

December 5, 2005

## 2005 Preliminary Western Washington Pheromone-trap Delimiting Survey for *Cydia coniferana* (Lepidoptera: Tortricidae), an Old World Conifer-bark-feeding Tortricid New to Western North America

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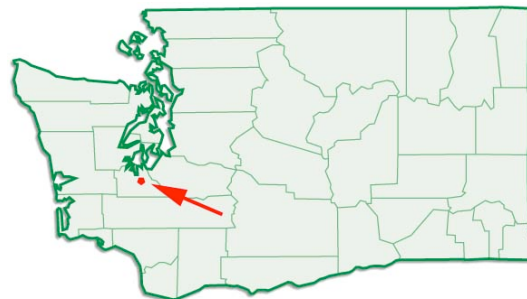
### Background

A single adult male *Cydia coniferana* (Saxesen, 1840) was collected in 2000, as a non-target capture, in a USDA APHIS CAPS detection survey for European corn borer, *Ostrinia nubilalis*, in western Washington State. That collection was the first record of the Eurasian species in the Western U.S., and only the second location recorded for it in North America. The previous North American records consisted of several adults reared from pine in New England in the 1950's, and the species was subsequently not officially reported for North America because it appeared to not get established (Wm. Miller, personal communication).

The 2000 collection was in a pheromone-trap baited with the (hybrid) European corn borer lure (1:1 Z11/E11-14Ac) on May 30, at a site in Tumwater, Thurston County, Washington (Figure 1.). The specimen identification, after initially determined as a potential exotic species collection by the WSDA Olympia Entomology Laboratory in April 2005, was confirmed by Dr. Wm. Miller (U. Minnesota, St. Paul), via a WPDN consultation, May 9, 2005.

*C. coniferana* is native to Europe and Asia, where the larvae feed in the cambium layer of the bark of many conifer trees, including *Pinus spp.*, *Picea spp.*, and *Abies spp.* (Bradley et.al., 1979). It is not generally considered a significant pest in Europe, although it is associated with fungal disease infected host trees and identified as a "harmful species" in Western Russia (Medvedev ed., 1987).

Figure 1. 2000 *Cydia coniferana* Collection Site in Western Washington



### 2005 Project Objectives

1. Determine survey methods and survey area priorities (as resources allow).
2. Conduct a preliminary delimiting survey of *Cydia coniferana* distribution in western Washington.

### Project Methods and Materials

A total of 200 pheromone-lure-baited traps were placed in counties along the I-5 corridor in western Washington, from King County south to the Oregon border (Table 1). Trap sites were roadside or residential yard trees, mostly various *Pinus spp.*, and a few true fir (*Abies spp.*), Douglas fir (*Pseudotsuga menziesii*), and spruce (*Picea spp.*).

Table 1. 2005 *C. coniferana* Trap Site Numbers and Results by County

County	Total Sites	Positive Sites	% Sites Positive	Total Moths	Average moths (per Pos. Site)
King	30	28	93.3%	885	31.6
Pierce	50	46	92.0%	976	21.2
Thurston	60	58	96.7%	1,453	25.1
Lewis	30	26	86.7%	400	15.4
Cowlitz	10	9	90.0%	154	17.1
Clark	20	18	90.0%	477	26.5
Totals	200	185	92.5%	4,345	23.5

Traps were placed in early June and inspected about every two to three weeks until late August.

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**Project Methods and Materials (Cont.)**

Pherocon 2® type traps were used, with pheromone lures provided by the USDA APHIS Otis Methods Development Center. Lures consisted of 0.5 mg of E,8 – Dodecenyl Acetate on a hexane-rinsed red rubber septa, and were changed every four weeks or less.

All field and lab data in this survey was recorded on a Zire72® handheld PDA, using SmartList® vers.2.6 and Cetus vers.2.1 connected by Bluetooth® to a PalmOne® GPS receiver. Additionally, digital images of sites were captured with the Zire72® using PalmOS® proprietary software (example in Figure 2.)

**Project Results and Discussion**

Survey results, summarized by county in Table 1 and illustrated in Figure 3, clearly show that *C. coniferana* is well established, widespread, and common in the survey area. Traps at 185 (of 200 total) trap sites caught *C. coniferana* in this survey, which is 92.5% of all sites trapped. In total, 4,345 male *C. coniferana* were collected, with an average catch of 23.5 moths at positive sites.

Across the six counties surveyed, the proportion of positive (to negative) sites was high and uniform – ranging from 86.7 to 96.7% positive. The average number of moths captured across counties surveyed was also fairly uniform, with county averages of 17.1 to 31.6 moths per positive site.

