



Whoa, what happened to those trees? And whose fault is it?

Orchard Herbicide Symptomology Refresher

Herbicide safety and symptomology

- Most T&V herbicides “can” injury trees, safety is primarily due to placement



Primary routes of exposure

- Foliar
 - Drift from off-site
 - Drift from within the orchard
 - Vapor movement (volatility, “fuming”)
 - Movement on dust
- Soil/root
 - Good applications vs poor applications
 - Water or soil movement from off site
- Trunk/bark
 - Good applications vs poor applications

Ok, let's see some damage!



PRE - Root inhibitors (Prowl, Surflan, Treflan)

- Root inhibitors (Prowl, Surflan, Treflan)
 - Stops cell division at root tips
 - “never” see translocated symptoms, rarely and foliar activity (very lipophilic)
 - Above ground may have drought, nutrient deficiency symptoms





urflan injury to corn

Slide from W.T. Lanini

PRE - Cellulose synthesis inhib (Alion, Trellis)

- Few foliar symptoms from root uptake.
 - Rarely translocated.
 - Mostly see stunting due to root system truncation and lack of cell wall components

PRE – Pigment synthesis inhib (Serono, Command, Solicam, Callisto)

- The “bleachers”
 - Xylem-mobile
 - See in the newest tissue (carotinoids never form) or older tissue (carotinoids not replaced)



Clomazone on squash



Norflurazon on wheat

Command on walnut (5% rate) 28 DAT



PRE/POST - Photosystem II inhib (Princep, Karmex)

- Xylem-mobile herbicides. Move with transpiration
 - Chlorosis and necrosis appears at leaf margins first, then moves inward
 - Typically do not move basipitally
 - Can see veinal or interveinal chlorosis



Propanil on almond



Propanil on cherry (7 DAT)

Propanil – 28 DAT

10% of use rate

20% of use rate



**Diuron injury
on Fruitless
Mulberry**

**Note veinal
chlorosis**



PRE/POST - PPO inhibitors (Goal, Chateau, Zues, Treevix, Shark, Venue)

- Rapid injury from membrane disruption
 - Rarely translocated, rarely foliar symptoms from soil uptake
 - Usually see injury only on sprayed leaves, new tissue ok
 - Can look like paraquat, insects, or shot-hole



PRE – Goal 2XL

- Peach seedling emerging through Goal-treated soil
- Very rare to see translocated symptoms from PPO (but not impossible)



Goal 2XL



Cherry, 14 DAT

Almond, 28 DAT



Treevix (7 DAT)



Treevix soil uptake



PRE/POST - Amino acid inhibitors - glyphosate

- #1 drift question in tree crops (mostly self-inflicted)
 - Foliar uptake. Slow acting (~7-10 d).
 - Symptoms on young tissue first
 - General chlorosis, stunting of new leaves
 - New growth may have shortened internodes causing “witches brooming”
- Glyphosate can persist in woody plants and show up next season if dose sufficient

Glyphosate



Prune suckers

Exposed nursery stock
– last season









POST glyphosate -28 DAT

5% of use rate



20% of use rate



PRE/POST - Amino acid inhibitors

- Rely 280

- Symptoms can vary
 - General chlorosis, necrosis and drooping (ala glyphosate)
 - Sometimes necrotic spots more like a PPO or paraquat
 - Generally faster than glyphosate, slower than PPO
 - Some issues with trunk gumming in almond



