



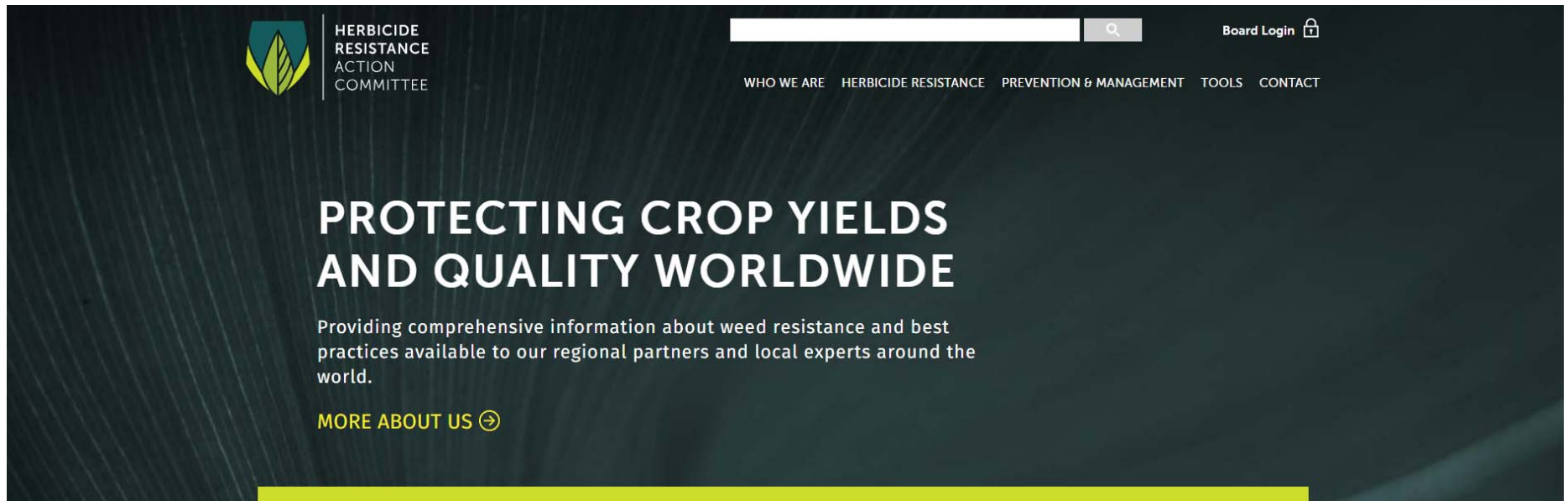
HERBICIDE
RESISTANCE
ACTION
COMMITTEE

Global HRAC & EHRAC Update

EPPO Resistant Panel

Lyon, October 14th & 15th, 2016

New Global HRAC Website (www.hracglobal.com)



WHAT'S NEW

WEED FACT SHEETS

View fact sheets on a range of synthetic auxin-resistant weeds found throughout the world.

[READ MORE](#)

BEST MANAGEMENT PRACTICES

MONITORING AND MITIGATION

See how weed scientists monitor herbicide resistance and develop systems to mitigate the development and spread of resistant weeds.

[READ MORE](#)

GLOBAL CLASSIFICATION LOOKUP

- Organized information
- Better search capabilities
- New content



Initiatives and Activities

- Disseminate information on resistant weeds:
 - International Survey
 - HRAC Website
 - Seminars and Symposia
- Build recommendations:
 - Working groups
 - Testing protocols
- Mode of Action Classification:



www.weedscience.org

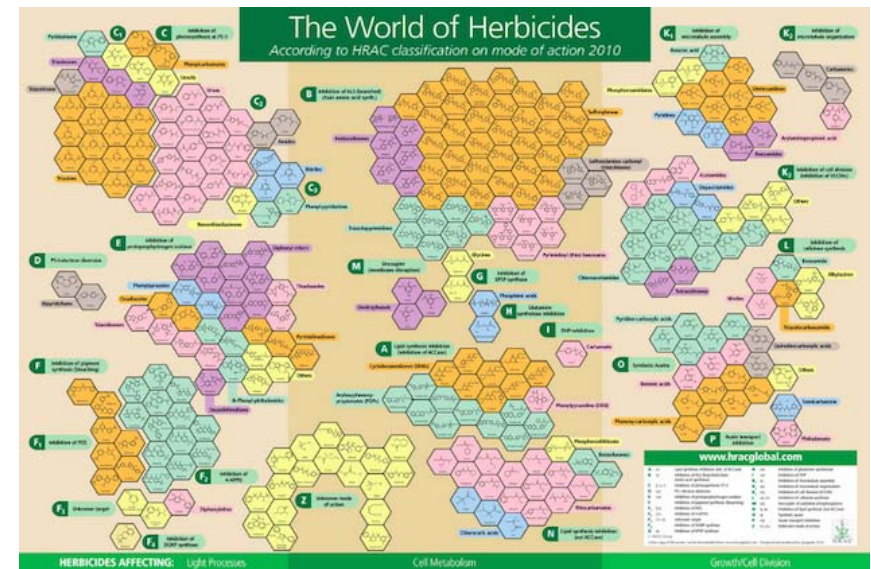


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Information and Education

- Providing information and tools to combat resistant weeds:

GLOBAL CLASSIFICATION LOOKUP

Chemical Family or Active Ingredient	Classification Group
<input type="text" value="Chemical Family or Ingredient"/>	<input checked="" type="checkbox"/> HRAC
<input type="button" value="Submit"/>	<input checked="" type="checkbox"/> WSSA

Chemical Family	Active Ingredient	HRAC	WSSA
Acetamide	diphenamid	Group K3	Group 15
Acetamide	napropamide	Group K3	Group 15
Acetamide	naproanilide	Group K3	Group 15

Information on herbicide Site of Action and classification

Synthetic Auxin Resistance in Corn Poppy

Available from the HRAC website: hracglobal.com

Synthetic Auxin Resistant Corn Poppy

Corn poppy is the most important broadleaf weed of winter wheat in southern Europe. Synthetic auxins, particularly 2,4-D, have been used to control corn poppy in winter wheat for over 60 years. Synthetic auxin resistant corn poppy was first identified in Spain in 1993, and subsequently in Italy and France. Synthetic auxin resistance in corn poppy is now widespread in both of these countries.

