

EUROPEAN SPRUCE BARK BEETLE (*IPS TYPOGRAPHUS* (L.)) INTERCEPTIONS IN INDIANA 1995¹

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ABSTRACT: The European spruce bark beetle (*Ips typographus*), an exotic Eurasian species, is not known to occur in North America. The species is a potentially serious pest of spruce and, less frequently, other conifer species. European spruce bark beetle has been intercepted in survey traps at various ports in North America, including recent interceptions in New Jersey (1994) and Pennsylvania (1993). Surveys for spruce bark beetle have been conducted at Indiana ports since 1993 as part of a cooperative State and USDA, APHIS, PPQ Northeastern Region Bark Beetle Initiative. Negative findings were reported each year in Indiana until 17 April 1995, when one adult was intercepted in a trap within the Indiana Dunes National Lakeshore. This is the same geographic area from which early detections of the regulated pest species, pine shoot beetle (*Tomicus piniperda*), first occurred in Indiana. Following detection of the first European spruce bark beetle, an intensive trapping program was initiated. Thirteen beetles were trapped during 1995, eleven of which were taken directly at the port. No evidence of an infestation was found. All interceptions were apparently related to beetles arriving at the Port of Indiana in ships.

KEYWORDS: Exotic, Indiana, *Ips typographus*, regulatory, Scolytidae.

INTRODUCTION

Although many potential pest problems are addressed daily by Federal and State plant health regulatory officials, few instances of how the regulatory process works to mitigate an intercepted pest species have been presented in the scientific literature (see Appendix). Successful handling of new pest interceptions frequently results in activities which arouse little awareness in the general public. Success is a combination of fortuitous timing and good science, utilizing pest risk assessments and effective action plans. Action plans for the abatement and mitigation of an introduced pest are driven, in part, by the biology of the pest, its likelihood of causing extensive damage, and its ability to be intercepted and controlled through various identifiable pathways (National Plant Board, 1995). Knowledge of the regulatory process is critical to a long-term understanding of

¹ A separate presentation of this paper was made by the author at the annual meeting of the Central Plant Board (held in Des Moines, Iowa, on 4-7 February 1996) and will appear in report format in the minutes of that meeting.

regulatory actions as science and how such actions may benefit the general public as well as the regulated communities.

A discussion of a pest bark beetle, the European spruce bark beetle (*Ips typographus* (L.)), which was intercepted in Indiana, follows. This species is of considerable national interest because of its possible economic effect on coniferous forest timber resources.

BIOLOGICAL CONCERNS

Biological concerns regarding the European spruce bark beetle in North America have been well documented (e.g., anonymous, 1993; Whittle and Anderson, 1985). Christiansen and Bakke (1988) provide an overview of the biology and economic effects of this species in Eurasia, which may also apply to its possible biological activity in North America, if it should become established.

Two or three broods are produced by European spruce bark beetles in a single season. The adults overwinter in leaf litter and under bark near the sites where they emerged. They disperse in spring when temperatures rise to ca. 20° C (68° F) or approximately early April in Indiana. Dispersal flights may range from several meters to several kilometers depending on the food reserves of the individual beetle. Dispersal flight will continue until suitable host material is found or until the beetle expires. Beetles prefer weak, recently killed or felled spruce trees and slash in non-outbreak populations but will attack and kill trees when outbreaks occur (e.g., Christiansen and Bakke, 1988; Annila and Petaiso, 1978; Löyttyniemi and Uusvaara, 1977).

The European spruce bark beetle exhibits two behavioral phases: a dispersalist phase and a colonizing phase (Botterweg, 1982; Christiansen, 1991; Christiansen and Bakke, 1988; Gries, 1985). The dispersalist phase is comprised of single individuals and rarely results in the establishment of the species in the absence of diseased, stressed, or damaged spruce trees due to the inability of a single beetle to successfully colonize healthy trees (Bombosch, 1991). However, the colonizing phase is comprised of multiple individuals. During this phase, the beetles exhibit pheromone responsive attack behaviors which frequently result in establishment on diseased and damaged host materials or on healthy hosts. Large populations may become established (Anderbrant, *et al.*, 1988). With large populations, even healthy trees may be successfully colonized. When populations of this beetle are large, and host material is available, epidemics may last for extended periods of time. Exemplars of lengthy epidemics include ranges from seven to fifty years (Christiansen and Bakke, 1988). However, control of epidemic populations can be regained by good forest sanitation practices; i.e., the removal of freshly killed or felled trees, broken limbs, and so forth (Christiansen and Bakke, 1988). Beyond the damage caused by direct infestations, the European spruce bark beetle is known to vector several species of blue stain fungus (*Ophiostoma* spp.). The presence of the fungus can lead to additional adverse economic effects (e.g., loss of marketable timber and reduced recreational use (Christiansen, 1991)).

