Integrated Pest Management

John Chandler
Vice President of Cultivation Technologies
Denver, Colorado
IPM in Cannabis

• Work on IPM with over 75 licensed facilities around the country
  • Biological and Organic Chemical
  • Large Scale Horticultural Products
    • Biobest – 400 Ac Greenhouse Tomatoes, 1000 Ac outdoor strawberries
    • Organic Chemicals (1000 Ac certified organic lettuce/kale/tomato in California)
IPM in Cannabis

Large-Scale Integrated Pest Management

No Silver Bullet Approach

1) Cultural
   • Climate (Airflow, Temp, RH/VPD, Sunlight, etc)

2) Mechanical
   • Exclusion (Quarantine, Filters, Positive Pressure)

3) Biological
   • Beneficial Insects, Mites and Microbiology

4) Chemical – Start w/ Least Toxic (Oils, Essential Oils)
   • Check Compatibility w/ Biological Control
1. Powdery Mildew

- Exclusion – Filter and UV all incoming air
- Cultural – Drought Stress (Automated Fertigation)
- Uniform, indirect airflow (not direct) (vertical)
- Good bottom pruning for airflow (prevention of microclimates (high RH) in canopy)
- Uniform spacing for light penetration
- Uniform temperatures to prevent dew on leaves
- Once established indoors
  - Requires regular spraying (weekly) & climate management (no silver bullet)
    - Oils + Bacillus to act as barrier
    - Systemic Induced Resistance
2. Root Aphids

- Quarantine new genetics – Don’t bring them in
- Limit Nitrogen
- Entomopathogenic Fungi – Not allowed in CO
- Macrobiologicals (beneficial insects, mites, nematodes) not effective at treatment
- Once established indoors
  - Requires regular drenching in veg
    - Pyrethins
    - Azadirachtins
    - Synergistic Effect
3. Spider Mites

- Easiest to Control
- Regular Scouting
- Regular Application of Beneficials or Oil-based sprays
- *Persimillis* – outbreaks and clones (weekly)
- *Californicus* – breeder sachets for long term prevention (monthly)
- Chemical – Oils + Pyrethrins + Azadirachtin
  - Mineral Oil plus Essential Oils (late flower)
4. Thrips

- Biological Control MORE Effective Than Chemical
- *Swirskii* Mite – prevention / treatment
- *Hypoaspis* Mite – prevention
- *Steinernema f.* – prevention / treatment
- *Atheta beetle* – prevention / treatment (breed)
- *Orius* – treatment (breed)
  - Sport kill when full

- Chemical – Oils + Pyrethrins + Azadirachtin
  - Mineral Oil plus Essential Oils (late flower)
5. Fungus Gnats

- Biological Control MORE Effective Than Chemical
- *Hypoaspis* Mite – prevention

- *Steinernema f.* – prevention / treatment
- *Atheta beetle* – prevention / treatment (breed)
- *Bacillus thuringiensis*, subsp. *Israelensis* (Bti)
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