

University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources

# Iris Yellow Spot Virus on Onions in Hawaii

Team Iris Yellow Spot Virus

R. Shimabuku, R. Mau, M. Kawate, S. Fukuda, J. Sugano, J. Hu, W. Borth, M. Chou,  
Daisuke Inoyama, Steven Ogata and Tom Matsuda

May 2012



# IYSV Team Members

- Virologist: Drs. John Hu and Wayne Borth
- Entomologist: Dr. Ronald Mau & Ming Yi Chou
- IR4 Specialist: Dr. Mike Kawate
- Agents: Robin Shimabuku, Steve Fukuda & Jari Sugano
- HDOA Pesticide Specialist: Diasuke Inoyama, Steven Ogata and Tom Matsuda

# Special mahalo to:

- Katsu Kobashigawa
- Lisa Salazar



Photo credit:. UH CTAHR

# Agenda

- Overview of:
  - IYSV virus
  - Insect vector
  - BMP's
- Field symptoms of IYSV
- Spray coverage demonstrations

\*\*HDOA credits



Photo credit.. Advertiser

# What is Iris Yellow Spot Virus?

- IYSV is a Tospovirus
- Related to tomato spot wilt virus
- Typically spread by thrips



Photo credit: R. Shimabuku



# Why is this important?

- Affects photosynthetic growth
- Lowers crop yields
- Lowers crop quality



Photo credit: Flickr

# Insect vector

- Transmitted only by the insect vector
  - Onion thrips (*Thrips tabaci*)
- Not mechanically transmitted
- Not seed borne



# Iris Yellow Spot Symptoms



Photo credit: R. Shimabuku











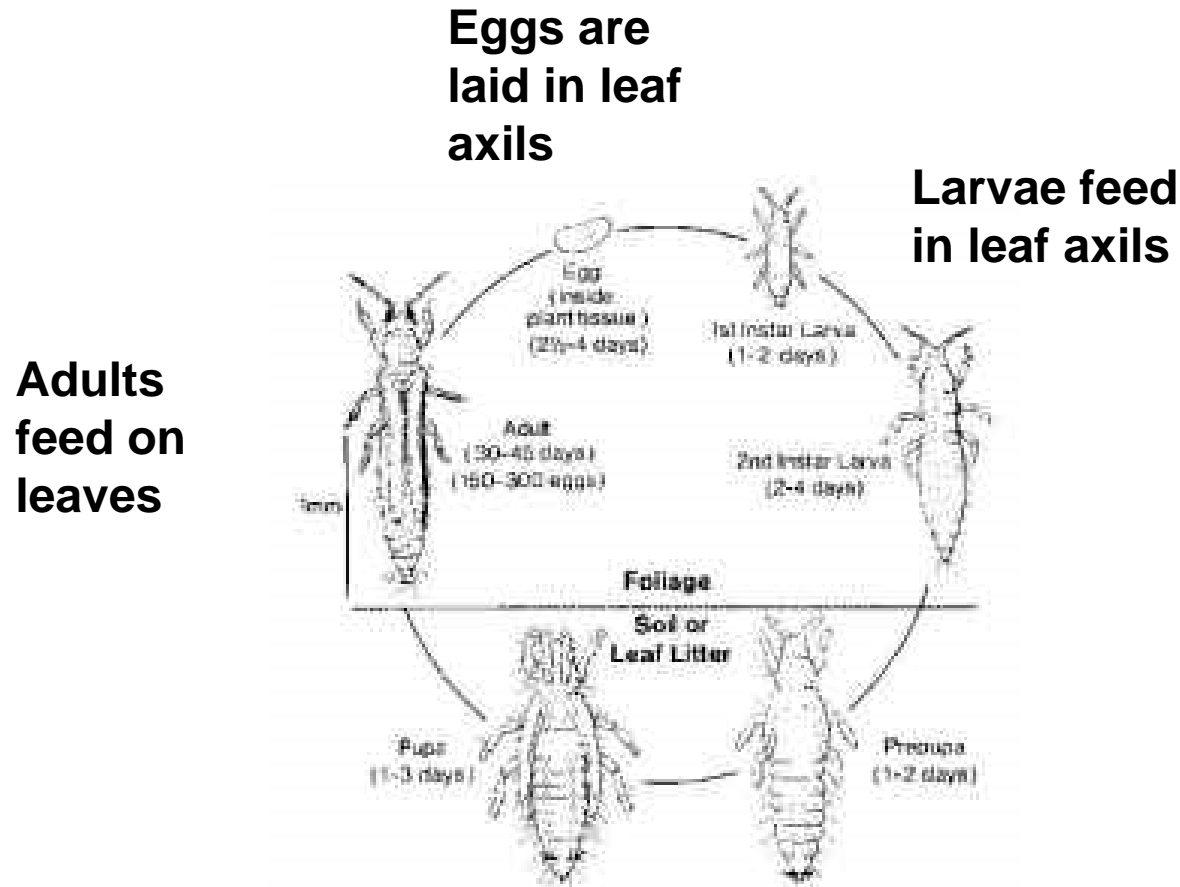




# IYSV Distribution

- Detected on Maui bulb onions on July 2010
- Found on bulb & green onions in Ewa, Oahu, November 2011
- Confirmed on green onions in Waianae, April 2012
- All confirmed by Hu and Borth - UH CTAHR

# Onion thrips biology and control



**Figure 17 Pupal stages are found in the soil**

# Onion thrips biology and control

- Transmitted by 2<sup>nd</sup> instar larvae and adult stages
- Larvae acquires the virus from infected plants
- Severity dependent on feeding, timing, crop host



JUL 14 2004

Photo credit:  
Cornell & Columbia University

# Onion thrips behavior & control

- Eggs are laid within axils
- Immatures feed within leaf axils
- Adults feed in leaf axils and on exposed leaves
- Sprays must penetrate leaf axils for best control





# Host Plants

- Bulb onion (*Allium cepa*)
- Garlic (*Allium sativum*).
- Leek (*Allium ampeloprasum* var *porrum*)
- Chives (*Allium schoenoprasum*)
- Iris (Iris spp.)
- Lisianthus (*Eustoma grandiflorum*).



