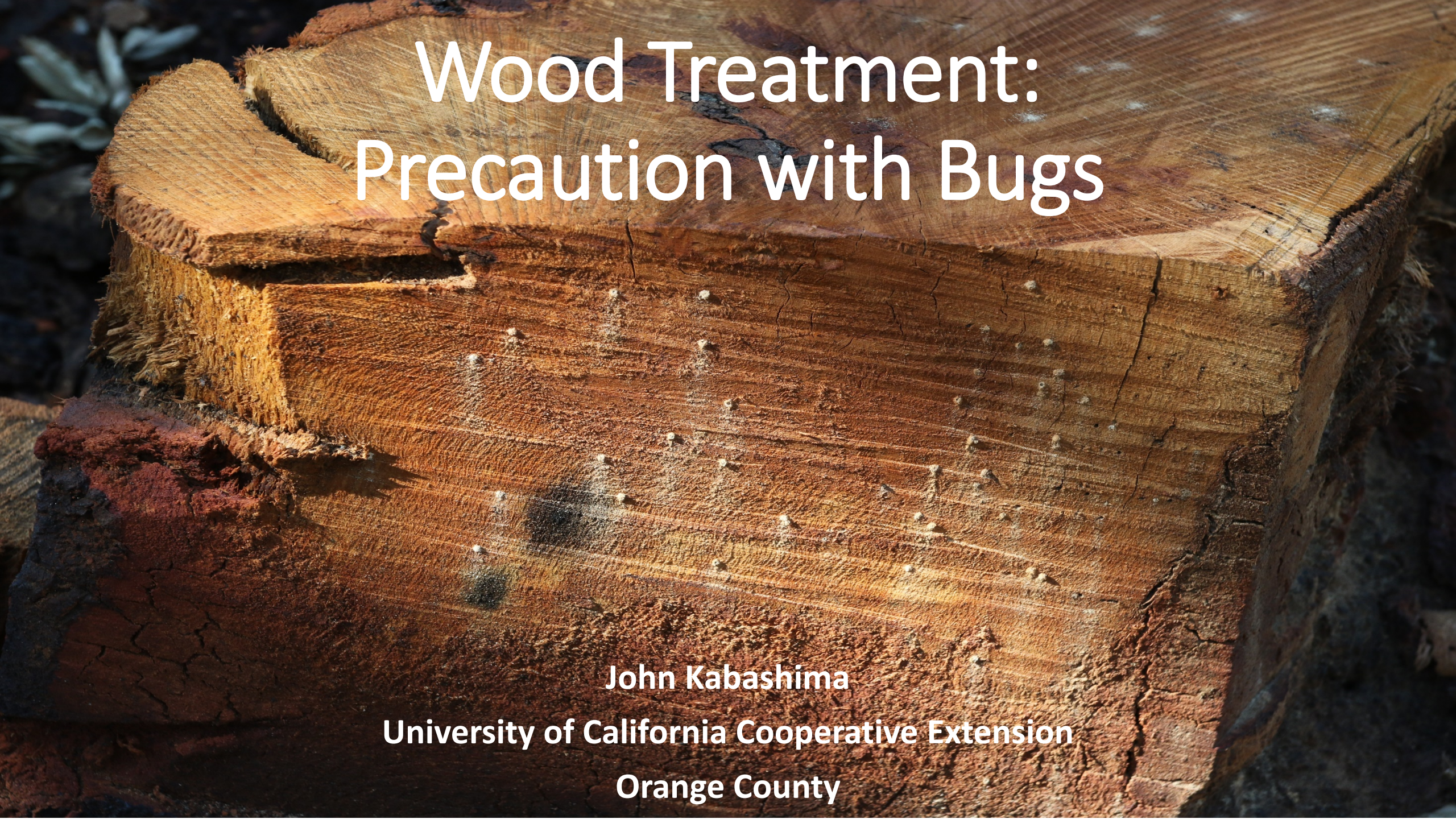
Wood Treatment: Precaution with Bugs



John Kabashima

University of California Cooperative Extension

Orange County

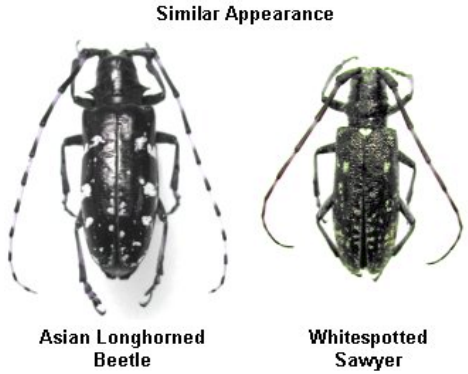
Wood Destroying Insects (and fungi)

- Attack Living or Weakened Trees
  - Bark beetles
  - Ambrosia beetles
  - Weevils and snout beetles

  - Flatheaded/metallic borers

Wood Destroying Insects (and fungi)

- Attack Living or Weakened Trees
  - Roundheaded/long horned borers
    - Old House Borer – *Hylotrupes bajulus* (L.) can reinfest seasoned wood from which the adults have emerged.



