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Biopesticides and Economic Democracy

In my work on the social impacts of new technologies, I have dealt with a wide variety of issues related to the new biopesticides. As a Peace Corps volunteer in Botswana, I tried to grow vegetables for the market in an environment which fairly teemed with all manner of pests from caterpillars to elephants. There was little we could do about the elephant—but we fought insect pests like the caterpillars with a variety of pesticides such as Chlordane and Malathion. And those pesticides worked—they killed the pests, they kept blight off the tomatoes, and they killed the caterpillars on the cabbages.

But though these insecticides worked, I was uncomfortable using them. I read the labels, and did not like the cavalier way in which my colleague, a missionary farmer from North Carolina—mixed and applied them. I also had to wonder about the usefulness of pesticides to local people—we were, after all, there to help them. But even though the chemicals worked, few people could afford them. Fewer yet could read the labels and mix them safely and properly. And there was the disturbing tendency for any impermeable container to be used for water storage.

The pesticides carried certain benefits, but they also carried certain costs. This Janus-like character is true of any new technology. The balance of costs and benefits is as much a function of the social, economic and environmental conditions in which the technology is deployed as it is of the characteristics of the technology itself. Even in the advanced

industrial nations, though pesticides did indeed confer benefits, their use also entailed substantial costs both to the user and to society as a whole.

Ten years ago in Botswana, I was not aware of alternatives to chemical pesticides. Today, they are in the headlines of the news. For example, there has been the development and the promise of a broad range of biopesticides: pheromone traps, engineering cross resistance in plants, encoding toxin genes in plants, encoding insecticidal or antiviral or anti-fungal genes in rhizobacteria. And biotechnology promises to greatly facilitate the development of such biopesticides.

BIOTECHNOLOGY UTOPIA

McManus (see page 65) provided a litany of benefits that could accrue to the development and use of these new pest control technologies. Biotechnology can be used to develop new pesticides that are "biorational" and contribute to environmental sustainability—because they may be less toxic to people and other nontarget organisms; kinder and gentler to our environment in general. They may also contribute to social and economic sustainability—because they may be less energy intensive, less costly, and because they may permit farmers to begin reducing purchased inputs.

There is indeed great promise. There are many in the business and academic worlds who emphasize that promise. That emphasis on promise is characteristic not just of approaches to biopesticides, but to biotechnology in general.

That emphasis is seen in crop biotechnology—for example, a Northrup King advertisement shows wheat growing next to the Egyptian pyramids with the question "Could the world's deserts be made to bloom again?" The apotheosis of this approach is an advertisement from Monsanto showing a corn plant growing in barren desert with the slogan "Will it take a miracle to solve the world's hunger problems?" The implication of the advertisements are that biotechnology is miraculous; permitting the growth of wheat and corn even in the desert. More than this, the advertisements suggest that biotechnology is a miraculous solution to world hunger.

The advertisement by Monsanto is disingenuous in at least three important ways. First, it presents a goal that no one seriously intends to pursue: growing corn in a barren desert. Second, it implies that there

is a technical solution to the problem of world hunger, a problem that is as much or more sociopolitical than technological. And third, it uses the miraculous and metaphysical as an explanation.

Monsanto is guilty of the very hyperbole it criticizes in those who question the way biotechnology is being developed. The invocation of technological utopia is no less hyperbolic, no less an exaggeration, than invocations of technological apocalypse. And there is actually a good deal more of the former than the latter.

This innovation of the apparently magical character of biotechnology is again apparent in an advertisement from Pioneer Hi-Bred International depicting a medieval alchemist, and containing the slogan "Biotechnology, science or alchemy? Biotechnology is, of course, science. But why not the alchemical analogy; DNA as the new Philosopher's Stone, capable of changing base life to gold, to products to profits? Companies naturally have an interest in emphasizing the promise and minimizing the possible problems of a technology because they expect to make money. The technological imperative—legitimated with reference to technological utopianism—often has a financial imperative behind it.