# Best Management Program for IYSV in Hawaii



Maui Onion  
Type  
#100 lb



# Clean start with virus free plants

- Avoid using infected planting material (transplants or sets) when planting new areas.
- Remove infected plants, culls and volunteer onions



Photo credit: Food project



# Crop management practices

- Ensure proper crop nutrition, adequate water to minimize plant stress



# Field scouting for symptoms

- Conduct routine scouting of greenhouse, seedling area and commercial fields
- Once infected = always infected



Photo credit: Colorado State University

5365856

# Weed management

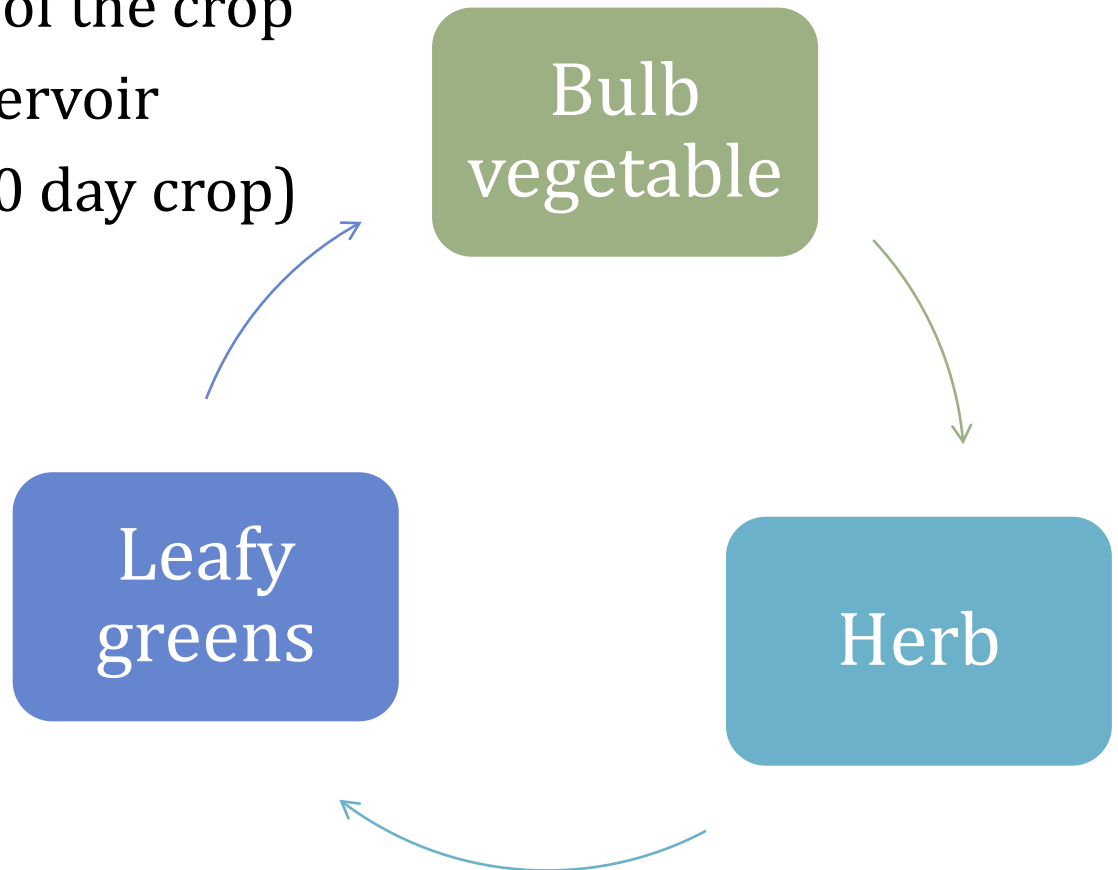
- **Common Weed Hosts:**

- Jimsonweed (*Datura stramonium*),
- Redroot pigweed (*Amaranthus retroflexus*)
- Common pigweed (*Portulaca oleracea*)



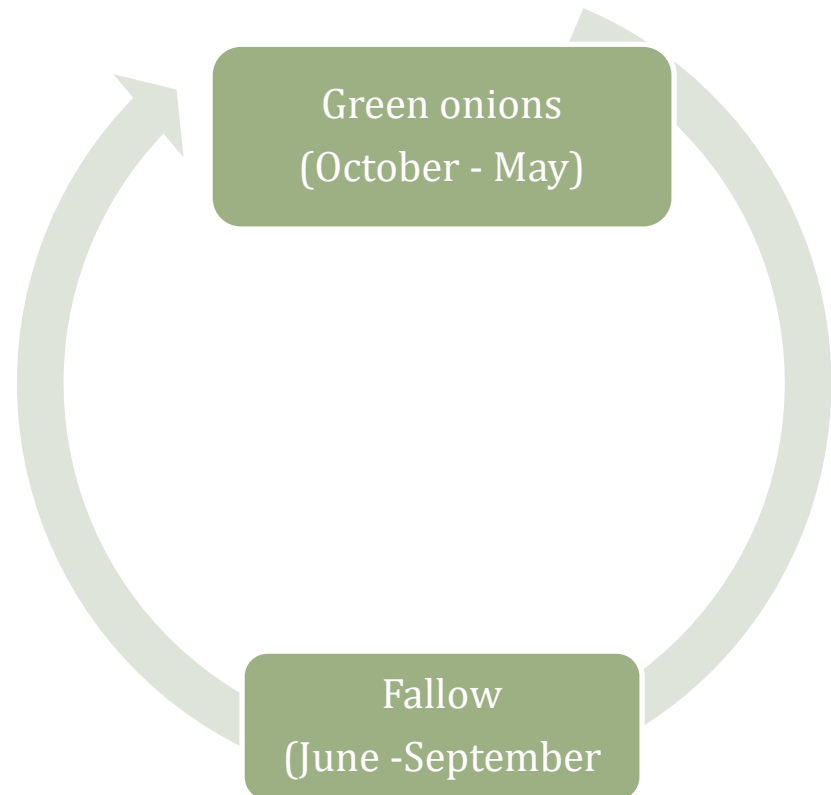
# Crop rotation

- Eliminate “green bridge”
  - Vegetative phase of the crop
  - Primary IYSV reservoir
- Plan ahead (100-120 day crop)
- Consider economics



