

ERADICATION OF AN EXOTIC AMBROSIA BEETLE, *XYLOSANDRUS CRASSIUSCULUS* (MOTSCHULSKY), IN OREGON

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ABSTRACT

The Oregon Department of Agriculture (ODA) has been monitoring an industrial plant in The Dalles, OR, for exotic wood boring insects since 1998. This plant receives raw railroad ties from British Columbia and several localities in the United States, including Arkansas, Missouri, and Texas. On several occasions, ties were imported from Mexico and Russia. Upon receipt, the ties are left outside to dry in the local arid climate, sometimes for more than a year. During this period, the ties are often stored adjacent to potential hosts for wood boring insects. When dry, the ties are treated with creosote and used in the construction of rail lines.

ODA used Lindgren funnel traps baited with alpha-pinene and ethanol, ethanol alone, and exotic *Ips* lures to survey for target insects. Wood boring insects known from the southeastern U.S., but not from the West, were detected almost from the outset of trapping. Through 2003, these included *Monochamus carolinensis* (Olivier), *Tetropium castaneum* (Linnaeus), *Xylotrechus sagittatus* (Germar) (Cerambycidae), *Gnathotrichus materiarius* (Fitch), and *Xylosandrus crassiusculus* (Motschulsky) (Curculionidae: Scolytinae). Two species were exotic to North America: *T. castaneum*, a European species never before trapped in the U.S., and *X. crassiusculus*, an Asian species exotic to North America but known to have been established in the Southeast since 1974. Other than *X. crassiusculus*, these species are known only to attack coniferous hosts. This made sense, since the bulk of the ties received at the plant were from conifers. Trapping and other methods (e.g., bait logs) subsequently determined that neither of the latter two species had become established at The Dalles.

In 2004, there was a puzzling change. Additional species known from the Southeast, but not the West, were detected, including *Euplatypus compositus* (Say), *Monarthrum fasciatum* (Say), *M. mali* (Fitch), and *Oxoplatypus quadridentatus* (Olivier). Unlike the previous detections, these species were, for the most part, associated with broad-leaved hosts. Most alarming were the high numbers of *X. crassiusculus*. Tie plant staff verified that the source and nature of ties received at the plant had changed to predominantly hardwood ties, mainly oak and hickory, from the Southeast. Seven additional Lindgren traps were placed around the immediate outskirts of the tie plant. By mid-November of 2004, when trapping was terminated, 156 *X. crassiusculus* individuals had been captured. The pattern of catch suggested not only an established population of *X. crassiusculus*, but also a very localized infestation.

ODA was very concerned about the possibility of this exotic pest becoming permanently established in Oregon. This ambrosia beetle is becoming a significant pest of nurseries, ornamental plantings, and orchards in the Southeast. It is known to attack and kill apparently healthy hosts and has been documented from more than 200 species of woody plants, including cherries, grapes, oaks, peaches, pines, poplars, and many important nursery plants. It could pose an immediate threat to Oregon agriculture because The Dalles is a major production area for cherries and other fruits. The Dalles is also only a few miles east of the heart of Oregon's orchard country. Because Oregon nursery and greenhouse sales were almost \$1 billion in 2007 (the most recent year for which this information was available), any threat to this industry must also be

taken seriously. Consequently, if *X. crassiusculus* was established in The Dalles, ODA felt compelled to consider eradicating this pest.

Although the 2004 trapping suggested the *X. crassiusculus* infestation was sufficiently restricted to allow possible eradication, this was not certain and could only be ascertained through a delimitation survey. Such a survey was initiated in 2005, using 12-funnel Lindgren traps baited with four ultra-high release ethanol lures per trap. Based on the delimitation schemes ODA used for gypsy moth infestations, the traps were deployed at 49/mi² in a core area centered around positive 2004 trap sites, at 25/mi² for a half-mile buffer around the core area, and at 5/mi² beyond the buffer boundaries, for a total of more than 200 traps. All traps were placed by April, before any overwintering beetles were expected to fly. Although traps remained active until mid-November, by mid-July it was apparent that emergence and flight of *X. crassiusculus* had peaked in mid-June. The delimitation trap data to that point, along with the 2004 data, indicated the bulk of the infestation extended over an area of about 394 acres, and all of the catches could be encompassed within 860 acres. ODA concluded that eradication was possible.

Preparations for a potential eradication program in 2005 began late in 2004. There were many challenges to consider. As best we knew, no such program targeting an ambrosia beetle had been conducted anywhere, so there were no established protocols. In addition, no insecticide was known or registered for the eradication of ambrosia beetles. Because *X. crassiusculus* is facultatively parthenogenetic, 100 percent mortality was necessary for successful eradication. Sited in the western end of the Columbia Gorge, The Dalles is one of the wind-surfing capitals of the world, with almost constant high winds during the day. It is also the junction of a major interstate freeway and several state highways, with much human traffic and activity during the day. The proposed treatment blocks were bounded to the north by the Columbia River and included several streams and

other bodies of water. The pesticide ODA selected could not be applied over water. The broad known host range of *X. crassiusculus* suggested that virtually any woody plant could be a host. Access to some hosts was difficult because of their size or location in the often rough and steep terrain. Finally, the volume of material to be treated at the tie plant was daunting – almost 1/2 million ties.

Eradication efforts took place in 2005 and 2006. The first eradication action was to request that the plant immediately cease further importation of all rail ties from the Southeast. Any subgrade ties and pieces of wood used to separate ties during shipping were to be burned. All ties on the plant premises were to be heat treated and creosoted as soon as possible, which was completed by October 13, 2005. Before that treatment, all ties on the premises were sprayed with a permethrin product, Perm-up 3.2EC. This pesticide was selected because it binds to cellulose and thus has long residual activity, up to 6 months. At least some potential host material was removed from the tie plant premises and chipped or burned, along with recently cut wood and limbs at a nearby park.

Three ground sprays of all shrubs and trees in treatment blocks, using Masterline Permethrin Plus-C, were conducted. Like Perm-Up, this formulation binds to cellulose and has long residual activity. Unlike Perm-up, it is registered for use on live plants. Because of the high winds and extensive human traffic in the area during the day, applications were primarily made at night. Permethrin cannot be applied over water, so host plant treatments had to be performed as ground applications. This required obtaining permission to spray from all private landowners. A day crew acquired permissions and a night crew conducted applications. Because some potential hosts were very tall or difficult to access, “bucket” trucks were often necessary. The first treatment was conducted in early July 2005 over the large block of 860 acres. The second treatment, targeting any *X. crassiusculus* that may have emerged from untreated ties, took place in the core block of 394 acres. A final application over the large block was

performed in April 2006, before any surviving and overwintering beetles would become active.

Post-treatment surveillance (with more than 157,000 wood boring insects trapped and examined) since 2005 has detected no further *X. crassiusculus* or other wood boring species of concern. The rail tie plant is

now under a compliance agreement with ODA and can bring in ties from the Southeast only from December through February, when the risk of tie infestation and subsequent emergence of *X. crassiusculus* in Oregon is lowest. This is the first instance of the eradication of an exotic ambrosia beetle in North America.