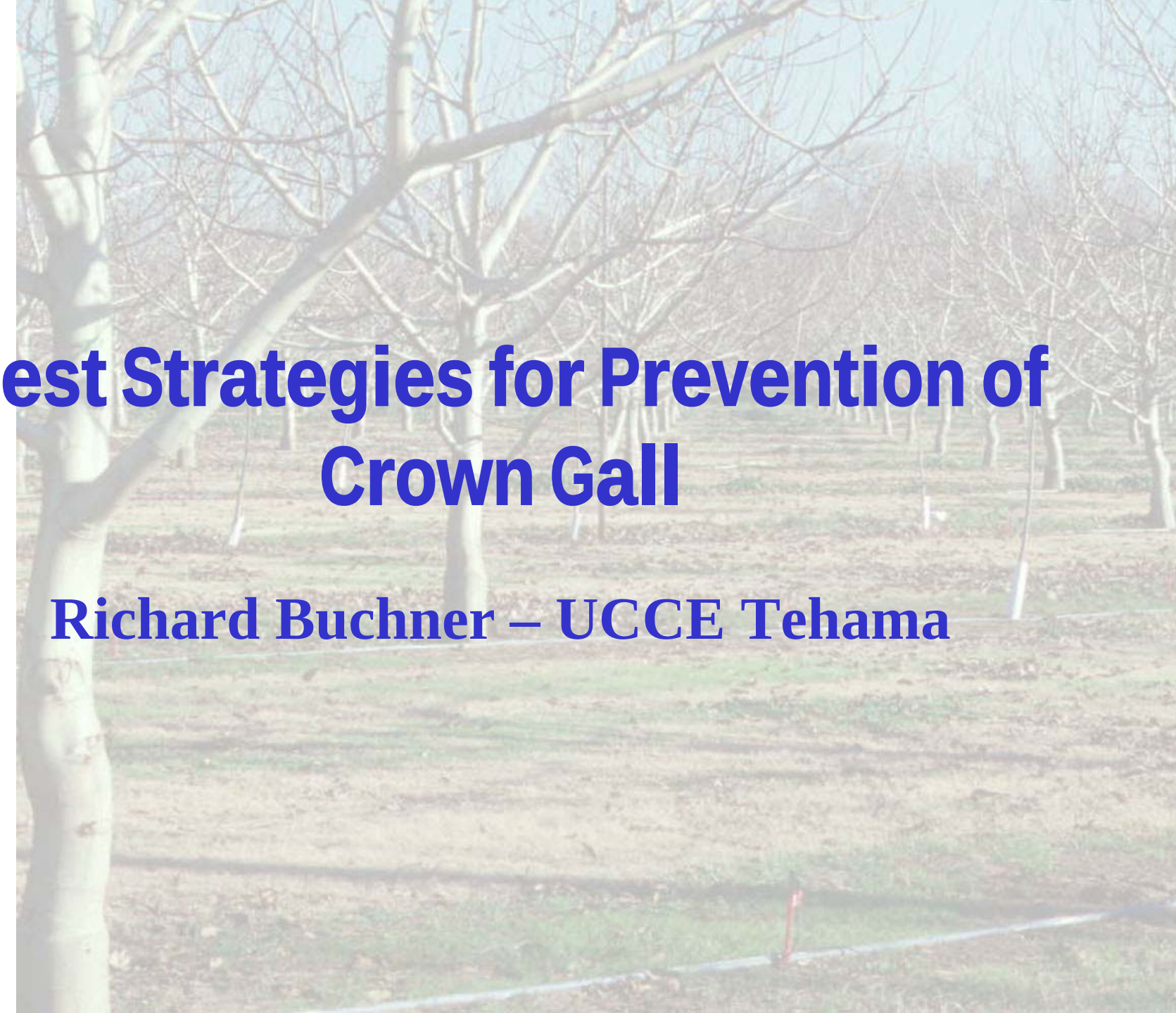


Best Strategies for Prevention of Crown Gall

Richard Buchner – UCCE Tehama

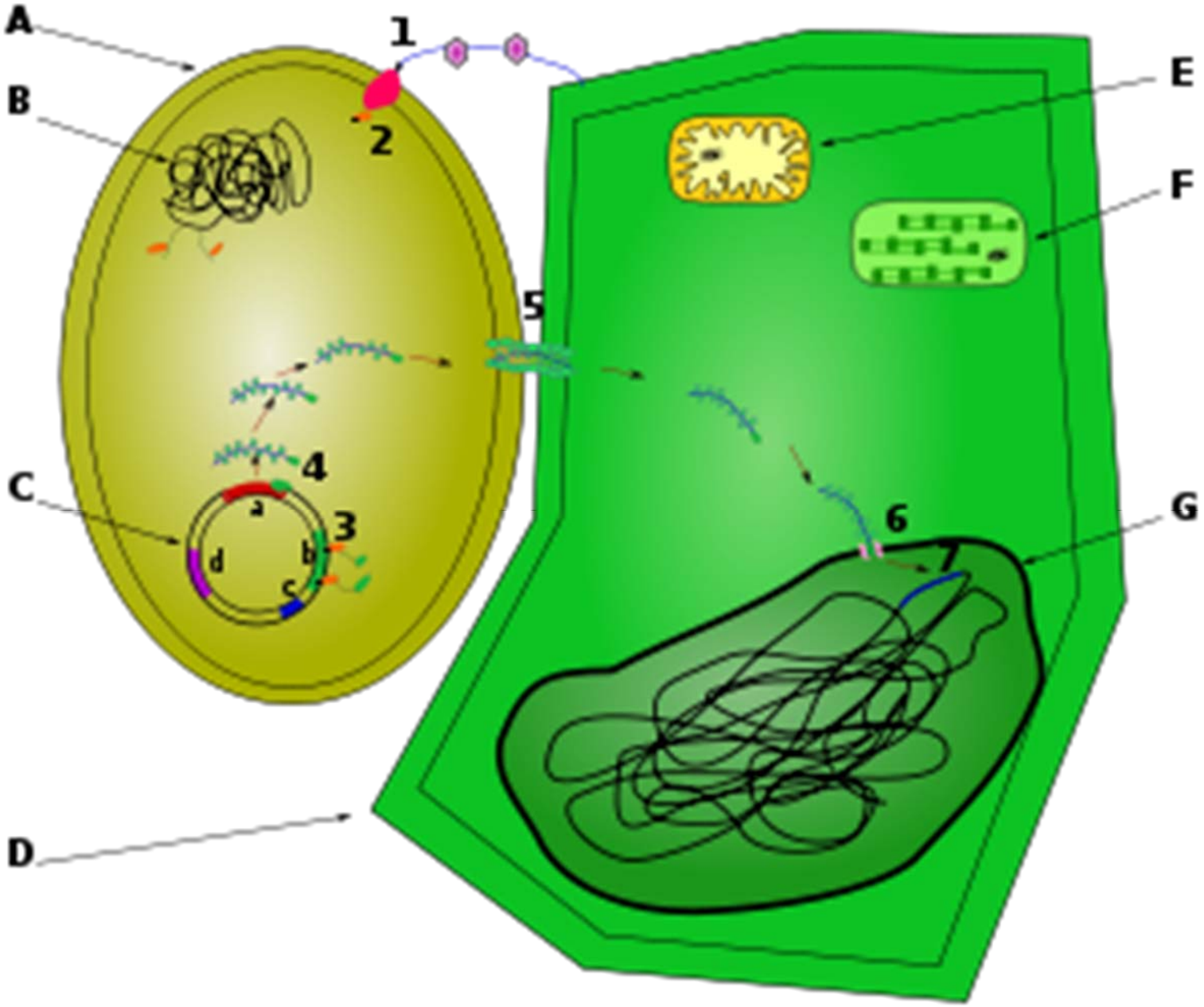
Crown Gall Disease of Walnuts

Causative agent:
Agrobacterium tumefaciens

- ubiquitous soil-borne bacterium
- long term persistence
- natural genetic engineer
- wide host range; (”all” dicots)
- economic impact on walnut
- essentially “girdles” trees
- Paradox root stock highly susceptible
- ability to exist systemically
- very damaging to young trees

How the disease works

- *A. tumefaciens* can transfer tumor producing genes into plant nuclei in the form of tumor-inducing plasmids. These plasmids carry the tumor-inducing genes and can transfer them to host cells. Genes are encoded to produce Auxin and Cytokinin which cause gall formation.


A
B
C
D
E
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G
1
2
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4
5
6
a
b
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d

Crown Gall is a very challenging disease to work on. As a result, there is not a great deal of good replicated CG research on walnut.

- Different pathogen strains
- Genetic differences in Paradox
- Variable inoculum levels
- Variable soil conditions

Options for preventing Crown Gall

- Plant non-infected trees
  - Discard any trees with visable galls
  - Bare root tree storage – Lynn Epstine UCD
  - Plant non-infected seeds – Kluepfel UCD

Options for preventing Crown Gall

- Methyl Bromide is effective on *A.tumefaciens*, however, *A.tumefaciens* can re-colonize in soil to higher levels in fumigated soil (Kluepfel UCD).
- Chance for reinfection with trees/seed.

Options for preventing Crown Gall

- Choice of root stock
- Most seedling Paradox highly sensitive
- Black is more tolerant but not totally resistant
