Current Status of Herbicide Resistance in Weeds

Lesson 1

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Objectives

By the end of this lesson, you will:

- Understand the need for managing herbicide resistance in weeds.
  - Know the current status of herbicide resistance in weeds.

Above: Seedling stage of kochia, a weed that is known to be resistant to several herbicides.

Image number 5361300 at www.invasive.org.

Introduction

Due to the extensive use of herbicides to control weeds, populations of weeds with resistance to one or more herbicides continue to increase within the USA.

The entire agricultural community must make an effort to understand herbicide resistance, learn to identify it early, and implement management tactics to reduce the evolution of herbicide-resistant weeds.

Evolution is a term used by weed scientists to refer to the process of herbicide-resistant weeds becoming dominant in a field over time. This process is a result of a herbicide selecting individuals that occur naturally and are not controlled by the herbicide.

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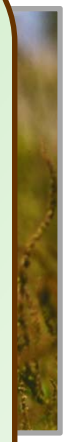

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to

Pho t: Aaron Hager, University of Illinois.

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Why Care About Herbicide Resistance?

- Require changes in weed and crop management practices
- Increase the cost of weed management
- Reduce viable herbicide options
- Loss of yield potential and income

Photo credit (far left): Cotton planted into ultra-narrow rows in rye residue.

Image number 1319008 at www.invasive.org.

Current Status of Resistance

1. No herbicides with new mechanisms of action are in advanced development trials. The last new mechanism of action was introduced over 20 years ago; therefore, we will have to rely on currently available herbicides for the foreseeable future.

2. The number of weeds with herbicide resistance continues to increase within the United States and around the world.

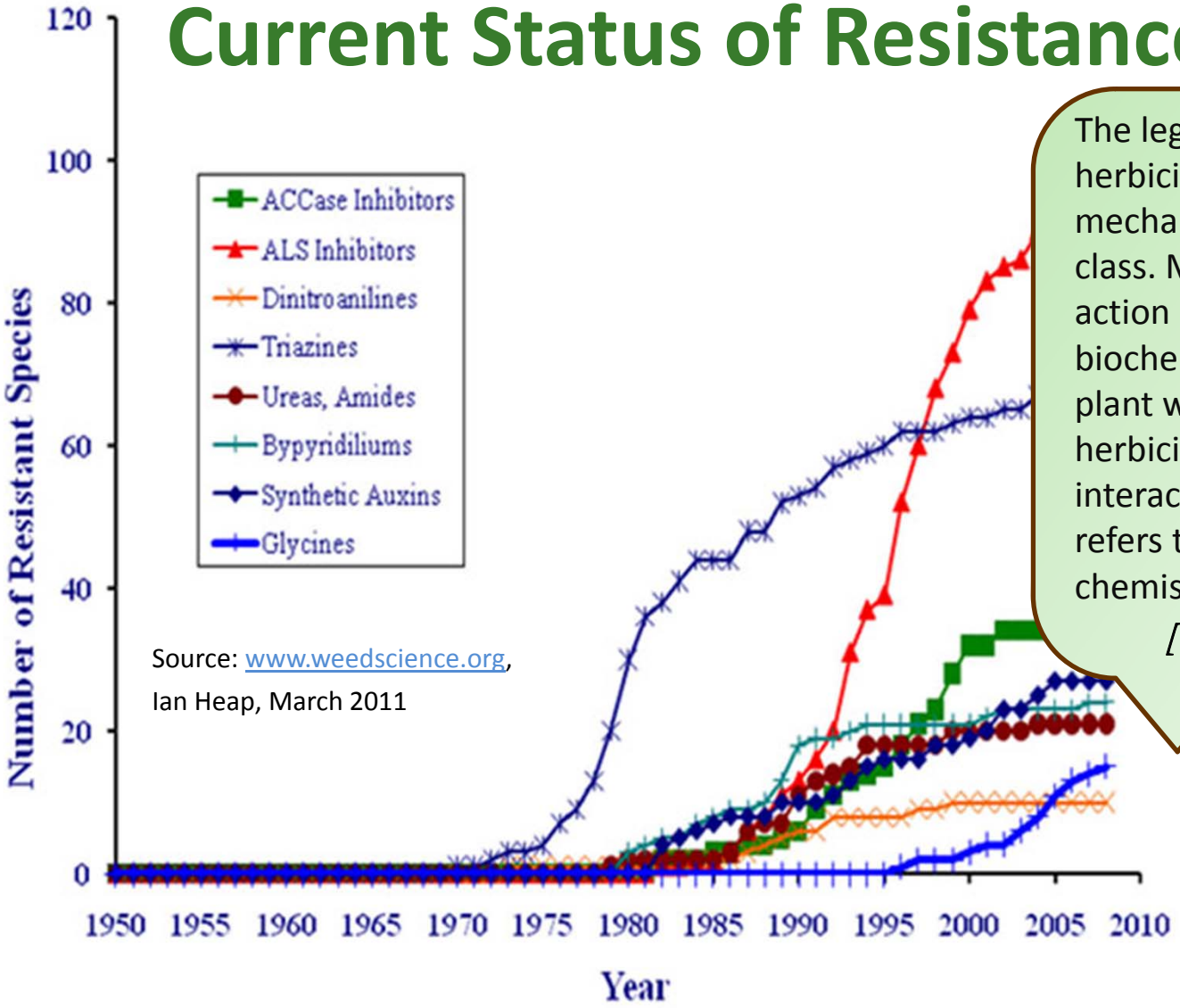
3. The number of weeds with herbicide resistance to more than one herbicide continues to increase.

