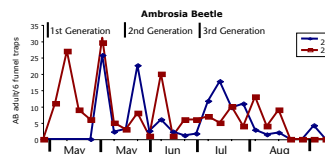
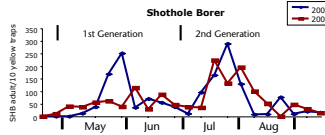


Biology and Management of Bark Beetles in Stone and Pome Fruits

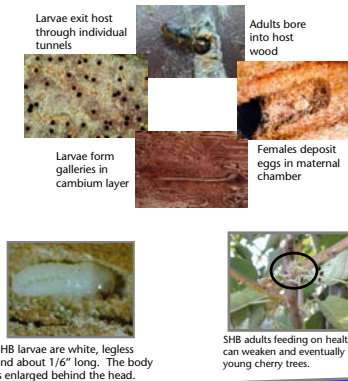
Mike Doerr, Jay Brunner, Tim Smith, and Matthew Smith
WSU-Tree Fruit Research and Extension Center
Wenatchee, WA

Species ID and Life History

- Dominant species was **Shothole Borer (SHB)**, *Scolytus rugulosus*.
- **Ambrosia beetle (AB)**, *Xyleborus dispar* or *X. saxoseni*, also important.
- Most locations had both.



One generation lasts about 2 months



SHB larvae are white, legless and about 1/6" long. The body is enlarged behind the head.

SHB adults feeding on healthy trees can weaken and eventually kill young cherry trees.

Life Cycle

Orchard Sanitation to Control SHB

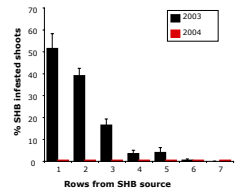


SHB source removed in winter of 03/04

Controlling SHB in a high pressure orchard primarily by sanitation

- >45% shoot infestation recorded within border rows in 2003.
- The first step was to locate and remove the host material. Source was identified as a brush pile and a firewood pile that was replenished each season.
- SHB reproduce in 6-18 month old cuttings. Removing this source limits reproductive potential.

- In 2004 a total of 4 SHB and 9 AB were trapped in 5 yellow traps and 2 intercept traps over the entire season.
- No specific SHB insecticide applications needed in 2004.
- No SHB damage noted in fall of 2004.



Insecticide Screening

Field-aged bioassay data from candidate insecticides, 2004.

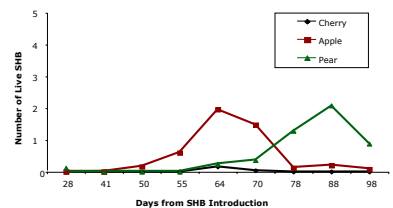
Insecticide	Average corrected % mortality			
	1 DAT	7 DAT	14 DAT	21 DAT
Asana	100.0	100.0	100.0	100.0
Actara	100.0	100.0	100.0	90.5
Assail	100.0	100.0	100.0	95.2
Avant	100.0	100.0	95.2	61.9
Guthion	100.0	100.0	85.7	42.9
Malathion	90.9	81.3	61.9	47.6
Proclaim	50.0	81.3	100.0	66.7
Success	31.8	43.8	52.4	23.8

- Insecticide treated branches collected at 7 day intervals. SHB adults placed on branches.
- Mortality assessed after 3 days.
- All insecticides tested caused at least a low level of mortality.
- Asana was highly toxic through 21 days.
- Actara, Assail and Avant also highly toxic.
- Guthion and Malathion had shorter residual activity than the best.



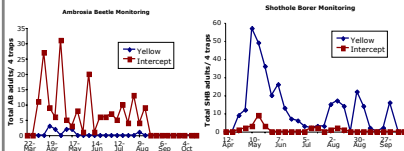
Laboratory study to evaluate host suitability of cherry, pear and apple

- SHB introduced to different host woods in arenas similar to Insecticide screening and emergence of 2nd generation adults was recorded.
- First SHB emerged from apple at 50 days. Emergence from a single arena occurred over a 3-4 week period.
- First emergence in cherry and pear was at 64 days.
- Production was equal in apple and pear. Reproduction in cherry limited by high humidity and mold in arenas.
- Cherry, pear and apple all appear to be suitable hosts for SHB reproduction.



Host Suitability

- SHB adults emerging from reproductive hosts move immediately to neighboring orchards.
- Study sites show SHB readily move 10-50m to healthy trees.
- Approximately 10X as many SHB are trapped at the source than in the orchard borders.
- A practical management option might be to monitor emergence at the source and protect orchard borders when trap captures begin to increase.



Ethanol baited intercept traps captured more AB, but few SHB.

Yellow sticky traps best for SHB, but captured few AB.



Monitoring