PROBLEMS

The public has heard this technological utopianism before from business, academics, the government, and from the press. There is reason to distrust technological utopianism. There is a real problem of what to do with nuclear and toxic chemical waste. Now newspapers carry headlines, such as "Bomb site cleanup is put at billions". But in 1959 the Atomic Energy Commission was saying "Waste problems have proved completely manageable..." Currently there is worry about toxic waste dumps and their leakage. But only a few years ago there were advertisements such as Monsanto's, "Without chemicals millions more would go hungry". And this from the same company now engaged in the development of biological pesticides.

How is the public to respond to the assertion that biological pesticides are the solution and that deliberate release of such biorational organisms—miraculous though they may be—is entirely safe and benign? Caution is needed, but note that caution does not mean rejection. The criticism is of the way biotechnology is being developed, not a criticism of biotechnology per se.

This suggestion of caution is reinforced by the caution of others. A recent report titled, "Ecologists wary about environmental releases" from a committee of prominent ecologists (nearly 100 reviewed the paper) published in Ecology, challenges arguments put forth by those in industry and academic circles who would like to see faster development and commercialization of genetically engineered biological pesticides.

Here is a fundamental problem. Individuals are not involved in the development of these technologies. Yet they will certainly affect individuals directly or indirectly. Should one embrace what appears to be great potentials in biotechnology, when one is uncertain as to the balance of costs and benefits. If individuals not involved in the process, how can they make an informed decision on issues? Or, if someone who is trusted or who has been designated as the public's representative is not involved, how can the public decide?

Out of this problem arises a second problem. Technologies have differential effects on people—some win, some lose. Not only are there both costs and benefits, those costs and benefits are borne in different proportions by different social groups. An example is the well-known case of the mechanical tomato harvester, whatever the level of gains elsewhere in society, those who lost their jobs suffered substantial costs. The next gains to society may be positive, but what are the ethical implications of excluding from the technology development process those who are actually damaged?

ECONOMIC DEMOCRACY

The central social and economic issue in the development of biopesticides—indeed, in the development of biotechnology globally—is the question of economic democracy. Citizens of the United States enjoy political democracy—they can vote, and thereby influence political decision making. More than that, they can belong to a political party and by being involved in party activities can help shape party policies and objectives. Political democracy means the right to actively participate in political institutions; not just to vote yes or no on a candidate, but to help select the candidate to run for office.

There is no parallel institutional structure for participation in economic decision-making. There is not the right—directly or indirectly—to participate in decision making at Monsanto or Eli Lilly or Chrysler or General Foods. It might be argued that economic democ-

racy exists inasmuch as there is a "vote" on a new technology by deciding to purchase it or not. But this is a degraded sort of economic democracy parallel to Soviet political democracy in which a candidate is presented and citizens vote yes or no. Even the Soviets are moving away from that model now.

Full economic democracy is not a feature of the American economy at this time. It should be. The fundamental social and ethical task to be undertaken in regard to the new biotechnologies is the development of institutions to provide full economic democracy—institutions that would allow for participation in the development of new technologies by a broad range of social interests. Participation in the direction of the research and development process is needed.

How? Through what mechanisms? At what levels? By what groups? There are few people looking for such mechanisms. There is no doubt that it will be difficult. But the point is to make a reasonable beginning because broader social participation in technological development is both ethically appropriate and socially rational.

Broader participation is ethically appropriate because those who stand to be affected by an economic decision should have a right to participate in that decision. The emphasis is on the word "participate". This does not mean "veto".

Broader participation is ethically appropriate because the effects of a new technology are not always predictable. If they cannot be predicted, and if there are going to be unforeseen losses for some, then collective responsibility is needed for important decisions.

Broader participation is socially rational because if there are formal institutional mechanisms for ensuring popular participation, there is a provision for collective responsibility and therefore for conflict reduction. If there is a problem, it is a community problem.

