

# Genetically Modified Herbicide-Resistant Crops

## Objectives

- ✓ Identify the mechanism of action of glyphosate in the crops and the molecular bases to obtain the first resistances and also the mechanisms of interaction with glyphosate.
- ✓ Research and assessment of environmental and socio-economic impacts of herbicide-tolerant crops.

Glyphosate competes with PEP to interact with the EPSPS-S3P complex and inhibits the metabolism of essential aromatic amino acids.

## Glyphosate

## EPSPS insensitive

Based on the insertion of the CP4-EPSPS gene that replaces the amino acid 101 proline for serine, generating insensitivity due to structural changes.

## Detoxification

Based on using the AMPA pathway and the GOX enzyme to degrade glyphosate to non-toxic substances.

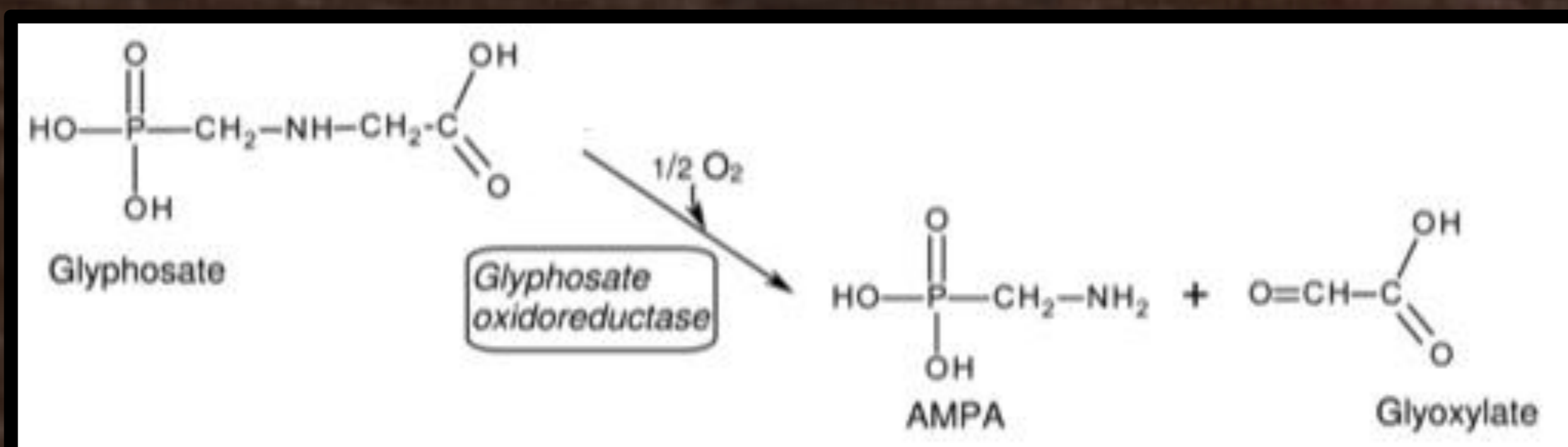


Figure 2 Aminomethylphosphonic acid (AMPA) pathway (Pollegioni et al. 2011)

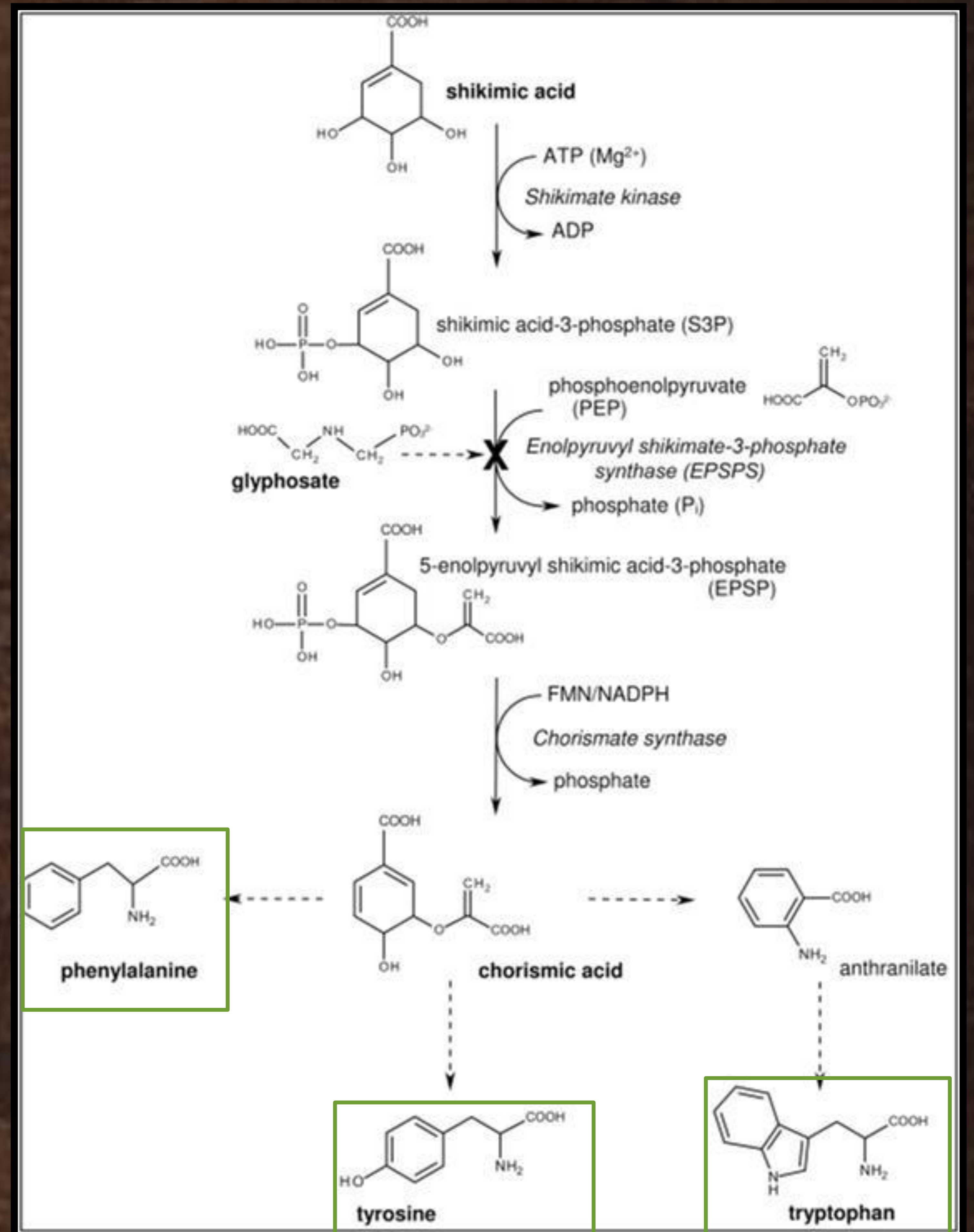


Figure 1 Shikimate pathway that leads to the biosynthesis of aromatic amino acids and mode of action of glyphosate on the reaction catalyzed by EPSPS (Pollegioni et al. 2011)

## Conclusions

- ✓ The benefits of GM crops over conventional ones are remarkable, but they involve certain dangers that must be taken into account.
- ✓ They are very useful for developing countries where the farmer does not have so many resources.
- ✓ In order to be able to act with the maximum optimization, it would be necessary to drive an external organism to companies that evaluate the risks and impacts as well as develop good practice guides for their cultivation in specific areas.

## Environmental and socio-economic impacts

Superweeds

Biodiversity

Agronomic management

Intellectual property