Area-wide Survey of Tree Fruit Borers including Nurseries in Utah – 2004

Final Report for
USDA APHIS Western Region CAPS Project

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Introduction

Bark and ambrosia beetles are the most destructive group of insect pests attacking coniferous trees. Destruction of standing timber is estimated to reach 4.5 billion board feet per year in the United States (Wood, 1982; Metcalf and Metcalf, 1993). Many of these and other beetle families also attack deciduous trees, including fruit trees. The focus of this study was to survey the borer pests, mainly beetles, found in orchards and nurseries in North and Central Utah.

Another focus of this study was to document the range of the exotic banded elm bark beetle *Scolytus schevyrewi* Semenov in North and Central Utah. This bark beetle is endemic to Asia and was found in 2003 both in Aurora, Colorado and Ogden, UT. The beetle is known to be established from California to Michigan (Anonymous, 2004; Haack, 2004) and was probably introduced in wood packaging (Anonymous, 2004). It attacks and kills drought-stressed Siberian elms (*Ulmus pumila*) in the USA (Anonymous, 2004). The beetle also has attacks American (*U. americana*), English (*U. procera*), rock (*U. thomasii*), and Siberian elms in the USA. However, it has a broader host range in its native range including fruit trees such as apricots, cherries, and peaches (*Prunus* spp.), and Russian olives (*Elaeagnus angustifolia*), and could pose a moderate risk particularly during periods of drought (Anonymous, 2004).

Materials and Methods

Survey Sites

Survey sites were established in five of the northern orchard producing counties of Utah (Table 1). There were a total of 28 survey sites within these five counties. County agricultural agents were queried to identify appropriate survey sites for their respective counties. Growers were contacted and permission was then obtained for placing traps on private property. Geographical positioning system (GPS) coordinates were recorded with a handheld Garmin Etrex Venture GPS unit (Table 1).

Host Tree Selection

Sites with a large variety of fruit trees were chosen specifically, when the option was available, to allow for having the largest range of host possibilities as possible at the same site (Table 1). Within each orchard site, traps were placed near different fruit tree varieties.

Insect Traps

Commercial traps were placed at each site and left for approximately one month. Traps were placed in orchards between 27 May and 12 June 2004 (Table 2). They were removed from each site as given in Table 2 (Table 2). Traps were present at the sites for 12-15 weeks.

Both emergence traps and Lindgren funnel traps were used in this study. Emergence traps were made based on the design of J. Vandygriff (USDA Forest Service, Logan, UT). The design consisted of: 1) cutting a fine-mesh screen to roughly a square of 2'x 2' in^2; 2) folding back the corners of one side of the square and fastening it along the seam to make a "point"; and 3) inserting a small collection container (10 ml) into the point. The screen was loosely stapled to a tree with a continuous seam of staples and with the collection container oriented downward filled with 70% propylene glycol in water as a preservative. Two emergence traps were placed at each site and the collection containers were removed at the end of the study.

Lindgren funnel traps (obtained from Dawn Holzer, USDA-APHIS-PPQ, Utah State University, Logan, Utah) also were used throughout the study with appropriate pheromone or kairomone lures for attracting borer pests. Four traps, each with a different lure, were placed at each selected site (Table 1). The four different lures used were ethanol, alpha-pinene, an exotic *Scolytus* lure or a set of lures containing 2-methyl-3buten-2-ol, *Ips* dienol, and cis-verbienol. The collection vessel contained a solution of 70% propylene glycol in water and was changed out approximately monthly. The collected insects were brought back to the laboratory for identification.

Beetle Identification

The beetle species were identified using various publications in conjunction with identified material deposited in the Insect Collection at Utah State University. Scolytinae beetles were identified using Wood (1982) and Anderson (2002). Bright and Stark (1973) and Furniss and Johnson (2002) also were consulted to aide in identifcaiton. LaBonte *et al*. (2004) was used to discriminate the exotic banded elm bark beetle *Scolytus schevyrewi*, while Fisher (1942) was used to identify the *Chysobothris* buprestid beetles. Voucher specimens are deposited into the Insect Collection, Department of Biology, Utah State University, Logan, Utah.

Results

Emergence Traps. Two emergence traps were erected at each site for a total of 56 traps. Although these traps were left out for the duration of the study, no pests were collected in any of the emergence traps. The traps did manage to collect Collembola, which were small enough to enter the trap through the screen, several Psocoptera, and one ground beetle larva (Coleoptera: Carabidae), both of which could have been present on the tree when the trap was erected.

