

GENETICALLY MODIFIED ORGANISMS: HERBICIDE-RESISTANCE

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INTRODUCTION Due to the overgrowth of weeds, and the fact that herbicides cannot differentiate between crops and weeds, herbicide-resistant crops have been developed. This kind of genetically modified organisms (GMO) allows farmers to eliminate all weeds in a unique implementation of the herbicide meaning: less spraying, less "traffic" in the field and lower operating costs. However, this, like any other innovation, has generated much **controversy**.

Herbicidal inhibitors of amino acid biosynthesis

Due to its low toxicity to mammals and high control of the weeds activity derived from their use, herbicidal inhibitors of amino acid biosynthesis seems to be the perfect choice to develop herbicide-resistant crops (CRH). One example of this kind of herbicides is Glyphosate, an inhibitor of **aromatic amino acid biosynthesis**

Glyphosate - tolerant crops Resistance strategies

DETOXIFICATION

An **offensive** strategy based on the use of the GOX enzyme to reduce the amount of glyphosate that can achieve the target enzyme (EPSPS)

GEN ALTERATION

A **defensive** strategy based on the insertion of a gene (CP4-EPSPS) that encodes a new EPSPS that is insensitive to glyphosate

Controversy

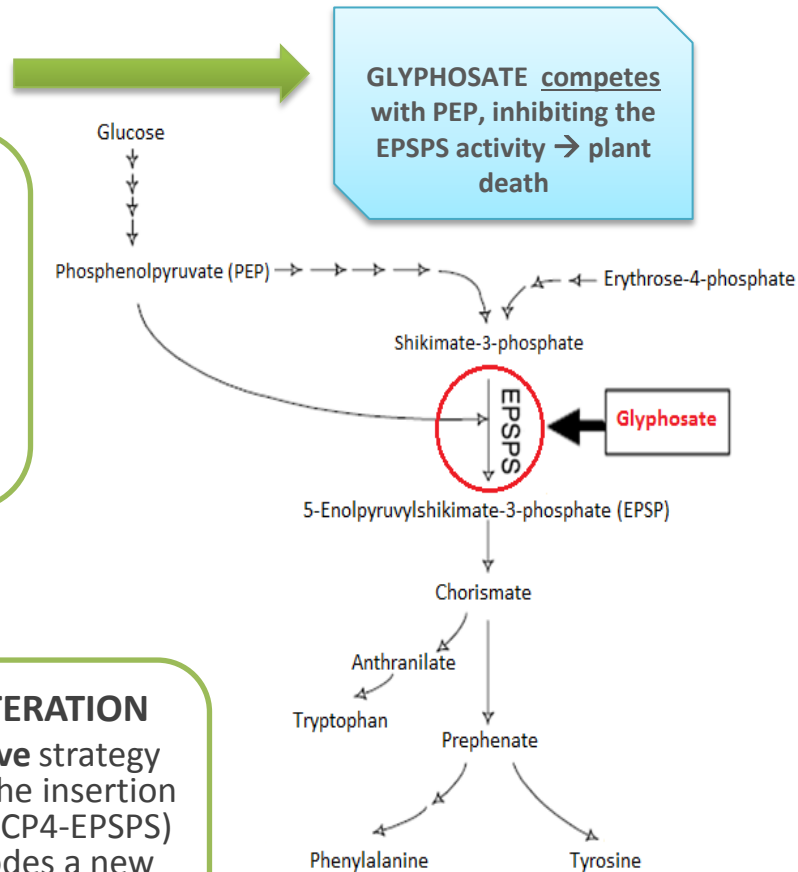
ADVANTAGES

- Excellent weed control and hence higher crop yields
- Less spraying and reduced fuel use
- Reduced soil compaction
- Use of low toxicity compounds
- The ability to use no-till or conservation-till systems

DISADVANTAGES

Glyphosate-resistant weeds evolution :

- Gene flow
- Strong and persistent glyphosate selection pressure



PROLINE

CCG

SERINE

ICG

CONCLUSIONS

- Almost all the environmental arguments have not been demonstrated as of yet
- Is very important to compare the herbicide-resistant crops technology with the technology that it replaces
- The environmental benefits are substantial