Suspected Rely drift on nursery almond



Glufosinate – 28 DAT

20% of use rate

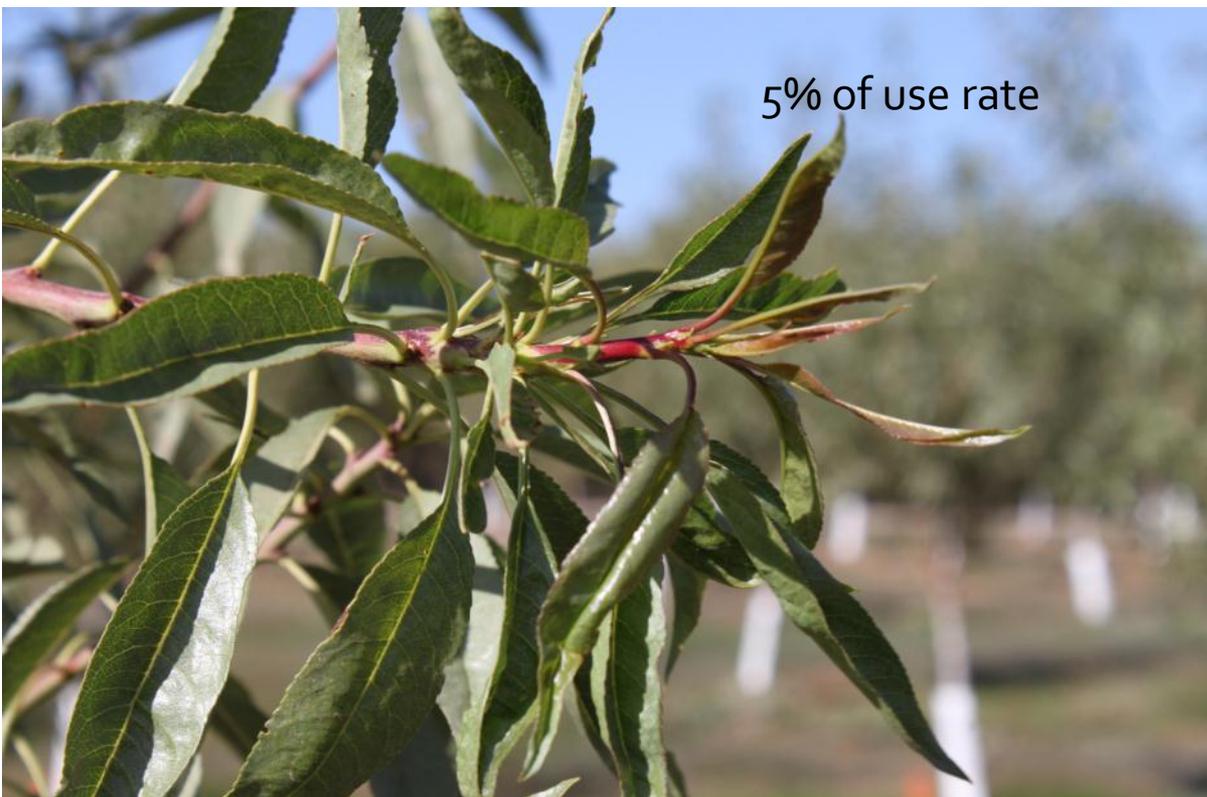


PRE/POST - Amino acid inhibitors

- ALS inhibitors (Matrix, Pindar, etc)

- Foliar exposure usually causes a general chlorosis leading to necrosis and leaf drop
 - Newest tissue (meristems) affected first
 - Typically does not “witches broom” like glyphosate
 - Sometimes kill growing points and release lateral buds (branching)

Penoxsulam – 28 DAT (foliar)



Penoxsulam – 3 MAT (soil)

Mis-spray – rate unknown



Suspected Pindar GT soil uptake



ALS inhibitors on walnut 28 DAT



Londax (bensulfuron)



Regiment (bispyribac-sodium)

Suspected Oust injury on grape -probable soil or water movement from roadway



POST - Lipid synthesis inhib

(Poast, Fusilade, Prism)

- Grass-specific herbicides
- Rarely injury on trees or other broadleaf plants (different form of ACCase enzyme)
 - Ex. Hypersensitivity to Clincher in peach



Poast on corn



POST - Photosystem I inhib (Gramoxone)

- FAST acting.
 - Not translocated (usually).
 - Spotting, and rapid necrosis with limited chlorosis.



Paraquat, cherry, 7 DAT

Gramoxone - 7 DAT simulated drift



POST - Synthetic auxins (2,4-D, Transline, Clarity, MCPA, Garlon)

- Hormone mimic. Fast acting (epinasty)
 - More common to see foliar injury, occasionally soil issues (tomato sensitive)
 - Grapes are VERY sensitive



Garlon on watermelon



Garlon on grape cane

MCPA drift on walnut



POST - “membrane disruptors” (oils, acids, and organic herbicides)

- Drift damage limited to treated tissue (spots)
 - Looks like many of the PPO inhibitors and Gramoxone
 - Light dose could look like shot-hole or insect damage too
- None of the current products have soil activity at “reasonable” rates

Symptom variability

- Symptoms can vary widely among:
 - Species
 - Dose/rate
 - Time since exposure

Not every problem is an herbicide issue

Any ideas?



This turned out to be a natural gas leak!



Troubleshooting suspected herbicide injury

- A cell phone photo of a completely dead plant from 10 ft away is pretty hard to diagnose!
- Helpful info:
 - Descriptive symptoms and photos
 - Symptom timeline
 - Herbicides and other practices used at site
 - Surrounding crops and weed management
 - Symptoms on other plants?
 - Is there a pattern in the field? (rarely a “magic bullet”)
 - Pull and freeze samples for lab analyses if necessary



Thanks



Littlejohn Farm