HISTORY OF BARK BEETLE STUDIES IN INDIANA

The earliest faunistic treatise including Indiana bark beetles was that of Blatchley and Leng (1916). Deyrup (1981) performed the most recent survey of the bark beetles of Indiana followed by distribution and biological updates (Deyrup and Atkinson, 1987a, b). Ninety-two species of bark beetles were recognized from Indiana as of 1987 (Deyrup and Atkinson, 1987a). Two additional records of exotic bark beetle species, *Xyleborus atratus* Eichhoff and *Xylosandrus crassiusculus* (Motchulsky), were obtained in Indiana as a result of the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ) Northeastern Region Bark Beetle Initiative. The results will be reported by Cavey and Passoa (in prep.). Another introduced bark beetle, pine shoot beetle (*Tomicus piniperda* (L.)) was also reported from Indiana as the subject of a Federal and State quarantine (see Sadof and Waltz, 1992; Sadof, *et al.*, 1995). Like the spruce bark beetle, this latter species was believed to have been introduced through Burns Harbor. A total of ninety-five bark beetle species are recognized as established in Indiana as of this writing. The spruce bark beetle is not known to be established in Indiana or anywhere else in North America.

Dunnage. The continued introduction of exotic bark beetles from infested wood products carried within a ship's hold (dunnage) is problematic (e.g., Sadof, *et al.*, 1995; USDA, APHIS, PPQ, 1995). However, a final rule regulating dunnage and other non-manufactured wood articles has been enacted (USDA, APHIS, PPQ, 1995), which should lead to reduced pest introductions via dunnage.

1995 Interceptions. In 1995, a single European spruce bark beetle was intercepted in a baited trap monitored by the USDA, APHIS, PPQ as part of a northeast region (USDA region) State-Federal cooperative program on introduced bark beetles. Following the initial interception, approximately 200 additional baited traps were placed within a twenty-mile radius of the Port of Indiana and monitored for additional interceptions. Twelve additional beetles were intercepted; ten beetles were trapped within the Port of Indiana perimeter, and two beetles were found on private property in separate locations within a few miles of the port.

Several attempts to scout and locate possible host sites within the twenty-mile radius of the port resulted in the discovery of a few old, recently felled Norway spruce (*Picea abies*) trees at the Dunes National Lakeshore. These trees were examined and found to be infested with *Ips grandicollis* Eichhoff, but no signs of galleries or excavations by *Ips typographus* were found. The trees were burned within days of their discovery by National Lakeshore personnel.

A total of 13 European spruce bark beetles were reported from Indiana. The capture of the majority of trapped beetles appeared to coincide with the arrival of a ship from the Ukraine. No further beetles were discovered in 1995 or in 1996 in follow-up surveys. No evidence of any established population of this species in Indiana was found.

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APPENDIX

CHRONOLOGY OF INTERAGENCY COOPERATION

Upon detection and confirmation of the first spruce bark beetle (collected on 17 April 1995), an electronic message was forwarded by USDA, APHIS, PPQ to all States providing notification of the confirmed interception in Indiana. The State Entomologist, Indiana Department of Natural Resources (IDNR), was notified prior to the release of the electronic message regarding the confirmed find and began coordination activities with the State Plant Health Director (USDA, APHIS, PPQ).

Immediately following confirmation, additional lindgren funnel traps were placed within the Burns Harbor and Dunes National Lakeshore area. Calls to other federal agencies for additional traps were coordinated by the USDA State Plant Health Director, who also placed orders for lures attractive to the spruce bark beetle to be used in the delimiting survey. Communication was maintained between USDA, APHIS, PPQ, IDNR, USDA Forest Service, and Dunes National Lakeshore personnel as the traps and other support and operations materials arrived and were placed. Data on biology, controls, and pathway information were gathered by the State Entomologist. Trapping protocols used previously by the USDA in other States with this species were obtained by the USDA State Plant Health Director.

After placing the traps in the area of the initial interception and nearby surrounding sites, additional beetles were detected. Further resources were required to expand the delimiting survey.

A response team coordinated by USDA, APHIS, PPQ (Jerry Fowler, Chair) was assembled. This team was comprised of Federal and State cooperators and functioned as the New Pest Advisory Group (NPAG). A teleconference among the members of the NPAG was held on 25 May 1995 to appraise the situation and establish a plan of action. NPAG members were asked to consider and discuss possible courses of action, including trapping protocols at different levels of intensity and coverage.