# Host free periods

- Reduces host plant inoculum and insect vectors
- Consider economics
- Consider area wide
- Plan ahead
  - (100-120 day crop)







# Find Alternative Fields

- Locate alternative production fields
- ‘Out run’ pest and diseases
- Long term strategy

# Evaluate cultural management techniques

- Consider evaluating
  - Varietal selections (resistant lines)
  - Overhead irrigation
  - Compost
  - Mulch
  - Reflective mulches



Photo credit: University of Minnesota

# Insecticidal Field Screening

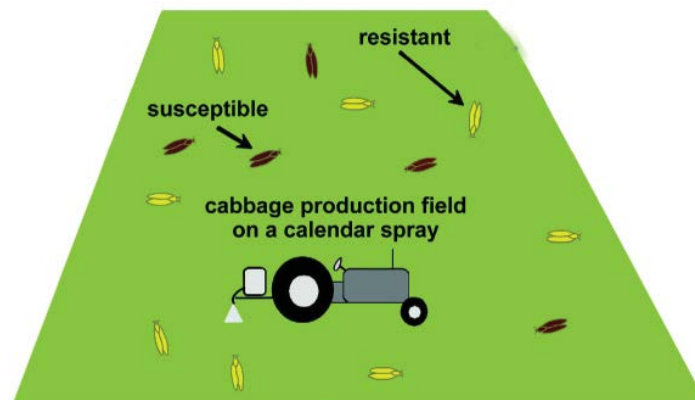
- Important for resistance management
- Evaluation of insecticidal rates and frequency
- Registration of new products



Photo credit R. Shimabuku

# Implement insecticide resistant management program

- Resistance occurs when a pest population is exposed to an insecticide group for an extended period of time
- Thrips that are genetically immune to the insecticides breed and create a new population that are not killed
- This is called genetic selection of resistant populations



Extracted from University of Georgia,  
Insecticide Resistance Management Publication

# Approved Insecticides Green Onions

Partial list of insecticides that can be applied to green onions for onion thrips.

**Check all labels first before applying.**

<u>Pesticide</u>	<u>Group</u>	<u>EPA Reg. No.</u>	
Admire Pro	4A	264-827	(both)
Prentox Malathion	1B	655-777	(both)
Mustang (RUP)	3	279-3126	(both)
Knack (IGR) (SUP)	7D	59639-95	(both)
Intrepid 2F	18	62719-442	(not bulb)
AzaMax	22	71908-1-81268	(both)
Entrust	5	62719-282	(both)
M-Pede	Insec. Soap	10163-342	(both)
Lannate LV	1A	352-384	(both)
Dipel DF	11C	73049-39	(both)



