FHP SPECIAL TECHNOLOGY DEVELOPMENT FINAL REPOR0T FOR FY 1998

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PROJECT STATUS: Completed

PROJECT NUMBER: NA-98-02

PROJECT TITLE: Adjusting the Federal Tomicus Quarantine for Log Movement to Millyards: How Do Tomicus Adults Disperse Within Millyards After Overwintering?

SUBJECT: Bark beetles

PROJECT OBJECTIVE: This project focused on spring-dispersal flight and reproductive behavior of the pine shoot beetle, Tomicus piniperda (L.) (Coleoptera: Scolytidae), in millyards. Specifically, this study addressed the following question: When temperatures warm sufficiently to support spring dispersal flight, do Tomicus adults that are overwintering in decked pine logs (a) reproduce within the same log deck where they overwintered, (b) fly to other pine logs within the millyard and then reproduce, or (c) disperse beyond the millyard in search of suitable host material?

BRIEF DESCRIPTION OF PROJECT:

Background: Tomicus piniperda was discovered in July 1992 near Cleveland, Ohio. Subsequent surveys through November 1998 have found this exotic bark beetle in 243 counties in 9 US states (IL, IN, MD, MI, NY, OH, PA, WI, WV) and in 21 counties in Ontario, Canada. In November 1992, USDA APHIS initiated a federal quarantine that regulated movement of pine logs with attached bark, pine Christmas trees, and pine nursery stock.

Since the original federal quarantine was imposed in November 1992, it has undergone relatively few modifications. Currently, for the logging industry, pines can be cut and shipped "freely" from regulated (infested) to unregulated (uninfested) areas only during the period July 1 to October 31. This "open season" was created because Tomicus adults feed in shoots during the months of July to October, and therefore, if all branches and foliage are left behind in the forest, then there is basically no risk of transporting Tomicus to uninfested areas.

On several occasions, representatives of the pine logging industry in the Great Lakes region have asked APHIS if changes could be made so logs could be moved to unregulated areas during the months of November through June. During the period November to March, Tomicus adults overwinter in the thick bark of live pine trees near groundline. Then, from March through May, adults generally reproduce in recently cut

pine logs, stumps, and slash. From June through October the new generation of adults feed within shoots of live pine trees.

At an APHIS- sponsored meeting in Michigan in August 1997, various proposed changes to the logging portion of the federal quarantine were discussed. At the heart of those discussions was the assumption that if overwintering Tomicus were inadvertently moved to millyards in some of the pine logs then, when temperatures warmed in spring, the beetles would "almost always" stay and reproduce in logs within the millyard. If true, then transporting infested pine logs to mills in uninfested areas would pose little risk of spreading Tomicus as long as all pine logs were processed before any brood adults could complete development and emerge. This 1-year STDP project tested this assumption.

Methods: Using baited funnel traps and trap logs, we monitored Tomicus spring flight and reproductive behavior in both operational millyards and in simulated millyards in Michigan. In five operational millyards in Michigan's Lower Peninsula (LP), we placed 9 funnel traps inside and up to 16 traps outside of each millyard. The traps placed outside the millyards were set out in the four cardinal directions (N, S, E, and W) at distances of 50, 100, 200, and 400 meters from the edge of the millyard. At some mills, it was not possible to place traps at all locations because of land ownership patterns. We placed six logs, which contained overwintering Tomicus, inside each of the five LP millyards to make sure that some Tomicus were present. We dusted the logs with a fluorescent powder so that the beetles would mark themselves as they emerged. Later, when the beetles were caught, we used the presence of the dust to positively identify the beetles that we had released.

We also placed 16 traps as described above around three millyards in Michigan's Upper Peninsula (UP). These three mills were located in counties that were considered to be Tomicus-free as of 1997. However, in late 1997 these mills had received permission from APHIS and the Michigan Department of Agriculture to import logs from Tomicus-infested counties in lower Michigan. We placed the traps around the mills as a check to see if Tomicus adults, if present, were leaving the millyards. We, of course, did not bring any infested logs to these three UP mills.

In the simulated millyard study, we set out four arrays of logs in an open field during late winter 1998. We utilized logs that were heavily infested with overwintering Tomicus adults. The logs were the lower 2-m stem sections of 36 Scotch pine trees. After cutting the trees, the basal 60-cm portion of each trunk (where Tomicus overwinters) was sprayed with fluorescent dust. In each ``millyard' a central log deck was constructed containing six uninfested red pine logs, each 2-m long, and nine infested Scotch pine logs. A different color of fluorescent powder was used for each simulated millyard. Satellite log decks, each composed of three uninfested red pine logs, 2-m long, were set out N, S, E, and W at 25, 50, and 100 m from the central infested deck. In addition, we set out funnel traps that were baited with a-pinene at the same three distances along NE, SE, SW, and NW transects. Therefore, each ``millyard' consisted of 51 logs (42 red pine and 9 Scotch pine) and 12 funnel traps. Overall, for the four millyards, there were 204 experimental logs (168 red and 36 Scotch pine) and 48 funnel traps. After peak flight in

spring, we collected the traps and logs. We counted all the Tomicus adults in the traps that had fluorescent dust. The beetles were examined under ultra-violet light to detect the presence and color of the fluorescent powder. After the logs were debarked, we recorded the number of Tomicus galleries on each.