  - Caterpillars
  - Woodwasps

Nathan Schiff

Wood Destroying Insects (and fungi)

- **Can Infest and Reinfest Dry or Seasoned Wood**
  - Termites
  - Powder Post Beetles – Lyctidae
  - False Powder Post Beetles – Bostrichidae
  - Deatwatch Beetles – Anobiidae
  - Carpenter Ants – Formicidae: Formicinae
  - Oldhouse Borer – Cerambycidae
- Cause Superficial Damage – can bore into wood to pupate
  - Spider Beetles – Ptinidae
  - Hide Beetles - Dermestidae

Management of Wood Boring Beetles

Identification

- Ball Point Pen and Frass Test

Table 2. Two Methods for Distinguishing Powderpost, Deathwatch, and False Powderpost Beetles.

Group name	Ballpoint pen test[1]	Frass test[2]
powderpost (Lyctinae)	Only the tip of the pen fits into the exit hole.	Feels like talcum powder.
deathwatch (Anobiidae)	The tip and part of the angled face fit into the exit hole.	Feels gritty.
false powderpost (Bostrichidae)	The entire point of the pen usually fits into the exit hole.	It is difficult to dislodge the frass from the hole.

[1] Insert the tip of a click-type, refillable ballpoint pen into the exit hole of the beetle.

[2] To determine the texture of frass, a mixture of feces and food fragments, rub it between your fingers.

Pest Notes: Wood-Boring Beetles in Homes UC ANR Publication 7418

Management of Wood Boring Beetles

Identification

- Ball Point Pen and Frass Test

Prevent Infestation

- Curtailment of exterior mercury vapor lighting around lumberyards and warehouses.
- Protective measures at every stage of lumber processing and handling including lumber mills, plywood mills, lumberyards, furniture-manufacturing factories, and building-construction firms.

Sanitation

- Remove and destroy dead tree limbs around buildings or near any area where wood products are stored.
- Destroy scrap lumber and other wood products before infestation occurs.

Pest Notes: Wood-Boring Beetles in Homes UC ANR Publication 7418

Management of Wood Boring Beetles

- Thoroughly inspect materials used for constructing buildings before use to ensure they don’t contain wood-boring beetles.
- Protect wood from infestation by
- painting or varnishing to seal pores, cracks, and holes where these beetles could lay eggs.
- To keep from accidentally introducing wood-boring beetles into a finished structure, inspect furniture and other objects before bringing them into buildings.

Pest Notes: Wood-Boring Beetles in Homes UC ANR Publication 7418

Management of Wood Boring Beetles

- Remove and fumigate objects that show signs of beetle infestation.
- When bringing in firewood, limit yourself to only what you will burn that day.
- Inspect buildings for signs of wood-boring beetle damage. Look for exit holes where adult beetles have emerged, and be aware of any new beetles accumulating on your windowsills.
- Once you have located galleries, tap out the frass to aid in identifying the pest

Pest Notes: Wood-Boring Beetles in Homes UC ANR Publication 7418

Management of Wood Boring Beetles

Liquid insecticides can be applied to bare structural wood.

- Most effective and safest materials are pesticide formulations containing
  - Sodium borate (e.g., Tim-Bor and Bora-Care), which a licensed pest control operator must apply.
  - Must penetrate wood to kill beetle larvae that are within, so finished wood can't be successfully treated.
  - Depth of penetration is enhanced in moist wood; if moisture is less than 15%, penetration might occur only in the top 1/4 inch.

Fumigation

- Doesn't prevent reinfestation
- Fumigation works best to control adults and larvae; wood-boring beetle eggs require a higher dose of fumigant.