# Use Approved Insecticides in HI

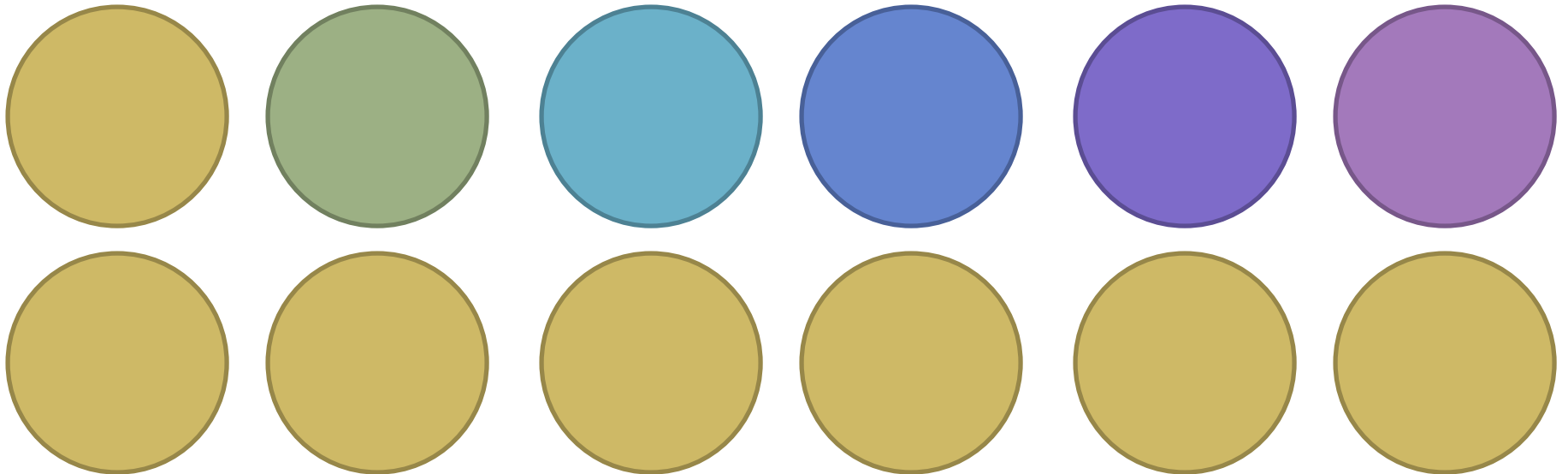
Insecticides for Use on Green Onions in Hawai'i **			
Active Ingredient			
Product Name (EPA Registration No.)		Registrant	Pest(s) (as listed for the specified crop)
Insecticides			
Acetamiprid			
<a href="#">Assail 70 WP Insecticide (Disc.) (8033-23-82695)</a>		Cerexagri-Nisso, L.L.C.	Thrips
<a href="#">Tristar 30 SG Insecticide (8033-94-1001)</a>		Cleary Chemicals, L.L.C.	Aphids and psyllids
<a href="#">Supplemental label - transplants only</a>			
<a href="#">Assail 70 WP Insecticide (8033-23)</a>		Nippon Soda Company	Thrips
<a href="#">Assail 30 SG Insecticide (8033-36)</a>		Nippon Soda Company	Thrips
<a href="#">Assail 70 WP Insecticide (8033-23-70506)</a>		United Phosphorus, Inc.	Thrips
<a href="#">Assail 30 SG Insecticide (8033-36-70506)</a>		United Phosphorus, Inc.	Thrips
Azadirachtin/Neem			
<a href="#">Debug Turbo (70310-5)</a>		Agro Logistic Systems, Inc.	Broad spectrum pesticide
<a href="#">Ecozin Plus 1.2% ME (5481-559)</a>		Amvac Chemical Corp.	Broad spectrum insecticide and nematocide
<a href="#">Ecozin 3% EC Botanical Insecticide (Disc.) (5481-476)</a>		Amvac Chemical Corp.	Broad spectrum insecticide and nematocide
<a href="#">Molt-X Botanically Based Insecticide / Nematicide (68539-11)</a>		Bioworks, Inc.	Broad spectrum insecticide and nematocide
<a href="#">Azaguard Botanical Insecticide / Nematicide (70299-17)</a>		Biosafe Systems LLC	Broad spectrum insecticide and nematocide
<a href="#">Aza-Direct Biological Insecticide (71908-1-10163)</a>		Gowan Company	Broad spectrum insecticide and miticide
<a href="#">AzaMax (71908-1-81268)</a>		Parry America Inc.	Broad spectrum insecticide and miticide
<a href="#">Azatin XL (70051-27-59807)</a>		OHP, Inc.	Broad spectrum insecticide
<a href="#">Azasol (81899-4)</a>		Soluneem Inc.	Broad spectrum insecticide
<a href="#">Neemix 4.5 (70051-9)</a>		Certis Usa, L.L.C.	Broad spectrum insecticide
<a href="#">Neemazad 1% EC (70051-104)</a>		Certis Usa, L.L.C.	Broad spectrum insecticide
<a href="#">Trilogy (70051-2)</a>		Certis Usa, L.L.C.	Broad spectrum pesticide
<a href="#">Plasma Neem Oil Biological Insecticide (84185-4)</a>		Plasma Power Private Limited	Broad spectrum insecticide
Bacillus thuringiensis			
<a href="#">Agree WG (70051-47)</a>		Certis USA, L.L.C.	Caterpillars
<a href="#">Javelin WG Biological Insecticide (70051-66)</a>		Certis USA, L.L.C.	Caterpillars
<a href="#">Dipel DF Biological Insecticide Dry Flowable (73049-39)</a>		Valent Biosciences Corp., ESD	Caterpillars

<http://pesticides.hawaii.edu/>

Always read and follow the label directions (04/12)

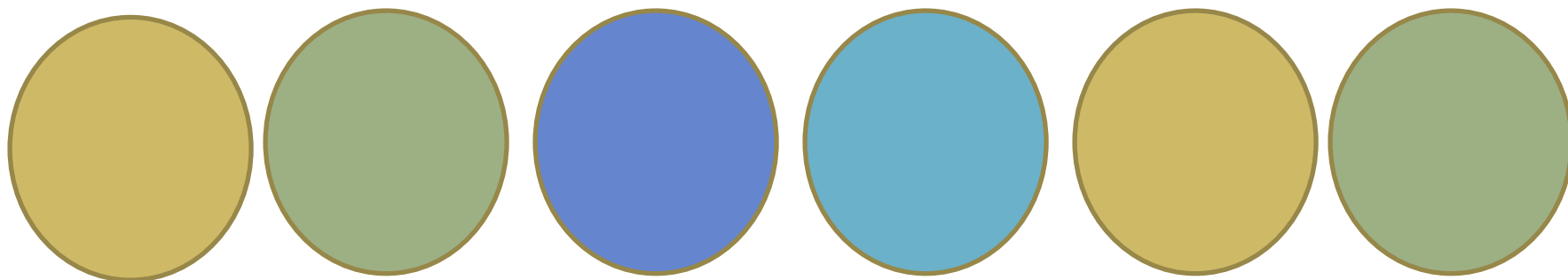
# Rotate Insecticides to Minimize Resistance:

- Crop protection chemicals such as insecticides should always be rotated
- Never use the same insecticide for an extended period of time without rotating to a chemical in a different chemical class that pesticide



# Sample Insecticide Schedule for Typical Ag Pests

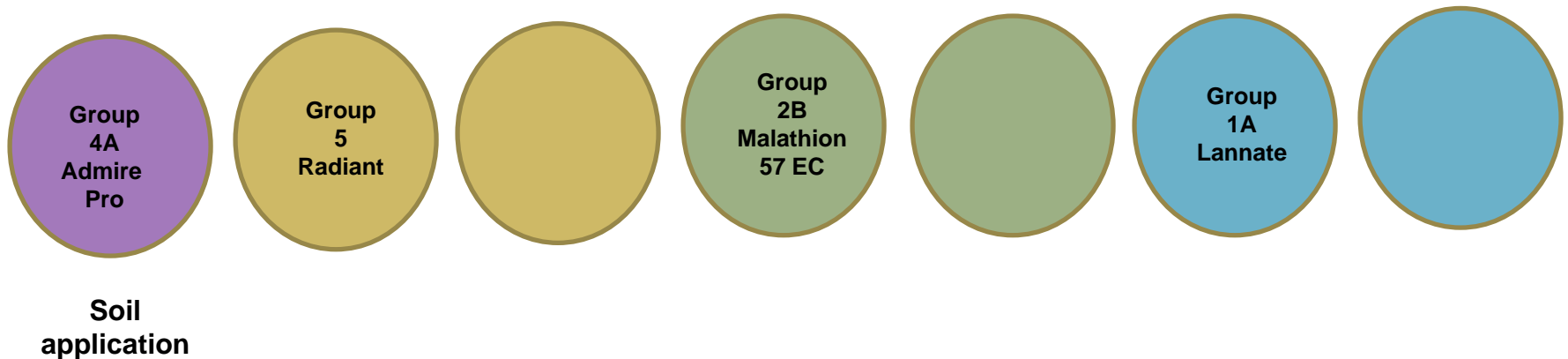
Recommended: Rotation between pesticide groups  
Each color represents a different insecticidal class



