Trapping Ambrosia beetles common in Nurseries

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Size variance, height of traps

- The main cause is the male/female variance.
- Sex ratio is typically 10F:1M, with males being smaller.
- The average flying heights (based on trap data) are 1.2m-1.6m, the ideal area for ambrosia beetles to attack a tree.

Sites vary in species and abundance

Year	No. genera (total)	# species (total)
1998	6-10 (11)	7-18 (21)
1999	6-9 (9)	12-18 (19)

Abundance is different between years on the same site (ranked the same)

Year	No. beetles per site (average)
1998	117-1464 (683)
1999	627-1193 (920)

Mannion and Oliver 2001 Environ Entomol

A few species dominate

	% of total species		
Species	**1998**	**1999**	**total**
Xyleborinus saxeseni Ratzeburg	38.6	57.9	49.7
Monarthrum fasciatum Say	25	<5	12.5
Xylosandrus crassiusculus (Motschulsky)	11.3	22.4	17.6
Xyleborus pelliculosus Eichhoff	6.8	<5	4.1
Monarthrum mali Fitch	5.2	6.2	5.7
Hypothenemus spp.	0.4	0.3	0.4
Xylosandrus germanus Blandford	3.6	0.4	1.7

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Table 2. Total and percent emergence of different species of ambrosia beetle from chestnut at the Nursery Crop Research Station, McMinnville, TN, in 1999

Species	No. Cages	No. emerging		
		Males	Females	Total
No Emergence	96	—	—	—
Solitary				
Hypothenemus sp. 2	2	0	4	4
Hypothenemus sp. 3	2	0	2	2
Hypothenemus sp. 4	1	0	1	1
Xyleborinus saxeseni	1	0	3	3
Xylosandrus crassiusculus	15	10	148	158
Xylosandrus germanus	61	16	257	273
Mixed				
Xylosandrus crassiusculus	4	1	28	29
Xylosandrus germanus		4	12	16
Hypothenemus sp. 2	1	0	1	1
Hypothenemus sp. 4		0	2	2
Xyleborinus saxeseni	1	0	1	1
Xylosandrus germanus		1	3	4
Total	184	32	462	494

203 galleries were not caged.

The dominant species in traps isn't always the species attacking:

Hypothenemus spp.: 0.4% of capture

X. germanus: 0.4% of capture

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Table 3. Average height, stem caliper, compass direction, and number of progeny emerging for the primary species of ambrosia beetles collected from chestnut at the Nursery Crop Research Station, McMinnville, TN, in 1999

Species	Gallery site measurements (mean ± SE)			
	Height, cm	Stem caliper, cm	Compass direction, °	Progeny per gallery (mean ± SE)
Xylosandrus germanus	24.3 ± 4.1a	11.5 ± 0.5a	195.2 ± 13.1a	4.4 ± 0.5a
Xylosandrus crassiusculus	28.7 ± 4.1a	10.2 ± 0.7a	238.6 ± 22.0a	9.9 ± 4.0a
Hypothenemus sp.	60.4 ± 6.9b	5.5 ± 0.4b	185.4 ± 33.4a	1.2 ± 0.2b

Species differ in:

Fecundity (progeny)

Height of attack

Stem caliper at gallery

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Trapped year round in 1998, 1999

Two peaks for Xylosandrus crassiusculus
Apr-Jun and Aug-Oct
Xylosandrus germanus-one spring peak
Xyleborinus saxeseni-two peaks similar to X. crassusisculus

Attack period follow spring emergence for Xylosandrus spp.

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Attack period coincident with peak trap collections.

Traps good for detecting activity but may provide false positives of when tress are under attack.

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Location of attacks

-Most near buds or leaf scars

Development time similar for X. crass and X. germanus (55d from attack to emergence).

Mannion and Oliver 2001 Environ Entomol
Ranger et al. 2010 Agric Forest Entomol.

Frass sticks isn't a species identification:

Produced by Xylosandrus germanus, X. crassiusculus, and Xyleborinus saxseni

Mannion and Oliver 2001 Environ Entomol

Stress volatiles are emitted from "stressed" trees

Ethanol, methanol, acetaldehyde, acetone

Ethanol>Methanol were the most attractive to *X. germanus*

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Why not just continue spraying?

Costs

- Financial
- Environmental

Secondary pest outbreaks in nurseries

- Steven Frank NC State

Pyrethroid review by EPA