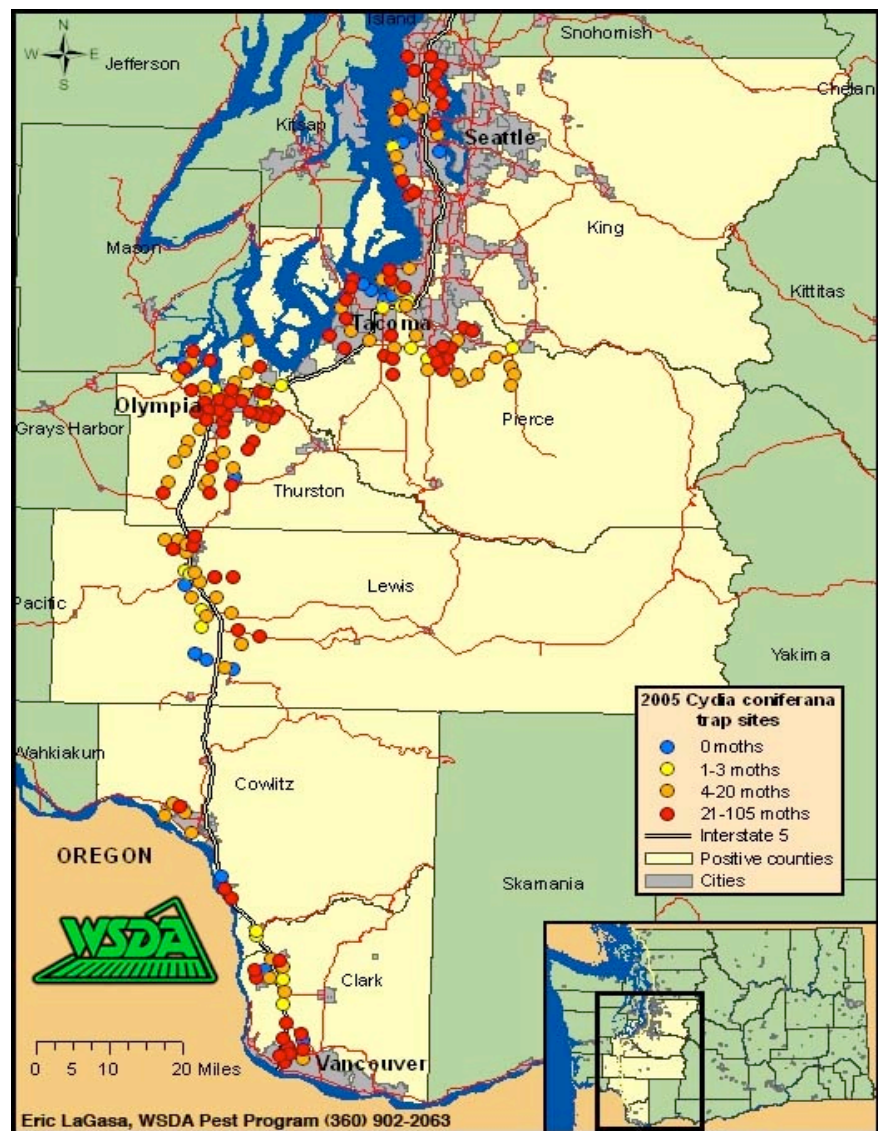
Additionally, the distribution of positive sites and catch numbers did not vary significantly between rural/woodland areas and more urban sites.

In light of the generally prevalent and uniform occurrence of *C. coniferana* in the surveyed area, it is likely that the current distribution of the introduced species includes more (if not most) of western Washington and possibly adjacent areas in Oregon and British Columbia west of the Cascade Mountains. Additional survey is needed to determine the extent of current distribution of *C. coniferana* in the Pacific Northwest.

**Figure 2. Typical Site (Zire72® Image)**



**Figure 3. 2005 *Cydia coniferana* Survey Sites and Results**



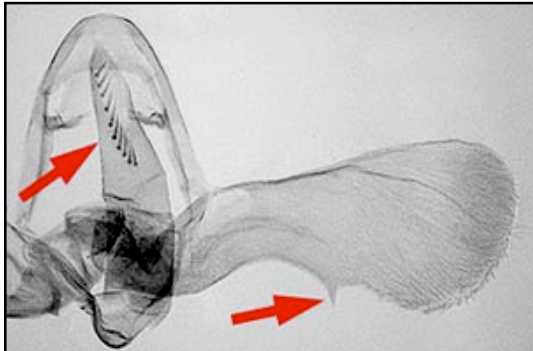
**Project Results and Discussion (Cont.)**

Adult *C. coniferana* are small dark moths, with a somewhat variable wing-stripe pattern (Figure 3.). The dark wing background and oblique light and metallic banding is typical of many *Cydia* and *Grapholita spp.*, making recognition of adults somewhat difficult. However, the labial palps are broader (expanded vertically) in profile than most similar *Cydia* and *Grapholita spp.* (Figure 4), and male moths can be easily identified by genitalia characters of the valves and aedeagus (Figure 5.). A distinctive alignment of short deciduous cornuti in the aedeagus and a ventral projection on the valves (illustrated in Figure 5) are characters unique to *Cydia coniferana*.