# A Possible Rotation for **GREEN** onion

- Based on insect lifecycle

## Sequential applications by Pesticide Group

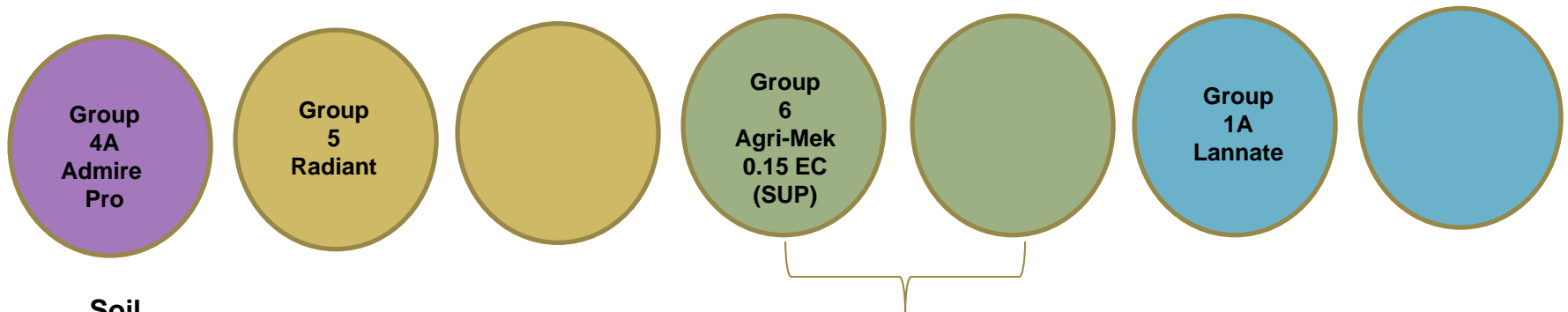




# A Possible Rotation for **BULB** onions

- Based on insect lifecycle

## Sequential applications by Pesticide Group



Soil  
application

Approval for use in HI  
on BULB onions  
May 1, 2012

**\*\*Not approved for use  
in GREEN onions**


OR  
Epi-Mek (SUP)  
100-1154

# Obtain Good Spray Coverage

- Achieving good spray coverage is important for IYSV management.
- Ideal spray coverage involves the uniform application of crop protection chemicals within the recommended label rate ranges and use of appropriate adjuvants (e.g., spreader/spreader-sticker)
- Management of IYSV requires optimal penetration throughout the plant canopy and into leaf sheaths

# Maximum Application Limitation

- Be mindful of the maximum limits on crop protection chemicals
- EXAMPLES ONLY:
  - ADMIRE PRO (Soil application only)
    - Do not apply more than 14 ounces of Admire Pro/ acre/ crop season (soil application)
  - Agri-Mek 0.15 EC (RUP) (Bulb only)
    - Do not apply more than 48 fl oz. (or 0.056 lbs a.i.) of Agrimek 0.15 or any product containing abamectin in a growing season per year
  - RADIANT SC
    - Do not apply more than 30 ounces of Radiant / acre/ year

GROUP 4A INSECTICIDE	
	
<b>ADMIRE® PRO Systemic Protectant</b>	
For uses in pest management, suppression of insect vectored diseases and maintenance of plant health.	
ACTIVE INGREDIENT:	Imidacloprid, 1-[(6-Chloro-3-pyridinyl)methyl]-N-nitro-2-imidazolidinimine..... 42.8%
INERT INGREDIENTS:	..... 57.2%
	100.0%
EPA Reg. No. 264-927	EPA Est. No. 3125-MO-001
Contains 4.6 pounds of active ingredient per gallon or 550 grams AI/liter. SHAKE WELL BEFORE USING	
<b>STOP - Read the label before use</b>	
<b>KEEP OUT OF REACH OF CHILDREN</b>	
<b>CAUTION</b>	
For MEDICAL And TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334-7577 For PRODUCT USE Information Call 1-866-99BAYER (1-866-992-2937)	
<b>FIRST AID</b>	
IF ON SKIN OR CLOTHING:	<ul style="list-style-type: none"><li>• Take off contaminated clothing.</li><li>• Rinse skin immediately with plenty of water for 15 to 20 minutes.</li><li>• Call a poison control center or doctor for treatment advice.</li></ul>
IF INHALED:	<ul style="list-style-type: none"><li>• Move person to fresh air.</li><li>• If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.</li><li>• Call a poison control center or doctor for further treatment advice.</li></ul>
IF SWALLOWED:	<ul style="list-style-type: none"><li>• Call a poison control center or doctor immediately for treatment advice.</li><li>• Have person sip a glass of water if able to swallow.</li><li>• Do not induce vomiting unless told to do so by a poison control center or doctor.</li><li>• Do not give anything by mouth to an unconscious person.</li></ul>
In case of emergency call toll free the Bayer CropScience Emergency Response Telephone No. 1-800-334-7577. Have a product container or label with you when calling a poison control center or doctor, or going for treatment.	
Note To Physicians: No specific antidote is available. Treat the patient symptomatically.	
<b>PRECAUTIONARY STATEMENTS</b>	
<b>HAZARDS TO HUMANS AND DOMESTIC ANIMALS</b>	
<b>CAUTION</b>	
Harmful if swallowed or absorbed through skin or if inhaled. Avoid contact with skin, eyes, or clothing. Avoid breathing spray mist. Wear long-sleeved shirt and long pants, socks, shoes and chemical-resistant gloves (such as natural rubber, section Category A).	
<b>Applicators and Other Handlers Must Wear:</b>	
<ul style="list-style-type: none"><li>• Long-sleeved shirt and long pants</li><li>• Chemical-resistant gloves made of any waterproof material such as, barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylidene chloride (PVC) or viton.</li><li>• Shoes plus socks</li></ul>	

