Entomologists and Public Policy[1]

BARRY M. BRENNAN[2]

Daniel Yankelovich (1984), chairman of the public opinion research and consulting firm of Yankelovich, Skelly and White, recently discussed the disparity between the scientific sophistication and the political backwardness of our public institutions. The public still marvels over the wonders of science; gene splicing, supercomputers, artificial organs and space shuttles to name a few. Yet, in other ways we are very backward relying on war to settle differences over territory or ideology.

With the exception of a few areas of research, e.g., atomic weaponry, scientists tend to view their work dispassionately or to assume some moral or intellectual superiority over the non-scientist. Scientists seem to assume that the public and society at large must catch up with science. We seem to feel that if we can only *teach* the public about science and technology, most of our problems will be solved. Yankelovich asked why it is always the public that is expected to catch up with science. Shouldn't science also learn from the public?

Several years ago a visiting professor in the Department of Human Resources interviewed farmers occupying Hawaiian Home Lands on the Big Island. These individuals were at best only marginally successful as farmers. Both the Office of Hawaiian Affairs and the Cooperative Extension Service spent considerable time and effort attempting to teach these people scientific methods of crop and livestock production. Most famers were polite but did not adopt the newer methodologies. The interviews revealed that the goal of the Hawaiian farmers was to pass their leased land on to their heirs. Their stature derived not from crop or livestock production, but from occupying the land. Farming was of secondary importance.

Let me briefly review the relationship between science and the public over the last few decades.

In the fifties and sixties the public was awed by science. Science was credited with playing a decisive role in gaining victory in war and prosperity in peace. Science enhanced our health, increased our life-span and enriched the quality of our life. The introduction of synthetic organic pesticides and fertilizers decreased the drudgery of farm work and increased productivity. Some even viewed pest eradication as a distinct possibility for the first time in man's history. Based on its impressive record, science was also expected to solve social problems related to poverty, hunger, urban decay, illiteracy and pollution. The public was very positive on science. Federal and state spending expanded faster than it could be wisely invested.

Interestingly, the impersonal, objective nature of science was seen as its key to success. Everything was reduced to quantifiable terms. Biology, including entomology, was reduced to mathematical models, molecules and physical laws. Numerical taxonomy, ecology and behavior sought to define the lowest common denominators. The public seemed to think that the tremendous expansion of science was really no mystery. After all, given enough data everything could be deduced. Unfortunately the human characteristics of understanding, wisdom, insight, adventure and experience were all ignored.

In the seventies, there was a strong reaction against science, particularly among young people. Lyndon Johnson's war on poverty, Richard Nixon's war on cancer,

[1]Presidential Address presented at the December, 1984 meeting of the Hawaiian Entomological Society.
[2]Department of Agricultural Biochemistry, University of Hawaii, Henke 329, Honolulu, HI 96822.

and the failure of the United States to win a clear victory in Southeast Asia clearly demonstrated that funding alone was not enough. Science and technology were accused of ravaging nature and polluting "Spaceship Earth." Pesticides were no longer tools; they were "ecological poisons." "Mother Nature" was conceptualized as a deity. Science and technology were seen as enemies of nature and thus lost their attractiveness as "Keepers of the truth." America's youth turned inward, became subjective and developed a penchant for mysticism and the occult. Science was seen as too deductive, rational and narrow-minded; it was unable to admit that there might be another "reality."

Today we see a better balance between the unreasonable expectations of science and the romanticizing of nature. Poverty, hunger, illiteracy and disease are still with us. While the public is reconciled to the fact that science does not have all the answers, it also seems to accept that material scarcity requires thoughtful use of land, water and other natural resources. Conservation for conservations' sake has few adherents. Both conservation and growth must be justified. As Yankelovich noted, today it is possible to be pro-environment without being anti-technology.

Society seems to have learned that there are a few easy choices. Both risks and benefits must be considered. Living next to a golf course with its well-manicured fairways as beautiful extensions of backyards, means having to put up with odors from the pesticides and fertilizers applied to enhance the beauty of the course. Availing oneself of blemish-free produce means consuming minute amounts of pesticide residues. Indeed, protecting one's home from cockroaches and fleas often requires the use of chemicals which, if used indiscriminately, could adversely affect both owner and pets. Which of us would risk building our home on land that wasn't treated with a persistent termiticide?

I think it is safe to predict that pesticides will be used for the foreseeable future. Given our ability to identify and synthesize naturally occurring pesticides I suspect that the volume of use will decrease as will their toxicity to humans and other non-target organisms. Specific pesticides or mixtures of specific pesticides will be used to increase the effectiveness of pest control efforts without endangering the environment. Pesticides will only be applied on a prescription basis. Timing and dose will be related to pest population levels. Indeed insect population levels will probably be monitored with pheromone-baited traps. Advances in technology will permit precise application so as to avoid drift and contamination of ground water. Advances in formulation technology will increase safety to the applicator and increase or decrease pesticide persistence, whichever is desired.