Lindgren Funnel Traps. Scolytus schevyrewi Semenov, *Scolytus multistriatus* (Marsham), *Scolytus rugulosus* (Müller), *Xyleborinus saxeseni* (Ratzeberg), *Ips plastographus* (LeConte), and *Ips hunteri* Swaine (Coleptera: Curculionidae; Scolytinae), as well as *Chrysobothris femorata* (Coleoptera: Buprestidae) and *Scobicia declivis* LeConte (Coleoptera: Bostrichidae) were collected in the traps. Complete data, including number of species and collection site, are given in Table 2. A summary of total number of each species is given in Table 3 and a summary per county is given in Table 4.

Scolytus schevyrewi, also known as the banded elm bark beetle, has the potential to pose the most threat to orchards and nurseries. This species was most often collected making up 67% of the total number of individuals collected (Figure 1; Table 3 and 4). Furthermore, this species is exotic, newly introduced, and was collected in all five counties monitored. This species uses a variety of hosts and includes *Prunus* species in its endemic range, but this behavior is not known in the USA (Anonymous, 2002). Another species that poses potential orchard and nursery threats is *Scolytus rugulosus*, known as the shothole borer, which uses moisture stressed *Prunus* and *Malus* species as hosts. Also collected were *Xyleborinus saxeseni*, an ambrosia beetle that uses almost all genera of deciduous trees as host, and *Chrysobothris femorata*, which uses a wide range of hosts including *Prunus* species (Furniss and Johnson, 2002). However, relatively few of these species were collected compared to *Scolytus schevyrewi* (Figure 1).

Several other bark or boring beetles were collected, but they use hosts other than fruit trees. *Scolytus multistriatus*, another exotic bark beetle pest, uses elms as host and has been dubbed the smaller European elm bark beetle (Furniss and Johnson, 2002). *Ips plastographus* (LeConte), and *Ips hunteri* Swaine exploits *Pinus* and *Picea* species as hosts (Furniss and Johnson, 2002) and *Scobicia declivis*, the lead cable borer, is known to cause damage to lead-sheathed telephone cables.

References Cited

Anderson, R.S. 2002. Curculionidae. In: *American Beetles, vol. 2:, Polyphaga: Scarabaeoidea through Curculionoidea* (Arnett, Jr., R.H, M.C. Thomas, P.E. Skelley, and J.H. Frank, eds.) CRC Press LLC.

Anonymous. 2004. *Scolytus schevyrewi* Semenov - An Asian bark beetle new to the United States. http:// www.fs.fed.us/r2/fhm/reports/ pest_update_s-schevyrewi.pdf . Accessed December 2004.

Bright, Jr., D.E. and R.W. Stark. 1973. The bark and ambrosia beetles of California (Coleoptera: Scolytidae and Platypodidae). *Bulletin of the California Insect Survey* 16: 1-169.

Fisher, W.S. 1942. A revision of the North American species of buprestid beetles belonging to the tribe Chrysobothrini. *United States Department of Agriculture Miscellaneous Publication* 470: 1-274.

Furniss, M.M. and J.B. Johnson. 2002. *Field Guide of the Bark Beetles of Idaho and Adjacent Regions*. University of Idaho.

Haack, R. 2004. Forest Diversity and resistance to native exotic pest insects. International Union of Forest Research Organizations D7/D8, August 10 - 13, 2004, Hanmer Springs, New Zealand.

LaBonte, J.R., R.J. Rabaglia, and E.R. Hoebeke. 2004. A Screening Aid for the Identification of the Banded Elm Bark Beetle, *Scolytus schevyrewi* Semenov.

http://www.ceris.purdue.edu/napis/pests/barkb/schevy/schevyrewi_ID_new1A.
pdf. Accessed December 2004.

Metcalf, R.A. and R.L. Metcalf. 1993. *Destructive and useful insects: Their habits and control, 5th ed*. McGraw-Hill, Inc.

Wood, S.L. 1982. The bark and ambrosia beetles of North and Central America (Coleoptera: Scolytidae), a taxonomic monograph. *Great Basin Naturalist Memoirs* 6: 1-1359.