# Spreader or Spreader-Sticker

- Utilize a good spreader or spreader-sticker to obtain good spray coverage.
- Be careful of phyto-toxicity issues.
- Apply new material to a small area first
- Assess spray coverage and phyto-toxicity issues before making large area applications.





**Solo**

#1

MADE IN U.S.A. GERMANY

# The Label is the Law

- Only crop protection chemicals approved for use in Hawaii on green or bulb onions should be used to control onion thrips
- Read and follow the label directions
- Pay attention to key words such as preharvest intervals (PHI), re-entry intervals (REI), personal protective equipment (PPE), spray interval, maximum number of applications, etc.





# Monitor for Damage = Damage

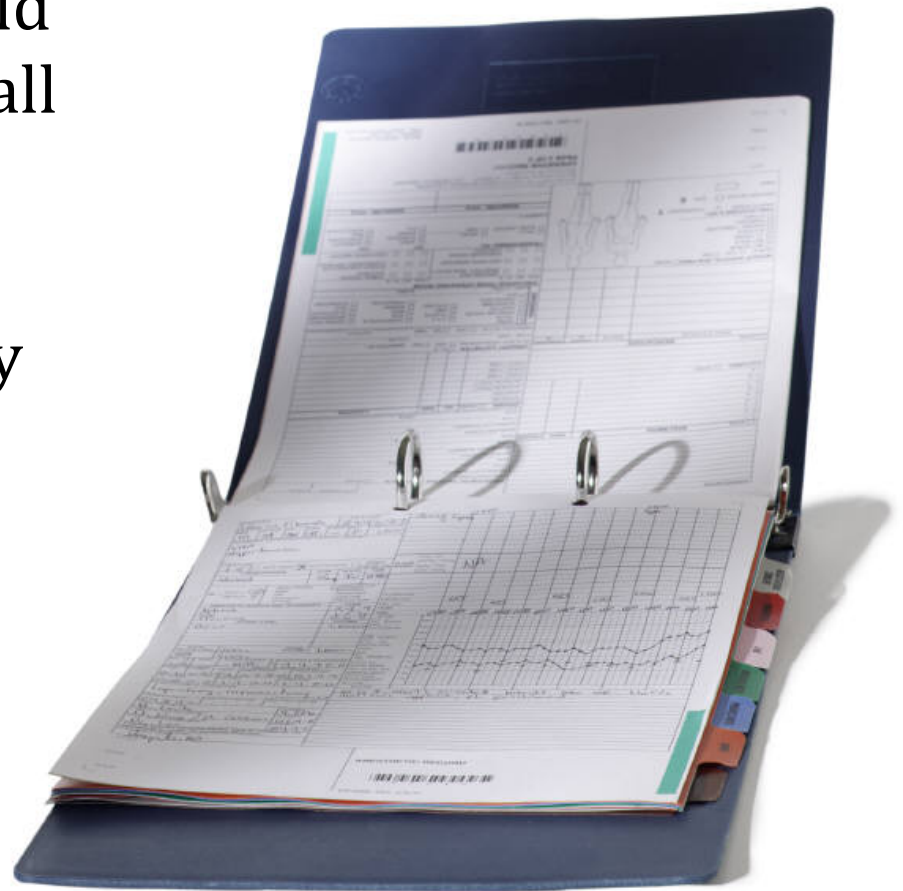
- **CAN NOT** undo old damage
  - Protect new leaves
  - Evaluate effectiveness based on **NEW** leaves
  - Do **NOT** assess effectiveness based on older parts of the plant



Photo credit: UtahState University

# Keep Good Records: RUP or not

- Good record keeping should be a common practice for all commercial agricultural operations
- Keep good records of spray applications. Important information such as rates, frequency, treatment area, damage, etc. should be documented.





# Impact of IYSV in Hawaii

- Results in reported crop losses from 20-100%
  - Reduction in crop yields
- Lowers crop quality
  - Reduction in grade A products
- Threatens Hawaii's niche market varieties, i.e. Maui onion





# Future areas of work

- Host suitability of green onions vs. bulb onions
- Screening & registration of new insecticides
  - Increased products
  - Better rotation program
- Varietal screening

# Agriculture is Changing... Risk oriented business

- Ensure farm sustainability
  - Responsible farming
  - Business and risk management
  - Responsible pest management
  - Environmental stewardship
  - Farmer training programs
  - Access to resources & agencies





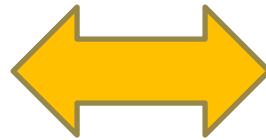
University of Hawai'i at Mānoa  
College of Tropical Agriculture & Human Resources

## Our Goals

Increase viability and sustainability of commercial farms in Hawaii  
Integrate more farmers into mainstream agriculture  
Assist producers in adjusting to the changes in Hawaii agriculture

## LIFE excels in:

Grass roots educational programs  
Responsible and sustainable farming  
Integrated pest management  
Environmental stewardship  
Pesticide, worker and food safety  
Continuing farmer education programs  
Agricultural resource & agency access



