Weed Resistance
- Insights from farmers around the world -

Paris 2015
Conducted for Bayer CropScience
Farmer insights regarding Weed Resistance

BCS dealt intensively with this countries in the past. They are not target of this presentation. A lot of results are similar to the results of the other countries.
Target countries

Europe:
- Belgium
- Bulgaria
- Croatia
- Czech Rep
- Denmark
- Germany
- Hungary
- Italy
- Lativa
- Lithuania
- Poland
- Portugal
- Romania
- Slovenia
- Spain
- Turkey
- Ukraine

Brazil
Chile
Argentina
Australia
Survey objectives

Bayer CropScience takes an proactive role in helping to manage weed resistance globally.

Within this framework, one important activity is to track the perception of farmers regarding weed resistance development and management.

Asked via telephone interviews, some key questions were:

- Do you perceive weed resistance as a thread for your farm?
- Have you already implemented measures to manage weed resistance?
- What do you plan for the future in order to manage weed resistance?
- Which ccp industry player is the best partner in the field of weed resistance management?
Research method and target group

**Target group**
- Cereals growers
- Corn growers
- OSR growers
- Soybean growers

**Method**
- Computer Assisted Telephone Interviews
- Duration = 15 - 25 minutes

**Design**
- Structured questionnaire including open ended questions

**Timing**
- February 2013 until October 2014
Perceived weed resistance situation

Which of the following four statements would describe the resistance situation on your farm best? It is not visible on my fields, in the neighborhood it is visible, but not on my fields, it is not visible on my fields but probably already present, it is clearly visible on my fields.

"Resistance is clearly visible on my fields."

Spain 29%
Turkey 26%
Croatia 25%
Portugal 24%
Italy 22%
Czech Rep 18%
Germany 15%
Belgium 14%
Poland 14%
Hungary 13%
Slovenia 12%
Ukraine 9%
DNK/BUL/ROM/LIT/LAT < 5%
Weed resistance perception

In the future weed resistance can become a problem on my fields.

I believe industry will come up with new solutions to prevent weed resistance.

How strongly would you agree with the following statements? Please use a scale from 1 to 7, where 1 means ‘I do not agree’ and 7 means ‘I fully agree’.

Top-2-boxes
Which weeds are difficult to control?

<table>
<thead>
<tr>
<th>Cereals</th>
<th>Corn</th>
<th>Soybean</th>
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<tbody>
<tr>
<td>Focus Europe</td>
<td>Focus Europe</td>
<td>Focus Latin America</td>
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<tr>
<td>Black-grass (Alopecurus myosuroides)</td>
<td>Horseweed (Conyza canadensis)</td>
<td>Comelina (Comelina erecta)</td>
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<td>Rye-grass (Lolium sp.)</td>
<td>Johnson grass (Sorgum halepense)</td>
<td>Fleabane (Conyza bonariensis)</td>
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<td>Silky-bent-grass (Apera spica-venti)</td>
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<td>Wild-oat (Avena fatua)</td>
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<td>Pigweed (Amaranthus sp.)</td>
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You said you have a considerable pressure of….What would you say is … easy to control, normal to control or difficult to control?
Do you observe insufficient acting herbicides in cereals?

- Chile: 66% of respondents observed insufficient acting herbicides. The herbicides mentioned include Glyphosate (EPSPS), Iodosulfuron (ALS), and Pinoxaden (ACCase).
- Australia: 58% of respondents observed insufficient acting herbicides. The herbicides mentioned include Trifluralin (MAI), Prosulfocarb (ACCase), and Pinoxaden (ACCase).

- Slovenia: 56% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Portugal: 46% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Germany: 44% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Spain: 41% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Denmark: 41% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Belgium: 40% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Poland: 39% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Ukraine: 39% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Latvia: 33% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Italy: 31% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Czech Rep: 31% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Croatia: 31% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Turkey: 22% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Hungary: 15% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Lithuania: 13% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Romania: 5% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).
- Bulgaria: 4% of respondents observed insufficient acting herbicides. The herbicides mentioned include Iodosulfuron (ALS) and Tribenuron methyl (ALS).

