Integrated Pest Management in Hops

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UNIVERSITY OF VERMONT EXTENSION

CULTIVATING HEALTHY COMMUNITIES

The Basics of IPM in Hops

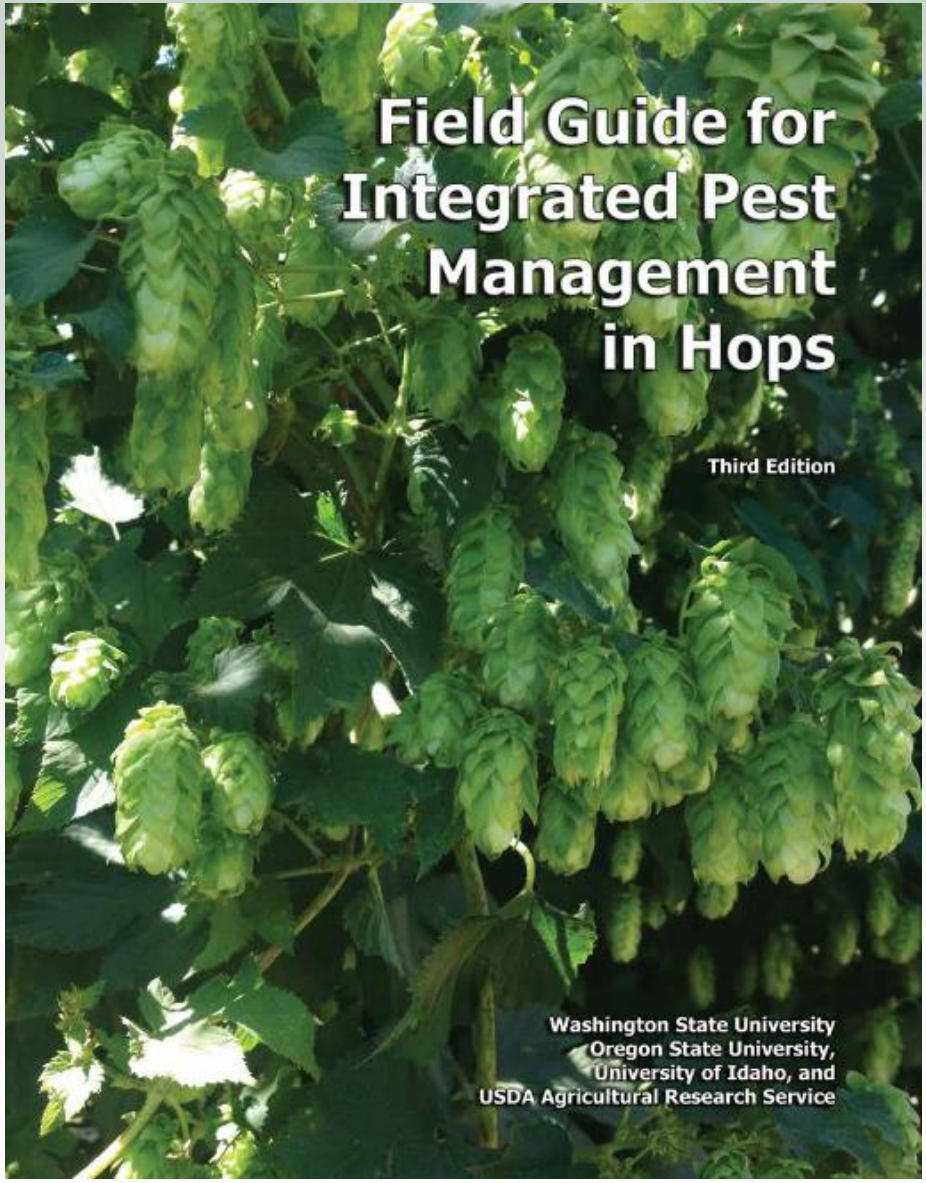
Integrated Pest Management

- Systems approach
- Uses complimentary tactics
- Maintains pests below “injurious” levels
- Minimizes impacts of activities