Levels of Resistance and Cross-Resistance

herbicides used for corn poppy control. Seven mutant ALS alleles, Ala197, Arg197, His197, Leu197, Ser197, Thr197 and Leu574 that have been identified that confer ALS inhibitor resistance in corn poppy populations. Combinations of these mutant ALS alleles have sometimes been found in the same population, and indeed in the same plant. The different mutant ALS alleles give different patterns of cross resistance to ALS inhibitors however all appear to confer resistance to sulfonylureas such as tribenuron. These mutations are dominant and spread rapidly throughout fields through pollen and seed dispersal.

Multiple Resistance

Information on herbicide-resistant weeds

BEST MANAGEMENT PRACTICES

Use these tools to assess the risk of developing herbicide-resistant weeds and to manage fields with resistant weed populations.

By bringing diverse crop management techniques to their farms, growers can mitigate the development and spread of herbicide-resistant weeds. For more detailed information, download our [Guideline to the Management of Herbicide Resistance](#) document.

Tools for preventing and managing herbicide resistance

Recent Resistant cases in EU

Date Last Updated	Species	Country	First Year	Site of Action
February 1, 2016	<u><i>Alopecurus myosuroides</i></u>	Spain	2015	Multiple Resistance: 3 Sites of Action ACCase inhibitors (A/1) ALS inhibitors (B/2) PSII inhibitor (Ureas and amides) (C2/7)
January 20, 2016	<u><i>Chenopodium album</i></u>	Finland	2015	ALS inhibitors (B/2)
February 4, 2016	<u><i>Atriplex patula</i></u>	Belgium	2015	Photosystem II inhibitors (C1/5)
February 2, 2016	<u><i>Echinochloa crus-galli var. crus-galli</i></u>	Spain	2015	ALS inhibitors (B/2)
December 20, 2015	<u><i>Digitaria sanguinalis</i></u>	France	2015	ALS inhibitors (B/2)
July 3, 2015	<u><i>Senecio vulgaris</i></u>	France	2009	ALS inhibitors (B/2)
June 29, 2015	<u><i>Sorghum halepense</i></u>	Spain	2015	ALS inhibitors (B/2)
April 1, 2015	<u><i>Matricaria recutita (= M. chamomilla)</i></u>	Poland	2014	ALS inhibitors (B/2)
March 31, 2015	<u><i>Papaver rhoeas</i></u>	Poland	2014	ALS inhibitors (B/2)



European working groups: Spain

Maize:

Confirmation of resistance populations of Sorghum in the North east of Spain. Samples taken and analyzed has confirmed resistance by non– target site and by target site mutation. Study is still in progress.

Resistance to *Echinochloa crus-galli* confirmed.

Cereals:

R-Papaver: Intensity provide a good control

R-Ryegrass: recommendation of prosulfocarb seems to work well

R-Alopecurus: identify in the North of Spain with population resistant to HRAC group A (fop, dim, dem) and B (Sulfonylureas)

R-Sinapis arvensis: resistance to HRAC group B, ALS confirmed

R-Rapistrum rugosum resistance to HRAC group B, ALS confirmed

Fruit Trees

R- *Lolium* and *Conyza* resistant to glyphosate

Rice:

Important problem on *Echinochloa*, *Cyperus*, *Leptochloa*.

FMC has present Command (Clomazon), registered in early post---emergence control of *Echinochloa* resistant at 60-70 %. Clomazon in Pre-emergence shows better efficacy 80-90%. Product is volatile so should be used carefully to avoid damage to adjacent crops



European working groups: France

As reported previously the field testing protocol has been finalized and approved. This Document is specifically aimed at farmers using a single and double rate application of the herbicide in comparison with a standard. It is to be used to establish a suspicion of resistance not confirm it. If a suspicion is established then seed samples are taken and tested using current methodologies.



ASSOCIATION FRANÇAISE DE PROTECTION DES PLANTES

COMMISSION DES ESSAIS BIOLOGIQUES

MÉTHODE DE TEST RAPIDE AU CHAMP D'ÉVALUATION DE LA RESISTANCE DES ADVENTICES AUX HERBICIDES

Quick field trials method for assessment of weed resistance to herbicide products



European HRAC Activities

ECPA/Rothamsted proposed European founded project under 2020

The aim of the project is to form a consortium composed of research Institutes and agri-food chain stakeholders to work toward implementing a long term sustainable resistance management strategy at the EU level. The project is focused on Insect and disease resistance management (90% of the project) and weed resistance management (10% of the project). In addition the focus of the project is on vegetables and fruits.

Actions:

- Implement the relevant top 2 or 3 weeds in the table “Criteria set of Biotic threats” for each crop. Define for each crop the 3 main relevant countries in Europe, and add the most important weeds to be controlled with a resistance risk evaluation. The crops have been defined for pests and LOLSS will be one of the top weed for many crops.



European HRAC Activities

Sharing resistance monitoring processes/methodologies and in-vitro in-vivo resistance methods

European Guidelines to conduct herbicide resistance tests

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THANKS