

My view

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Weed competition causes up to 12% loss in U.S. crop yield annually and reduces crop yields by up to \$33 billion (Pimental et al. 2001). U.S. growers spend more than \$6 billion annually to control weeds, and in 1998, herbicides accounted for 68% of U.S. pesticide sales. Weed scientists do not debate on the importance of these figures. We may simultaneously lament the losses and take pride in the clear importance of weed management systems.

At present, dominant weed management systems in the world's developed countries are energy, chemical, and capital intensive. Although these systems are very effective, they have well-recognized disadvantages. In fact, some aspects of the systems are bad, e.g., soil and water pollution, labor displacement, harm to non-target species. The stark, but often proposed, choice may be between weed management systems that have some or all of the above bad characteristics and those that are really bad and require much human labor, are not nearly as effective, and may reduce crop yield. It is impossible to know what to do if the dilemma is not considered. This short essay has two suggestions, not about what to do, but rather about how to begin to think about the kinds of weed management systems that ought to be developed.

In Delhi, India, near the Red Fort is the site of Mahatma Gandhi's cremation and last rites. When one enters through the gate in a grassed berm, one sees a serene, beautiful place. The area is open to the sky and is dominated by the slightly raised, flat, black marble memorial in the center, on the spot where Gandhi was cremated. Etched in the marble is Gandhi's talisman. It says, "I will give you a talisman. Whenever you are in doubt or when the self becomes too much with you, try the following expedient: Recall the face of the poorest and the most helpless person whom you may have seen and ask yourself if the step you contemplate is going to be of any use to him."

To put the challenge in another way, it is true that any technology will have inevitable social effects. It is good to pause and ask as the technology is developed: Who wins? Who loses? What are the externalities? The last refer to real costs not accounted for by normal marketing mechanisms. Who will the technology help? Will those Gandhi counsels us to consider be helped?

In today's times, most of us are so busy doing what we are paid to do that we may lose sight of who we are doing it for. Our thoughts also frequently turn to a current concern: corporate accounting scandals, executive greed, and cooking the books. Scientists are concerned because these corporate scandals affect their retirement and their faith in business and the economy on which their retirements may depend. But even as corporate scandal may diminish our retirement, we must deal with science's own book-cooking problem. A recent article in the *Christian Science Monitor* (Spotts 2002) exposes fraud charges against some prominent scientists and inquires about the integrity of science and the need for ethical rules. It is a certainty that if businessmen and scientists cannot or will not behave ethically, the public will impose rules to force appropriate behavior. No one knows how widespread scientific misconduct is but we do know that science and scientists

no longer have the level of public confidence they once enjoyed. The lab and field books have been cooked by a malicious few and all suffer. Perhaps what we ought to consider is a publicly proclaimed and widely accepted and publicized oath for scientists similar to the physician's Hippocratic oath. Graduating medical doctors pledge via the Hippocratic oath never to use their skills to cause harm. It has been suggested (www.onlineethics.org) that scientists ought to pledge to protect humanity from the harmful effects of technology. The scientists' equivalent of the Hippocratic oath has been proposed by the Institute for Social Invention in London. The oath is:

I vow to practice my profession with conscience and dignity; I will strive to apply my skills only with the utmost respect for the well-being of humanity, the earth, and all its species; I will not permit considerations of nationality, politics, prejudice, or material advancement to intervene between my work and this duty to present and future generations. I make this Oath solemnly, and upon my honor.

The Institute wants the oath to become a part of the graduation ceremony for scientific and engineering disciplines around the world. Why not? It is not as demanding as Gandhi's talisman, but both are related. A problem is what may happen to scientists with ethics, if they adhere to the oath, make a stand, and get fired or lose a major grant or contract. Will professional associations stand up for scientists who follow their conscience and lose their employment? Can alternative employment be provided for people with conscience who want to help the poorest and the most helpless person whom they have seen or those who see technology causing harm to the well-being of humanity, the earth, or its species? Standing on principle is a wonderful thing if one has the right principles and is not made to suffer for defending them.

If such an oath became part of becoming a scientist and the public knew its intent, it would seem to be a good thing. To think carefully about who is served by science and technology seems to be a good thing. To remember the face of the poorest and the most helpless person you have seen and ask yourself if your work will help that person, seems to be a good thing. To vow, when beginning, to apply one's skills only with the utmost respect for the well-being of humanity, the earth, and all its species also seems to be a good thing. The well being of the poor, of all humanity, of the earth, and of all species is, and will remain, more important than what the personal interests of greedy corporate CEOs has done. Gandhi's talisman will always be a demanding and correct guide to private and public behavior. Publicly vowing to do what is morally and scientifically right is the right thing to do.

Literature Cited

- Pimental, D., S. McNair, J. Janecka, et al. 2001. Economic and environmental threats of alien plant, animal and microbe invasions. *Agric. Ecosys. Environ.* 84:1–20.
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