The Basics of IPM in Hops

Pest and natural enemy identification is crucial for success

The more you know about pest and natural enemy biology the better



Available for free at:
https://www.usahops.org/cabinet/data/Field-Guide.pdf

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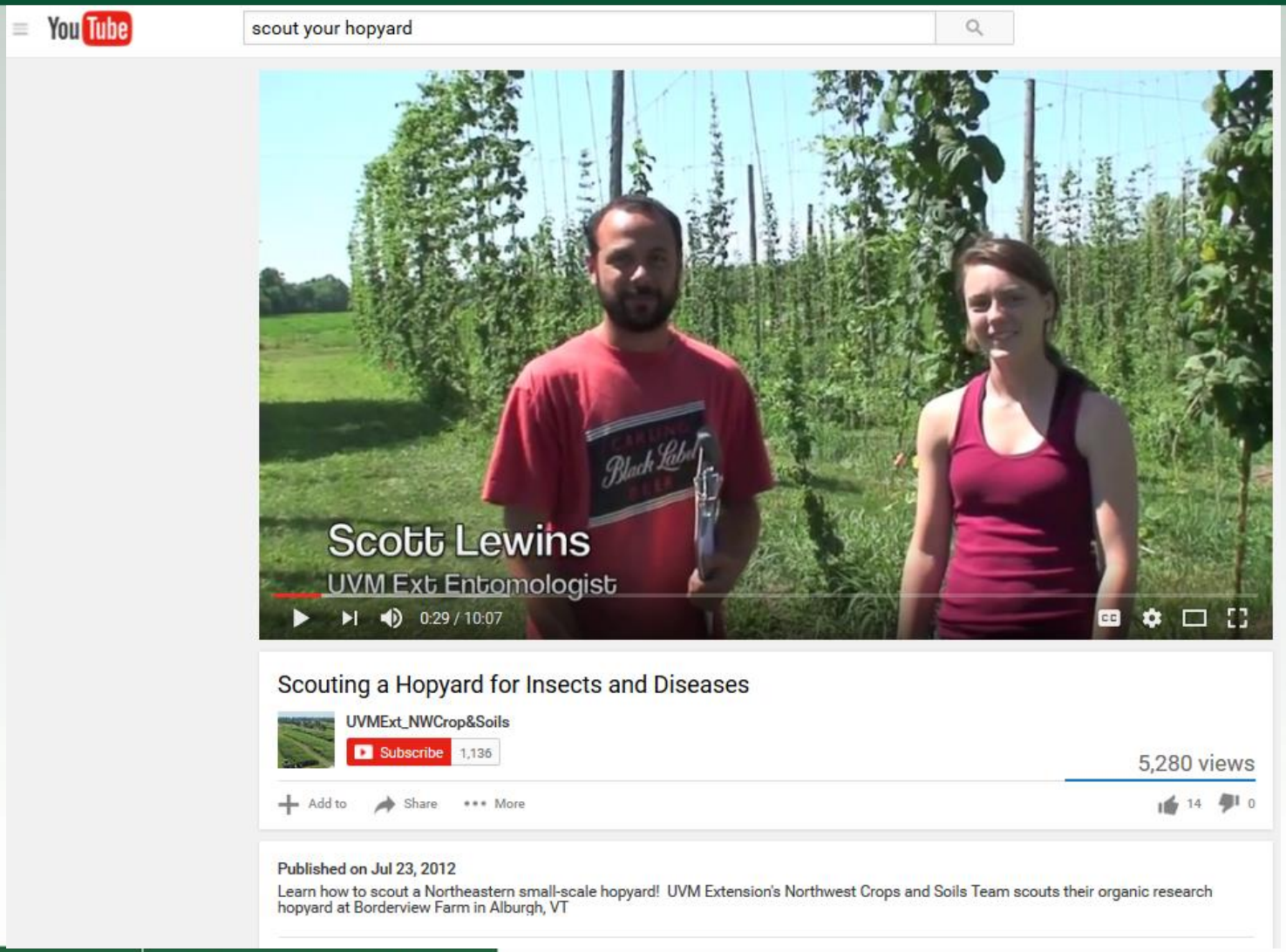
The Basics of IPM in Hops



