

Ecological Applications Topic: Bioreporters - What Are They,
Their Potential Uses, and Overall Safety

Q - What is a bioreporter?

A - Bioreporters are living microbial cells that have been genetically modified to produce a quantifiable signal in response to specific physical/chemical agents in their presence.

Contain 2 essential genetic elements: promoter gene & reporter gene.

Promotor gene is turned “on” (transcribed) in the presence of the target agent (iron, phosphorus, herbicides, heavy metals). Promotor gene is linked to other genes that assist the cell in adapting/combating the target agent the cell has been exposed to. In bioreporters, these genes are removed and replaced with a Reporter gene. So now, turning on the promoter → turns on the reporter. The Reporter gene codes for proteins that ultimately produce a type of measurable signal.

Q - What is the host range of bioreporters?

A - Reporter genes can be genetically modified in bacteria, yeast, plants, and mammalian cells. Wide host range.

Q - Uses?

A - Detection of environmental contaminants (TNT), detection of specific elements in soil/water samples (Iron, Phosphorus), detection of herbicides and other toxins in soil/water samples.

Q – Is it Safe?

A – after researching, there have not been any research articles or even review articles I have found that identify the negative implications of using bioreporters in the environment. The research articles that conducted experiments to detect TNT and Iron both used *Synechococcus*, an abundant, harmless bacteria.