Pest Notes: Wood-Boring Beetles in Homes UC ANR Publication 7418

Management of Wood Boring Beetles

Heating

- Kiln drying lumber destroys beetle infestations
  - Doesn’t prevent reinfestation.
  - Heat treatment of the core of imported wood packing material to 133°F for 30 minutes to combat these types of pests is an important phytosanitary regulation adopted by current international convention.
  - Heat treatment of the core of wood (max 3 inchs) to 160°F for 75 minutes to combat pests such as Emerald Ash Borer is an important regulation adopted by USDA Forest Service.
  - Heat small wooden items—but not those containing fabrics, pelts, or paints—in an oven at 120° to 140°F for 6 hours.

Solarization – Wrap wood in clear plastic sheeting or tarp (2 logs deep max)

- 6 weeks from July to Aug
- 6 Months from Sept. to June

Freezing

- You also can place items in a deep freezer at 0°F for 72 hours. Longer treatments might be necessary if the wood is thicker than 2 inches.

Pest Notes: Wood-Boring Beetles in Homes UC ANR Publication 7418

TABLE 3
Schedule for Treating Wood to Check Damage by Powderpost Beetles*

Relative humidity	Lethal temperature required	Thickness of timber†	Time required to overcome lag after kiln has attained lethal temperature	Additional margin of safety	Time then held at lethal temperature	Total period of exposure after kiln has attained required conditions
Per cent	*°F and C*	*Inches*	*Hours*	*Hours*	*Hours*	*Hours*
100.....	130—54	1.00	0.50	0.50	1.50	2.50
		2.00	2.00	0.50	1.50	4.00
		2.50	3.25	0.50	1.50	5.25
		3.00	4.50	0.50	1.50	6.50
80.....	125—52	1.00	0.50	0.50	2.00	3.00
		2.00	2.00	0.50	2.00	4.50
		2.50	3.25	0.50	2.00	5.75
		3.00	4.50	0.50	2.00	7.00
	120—49	1.00	0.50	1.50	6.00	8.00
		2.00	2.00	1.50	6.00	9.50
		2.50	3.25	1.50	6.00	10.75
		3.00	4.50	1.50	6.00	12.00
	115—46	1.00	0.50	7.50	30.00	38.00
		2.00	2.00	7.50	30.00	39.50
		2.50	3.25	7.50	30.00	40.75
		3.00	4.50	7.50	30.00	42.50
60.....	125—52	1.00	0.50	1.00	4.00	5.50
		2.00	2.00	1.00	4.00	7.00
		2.50	3.25	1.00	4.00	8.25
		3.00	4.50	1.00	4.00	9.50

Goldspotted oak borer

- *Agrilus auroguttatus*
- Hosts: Coast live oak, canyon live oak, CA black oak

GSOB adult ~10 mm long

D-shaped exit-hole <4 mm wide

Bark staining

Photos | left: Center for Invasive Species Research; center, right: Tom Coleman/USDA

Wood Destroying Insects/Fungi Interactions

- Bark beetles
- Ambrosia beetles
  - Polyphagous Shot Hole Borer – Euwallaceae spp. attacks living trees
    - *Fusarium euwallaceae* and *Graphium* sp.
- Weevils and snout beetles
- Flatheaded/metallic borers
- Roundheaded/long horned borers
  - Old House Borer – *Hylotrupes bajulus* (L.) can reinfest seasoned wood from which the adults have emerged.
    - *Fusarium aqueductuum* and *Phialophora aurantiaca* accelerated larval growth rate 10-30 fold
- Caterpillars
- Woodwasps

Foamy bark canker + Western oak bark beetle

- Fungus: *Geosmithia pallida;* Beetle: *Pseudopityophthorus pubipennis*
- Hosts: Coast live oak

Beetle: 1.7-2.3 mm long; entry-holes smaller than those of PSHB

Reddish sap and/or foamy liquid from entry-hole

Dead tissue around entry-hole, beneath bark

Photos | left: UC IPM; center, right: Akif Eskalen/UC Riverside

Oak ambrosia beetles

- *Monarthrum dentiger, M. scutellare*
- Hosts: Oak species, tanoak, CA buckeye

Monarthrum scutellare: 3.5-4.1 mm long
Entry-holes also larger: 1-1.5 mm diameter

Bleeding, frothing, bubbling, or white boring dust (tan when oxidized)

Photos | UC IPM

The Beetle

- Polyphagous Shot Hole Borer, *Euwallacea* sp. (PSHB)
- Invasive beetle from Southeast Asia
- Bores galleries into host trees to lay eggs and grow fungi