Broader participation is socially rational because enlarged participation will bring useful additions of information to the development of technologies. Lay people have experience and knowledge of a problem that experts cannot duplicate. As described in an article titled, "Scientists at the source: farm families are 'adopting' agriculture biotechnologists", one biotechnology company is already taking farmers' indigenous knowledge seriously. What farmers know about the production process or what patients know about their disease can be applied to the development of new technologies.

Broader participation is socially rational because debate over the desirability of competing technological directions highlights the possibility of generating options. It is socially rational to maintain a diversity of possible technological paths. Why is solar energy not pursued? Why are insights not being gleaned from Amish agriculture? When narrow interests predominate in setting technological trajectories, it must be asked what are the opportunity costs of taking that path, what may be the lost alternatives, the foregone options?

Robert Goodman, (see paper page 52) pointed out that farmers have a very short range of attention when it comes to their profitability. The same is true of corporations. There may be good, ethical people in companies, but they must sell technologies for profit. If private corporations are the only ones developing new technologies, to what extent does the need to make a profit drive them down one particular technological path as opposed to another? AH alternatives must be considered including those technologies that are socially useful, but not privately profitable.

Public institutions, especially Land Grant Universities (LGUs) are in a position to pursue these alternatives. They will be pivotal institutions for generating a participatory trajectory. If any measure of economic democracy is to be achieved in agricultural colleges, agriculture will have to play a leading role. But who are these institutions serving? There has been criticism at least since the 1970s suggesting that agribusiness is the principal social group served by the LGUs. Agribusiness is already and has long been participating in the shaping of public research agendas. While the LGUs are enlarging participation in agenda setting, private companies are expanding their already dominant role.

The increasing penetration of universities by industry is a general tendency within higher education at the moment, especially in the area of bioscience. During the last ten years a wide range of contractual and non-contractual arrangements have been established between universities and private businesses in the field of biotechnology. Companies have made their needs known. Monsanto does not provide $62 million to Washington University without expecting something in return. What companies get are a wide range of benefits for their dollars; influence over research agendas, patent rights, licensing rights, early looks at new technologies, and a window on university techniques. The result is the “commodification of the university".

Universities are becoming quite literally marketplaces for knowledge. And as universities become marketplaces, they respond to those who have the deepest pockets. There is plenty of demand for lots of different research out there in society, as economists, would point out, it is "effective demand"—that is, demand backed by dollars—that gets a response. While universities are certainly not ivory towers and never have been, should they not at least be semi-autonomous from the dominant economic powers? If technological options are going to be established and maintained, then the continued penetration of universities by narrow economic interests cannot be permitted.

A related problem that has accompanied the commodification of the university is the overemphasis on biotechnology and an underemphasis on other areas of biology. An advertisement from United Agriseeds, now subsidiary, shows a corn breeder covered in cobwebs, and states, "Some plant breeders are more patient than ours at United Agriseeds", saying in essence that classical plant breeders will not be needed anymore because gene transfers will all be done by genetic engineering. This advertisement is a social indicator of the funding and employment shifts that are underway. Already biotechnology is favored in both research support and when hiring at USDA and in colleges of agriculture.

It is not that research support should not grow for biotechnology, but rather that other areas should not be slighted in the process. This is crucial in the area of biopesticides. If agroecology and sustainable agriculture are to be seriously pursued, then money will have to be directed towards ecology, which has been and continues to be appallingly underfunded.

Lastly, a social and ethical issue that is too little addressed is the total federal research and development budget. The allocation to ecology and molecular biology has been relatively limited. In 1987, 70 percent of federal research and development expenditures went to defense. For every dollar that went into agricultural research, forty dollars went to defense. This is ethically indefensible and socially irrational. The defense budget is an agricultural and sustainable agricultural issue. If the nation is going to move towards a sustainable agriculture, the resources must be made available to it.