Current Status of Resistance

4. The number of acres infested with weeds that are resistant to one or more herbicides continues to increase.
5. Resistance to glyphosate, today's most widely used herbicide, continues to increase.
6. Herbicide resistance changes how a herbicide is used by a farmer and the company. Resistance has not led to the total loss of any one herbicide.

Strategies that successfully delay and mitigate the evolution of herbicide-resistant weeds must be in place to preserve and sustain herbicides as resources in weed management.

Current Status of Resistance



Source: www.weedscience.org,
Ian Heap, March 2011

The legend identifies herbicides by both mechanism of action and class. Mechanism of action (MOA) is the biochemical site within a plant with which a herbicide directly interacts. Herbicide class refers to herbicide chemistry.

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Glycines

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Current Status of Resistance

Herbicide Mechanism of Action	Number of Resistant Species	Herbicide Group Number
ACCase-inhibitors (ex. Select herbicide)	40	1
ALS-inhibitors (ex. Classic herbicide)	108	2
Photosystem II-inhibitors (ex. atrazine)	68	5
Glycines (ex. glyphosate)	21	9

Source: www.weedscience.org,
Ian Heap, March 2011

Mechanism of action (MOA) is the biochemical site within a plant with which a herbicide directly interacts. Herbicides with different MOAs are identified by different group numbers. For example, 2,4-D belongs to group 4 and glyphosate belongs to group 9. Herbicides are assigned into groups based on a WSSA approved system of categorizing based on mechanism of action.

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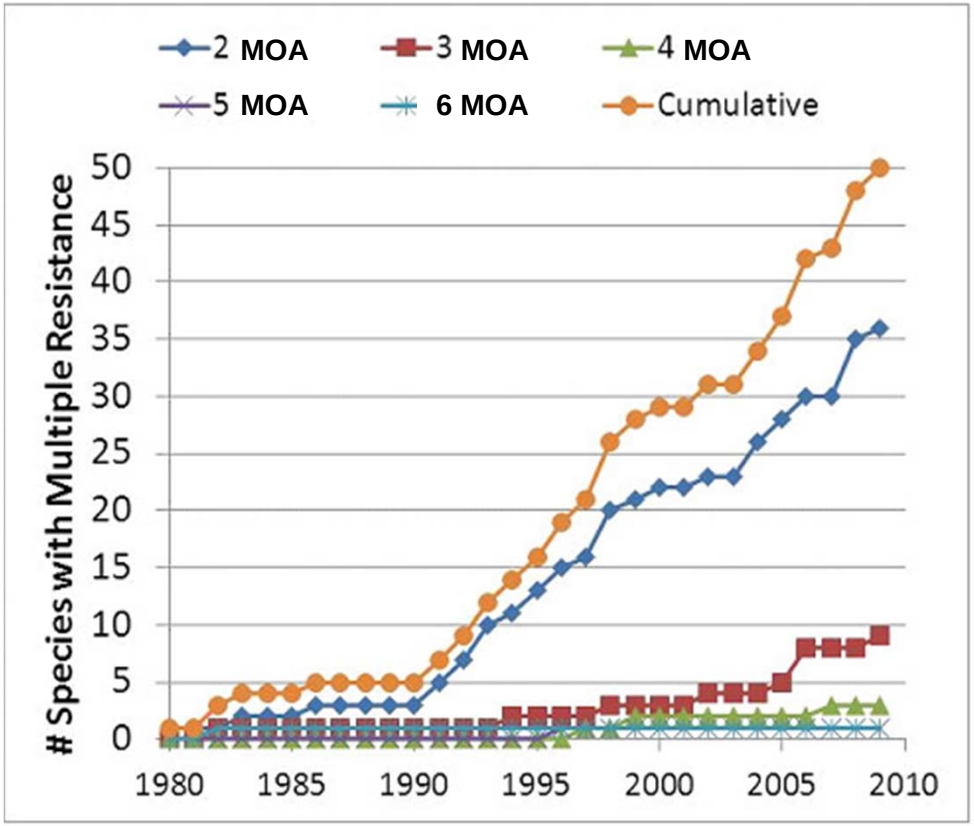
Chronological Increase in Weeds with Resistance to Multiple Mechanisms of Acti