Have you ever observed that a herbicide or a herbicide solution works insufficient on your cereal area in the last 3 years? If yes, which product(s) or which solution(s)?
Do you observe insufficient acting herbicides in soybean/corn?

Have you ever observed that a herbicide or a herbicide solution works insufficient on your soybean area in the last 3 years? If yes, which product(s) or which solution(s)?

- Argentina: 77%
- Brazil: 65%
- Nicosulfuron (ALS)
- S-metolachlor (CD)
- Isoxaflutol (HPPD)

- Italy: 27%
- Slovenia: 27%
- Hungary: 22%
- Croatia: 22%
- Poland: 21%
- Romania: 4%
Top 5 **reasons** for weed resistance from growers perspective

- **Usage of the same herbicide year after year**: 28% (X)
- **Dose rate too low**: 20% (√)
- **Monoculture**: 14% (√)
- **Less tillage, tillage without plough**: 10% (√)
- **Plants/organisms are adaptable**: 9% (√)

According to your opinion, what are the main reasons for weed resistance development?

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Germany, Portugal, Spain, Latvia, Czech Rep, Argentina

Poland, Italy, Hungary, Chile, Romania, Denmark, Ukraine, Australia, Brazil

Belgium, Turkey, Lithuania, Bulgaria, Slovenia, Croatia

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Conducted for BCS
Farmers lack knowledge about difference between MoA, AI and brands

| Use different MOA                      | ARG | AUS | BEL | BRA | BGR | CHI | HR | CZE | DNK | GER | HUN | IT | LVA | LIT | POL | POR | ROM | SLO | ESP | TUR | UKR |
|----------------------------------------|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| High knowledge                         |     |     |     |     |     |     |    |     |     |     |     |    |     |     |     |     |     |     |     |     |     |
| Medium, room for improvement           |     |     |     |     |     |     |    |     |     |     |     |    |     |     |     |     |     |     |     |     |     |
| Low, action needed                     |     |     |     |     |     |     |    |     |     |     |     |    |     |     |     |     |     |     |     |     |     |

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In your opinion, what are the main reasons for weed resistance development?

Conducted for BCS
Top 5 potential measures against weed resistance from growers perspective

- Crop rotation: 28% (Approval: ✔️)
  - Germany, Portugal, Spain, Czech Rep, Hungary, Argentina

- Usage of different herbicides: 23% (Approval: ❌)
  - Poland, Italy, Latvia, Lithuania, Chile, Romania, Ukraine, Croatia, Australia

- General agricultural practices: 19% (Approval: ✔️)
  - Belgium, Turkey, Bulgaria, Denmark, Slovenia, Brazil

- Usage of different AI’s: 15% (Approval: ✔️)

- Full dose rate: 11% (Approval: ✔️)

Which measures are suitable to avoid or control weed resistance?
In your opinion, what are the main reasons for weed resistance development?
To what extend do you agree with the following statement “There are enough information available about the different herbicide mode of actions”
Do you use any of the following sources of information and advice regarding weed resistance and weed resistance management?
Expectations towards crop protection companies in terms of weed resistances

What do you expect from crop protection manufacturers in terms of weed resistance management services?

- Good price: 19%
- Good products: 27%
- More information: 18%
- New products/ingredients: 27%
- Good advice: 13%
Highest weed resistance competence in market

Bayer is Benchmark
Belgium, Denmark, Italy, Latvia, Poland, Romania

Bayer is on same level as main competitor
Australia, Bulgaria, Croatia, Germany, Hungary, Lithuania, Portugal, Slovenia, Spain, Brazil, Argentina

Bayer is behind competitor
Czech Rep, Chile
Key learnings

• We measure a high level of **perceived weed resistance** in several European countries. – Science has to tell whether this perception is reality out there on the fields.

• Farmers are **not fully aware** of their **resistance management toolbox** and the appropriate measures to fight weed resistance.

• For those farmers saying “industry will solve the problem” an urgent **wake-up call** is necessary. They have to change their behaviour.

• **Continued education & training** for farmers is essential in order to cope with current and future challenges of resistance development. It’s not only Science that matters, also **Communication**!