A subsequent meeting was scheduled between USDA, APHIS, PPQ (Gary Simon), USDA Forest Service (Mike Connor), IDNR (Robert Waltz), and the Indiana Dunes National Lakeshore (Randy Knutson) to finalize details of a trapping plan and to locate resources for implementation. This meeting was held on May 26 at the Indiana Dunes National Lakeshore. A report drafted by the USDA Forest Service, which provided a summary of the meeting, was filed by Mike Connor. Results of this meeting were forwarded to the NPAG and to the USDA Forest Service for further comment and final approval.

During the week of May 29, verbal notifications with written executive summaries of the pest status and interception as well as a copy of a draft news release were provided to regional Cooperative Extension Service personnel, Cliff Sadof (Purdue University), IDNR Executives, and the Office of the Indiana Commissioner of Agriculture. For all parties involved, this was not the first notification

of the interception but a notification of a possible change in program activity levels and a beginning of the public education process.

Possible host sites for this species, which were identified by aerial and ground surveillance, are extremely limited in northern Indiana, especially for the preferred host, spruce. Potential host sites included wind breaks, landscape plantings, and a few plantings in recreational areas, on State fish and wildlife properties, and on private property. For this pest, Christmas tree production areas and production nurseries were not deemed to be preferred host sites, although selected properties were monitored for purposes of confirmation.

Approval to fill two temporary positions was granted to the State Plant Health Director by USDA, APHIS, PPQ. Funds for materials and additional traps were provided by the USDA Forest Service. Materials and people were ready for deployment by June 7.

On June 10, a news article by the Associated Press appeared in the *Indianapolis Star* informing the general public of the spruce bark beetle detection and the planned trapping. The article was of particular interest to nurserymen and Christmas tree producers in Indiana, who had experienced the development of pine shoot beetle regulations and might encounter misinformation regarding the spruce bark beetle introduction and the intent of the delimiting surveys. Other news stories and at least one radio interview were conducted regarding the interception and delimiting survey activities.

Delimiting traps were placed by USDA, APHIS, PPQ during the week of 12 June 1995 and were removed by the week of September 4. A total of 184 traps were placed; 78 traps were placed within a 10-mile radius of the port, and another 106 traps were placed at possible host sites within the 25-mile radius. Twelve additional beetles were collected after the trapping commenced; 11 beetles were intercepted at the port, and one beetle was intercepted in a trap at a private residence in Chesterton.

A summary meeting was held on 11 August 1995 at the Indiana Dunes National Lakeshore, which included all the May 26 attendees as well as Dennis Haugen (USDA Forest Service) and Charlotte Gallowitch (USDA, APHIS, PPQ). A review of the present status and program activities to date was presented and discussed as were survey plans for 1996.

An on-site review of possible host material at the Indiana Dunes National Lakeshore resulted in the discovery of a significant population of *Ips grandicollis* (Eichhoff) in recently a felled Norway spruce (*Picea abies*). However, no spruce bark beetles or galleries created by spruce bark beetle were found. The felled spruce was burned by Indiana Dunes National Lakeshore personnel within three days of its discovery.

FINAL ANALYSIS

In final analysis, this author believes the regulatory system was a success. A few of the more critical factors in that success are cited below.

Prior pest survey for this species established the fact that detected beetles were new introductions and were not coming from established, incipient populations. Similarly, more generalized faunal surveys of the Indiana species of bark beetles confirmed the absence of the introduced pest in collections taken over a period of years.

Literature and data on the beetle were readily available through the USDA, APHIS, PPQ, USDA Forest Service researchers, abstracting services, and so forth, including pest risk analyses completed several years previously (e.g., Whittle and Anderson, 1985). Funding for the port and domestic bark beetle trapping program via the Cooperative Agricultural Pest Survey (CAPS) and USDA program funds was instrumental in validating pest distribution within the north-east region. However, further trapping should be attempted by all States with ports or exposure to the St. Lawrence Seaway, before they are declared free from this pest. As demonstrated in the Indiana case, negative data based on prior pest and faunistic surveys allowed a clear assessment of the interception status and reduced the need for more extensive and costly trapping protocols.

The team management concept, practiced in the USDA's New Pest Advisory Group, allowed a gathering of technical experts and policy makers to formulate appropriate response plans and to allocate resources where they were needed as quickly as possible. Resources were allocated across agencies and across Federal and State cooperative lines. Prior USDA/State experience in working through interceptions of this beetle in Pennsylvania (1993) and New Jersey (1994) were beneficial in establishing a proven track record of interception and detection/delimit trapping for this species.

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