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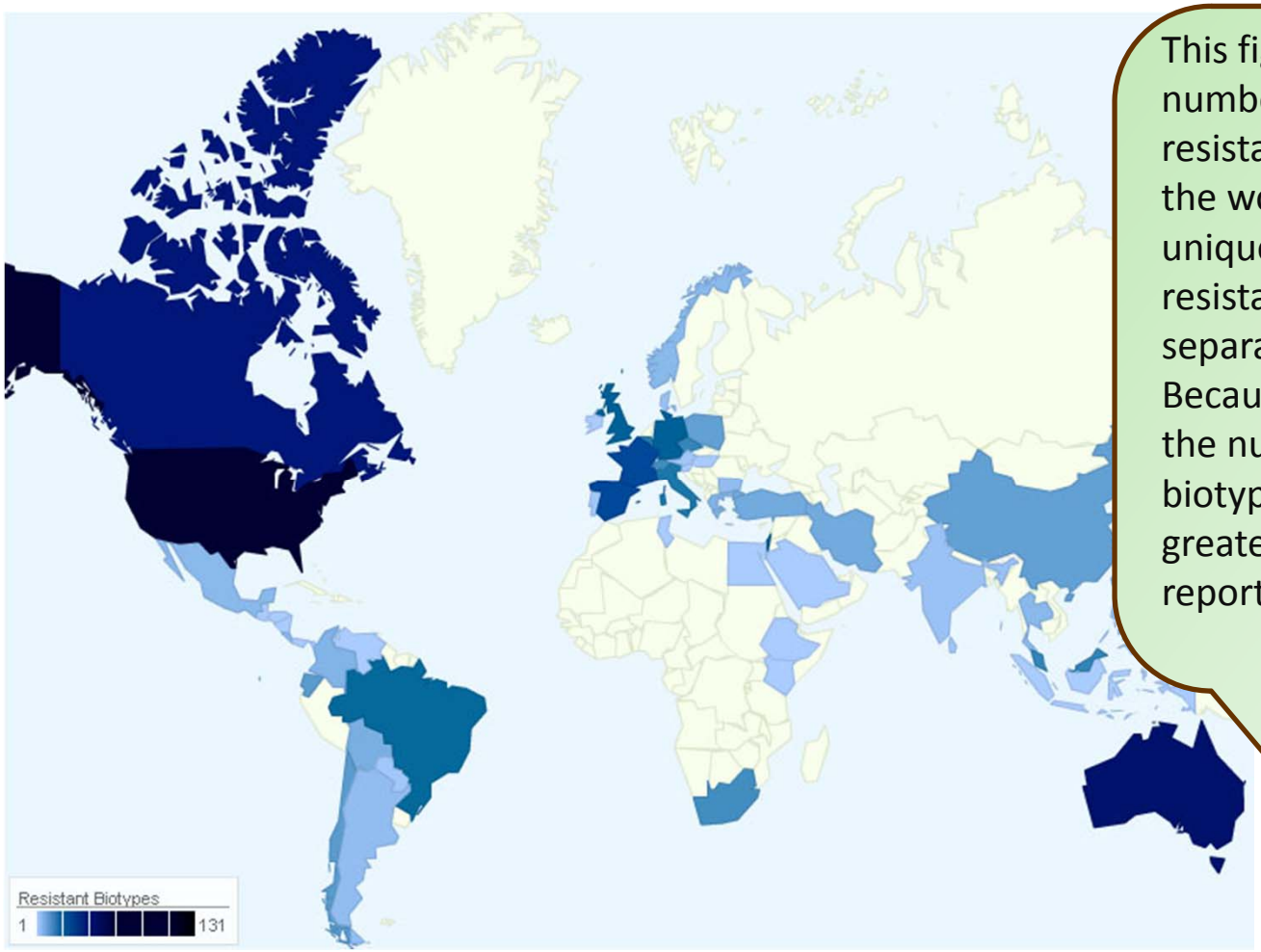
Source: www.weedscience.org, Ian Heap, March 2011

Global Distribution of Herbicide Resistance



This figure shows the number of herbicide-resistant **biotypes** around the world. Biotypes are unique cases of herbicide-resistance in weeds separated by geography. Because of this definition, the number reported by biotype will always be greater than the number reported by weed species.

[Click to close.]

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Conclusions

Herbicide-resistant weeds will require changes in weed and crop management tactics, increase the cost of weed ma… viable herbicide choices, and red…

Proactive herbicide resistance management strategies must be implemented before new populations of herbicide-resistant weeds evolve.

…more forms of herbicide …s to increase.

Herbicide-resistant weeds are found throughout the world, but are concentrated mostly in agricultural areas that rely heavily on herbicides for weed control.

Credits:

This lesson was developed by a WSSA sub-committee and reviewed by the WSSA Board of Directors and other WSSA members before being released. The sub-committee was composed of the following individuals.

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