Adult female: 1.8-2.5 mm long

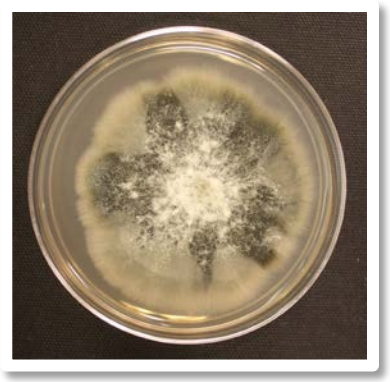
Adult male: 1.5 mm long

Photos | Gevork Arakelian/LA County Dept of Agriculture

The Fungi

- Pathogenic fungi: *Fusarium euwallaceae* and *Graphium* sp.
- Carried in mycangia of beetle
- Symbiotic relationship between beetle and fungi:
  - PSHB vectors fungi, inoculates new host trees
  - PSHB farms fungi in galleries

Fusarium euwallaceae



Graphium sp.

Beetle mycangia

Photos | left, center: Akif Eskalen/UC Riverside; right: Matthew Kasson/Penn State

Fungus-Farming

- Fungi transferred from mycangia to gallery walls
- Infects vascular tissue of trees, causing Fusarium Dieback
  - Blocks transport of water and nutrients from roots to rest of plant (xylem)

Fungi on gallery walls

Wood stained from infection

Infected tissue

Photos | Akif Eskalen/UC Riverside

PSHB Life Cycle and Reproduction

- Majority of life cycle spent in gallery
- Brothers and sisters can mate in galleries - females are already mated when they leave
- Beetle colony stays in one host until the tree is killed

Photos | top row: Akif Eskalen/UC Riverside; bottom row: Mike Lewis/UC Riverside

Follow-up Survey, so far

Species	Heavy	Moderate	Low	Total
Australian willow	0	0	9	9
Box elder	3	2	1	6
CA sycamore	27	198	669	894
Carolina poplar	11	16	19	46
Castor bean	0	1	0	1
Chinese flame	0	14	30	44
Coast live oak	3	5	10	18
Coral tree	0	0	1	1
Firethorn	0	0	1	1
Fremont cottonwood	1	7	39	47
Goldenrain	0	0	3	3
Liquidambar	0	8	84	92
Lombardy poplar	1	0	4	5
London plane	5	31	166	202
Mimosa/silk tree	0	5	0	5
Palo verde	1	1	1	3
Red willow	14	41	20	75
White alder	1	8	182	191
ALL SPECIES	**67**	**337**	**1239**	**1643**

Reproductive Hosts

Number of Tree Species Attacked by Beetle	**303**
Number of Tree Species Infected by Fungi	**134**
Number of Tree Families	**61**
Number of Agricultural Crops	**13**
Number of Southern California Native Plants	**16**
Number of Reproductive Hosts	**35**

1. Box elder (*Acer negundo*)*
2. Big leaf maple (*Acer macrophyllum*)*
3. Evergreen maple (*Acer paxii*)
4. Trident maple (*Acer buergerianum*)
5. Japanese maple (*Acer palmatum*)
6. Castor bean (*Ricinus communis*)
7. California sycamore (*Platanus racemosa*)*
8. Red willow (*Salix laevigata*)*
9. Avocado (*Persea americana*)
10. Mimosa/silk tree (*Albizia julibrissin*)
11. English oak (*Quercus robur*)
12. Coast live oak (*Quercus agrifolia*)*
13. London plane (*Platanus x acerifolia*)
14. Fremont cottonwood (*Populus fremontii*)*
15. Black cottonwood (*Populus trichocarpa*)*
16. White alder (*Alnus rhombifolia*)*
17. Titoki (*Alectryon excelsus*)
18. Engelmann oak (*Quercus engelmannii*)*
19. Cork oak (*Quercus suber*)
20. Valley oak (*Quercus lobata*)*
21. Coral tree (*Erythrina corallodendron*)
22. Blue palo verde (*Cercidium floridum*)*
23. Palo verde (*Parkinsonia aculeata*)
24. Moreton Bay chestnut (*Castanospermum australe*)
25. Brea (*Cercidium sonorae*)
26. Mesquite (*Prosopis articulata*)*
27. Weeping willow (*Salix babylonica*)
28. Chinese holly (*Ilex cornuta*)
29. Camellia (*Camellia semiserrata*)
30. Acacia (*Acacia* spp.)
31. Liquidambar (*Liquidambar styraciflua*)
32. Red flowering gum (*Eucalyptus ficifolia*)
33. Japanese wisteria (*Wisteria floribunda*)
34. Goodding's black willow (Salix gooddingii)*
35. Tree of heaven (Alianthus altissima)

* *Native species*

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QUESTIONS?