

Pesticide Exposure in the Cannabis Industry

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Objectives for PTOp

- ❖ Compile a complete list of all the pesticides that are being found in Oregon cannabis products since it was legalized
- ❖ Describe the residual levels of pesticides found in Oregon cannabis products
- ❖ Become a certified and licensed Pesticide Consultant
 - Exploratory research

Nomenclature for this presentation

- **Cannabinoid**
 - A chemical group of compounds that are the active ingredients in marijuana
 - THC, CBD, et.
- **Usable marijuana**
 - Any cannabis grown for industrial or smoking purposes
- **Concentrate**
 - Any cannabinoid product that is made using:
 - A mechanical process
 - Carbon dioxide without heat or pressure
 - Uses water, vegetable oil, etc.
- **Extract**
 - Any cannabinoid product that is made using:
 - Carbon dioxide with high heat and pressure
 - Uses hydrocarbon based solvent
- **Hemp**
 - marijuana plants that are used for industrial (non-food) purposes such as rope, paper, etc.
 - Crop wide average THC concentration cannot exceed 0.3 percent on a dry weight basis



Oregon's History with Cannabis

- First state to decriminalize the possession of small amounts of marijuana back in 1973
- Medical marijuana legalized in 1998
- Residents voted to legalize marijuana in 2014
 - Recreational sales started in 2015
- Multiple state agencies estimated marijuana sales would generate \$11-16 million in tax revenue for an 18 month period
- January 1st, 2016 to August 31st, 2017
 - \$108.6 million in state and local taxes collected and dispensed back into the economy
- It is estimated that 7-8,000 people are employed by the marijuana industry in Oregon
- ODA, OLCC, OHA, and OR OSHA are all involved in regulating the cannabis industry

How did the ODA decide what pesticides to allow on marijuana?

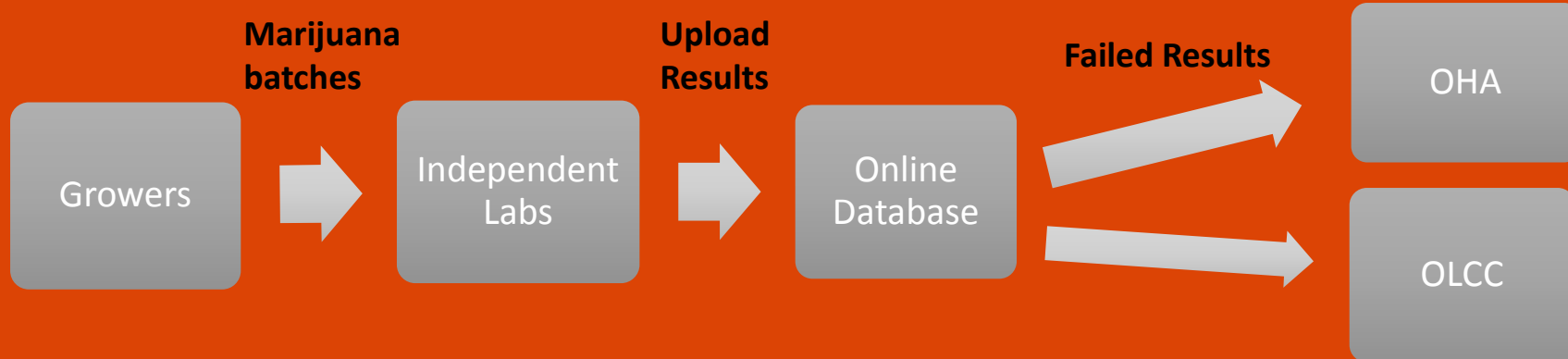
1. Marijuana is still illegal at federal level
2. Label is the law
3. ODA's 'recommended' pesticide list
 - a. Over 200 pesticides identified
 - b. Looked at tolerance, pyrolysis tests, and labels



Pesticides that are allowed

- **Piperonyl butoxide**
- **Pyrethrins**
- Azadirachtin
- Bacillus Amylouquefaciens, Pumilus, Subtilis, Thuringiensis, and Bassiana Strains
- Capsasin
- Citric Acid
- Canola, Castor, Clove, Cinnamon, Corn, Garlic, Rosemary, Sesame, Soybean, Thyme, Peppermint, Neem, and Oil
- Complex polymeric polyhydroxy acids
- **Copper octanoate**
- Cytokinins
- Gibberellic Acid
- Hydrogen dioxide
- Indole-3-Butyric Acid
- **Iron phosphate**
- **Petroleum distillate**
- **Hydrogen peroxide**
- Potassium Bicarbonate
- Sulfur
- And a few others

Testing Rules



Data

- Data requests to:
 - OLCC
 - OHA
- Database
- Drawing from same database
 - No identical findings

Summary Statistics

- Data sets were combined
 - Variables included pesticide name, concentration, ID number and product type
 - New variable created for pesticide classification
 - 1,121 batches failed over a 14 months period
 - Average concentration was 86 ppm
 - Most food/crop limits for pesticides are 20 ppm

Results

- Usable Marijuana
 - 182 batches failed
 - Average concentration of 120 ppm
- Extract
 - 374 batches failed
 - Average concentration of 58 ppm
- Concentrate
 - 565 batches failed
 - Average concentration of 11 ppm



What was found by pesticide classification

- Avermectins
- Azoles
- Carbamates
- Cynopyrroles
- Keto-enols
- Neonicotinoids
- Organophosphates
- Plant Growth Regulators
- Pyrazoles
- Pyrethroids
- Pyridines
- Spinosyns
- Strobins
- Synergists
- Tetrazines
- Xylalanime
- Unclassified

Conclusions

- Pesticides being used
- Average concentration of pesticides
- Experienced gain
 - Data gathering
 - State regulations

Discussion

- Who is applying the pesticides?
- Where are the pesticides being purchased?
- Black market or medical marijuana?
- Employee exposures?
- How can we help marijuana growers

Future Research

Questions?

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