



# AP Bio FRQ Fridays

2014 #5  
Ecological Impact of GMOs



# FRQ Friday #28

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Genetically modified crops have been developed that produce a protein that makes the plants resistant to insect pests. Other genetic modifications make the crops more resistant to chemicals that kill plants (herbicides).

- (a) **Describe** TWO potential biological risks of large-scale cultivation and use of such genetically modified plants.
- (b) For each of the risks you described in part (a), **propose** a practical approach for reducing the risk.



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Description of risk (1 point each; 2 points maximum)	Proposed mitigation* + (1 point each box; 2 points maximum)
Unknown human/other animal health risk due to consuming GM proteins	<ul style="list-style-type: none"><li>• Testing/labeling product packaging</li><li>• Isolate animals from crops</li></ul>
Disruption within food chain	<ul style="list-style-type: none"><li>• Intersperse GM plants with non-GM plants in culture</li><li>• Provide alternative food source</li></ul>
Developed resistance in pest species	<ul style="list-style-type: none"><li>• Increased use of effective pesticides</li><li>• Introduce pest predators</li><li>• Further engineer the GMO to produce more resistance protein</li><li>• Rotate GM and non-GM crops</li></ul>
Spread of genetic modifications to non-GM plants	<ul style="list-style-type: none"><li>• Contain pollen of GM plants</li><li>• Disable the ability of GM plants to produce viable seeds</li></ul>
GM plants out-compete native species	<ul style="list-style-type: none"><li>• Contain/isolate GM plants</li><li>• Disable GM plants' ability to produce viable seeds</li></ul>
Reduced numbers of pollinators	Contain/isolate GM plants
Loss of biodiversity	Intersperse GM plants with non-GM plants in culture
Use of herbicides harms non-target species	<ul style="list-style-type: none"><li>• Rotate GM and non-GM crops</li><li>• Use organic/alternative herbicides</li></ul>
Invasive disease wiping out the monoculture	Intersperse GM plants with non-GM plants in culture



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a.) One potential risk of cultivating genetically-modified crops is that the proteins produced to resist herbicides and pests may be harmful to humans. Another risk is that pesticides produced by the plants may destroy local insect populations, which may result in catastrophic imbalances in the local ecosystems.



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b.) To reduce the risk of harming humans, research could be done to understand the effects and properties of the proteins and to ensure that the proteins are safe for human consumption. To protect the ecosystem, safe crops could be planted in the area as well in order to provide food for the insects in order to ensure their survival.

