

Thème 3 : Une histoire du vivant
3.2. L'évolution comme grille de lecture du monde

What is glyphosate resistant? How do weeds become resistant to glyphosate? What are ways of dealing with weeds when they become resistant to herbicides? How can agricultural practices influence the evolution of living things ?

Document 1: Horseweed is the first weed species to develop glyphosate resistance in Roundup Ready soybean.



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Document 2: glyphosate resistance

Since the first report of glyphosate-resistant rigid ryegrass* in 1996, four additional resistant species with this trait have been identified. Although not yet one new species per year, this rate of development suggests that we will continue to see new resistant biotypes. Eventually, one of these weeds will occur in Iowa and surrounding states.

The simplest way to reduce selection pressure is to avoid planting continuous Roundup Ready crops. Using additional modes of action with glyphosate provides alternative selection pressures on certain weeds, and in some situations, reduces the likelihood of resistance. However, because we do not know which weed is likely to develop resistance, we do not know whether the alternative mode of action reduces glyphosate selection pressure on the appropriate species. Thus, we suggest an annual rotation of herbicides should be the foundation for resistance management.

Current glyphosate use in the Midwest makes resistance inevitable. When resistance develops, control of these biotypes will be necessary with existing herbicides because no herbicides with new modes of action will be introduced in the foreseeable future. Several alternative products for use in corn and soybean will reduce the impact of glyphosate resistance, but costs can be high. Thus, evaluating weed management programs in terms of selection pressure placed on weeds should be an important component of crop management planning.

*ryegrass: ivraie

Quelques éléments de discussions

What is glyphosate resistant?

- 1) ability to survive rates of glyphosate lethal to the majority of the waterhemp population, and
- 2) the trait is inherited.

How do weeds become resistant to glyphosate?

Resistance happens with the repeated use of the same herbicide, or herbicides with similar modes of action on a weed population.

Use mechanical weed control methods, such as cultivation, to control weeds. Rotate herbicides—do not make more than two consecutive applications of herbicides with the same mode of action in the same field.

Use tank mixtures of herbicides with differing effective modes of action. Rotate crops.¹

How agricultural practices can influence the evolution of living things ?

Domesticated species differ greatly in their phenotypes compared with wild ancestors.

Selection can favour wild species to specialize on traits of these over-abundant organisms.

Agriculture also causes evolutionary changes in wild species through non-selective mechanisms such as gene flow,

Significant environmental and social issues associated with agricultural production include changes in the hydrologic cycle; introduction of toxic chemicals, nutrients, and pathogens; reduction and alteration of wildlife habitats; and invasive specie.