

STUDIES OF GENETICALLY ENGINEERED PLANTS AT THE WESTERN ECOLOGY DIVISION

Methods for Monitoring Frequency and Effects of Gene Flow from Crops to Native Plants

The Western Ecology Division's biotechnology research program is providing scientific information needed for the agency to assess and manage the environmental risks of biotechnology.



Biotechnology presents a wealth of opportunities to improve crop productivity, nutritional value, and ability to resist pests and other stresses. However, there are potential risks to human health, natural ecosystems, and agriculture that need to be evaluated to properly regulate genetically engineered crops. Currently, EPA regulates crops and microbes that are engineered to produce pesticides or substances such as industrial enzymes. The agency also regulates microbes engineered to act as environmental monitors or to clean up contamination. While we do not anticipate that bio-technology products will pose new types of environmental risks, these new products are often on the cutting edge of science and regulatory policy and deserve research support to ensure that their safety can be appropriately evaluated.

Genetically Engineered Plants

The regulation of bioengineered plants is focused on situations where: 1) there is little prior experience with the new trait and host combination, 2) a transformed organism may persist and perhaps replicate in the environment without human intervention, 3) genetic exchange is possible between a transformed organism and unaltered organisms, or 4) targeted pests develop resistance to the pesticide produced by the engineered plant.

We have four goals for our studies: 1) develop methods to predict the potential for transfer of novel genetic material from engineered crops to nontarget plants, 2) understand the ecological consequences of such exchange, 3) develop methods to minimize gene transfer from proposed genetically engineered crops, and 4) develop models that can predict ecological risks of gene flow from genetically engineered crops.

Gene Flow

Genetically engineered crops are planted on tens of millions of acres in the U.S. and many more world-wide. Pollen from transgenic crops may cross with related crops or weeds, potentially transferring the engineered genes.

The resultant hybrids may cross to other compatible species, or to either of their parents. In addition, the transgenic genes may move via dispersal of plants or seeds. While it is commonly argued that cultivated crops would not persist well outside of agricultural situations, little information is available on the survival, fertility, and out-crossing potential of hybrids formed between crops and

compatible weeds or native plants. We also do not know how exchange of engineered genes will affect wild plants, either increasing or decreasing their ability to compete within the natural plant community. Our research uses laboratory, greenhouse, and field studies to answer these questions.

Our studies include breeding engineered and conventional crops to look for molecular or whole plant changes that affect plant success. We are designing models that will predict how plant communities might change as a result



of one or more species picking up an engineered trait. We also are taking field measurements to understand how far genes can travel and whether it is possible to document their effects on natural plant communities.

We are developing methods to address questions about ecological risks of genetically engineered crops designing methods for monitoring established crops.

For more information, contact:

Lidia Watrud
Project Leader

watrud.lidia@epa.gov
(541)754-4874

Western Ecology Division, NHEERL, US EPA
200 SW 35th Street
Corvallis, OR 97333
<http://www.epa.gov/wed/>