Science and technology have clearly demonstrated what they can do and cannot do. Science and technology cannot eliminate deliberate misuse of pesticides or applicator carelessness or negligence. Technology can reduce risks. Science can reduce risks. Neither can manage risks. Risk management is essentially a political process. Lawmakers must be aware of the capabilities and limitations of science and technology and balance this awareness against the concerns of their constituents.

Silent Spring (Rachel Carson, 1962), raised the public's awareness of the adverse affects pesticides may have on the environment. Congress reacted by imposing stringent new laws and regulations regarding the registration and use of pesticides. Pesticides which only a decade earlier had been viewed as miraculous tools to be used to increase agricultural productivity and to eradicate arthropod-borne diseases, suddenly became objects of fear. Pesticides were accused of being responsible for many human ailments including cancer, birth defects, sterility, and abortions.

Today's lawmaker sits in an uneasy position. Rarely has he or she been trained as a scientist. Technological developments have resulted in instruments that can detect persistent chemicals at the part per trillion level. Although it is impossible to attach any toxicological significance to such minute quantities, psychologically and politically they cannot be ignored. The politician is often required to vote on laws that could and often do have a profound effect on the availability and economics of food. The passage of the Delaney clause is an example of well-intentioned but ill-conceived legislation.[1] This clause prohibits the addition of any carcinogen at any level to our food. When Congress was confronted with the implications of this legislation as it affected the use of cyclamates, it voted for an exception to the clause. Politically it was unwise to even amend the clause, much less eliminate it. Dr. Bruce Ames recently reviewed (1983) the increasing body of evidence that carcinogens and mutagens are present in our daily diets. Some occur naturally, others result from reactions which occur while cooking. Indeed, "nature's" pesticides are approximately 10,000 times more prevalent in our diet than are man-made pesticides.

As scientists we have become painfully aware of the limitations of our knowledge. We cannot agree on the significance of toxicological data. Does chemical "A" induce or not induce a cancer? Are animal studies really relevant to human exposures? At what level do pesticides exert a toxic effect? It's not surprising that the public is confused. We scientists cannot agree amongst ourselves.

Hawaii's public is generally unsophisticated relative to the use and misuse of pesticides. Recent pesticide-related problems such as the contamination of milk, produce and water, brought cries of outrage from some and ho-hums from others. Interestingly, pesticide users seem to be the group most concerned over alleged misuse. They are well aware that it is the outraged minority that will insist that the legislature impose additional restrictions on the use of pesticides. There are no crops grown in Hawaii that do not require the use of some pesticide. Pesticides provide for the profit margin.

That, often vilified, rarely complimented, representative of the people, the politician, is the key link between the demands of their constituents and the knowledge and accomplishments of the scientist. To complicate the role of the politician, there is often little unamimity in either the public's or scientists' concerns and viewpoints. The diversity of subjects the legislator is asked to vote on adds a further obstacle to the passage of good legislation. Given the diversity of opinion, the diversity of subject matter and the reluctance of scientists to become involved in policy-making decisions, it is a wonder that our society does not collapse beneath a morass of well-intentioned but ill-conceived legislation.

As professionals devoted to the study of insects we are often asked to clarify some aspect of pest identification, biology, behavior or control. The fact is, many professional entomologists are no longer qualified to address the tremendously complex issues raised in the legislature and in the Congress. Restrictions on the use of pesticides, or cancellation of their registrations, could leave some crops without adequate protection against serious pests. As a result it may no longer be feasible to grow some crops in Hawaii. The social and cultural impact in communities affected by agricultural industry failures are of major concern to State and county governments.

For all of its limitations, science is still more sophisticated than either the political process or the concerns of the public. Scientists can provide reems of data to bewilder both the politician and the public. It is impossible to deny that scientists have their own biases. Yet the politician and the public both acknowledge that they must depend on

[1]Incorporated into Public Law 518 in 1958. PL518 amended the Food, Drug, and Cosmetic Act of 1954.

data provided by scientists in order to pass good legislation. This dependence puts two obligations on the scientist. First, the scientist must provide objective data and interpretation based on knowledge, intuition and experience. He or she must, in essence, educate the legislator and the public.

Secondly, and no less important, the scientist must be aware of the immediate and long-term needs of the public. This is particularly true for those of us who are paid from the public coffer. Academicians cannot divorce themselves or their actions from the needs of the State. (This is not to imply that basic research has no place in a university, but rather that a balance between basic and applied research is appropriate. It is also appropriate that the researcher establish what the proper balance is.)

In conclusion, as entomologists we have an obligation to support the society that gives us the opportunity to pursue our profession. Whereas our profession has become scientifically and technologically sophisticated, the public is relatively unsophisticated in matters of direct concern to us. It seems therefore, that we have a duty, either through the Hawaiian Entomolgical Society or as individuals, to provide the information that our lawmakers need to insure that legislation and public policy affecting pest control and pesticides is reasonable, well-written and effective. It is also our duty to listen carefully to the concerns of our neighbors, our elected representatives and those who take exception to our viewpoints.

Thank you very much.

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