

# 7<sup>th</sup> International Weeds Science Congress

## “Weed Science and Management to Feed the Planet”

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Proceedings (International Weed Science Society) may be located at:

[http://www.asacim.org.ar/wp-content/uploads/2016/07/IWSC2016\\_Proceedings.pdf](http://www.asacim.org.ar/wp-content/uploads/2016/07/IWSC2016_Proceedings.pdf)

This Paper presented by **Jim Steffel and Patrick Stephenson** representing the Global Alliance of Independent Agricultural Consultants) – to be read with associated Power Points.

### “Effective Management Strategies for Resistant Weed Species – A Global Perspective”

First I would like to thank the organizers of this congress and local arrangements for their efforts to make this a successful meeting.

To start, I would like to give you a brief orientation to GAIAC and the backgrounds of myself and my co-author. I spent the first 18 years of my career working in Product Development for an AgriChemical Company before establishing an independent CRO providing field testing and project management for plant protection products based in Eastern PA. My co-author is an independent crop consultant located in the United Kingdom providing advisory services to his grower clients in addition to conducting field testing for crop production products.

#### **SLIDE 2**

We are both members of the Global Alliance of Independent Agricultural Consultants, GAIAC. This group was formed in 2012 through the efforts of leadership in 3 National organizations of independent consultants: NAICC in the U.S., AICC in the U.K. and PCIA in France. The goal of GAIAC is to develop a global network of independent agricultural consultants to share information and experience and provide a platform for expansion of the consulting industry around the world. Our voting members must be independent, operating on a fee-for-service basis with their clients and cannot sell or receive commissions on the products they might recommend. Our members do collaborate with our colleagues in industry, government and academia in order to provide our clients information and advice that best represents their interest.

Of course pesticide resistance is of significant interest to GAIAC members and their clients, especially the recent increase in the occurrence of resistant weeds as evidenced by Dr. Heaps data presented here.

#### **SLIDE 3**

This rapid increase in weed resistant to herbicides and the lack of any new herbicide MOA's has created difficult management issues for crop consultants and their clients. Earlier this year we surveyed the GAIAC crop consultant members to assess this problem and the strategy they employ to maintain commercially acceptable control of resistant weeds for their clients. The results of that survey form the basis for this presentation.

#### **SLIDE 4**

As consultants to growers, our members must consider a broad scope of inputs and factors involved in producing an agricultural commodity in the most efficient, cost-effective and profitable manner. A crop production system is dependent on a number of different components, one of which is management of weeds and other pests. However many of the other components in this system can also enhance or antagonize conventional pest management practices. In this survey, we focused on weed control and how the various components are used to produce an effective strategy for controlling herbicide resistant weeds.

The recent rapid increase in weed species resistant to one or more MOA's has resulted in a conscious effort by many to implement proactive resistant management practices that will prevent or delay the appearance of resistant species. In the past, weed control has relied almost exclusively on one or two herbicide applications to provide effective weed control. The resulting development of resistance to one or more MOA's in many weed species requires a multifaceted management strategy where herbicides are not always the sole component. In the future, we need to think of resistance management as a proactive component of a sustainable crop production system rather than a response to the appearance of resistant species.

#### **SLIDE 5**

The survey included consultants from North America, Europe, South America and Australia. The primary crops managed by the responding consultants were corn, soybeans, wheat, cotton and rice, in that order. There were also a number of other agronomic and vegetable crops reported. Unlike insects or diseases which are typically specific to a single or group of crops, weeds are normally independent of the crop and therefore require a long term resistance management strategy.

#### **SLIDE 6**

The difficulty in managing resistant weeds was similar for corn, cotton and small grains however weed management in soybeans was considered less problematic.

#### **SLIDE 7**

When asked which of the herbicide chemistry was most problematic for resistance, EPSP synthesis Inhibitors (glyphosate) and the ALS inhibitors were by far most frequently ranked on top.

#### **SLIDE 8**

The most effective management strategies still focus on herbicides however nearly 100% of respondents favored mixtures and pre-emergence products to post-emergence herbicides. We do not have historic data; however, this preference was probably reversed 10 years ago. What is interesting is the wide range of practices being employed to improve weed control.

- 1) Post-harvest herbicides, a more proactive practice to reduce weed pressure in future crops.
- 2) A return to more traditional weed management practices of crop rotation and tillage.
- 3) The significant use of cover crops – proactive-long term- we'll discuss later.
- 4) Hand roguing – proactive practice to keep resistance genetics out of the seed bank. Done on large acreages in Midwest.

- 5) To the contrary, equipment sanitation is not done as frequently as needed to prevent the spread of resistant weed seed.

#### **SLIDE 9**

Post-harvest efforts to manage weeds are mostly limited to herbicides to reduce weed pressure in future crops. Use of seed destruction was low, however there was limited response from Australia where elimination of seed is a more important component of their resistance management program.

We also had a number of simple yes or no questions to gauge the consensus among crop consultants.

#### **SLIDE 10**

Resistance management strategies compromise soil condition: 70% not concerned, suggesting they are confident no till weed control will remain viable.

#### **SLIDE 11**

Voluntary/compulsory: resistance management schemes fairly evenly mixed and suggest that better or more commercially acceptable strategies are needed.

The responses on the next two questions are very interesting.

#### **SLIDE 12**

Government incentives that enhance resistance management: feeling that government institutions and regulators could do much more.

#### **SLIDE 13**

Government programs that hinder resistance management efforts: There was a fairly strong response the government can actually hinder implementation of resistance management strategies, land use and conservation laws.

On the question of increasing incidences of resistance in recent years

#### **SLIDE 14**

More than 90% of respondents indicated that problems with weed resistance has recently become worse.

#### **SLIDE 15**

The greatest increase in herbicide resistant weeds has been in the last 5 years: Positive: There is a keen awareness of the importance of resistance management.

In Australia greater than 95% of cotton consultants considered weed resistance their #1 or #2 production problem.

Cover crops –

Late summer/fall seeding into wheat stubble

- Crimson clover, tillage radish, some grass

- Started as agronomic soil improvement
  - o Aeration and OM
  - o ~ 40 lbs N

#### **SLIDE 16**

Pre-plant clover and holes from radish after winter freezes.

#### **SLIDE 17**

Plant corn directly into cover crop with use of strip till ahead of planter.

Followed by broad spectrum tank mix herbicide application of glyphosate, 2-4-D, S-metolachlor, atrazine and mesotrione.

#### **SLIDE 18**

Emergence w/ trash

- Geographically restricted
  - o Delays soil warming, not acceptable in areas with a short growing season where cool soils are a problem
  - o Producing a competitive cover crop requires moisture precluding areas where moisture is a limiting factor in production.

#### **SLIDE 19**

Before weed emergence through the herbicide and thatch, corn has reached a stage where it has canopied and out competes weed growth.

#### **SLIDE 21**

Questions