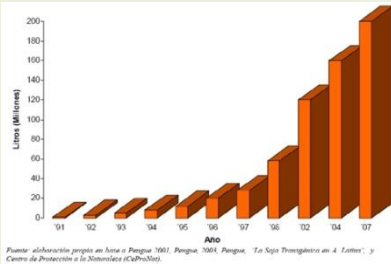


GM crops resistant to herbicides

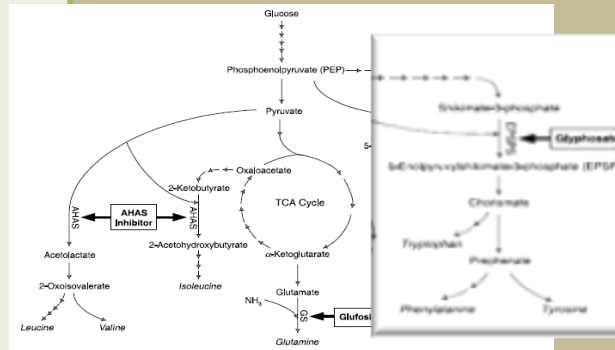


Herbicide



General method for controlling weeds. It has created a strong dependency among agrochemicals

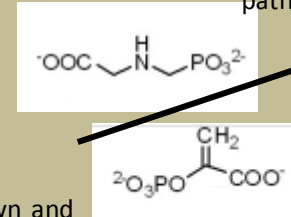
Glyphosate



Aminosfonat analog of the natural amino acid glycine. Most known and widely used herbicide worldwide because it interferes with aromatic amino acid biosynthesis pathway, which is not found in animals.

Mechanism of action

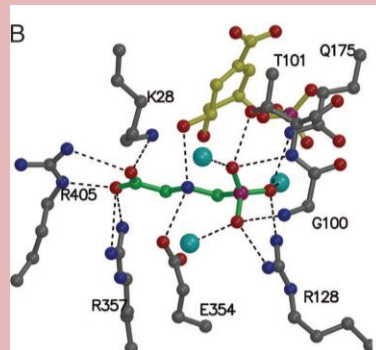
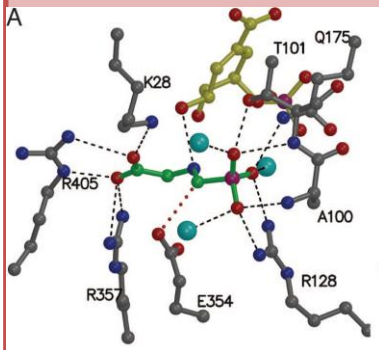
Glyphosate inhibits the enzyme enolpyruvylshikimate-3-phosphate synthase (EPSPS). Enzyme that catalyzes the conversion from phosphoenolpyruvate (PEP) and shikimate-3-phosphate, corresponding to the 6th step in the shikimate pathway.



Herbicide character due to the similar chemical structure of PEP, the natural substrate of EPSPS. Binds more tightly to EPSPS.

Glyphosate-resistant crops

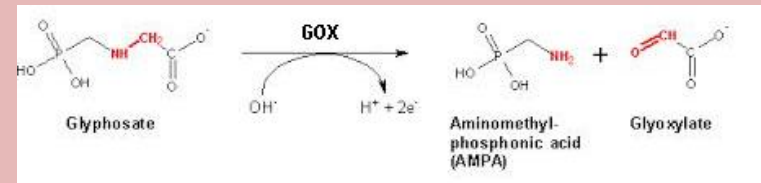
Alteration of the target enzyme gene(EPSPS)



Comparison of amino acid sequence between the wild and the mutant EPSPS has revealed two different substitution of bases ; Gly-100-Ala and Pro-101-Ser . The insertion of the gene encoding the CP4-EPSPS in plants, results in glyphosate-resistant crops.

Detoxification of glyphosate

Soil microorganisms can metabolizes glyphosate by the AMPA pathway



Investigations to obtain glyphosate resistant plants, they managed to get a resistant enzyme called CP4-EPSPS, through induced mutation of *Salmonella typhimurium* strain.

Introduction of the GOX gene that encodes the gox enzyme in plant cells, it gives them the ability to remove the herbicide, resulting in an increase of tolerance and in the normal reproductive development of the plant. The gox enzyme is used in a combination with CP4-EPSPS, since it is, on its own, insufficient to deal with the other concentrations of glyphosate used as.

Advantages of resistant crops

- Decrease in the number of herbicide use
- Replacement of herbicides with superior ecological and/or inferior toxicological properties.
- Decrease in crop damages
- Simplification and improvement in weed controlling