FPM PERSON LEADING THE PROJECT: James B. Hanson (NA-FHP, St. Paul)

COOPERATORS:
1. Principal investigators:
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2. Cooperators:
USDA APHIS field staff from Niles, MI
Michigan Department of Agriculture field staff from Traverse City, MI
Huron-Manistee National Forests
Dudek's Christmas tree farm
Several Michigan sawmills
Biewer Sawmill, McBain, MI
Gym's Sawmill, Mio, MI
Northwood Lumber, Mio, MI
Hoeberling's Sawmill, Alpena, MI
Wayerhauser, Grayling, MI
Sawyer Lumber, Gwinn, MI
Mead Paper, Gulliver, MI, and Trout Lake, MI

ACCOMPLISHMENTS AND RESULTS:

Operational millyards: Overall, only 13 marked Tomicus adults were collected at the five Lower Peninsula millyards where infested logs had been placed. Of the 13 recovered beetles, 7 were collected within the millyards, 3 at 50 m, 1 at 100 m, and 2 at 200 m.

We collected Tomicus adults at two of the three operational millyards in the Michigan Upper Peninsula. Overall, 32 Tomicus adults were collected at the two mills: 12 at 50 m, 13 at 100 m, 3 at 200 m, and 4 at 400 m.

Simulated millyards: Overall, 481 Tomicus galleries were found on the 204 experimental logs. Of the 481 galleries, 426 galleries (89%) were found on logs in the central decks. Within the central log decks, 53% of the galleries were found on the Scotch pine logs which had been infested with the overwintering beetles, and 47% were found on the previously uninfested red pine logs. Only 11% of the 481 Tomicus galleries were established on the surrounding log decks: 26 at 25 m, 20 at 50 m, and 9 at 100 m. Considering the four cardinal directions, 25 of the galleries had been made on logs along

the north transect, 19 to the west, 5 to the south, and 6 to the east. The general pattern of Tomicus attacks was similar in each of the four simulated millyards.

With respect to the baited funnel traps, we only collected 4 marked beetles. Based on the color of the fluorescent powder present on the captured beetles, it was determined that three of the beetles had remained within their original ``millyard.' Two of these three beetles were captured in funnel traps at 25 m and one at 50 m from the central log deck. The fourth beetle, was captured approximately 230 m to the north of the central log deck from which it emerged.

Implications: These results demonstrate that very few Tomicus adults leave millyards when searching for reproductive sites. Nevertheless, given that Tomicus adults were caught outside of the millyards in each of the above three studies, it is apparent that some Tomicus adults will leave a millyard no matter how much host material is present. Such results suggest that transporting logs from infested counties to mills in uninfested counties poses a real risk of spreading Tomicus.

In another study conducted in 1998 in New York, APHIS personnel found that some Tomicus adults flew as far as 2 km from their overwintering site.

DOCUMENTATION:

Publications: Results from this specific study have not yet been published in a formal journal, however, highlights were presented at two meetings in 1998: the North Central Forest Pest Workshop in Iowa, and at an international IUFRO conference in Puerto Rico. The abstract from the IUFRO meeting appears on the Internet at:

http://iufro.boku.ac.at/iufro/iufronet/d7/wu70303/puertorico/poster_abstracts.html

Haack, RA, TM Poland and T Petrice. 1998, Tomicus piniperda in North America: Quarantines, millyards, and spring dispersal flight. Poster abstract for an IUFRO meeting entitled ``Solving Forest Insect Problems Through Research,' Working Parties 7.03.03, 7.03.05, and 7.03.07, San Juan, Puerto Rico, 1-4 June 1998.

FIRST YEAR FUNDED: FY 98.

YEAR SCHEDULED TO END: FY 98

ACTUAL YEAR TO END: FY 98

PRODUCTS AND DUE DATES IDENTIFIED IN ORIGINAL PROPOSAL: Research results will be accomplished by end of FY 98, with publications being published during FY 99.

STATUS OF PRODUCTS: Project results have been analyzed and a journal manuscript will be written and submitted in FY 99. Prior to publication, project results will be disseminated to users through various outlets.

PROGRESS ON THIS PROJECT: Acceptable.

FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH END OF FY 98:

Fiscal Year	STDP funding	Contribution	Source organization
1998	20K	40K	USFS, NCRS, NC-4501, Insect Unit
		1K	Michigan Dept of Agriculture, staff time
		1K	USDA APHIS, Niles, MI, staff time

FUNDS CARRIED OVER FROM FY 98 TO FY 99: None.

POST-PROJECT TECHNOLOGY SUPPORT: Not needed.

LOOK to the FUTURE: This study indicated that a small number of T. piniperda adults will disperse from their overwintering sites even when abundant host material is nearby. Such results point out that there is a definite risk that T. piniperda will become established in areas where sawmill managers import logs from Tomicus- infested counties. Additional studies should be conducted to determine the distance to which adults disperse after overwintering.