VIEWPOINT

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An Agricultural Agenda

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Agriculture, one of our oldest sciences, has been practiced for the past 10,000 years. Early farmers observed nature and then tried to imitate natural processes to increase the availability of food and fiber. In fact, until this century, agriculture has relied almost exclusively on natural processes and products.

After World War II, new products, radically different from anything used in the past, were introduced into farming. These materials, plus new genetic advances and increased mechanical power, radically changed the face of agriculture. Food production capacities increased significantly, and modern farm management, as we know it, was born.

Through biology, physics, and chemistry, we have improved on the riches that nature provides. Past farmers were partners with nature; today we manage it. If we do not like the plant material available, we "engineer" something new. If it does not rain, we irrigate. If the soils do not produce, we fertilize. And, if a share of our yield goes to other creatures, we destroy the "pests" with poisons.

Although we have now become dependent upon these technological advances, it has only been relatively recently that we have also become more aware and increasingly concerned about the effects of modern farming practices on humans and nature. Agriculture finds itself on the front pages of our newspapers and on the nightly TV news: chemicals in children's juice, ground water contamination, and farm economies suffering from an increasing need for capital to purchase inputs. The image of the healthy, wholesome, rural lifestyle is fading with reports of poisons in the fields, air, and water. Nature, trying to restore its own balance, is developing new resistant species, disrupting the monoculture of efficient farming, and spinning the pesticide treadmill even faster.

As alarming as all this might be, perhaps most significant to producers has been the concern raised by consumers. Reports of Alar in children's apple juice last winter severely hurt apple growers—even those who had never used the product. Other commodity groups, fearing that similar incidents could influence consumer perceptions and practices, search for alternatives. The disruption of the market system, as much as the dis-

ruption of the natural system, is promoting a new revolution for American agriculture.

Increasingly, growers and their commodity groups voice concern over their vulnerability to an "Alar situation". They also feel pressure from a market that is beginning to separate horticultural products on the basis of what has been used to grow them. Crops grown without pesticides or detectable residues are labeled and bring higher prices at the grocery store. Several large chains base promotions on such claims and demand for these products often outstrips supply.

If the market is the "carrot" for agriculture's change, legislators are developing a "stick". Starting with California, state lawmakers across the country are taking a hard look at the products being put on our soil and in our air and water before they are put in our mouths. With consumer awareness and pressure on the market and in legislative halls, environmentalists are finding a wider audience for their own agenda that holds us accountable in a natural system for what we do to the resources we share with other creatures. Erosion, drainage problems, and the accumulation of toxic materials in our water, soil, and air pass from study reports to law to initiatives.

We need not look beyond the headlines to know that modern agriculture is in trouble. From family farm foreclosures and the decimation of rural communities to new products along grocery store aisles, America's agriculture is changing. While some still lament these blows to an industry that only a few years ago was touted at its zenith, others recognize these problems as related and as an opportunity to take the initiative, to develop new goals, and to work toward them.

Many in agriculture are setting a new agenda for the future. They see efficiency and profitability as insufficient goals. While profit remains a priority, it must be consistent with environmentally sound practices. Efficiency in production looks not only to quantity—crates per hectare—but also to the quality of the food produced: healthful, nutritious, tasty food that is within the reach of consumers.

As they set forth this new agenda, producers look to us, the providers of information and products, for the tools to realize this vision. As in the past, we in the agriculture research and development establishment have a major role in shaping this change.

Are we organized to respond to this challenge? Are we flexible and imaginative in our approaches and our responses? Are we concerned and farsighted enough to see beyond the tools and issues of our disciplines to address the interconnected problems of modern agriculture? Just as producers in the field are reframing their issues and needs to respond to a changing environment, we too must reframe our questions and responses to develop an agricultural production system less dependent on the use or management of toxic materials.

Today's agricultural problems cannot be laid at the door of any one discipline. They are the result of what we all do together. And no one discipline can supply the answer. Together we must look at the problems and find solutions. Recognizing this, we must move toward a more cooperative, interdisciplinary approach to our problem solving. We must learn to value the broad and general truths as much as we value the narrow and specific.

One such approach is now developing through farming systems research. With its reliance on many disciplines and specialists, systems research is more difficult to develop and to coordinate. By putting the component parts together under the same conditions, particular agricultural problems can be studied from the perspectives of many disciplines. This approach is more likely to produce long-term, thorough results. Also, information gathered from the entire system as well as the component parts leads to realistic management tools for the practitioner to meet the goals of high yield and profit from producing safe, nutritious food.

Another benefit of this systems approach, which introduces scientists to the issues and methods of inquiry used in other specialties, is that it has heuristic value. It keeps researchers focused on the major issues rather than reducing their perspectives to the narrow questions of any one discipline. By bringing all the disciplines together cooperatively, the overarching or general information becomes primary and the disciplinary issues become subsets of it. When information is sought about a subset problem, it is within the context of the larger question—keeping the "forest" in mind while we study the trees.

Interdisciplinary team efforts that focus on a farming system approach rather than a specific production problem will require new

resources—financial and human—as well as new management skills to coordinate such undertakings. These projects will need not only our current specialists, but new specialists—highly trained people who see the connections between specialties, who understand the nexus between disciplines, the boundaries where the major breakthroughs of the future will take place. We must cultivate people who are not only knowledgeable in a field, but who understand the total production system. We must seek out those who are skilled at integrating information from

the researcher with management practices in the field and who will serve as conduits of information to farm practitioners and of feedback to researchers.

The products of our laboratories will be as different as the products of our classrooms. Just as in field work, laboratories will use interdisciplinary teams to look at system impacts in product development. These new products will be more sophisticated in their use and effect. For example, the pheromones being developed to trap or manage insects deal with a particular problem rather than

disrupting an entire ecosystem.

Today, all of our major institutions—industry, business, religion, and government—have come before public scrutiny. The spotlight is now turning on our own endeavors and agriculture's management of its own tools is being questioned. Rather than denying, diminishing, or ignoring concerns raised by consumers, lawmakers, and environmentalists, we must look at our industry with fresh eyes. Only then can we take the initiative, set our own agenda, and work toward our mutual goals.