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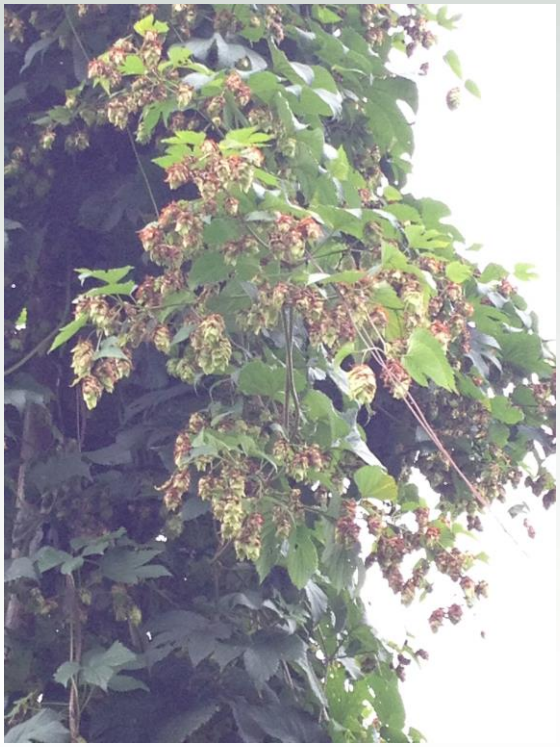
The Basics of IPM in Hops

Chemical control as a last resort…



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Downy Mildew

- Most difficult to control
- Promoted by wet conditions
- Obligate parasite specific to hops
- Attacks leaves and cones
- In the wood of the plant
  (persists in crown
  from year to year)

Downy mildew

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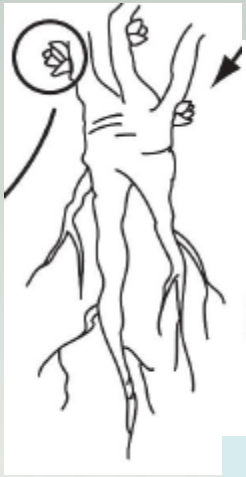
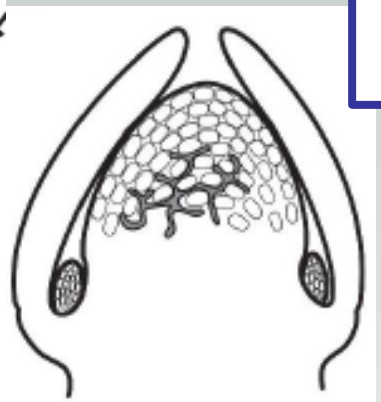
Downy Mildew Life Cycle



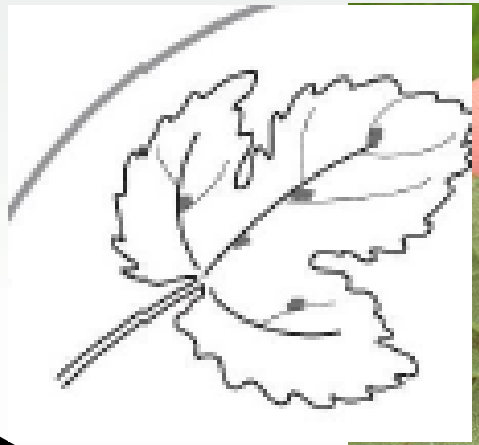


Overwinters in buds and crown

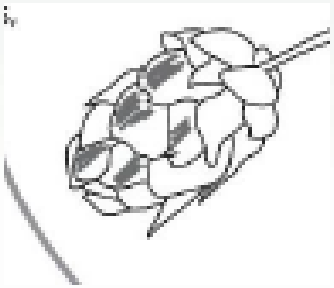
Systemic (year after year)

Primary basal spikes emerge in spring

Spores travel, landing on leaves



In-Season Infection



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Downy Mildew Resistance

Resistant

Fuggle

Newport

Perle

Spalter

Wye Challenger

Hallertauer Gold

Hallertauer Magnum

Hallertauer Tradition

Susceptible

Comet

Crystal

East Kent Golding

First Gold

Glacier

Horizon

Cluster

Northern Brewer

Downy Mildew Management

Crowning: removes first growth
Limits plant area for primary innoculum to land

Spraying Fungicide: Protectant
Spray before rain events for protection against secondary innoculum

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Moist conditions are ideal for infection:
Forecasting (predict spray applications)

Mechanical Control

- Crowning – removal top 1 to 2 inches of crown before bud break
- Scratching – disks scratch soil and remove buds from crown
- Pruning – removal of shoots before training