**Figure 5. *Cydia coniferana* Head and Palps**



**Figure 6. Male *Cydia coniferana* Genitalia**



**Figure 4. Male *Cydia coniferana* in Pheromone-traps**



Adult male flight activity was recorded in this survey from early June through August, the entire survey period, but the majority of moths collected (80%) were captured during August, and catch data suggests a peak of activity around mid-month. In southern England, adult flight has been reported from mid-May to August, and apparently bivoltine. In northern England, flight occurs in June and July (Bradley, 1979). Additional monitoring is needed to determine the entire duration of adult activity and whether the species produces one or two generations (bivoltine) in the Pacific Northwest.

No correlation between trap-site tree-type and *C. coniferana* catch was found (or expected) in this survey, as most host trees trapped are known to be (potential) hosts and the attraction-over-distance nature of pheromone-trap catch reduces the significance of the trap-site tree type. However, significant moth catch at numerous sites where only *P. menziesii* (Douglas fir) existed suggest that species may also be a new, undocumented host (in our region).

**Project Results and Discussion (Cont.)**

At the end of this survey, several of the higher-catch site and adjacent trees in Thurston County were examined for superficial signs of larval infestation (without cutting the bark), which proved inconclusive. Bark and sapwood feeding insect evidence was noted at most sites, much of which was consistent with damage from native conifer pests, such as the Sequoia pitch moth (*Synanthedon sequoiae* Edwards) or other lepidopterous pests. However, some evidence of larval infestation similar to the European description of *C. coniferana* – frass mixed with a slight exudate (Bradley, 1979) - was noted at several sites.

Examination (e.g. excavation, dissection) of suspect infestation sites in known and potential host tree species in the known *C. coniferana* infested area is needed to confirm which conifer species are attacked by *C. coniferana* in the region. The European literature suggests that the external signs (larval frass accumulations) are readily apparent in late winter/spring.

A number of other lepidoptera species were attracted to the pheromone-lure used in this survey, and a list of all species collected is presented in Table 2. One “non-target” collection may be of particular significance – *Epinotia nanana* (Trietsche, 1835), the European spruce needle miner. This collection (3 moths at one site) may be the first western U.S. collection of that exotic pest species, which is known to be established in the Eastern U.S. and Canada.

**Table 2. *Cydia coniferana* Pheromone-trap Collections**

Lepidoptera Species	Number of Specimens
<i>Acleris forsskaleana</i> Linnaeus, 1758	1
<i>Acleris nivisellana</i> (Walsingham, 1879)	2
<i>Argyrotaenia franciscana</i> (Wlsm., 1879)	4
<i>Batia lunaris</i> (Haw., 1828)	166
<i>Cydia coniferana</i> (Ratzeburg, 1840)	4,379
<i>Cydia fletcherana</i> (Kft., 1907)	178
<i>Ditula angustiorana</i> (Haw., 1811)	9
<i>Epinotia nanana</i> (Tr., 1835)	3
<i>Grapholita conversana</i> Wlsm., 1879	4
<i>Grapholita packardi</i> Zeller, 1875	58
<i>Gypsonoma aceriana</i> (Duponchel)	9
<i>Oegoconia quadripuncta</i> (Haworth, 1828)	17
<i>Recurvaria nanella</i> (Denis & Schiff.)	4
<i>Spilonota ocellana</i> (Denis & Schiff., 1775)	1
Total	4,842

**Pertinent Literature / References**

- Bradley, J.D., W.G. Tremewan, and Arthur Smith. 1979. British Tortricoid Moths, Tortricidae: Olethreutinae Curwen Press Ltd., London, England.
- Medvedev, G.S. (Editor-in-Chief). 1978. Keys to the Insects of the European Part of the USSR. Volume IV, Lepidoptera. Part 1. pp. 921-923. Academy of Sciences of the USSR Publication TT 81-52013. Nauka Publishers, Leningrad Division – Translated from Russian and Published for the United States Department of Agriculture and the National Science Foundation, Washington, D.C., by Amerind Publishing Co. Pvt. Ltd., New Delhi, 1987.

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This survey was funded in part by a Cooperative Agricultural Pest Survey (CAPS) grant from the USDA APHIS Western Region (#05-8553-0737-CA, CAPS Core Funds) and does not necessarily reflect APHIS' views.

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