- Several *Juglans* species exhibit resistance to crown gall
- GMO root stock – clonal propagation

Options for preventing Crown Gall

- Avoid tree damage
- Wounds that expose cambium
- Crown injury from cultivation

Options for preventing Crown Gall

- Avoid spreading with infected tools
- Contaminated soil
- Equipment or plant material

Options for preventing Crown Gall

- Use care with suckers
- Nitrogen –
- Flaming –

Options for preventing Crown Gall

- Control gophers and rodents
- Weed control in strips

Options for preventing Crown Gall

- Plant trees as high as possible
- May lessen exposure
- Usually make treatment easier


If all else fails, expose galls and treat

Pneumatic Excavation

- 90 psi at 150 cfm, ¾ inch diameter hose with a Mach 2 nozzle.
- 90 psi at 330 cfm, 1 ½ inch diameter hose with a Mach 2 nozzle.

http://walnutresearch.ucdavis.edu

Hydraulic Excavation

- One inch diameter forestry hose with KK ThunderFog nozzle (variable flow rate) or TFT Midmatic (automatic pressure regulating) nozzle.
- One and one-half inch diameter “attack line” hose with nozzles as above.
- Pressure washer, might be convenient but slow. Hold nozzle a foot or more from roots to avoid damage.

Treatments

- Tissue around the gall is critical to treat
- In our tests, chemical treatments alone were not effective (http://walnutresearch.ucdavis.edu)
- Clean surgery is effective
- Killing surrounding bark with heat is effective
- Surgery plus heat is the preferred method
- Get them when they're small
- Leave exposed for any "escapes"

For more information, go to…

http://walnut.research.ucdavis.edu

Scroll down to root, crown and graft union diseases and click on crown gall

Dan Kluepfel – current research

Lynn Epstine – biology and control

Bill Olson – economic effect

Richard Buchner – treatments

Janine Hasey – pneumatic soil excavation