University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources

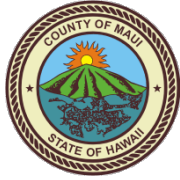
**AG background**

**Risk background**

Teaming up to service growers better  
Respond to a wider area of concerns

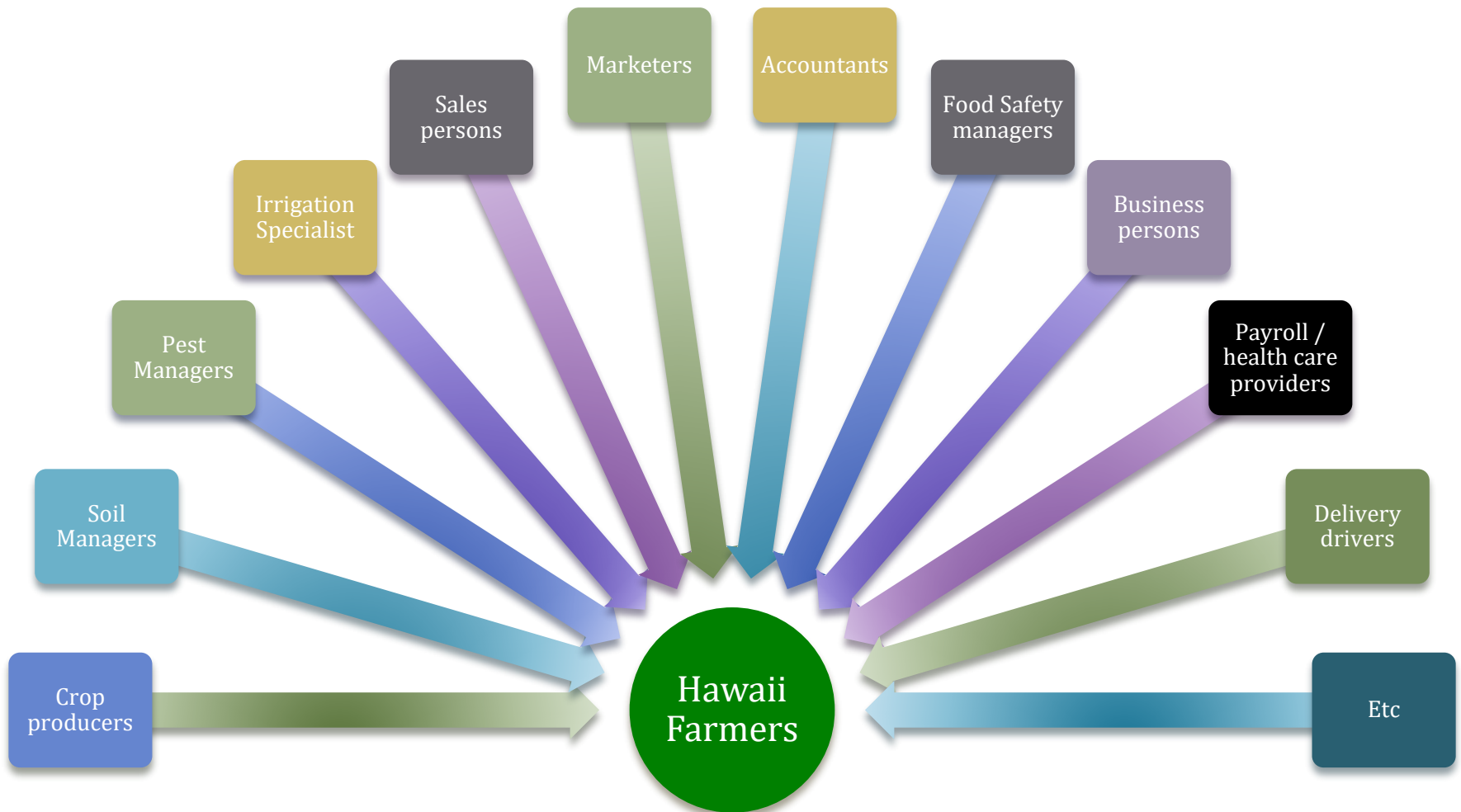


# Collaborative Partnerships



Mahalo to our agricultural partners: UH CTAHR (Risk Management Hawaii, Ag Incubator, Honey Bee, Aquaculture and Aquaponics, Sustainable and Organic Agriculture, Basil Swat Team, High Vaccinium, Hawaii Tea programs, etc.), Hawaii Department of Agriculture, USDA (FSA / NRCS), Hawaii Farm Bureau, County agencies, Oahu Resource and Conservation, Agricultural Foundation, agricultural chemical companies, health insurance companies, crop insurance companies, our many private and public partners, and Hawaii's farmers and agricultural vendors.

# Changing Role of Hawaii's Farmers



# Keeping Hawaii's Farms in Business

- Continuing education for Hawaii's growers
  - Agricultural Educational Workshops
    - Address specific risk management issues
      - Crop production
      - Crop specific insurance
      - Record Keeping
      - Financial Measures
      - Business Planning
      - Marketing Plan
  - On Farm Field Days
  - Grower Inspired Field Days
  - Farm Doctor Program
  - Risk Management school
  - Bilingual Materials