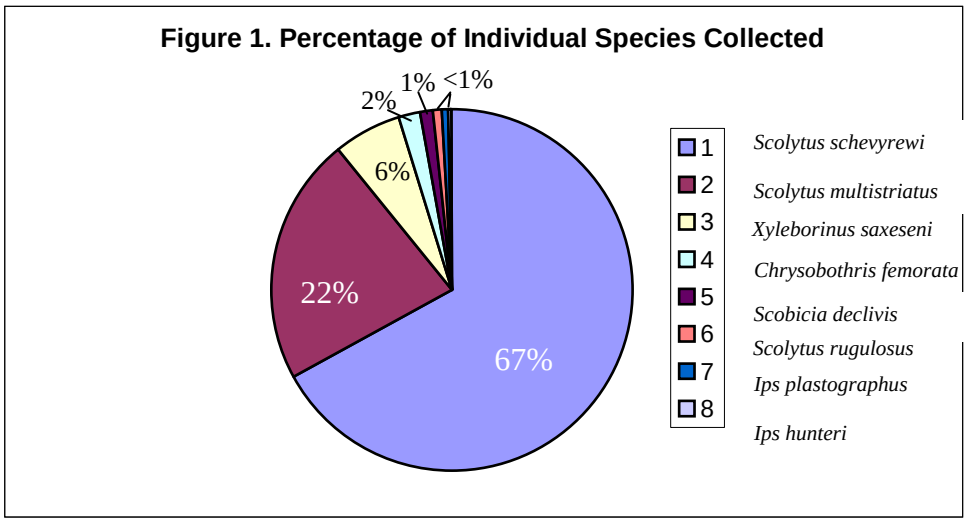

Table 1. Survey Sites (Two emergence traps were placed at each site. Lindgren funnel traps were placed only at sites designated with an "*".)

County	Collection Dates	Town / Area	Site	Latitude	Longitude	Fruit Tree Type
Box Elder	**6/16 - 9/22/04**	Perry	1	N41º28.257'	W112º01.317'	Apples, Cherries, Peaches
			2	N41º27.277'	W112º02.780'	Apples, Cherries, Peaches
			3*	N41º27.124'	W112º02.086'	Apples, Cherries, Peaches
		Willard	4	N41º25.477'	W112º01.799'	Cherries, Peaches, Pears
			5	N41º21.089'	W112º02.099'	Apples, Cherries, Peaches
Cache	**5/27- 9/2/04**	Logan	6	N41º47.419'	W111º48.536'	Apples
			7*	N41º43.439'	W111º48.457'	Apples, Cherries
			8	N41º43.264'	W111º49.557'	Apples, Cherries, Peaches
		Avon	9	N41º32.994'	W111º49.785'	Apples, Cherries
		Paradise	10	N41º34.993'	W111º49.078'	Apples, Cherries
Davis	**6/16 - 9/21/04**	Kaysville	**11***	N41º01.474'	W111º56.364'	Apples, Cherries
		Fruit Heights	12	N41º03.122'	W111º54.605'	Apples, Cherries
			13	N41º02.381'	W111º54.459'	Cherries
			14	N41º02.128'	W111º54.536'	Apples, Cherries
Utah	**6/1 - 9/23/04**	Payson	**15***	N40º01.617'	W111º42.090'	Apples, Cherries
		Santaquin	16	N39º59.011'	W111º46.616'	Apples, Cherries, Peaches
			17	N39º59.239'	W111º46.573'	Apples, Cherries
			18	N39º57.893'	W111º47.582'	Apples, Cherries, Pears
			19	N39º59.119'	W111º48.778'	Apples, Cherries, Peaches
		Genola	**20***	N39º59.051'	W111º49.583'	Apples, Cherries, Peaches
		Lincoln Point	21	N40º00.488'	W111º48.989'	Cherries
			22	N40º08.715'	W111º48.543'	Apples, Cherries
			23*	N40º00.316'	W111º48.047'	Apples, Cherries, Peaches
Weber	**6/3 - 9/19/04**	North Ogden	**24***	N41º18.937'	W111º59.537'	Apples, Cherries, Peaches
			25	N41º18.776'	W111º59.168'	Apples, Cherries, Peaches
			26	N41º19.728'	W112º00.561'	Peaches
		Riverdale	27	N41º10.903'	W112º01.588'	Apples, Cherries, Peaches
		Uintah	28	N41º08.660'	W111º55.490'	Apples, Cherries, Peaches

Table 2. Lindgren Funnel Trap Data from Survey Sites				
Box Elder County: Site 3	Ethanol Lure	Alpha-Pinene Lure	Exotic Lure	3 Component Lure
6/16 - 7/28/04				
Scolytus schevyrewi	3	0	0	1
7/28 - 8/11/04				
Scolytus schevyrewi	0	0	2	0
8/11 - 9/22/04				
Scolytus schevyrewi	0	1	0	1
Cache County: Site 7	Ethanol Lure	Alpha- Pinene Lure	Exotic Lure	3 Component Lure
5/27- 7/8/04				
Scolytus schevyrewi	1	1	8	0
Scolytus multistriatus	0	0	3	0
7/8 - 8/10/04				
Scolytus schevyrewi	10	0	3	1
8/10 - 9/2/04				
Scolytus schevyrewi	0	0	5	1
Scolytus multistriatus	3	3	19	0
Davis County: Site 11	Ethanol Lure	Alpha- Pinene Lure	Exotic Lure	3 Component Lure
5/? - 5/20/04				
Scolytus schevyrewi	3	0	0	0
Scolytus multistriatus	3	0	0	0
Xyleborinus saxeseni	3	1	0	0
Scobicia declivis	3	0	0	0
5/20 - 6/16/04				
Scolytus schevyrewi	3	0	0	0
Scolytus multistriatus	3	0	0	0
Xyleborinus saxeseni	3	1	0	0
Scobicia declivis	3	0	0	0
6/16 - 7/2/04				
Scolytus schevyrewi	5	0	0	0
Scolytus multistriatus	1	0	0	0
Xyleborinus saxeseni	2	2	0	0
7/2 - 8/5/04				
Scolytus schevyrewi	3	0	0	0
Scolytus multistriatus	2	0	0	0
Xyleborinus saxeseni	1	1	0	0
8/5 - 9/21/04				
Scolytus schevyrewi	4	0	0	0
Scolytus multistriatus	1	0	0	0
Xyleborinus saxeseni	2	0	0	0