Whole Row Crowning Would be Better

Preventative Fungicides

Spray fungicides on days <u>prior</u> to conditions that would increase DM susceptibility

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Arthropod Pests

Aphids

Japanese beetles

Two spotted spider mites

Eastern comma (Hop merchant)

Hop loopers

Potato leafhoppers

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Major Arthropod Pests

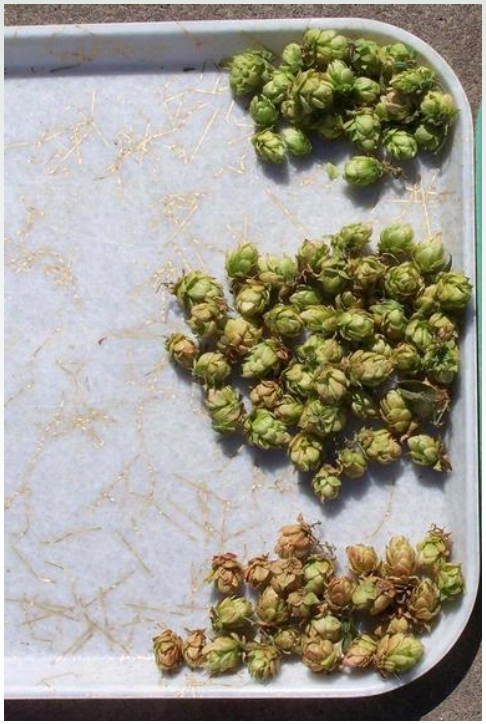
Two Spotted Spider Mites

Hot/dry conditions

Specialist predator

Can affect quality

Secondary outbreaks



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Major Arthropod Pests

Two Spotted Spider Mites

Two-spotted spider mites

Mite destroyer adult

Mite destroyer larva

Mite destroyer pupa

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Major Arthropod Pests

Potato Leafhoppers

Migrate each spring

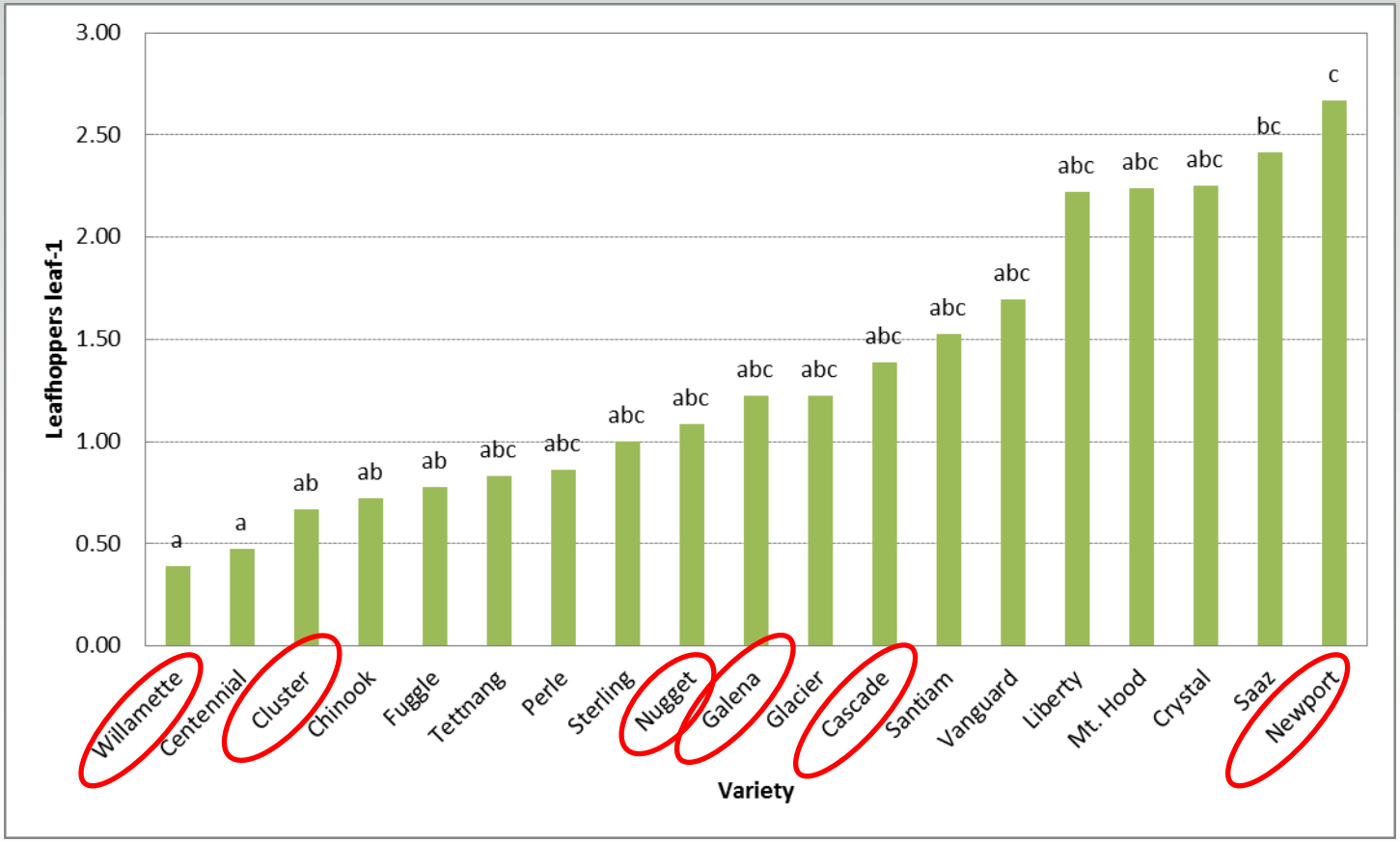
Prefer legumes

Cause “hopper burn”

Controlled by beneficials

Major Arthropod Pests

Potato Leafhoppers



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Major Arthropod Pests

