

NON-TARGET SITE HERBICIDE RESISTANCE

WHAT IS IT?

How is resistance acquired?

- As a result of selection pressure created by herbicide applications over time to diverse weed populations.

What is non-target site resistance?

- Non-target-site resistance encompasses any mechanism that reduces the amount of herbicide that reaches the target site.
- Changes are not made to the target site enzyme, however changes are made in the plant that affect the ability of the herbicide to interact with the target site enzyme.

COMPARTMENTALIZATION

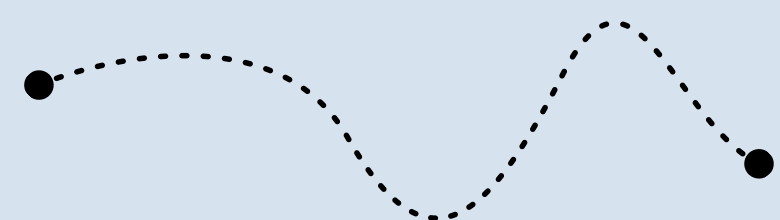
An example of this is with glyphosate. ABC transporter proteins have been proposed to sequester glyphosate via active glyphosate transport

METABOLIC

- An example of this is with ACCase. ACCase is a crucial enzyme that catalyzes the formation of malonyl CoA, a product needed for de novo fatty acid biosynthesis, and is essential for plant survival. ACCase-inhibitors (herbicides) cause problems in malonyl CoA formation in sensitive grass species, ultimately leading to plant death.
- Metabolic resistance involves the increased activity of enzyme complexes.
 - **Cytochrome P450s (CYP450s)**
 - It is likely that metabolism of ACCase-inhibitors occurs through a wheat-like detoxification pathway mediated by CYP450s
 - **Glutathione S-transferases (GSTs)**
 - Also been documented to govern the metabolic resistance to ACCase-inhibitors
 - There can be greater GST activity in resistant plants following ACCase-inhibitor application

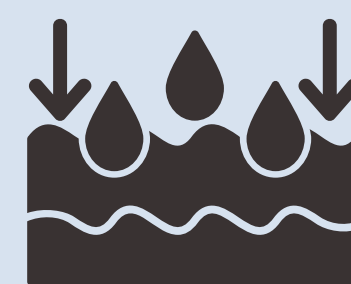
TRANSLOCATION

Modified translocation, can be increased or decreased. An example for decreased translocation is 2,4-D in oriental mustard that was retained in the treated leaves. An example of increased translocation is MCPA in wild radish that showed rapid translocation to the roots away from target site.



ABSORPTION

Properties of the leaf cuticle or other structural barriers can affect the ability of the herbicide to enter.



RESOURCES

1. <https://doi.org/10.1074%2Fjbc.REV120.013572>
2. <https://doi.org/10.3390%2Fplants8100382>
3. <https://doi.org/10.3390%2Fplants8100417>

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