# Risk Management Resources for Hawaii Agriculture

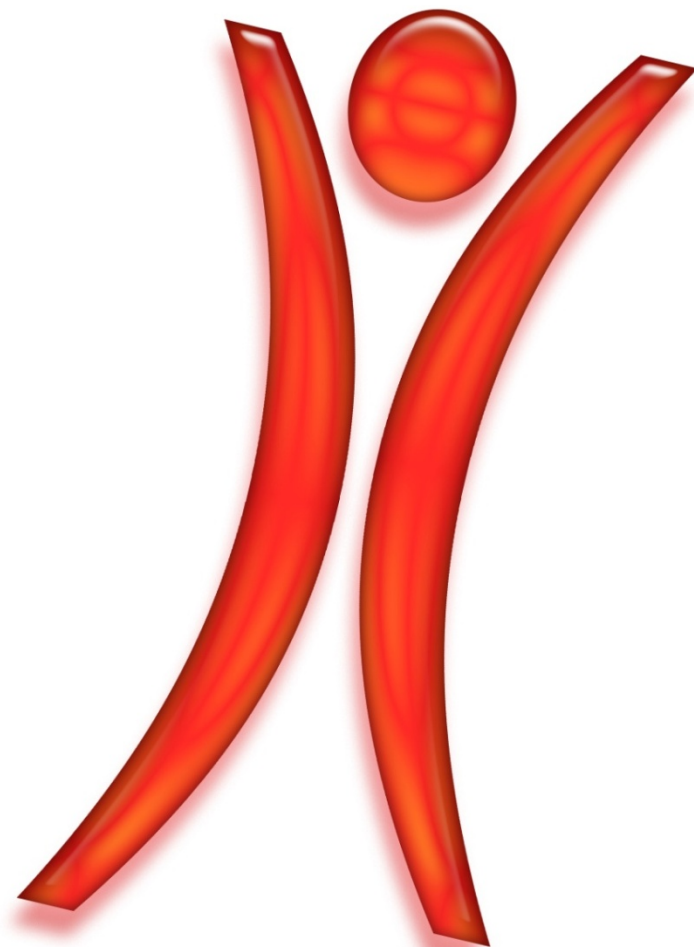
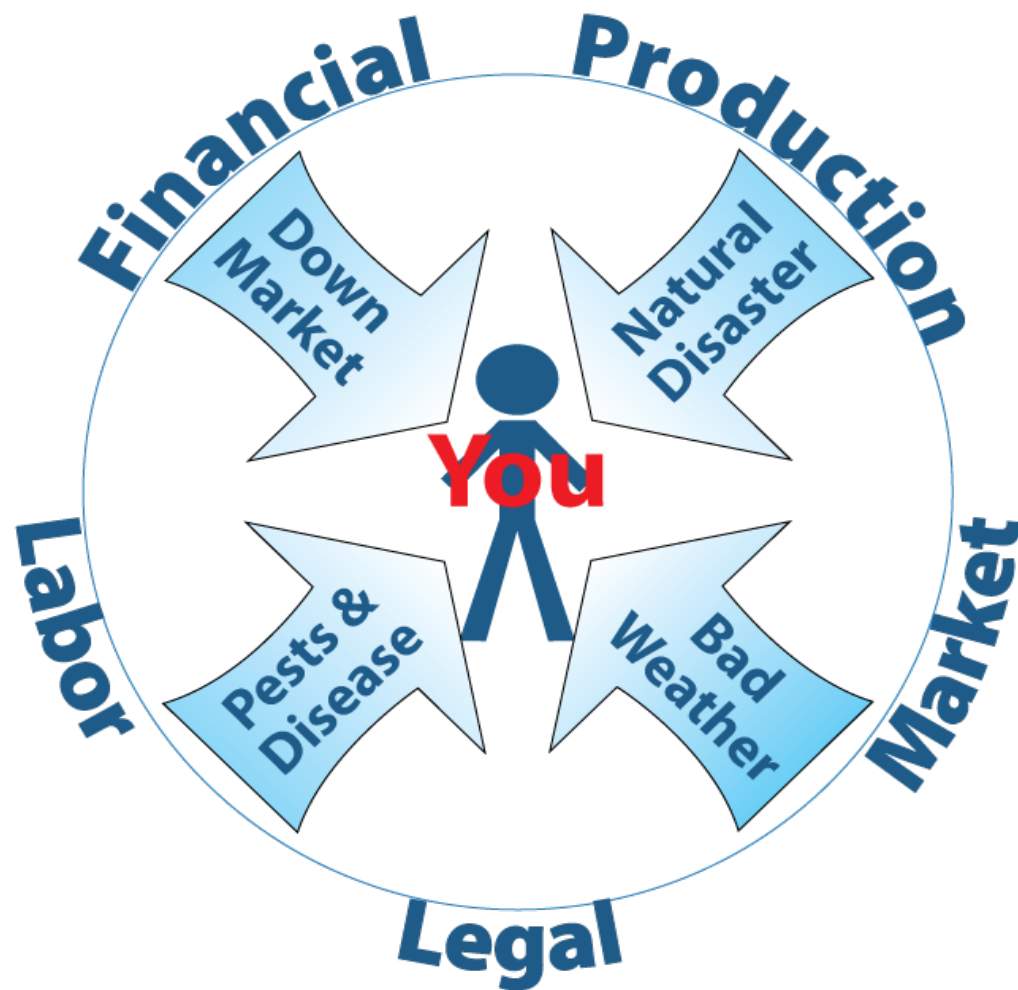
## Our Goals

Deliver risk management education to Hawaii's producers  
Educate Hawaii's producers about crop insurance





# Minimizing the RISK on You





# USDA Risk Management Products: Tools & Products

	Risk Management Agency (RMA)				Farm Service Agency (FSA)							
	Current Insurance Plans				Natural Disaster Programs							
Commodity	AGR-Lite	Fruit (APH)	Dollar Amount	Tree (Dollar)	NAP*	SURE	TAP	ELAP	LFP	LIP	ECP	Emergency Loans
Banana	√	√		√		√	√					√
Coffee	√	√		√		√	√					√
Mac Nuts	√	√	√ Trees			√	√					√
Papaya	√	√		√		√	√					√
Other Fruits	√				√	√	√ Trees					√
Other Tree Crops	√				√	√	√					√
Nursery	√		√			√						√
Vegetables	√				√	√						√
Cut flowers & foliage	√				√	√						√
Other Crops	√				√	√						√
Livestock	√					√		√	√	√		√
Farm/Ranch Land					√						√	√

Notes:  
 \* NAP is not available for crops where catastrophic (CAT) is available such as APH, Dollar or Tree base. If AGR-lite insurance is acquired NAP is no longer available.  
 \* No RMA crop insurance or FSA NAP = No access to disaster programs