Utah County: Site 15	Ethanol Lure	Alpha- Pinene Lure	Exotic Lure	3 Component Lure
6/1 - 7/14/04				
Scolytus schevyrewi	0	0	5	5
Scolytus multistriatus	0	0	10	3
Chrysobothris femorata	0	0	0	4
7/14 - 8/19/04				
Scolytus multistriatus	0	0	1	0
8/19 - 9/23/04				
Scolytus schevyrewi	0	0	0	1
Scolytus multistriatus	0	0	0	1
Utah County: Site 20	Ethanol Lure	Alpha- Pinene Lure	Exotic Lure	3 Component Lure
6/1 - 7/14/04				
Ips plastographus	0	0	0	1
Scolytus schevyrewi	1	3	4	0
7/14 - 8/19/04				
Ips hunteri	0	0	0	1
Scolytus schevyrewi	8	2	10	0
Scolytus multistriatus	3	0	0	0
8/19 - 9/23/04				
Scolytus schevyrewi	0	0	24	0
Scolytus multistriatus	0	0	2	0
Xyleborinus saxeseni	0	0	3	0
Scolytus rugulosus	0	0	2	0
Utah County: Site 20	Ethanol Lure	Alpha- Pinene Lure	Exotic Lure	3 Component Lure
8/19 - 9/23/04				
Chrysobothris femorata	1	0	0	0
Utah County: Site 23	Ethanol Lure	Alpha-Pinene Lure	Exotic Lure	3 Component Lure
6/1 - 7/14/04				
Scolytus schevyrewi	0	0	10	0
7/14 - 8/19/04				
Scolytus schevyrewi	0	0	14	0
8/19 - 9/23/04				
Scolytus schevyrewi	0	0	4	0
Weber County: Site 24	Ethanol Lure	Alpha- Pinene Lure	Exotic Lure	3 Component Lure
6/3 - 7/2/04				
Scolytus schevyrewi	1	3	2	1
7/2 - 8/5/04				
Scolytus schevyrewi	3	0	1	2
8/5 - 9/19/04				
Scolytus schevyrewi	3	2	2	2

Table 3. Total Number of Individuals Collected	
Species Collected	Number of Individuals
Scolytus schevyrewi	166
Scolytus multistriatus	55
Xyleborinus saxeseni	15
Chrysobothris femorata	5
Scobicia declivis	3
Scolytus rugulosus	2
Ips plastographus	1
Ips hunteri	1

Table 4. Total Number of Individuals Collected Per County	
Species Collected	Number of Individuals
Box Elder County: Site 3	
Scolytus schevyrewi	8
Scolytus multistriatus	0
Xyleborinus saxeseni	0
Chrysobothris femorata	0
Scobicia declivis	0
Scolytus rugulosus	0
Ips plastographus	0
Ips hunteri	0
Cache County: Site 7	
Scolytus schevyrewi	30
Scolytus multistriatus	28
Xyleborinus saxeseni	0
Chrysobothris femorata	0
Scobicia declivis	0
Scolytus rugulosus	0
Ips plastographus	0
Ips hunteri	0
Davis County: Site 11	
Scolytus schevyrewi	15
Scolytus multistriatus	7
Xyleborinus saxeseni	14

Species Collected	Number of Individuals
Davis County: Site 11 (con't)	
Chrysobothris femorata	0
Scobicia declivis	3
Scolytus rugulosus	0
Ips plastographus	0
Ips hunteri	0
Utah County: Site 15, 20, 23	
Scolytus schevyrewi	91
Scolytus multistriatus	20
Xyleborinus saxeseni	3
Chrysobothris femorata	4
Scobicia declivis	0
Scolytus rugulosus	2
Ips plastographus	1
Ips hunteri	1
Weber County: Site 24	
Scolytus schevyrewi	22
Scolytus multistriatus	0
Xyleborinus saxeseni	0
Chrysobothris femorata	0
Scobicia declivis	0
Scolytus rugulosus	0
Ips plastographus	0
Ips hunteri	0