Bioethics@
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Herbicide Resistant Rice
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Educational Goal:
Examine the ethical issues involved with using herbicide resistant rice.

Upon completion of the exercise, the student should be able to:
1. Identify moral arguments associated with using herbicide resistant crops.
2. Identify risk factors and the magnitude of harm or good associated with using a herbicide resistant crop.
3. Use issues analysis processes to examine ethical issues in similar situations.

The case:
Red Rice is a serious weed in rice production fields in North and South America. Red rice is extremely difficult to control because rice and red rice are different cultivars of the same genus and species, (Oryza sativa L), and will therefore interbreed. The outcrossing frequency is approximately 2% which is considered high by plant breeding standards. This means that in rice fields infested with red rice, traits of rice can be rapidly transferred to the red rice.

Rice has been genetically engineered to have a herbicide resistant gene. Because of outcrossing, it is apparent that if herbicide resistant rice were grown in red rice infested fields, the red rice would acquire herbicide resistance. An international donor agency funded the research that engineered rice herbicide resistance, but after examining the potential consequences to U.S. rice production, refused to allow the rice to be released for U.S. production.

A scientist at the international research agency learned of the herbicide resistant rice and requested and received from the donor agency herbicide resistant rice seed for commercial production. The scientist wanted the seed because using the seed would eliminate the chemical load on the environment, and reduce production costs. In Colombia, typical rice culture consists of tilling the soil, irrigating to germinate all seeds, and chemically killing the emerged seedlings. This process is repeated three times before the seedbed is ready to plant.

Questions:
1. What are the potential harms that could occur from using herbicide resistant rice?
2. What are the potential benefits that could occur from using herbicide resistant rice?
3. Who would be harmed, and who would be benefited by using the herbicide resistant rice?
4. If you were the international research agency executive who decided to ban its use in the U.S., how would you defend your position on moral grounds?
5. Suppose you are a member of the Sierra Club, which opposes using herbicide resistant crops. What arguments would you use to oppose its use?

6. Assume that the herbicide resistant rice can be effectively grown for a long time, but the herbicide resistance is transferred to another native plant in the community. What are the moral implications of allowing this change in the native species to occur?

COMMENTARY ON HERBICIDE RESISTANT RICE CASE STUDY
Gary Comstock
The case may be used to explore three sorts of questions.

First, it raises a general question in environmental ethics. Is herbicide resistant (HR) rice a good idea from an environmental perspective? Prima facie, it sounds like a bad idea to bioengineer rice to be resistant to herbicides, because we do not know all of the synergistic effects that come from the use of synthetic chemicals in agroecosystems.

Why not engineer rice to outcompete weeds, to be "weed resistant" as it were, rather than to be capable of growing in different doses and mixes of herbicides? This question is pressing, especially in areas like Indiana and Iowa, where farm chemicals have been showing up in wells for years.

Second, it raises a specific question in international ethics. Why did the international research agency decide that HR rice was a bad idea for domestic U.S. production, but a good idea for Colombia? One answer might be that: (a) there was a fear that through outcropping the HR might be transferred to the red rice weed in the U.S. and (b) that rice production is more critical to the wellbeing of Colombians than it is to people in the U.S., rice being a staple crop for Colombians. But why allow HR rice to be used in Colombia if the potential for outcrossing is so severe? In the long run, the deleterious results of using HR rice in Colombia might be worse than the long term results of using HR rice in the U.S. if indeed rice is a more basic food for Colombians than for us.

Third, it raises a question about autonomy. Who should decide questions such as those posed above? The individual in charge of the project at the agency that is funding the research? The administrators of that agency? The U.S. government? The Colombian government? An international environmental regulatory committee? The farmers, U.S. or Colombian, who stand to profit or lose from using the technology? The consumers, domestic or international, whose food bills and safety will be affected?