of technical terms, and 2) the success of this approach in presenting information on silverleaf whiteflies, mole crickets, and other insect pests. Development of a thrips identification kit was funded through the USDA's Small Business Innovation Research program as a central part of a complete program for the biological control of the melon thrips, *T. palmi*.

Materials and Methods

The Thrips Knowledgebase was prepared using HyperWriter (NTERGAID, 2490 Black Rock Turnpike, Fairfield, CT 06430). The textual portion of the program was written by Glades Crop Care, Inc. (GCC), drawing from their vegetable pest management experience, or from published articles. Photographic images were provided by GCC and H. T. Hsu (USDA). Detailed drawings of for the graphical identification key were made by T. X. Liu. The program is currently in an advanced stage of completion, and will be marketed by early 1998.

Results and Discussion

Following a survey of GCC collection records and published reports on thrips infesting vegetables, seven pest species were chosen for inclusion in the Thrips Knowledgebase. These include the western flower thrips,

Frankliniella occidentalis (Pergande), the tobacco thrips, *F. fusca* (Hinds), the Florida flower thrips, *F. bispinosa* (Morgan), the eastern flower thrips, *F. tritici* (Fitch), *F. schultzei* (Trybom), the melon thrips, *T. palmi* Karny, and the onion thrips, *T. tabaci* Lindeman. Also included were the grain thrips, *Limothrips cerealium* (Haliday), and the suborder Tubulifera. These were included because of their common occurrence and potential confusion with the pest species. The minute pirate bug, *Orius insidiosus* (Say), was included as the major biological control agent, although others, especially the predatory phytoseiid mites, are also mentioned.

The Thrips Knowledgebase is a 7 MB program that runs under Windows 3.1x, 95, or NT. Within each window in this program, the user is presented with options directing him either to a main menu or to the current menu. Movements within the program are facilitated by clickable screen buttons, which open menus, or by clicking the right mouse button, which returns the user to the previous screen.

With text and hyperlinked illustrations, the user is guided through an introductory section, explaining the purpose of the program, followed by discussions of thrips biology, their economic importance and the nature of their damage to vegetable crops. Also on the main menu are links to the detailed species descriptions, discussions of biological control, field activities for users, a bibliography, and identification keys.

Species descriptions provide information on geographic distribution, a detailed description, including characteristics which can be observed using low (20X) magnification for field identifications, and specifics on host range, economic importance, and management guidelines. Further details on thrips structures used in identifying species are given in the section containing the identification keys. As the intended market for this program includes non-entomologists, this section contains many links to definitions and drawings explaining and illustrating the specific structures. Identification keys are given in both plain text and hyperlinked graphical formats. In the graphical key, the user is presented with paired drawings clearly illustrating the key couplet. By clicking on the appropriate picture, the next couplet is presented. This process is repeated until an identification is made. Each species appearing in both the textual and graphical keys is linked to the appropriate species description.

The final sections provide information on scouting techniques and considerations, trapping methods, and specimen preservation. Scouting and sampling recommendations are derived from GCC's field experiences.

Preservation techniques are presented covering field to laboratory preservation, and the preparation of microscope slide mounted specimens. A list of suppliers accompanies sections where specialized materials are mentioned.

Literature Cited

Palmer, J., L. A. Mound and G. J. Heaume. 1989. IIE Guides to insects of importance to man. Thysanoptera. CAB International, Wallingford, UK. C. R. Betts, editor. 73 pp.

Stannard, L. J. 1968. The Thrips orThysanoptera of Illinois. Illinois Natural History Survey Bulletin. Vol. 29, Article 4. 552 pp.