Hop Aphids

Winter host: *Prunus*

Cool/moist weather

Controlled by beneficials

Cause sooty mold

Minor Arthropod Pests

Japanese beetle

Hop looper

Eastern comma (Hop merchant)

Beneficial Insects

Lacewing adult

Minute pirate bug

Parasitoid wasps

Lacewing egg and larva

Lady beetle larvae and adults

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Beneficial Insects

Spiders

Hover fly

Spider mite destroyer

Predatory mites

Spined soldier bug eggs, larvae, and adult

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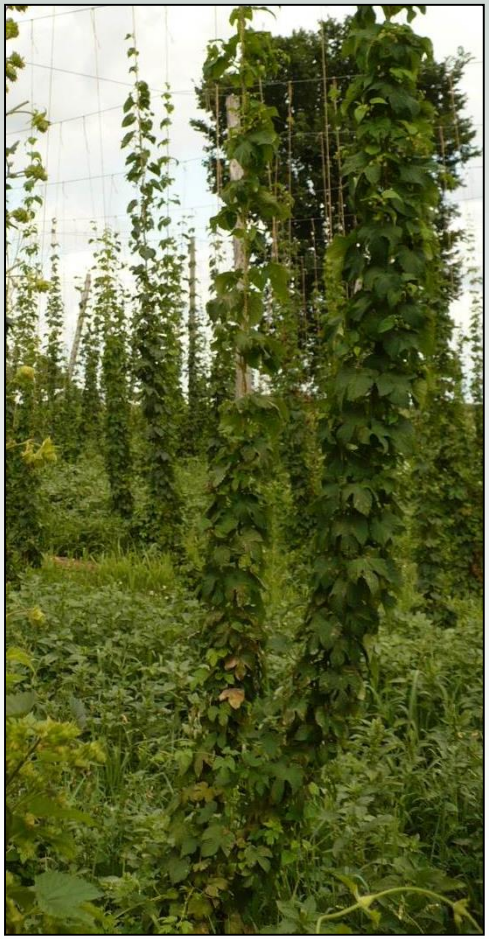
Weed control



“Scorched Earth”

Mulch

- Expensive
  - $1200 for 110 yards of hardwood mulch (including delivery)
  - Covered ½ acre, 6” deep, 4’ wide
- Approximately 100 woman hours saved
- Fertility trade offs?

Sod & Cover Crops

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Flame Weeding

Steam Weeding

Plastic Mulch

- Good for first year
- Effective control
- Pain to pull up

Thank You

Questions?

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