PART II

WORKSHOP REPORT

The "Break-Out" Session Workshops
William Lacy & Allan Eaglesham

NABC 15

WORKSHOP REPORT

At NABC meetings, all attendees are active participants. Exchanges of information, ideas, and opinions occur at Q&A sessions following formal presentations, and during lively discussions at breaks, over meals, and at social functions. However, the workshops provide the most direct and most powerful means of participation with face-to-face discussions and debates. At the 2003 meeting, three-person panels convened at the conclusion of each formal session (prior to the audience Q&A sessions) to ask questions and initiate discussion on issues raised by the speakers. Subsequently, each panel member for Modules I, II, and III became a discussion leader at one of the break-out workshop sessions, which helped maintain and broaden discussion of the themes raised at the keynote and plenary sessions. The role of the discussion leaders was to facilitate verbal exchange. A few found it difficult to move from an asker of questions with a specific position to be a neutral facilitator. Note-makers recorded the salient points of the workshop discussions, which are summarized in the following pages.

The "Break-Out" Session Workshops

WILLIAM LACY
University of California
Davis, CA

ALLAN EAGLESHAM
NABC
Ithaca, NY

The workshops were structured around three themes:

- Science and Society at a Crossroad
- Sustainability, Environmental and Production Issues
- Consumer Issues and Trade

Nine break-out sessions were held in total, three for each of the general themes. The discussion leaders and recorders are listed in the table at the end of this chapter. Notes received from the recorders were assembled and are summarized below.

SCIENCE AND SOCIETY AT A CROSSROAD

Issues associated with risk assessment were broadly debated. It was felt that many studies on risk are unsatisfactory to consumers—their concerns are not adequately addressed nor are the results of such studies communicated well. Pressing concerns included:

- the definition of risk,
- risk of genetically modified (GM) foods to human health,
- risk from corporate control of the food system, and
- risk of insect pests developing resistance to *Bt*.

Lack of availability of information from the federal agencies on risk assessments of GM foods was addressed; one response was that some information is available on the Internet at agency home sites.

The issue of food labeling was recognized to be complex. It was noted that many other countries require the labeling of GM foods. There was disagreement over whether labels should relate to the preparation process or to the product.

Doubt was raised as to whether it is possible to have symmetry in labeling across disparate products containing GM ingredients. Some felt that labeling is less a mechanism to provide choice to the consumer and more a ploy whereby market advantage may be gained. If traceability is to be a component of labeling—from seed through process to multi-ingredient product—some claimed that it may be impossible for labels to be exact and correct and still be informative for the lay-person. Other participants noted that traceability might occur by means of barcodes, *etc.*, and not interfere with consumer comprehension. Further debate is needed on tolerance limits for GM ingredients in nominally non-GM foods. Some see that only a zero-GM option for organic foods would provide a meaningful alternative for those who wish to avoid GM foods. The United States can profit from the experience of other countries.

It was suggested that third-party laboratories should be charged with the task of determining the presence and levels of GM ingredients in nominally non-GM foods in order to maximize confidence in the results. But who: universities, agencies, private companies under contract, or non-profit entities? Resources would be needed to provide such a service on a meaningful scale; there was debate as to costs and value. In review, one of the facilitators recalled that it was suggested that if the biotech industry were to find such costs excessive, they could charge more for their "improved" products; conventional farmers should not have to pay for following age-old practices.

There is need for more funding for alternatives to GM commodities, such as research on organic farming practices.

Sustainability, Environmental and Production Issues

Again, risk was subject for discussion. Given that our understanding of genetics is incomplete, can we ever be sure that the federal regulatory system is adequate? On the other hand, it is important to bear in mind that risk is not unique to biotech, and applies also to conventional and organic agriculture. Doubt was raised as to the efficacy of buffer zones, knowing that some data indicate that pollen can be wind-transported beyond any such zones. Comprehensive research is needed to determine how far pollen can travel. On the other hand, buffer zones fulfill a need, as long as they are properly planted and maintained.

Risk assessment is focused on GM crops. The dwarf wheat gene—a key compo-

Risk is not unique to biotech, and applies also to conventional and organic agriculture.

nent of the Green Revolution—did not provoke such assessment. Although, by comparison, conventional plant breeding seems fraught with risk, few problems have arisen from it, raising the question of where the line should be drawn re-

garding assessment of risk from new crops. Canada regulates all novel traits, not just those produced through biotechnology; the risk assessment is based on the trait introduced.

A range of consumer opinions was voiced at the meeting, whereas no conventional farmers were in attendance, raising the question of whether consumer priorities are consistent with those of growers. Similarly, the direct advantages of GM crops to the farmer must be juxtaposed with the disadvantages of market losses, *e.g.* in Europe and Japan. On the other hand, over the past 6 years, GM technology has been aimed at farmers rather than consumers, compromising market choice and resulting in calls for labeling to allow choice of non-GM food by those who wish to eat it exclusively. This raises the question of whether it is possible, within the present system, to segregate non-GM soy from GM soy, non-GM corn from GM corn, *etc*. Will alternative elevators be needed and, if so, who will pay? As far as Roundup Ready® wheat is concerned, the Canadian Wheat Board has asked Monsanto not to request deregulation as it would pose significant segregation problems. Where is the line to be drawn between the interests of the biotech industry and the interests of society as a whole?

The on-going loss of wildlife habitat was raised as a threat to human survival. Are there ways in which biotechnology can help to, at least, slow this process as a component of improving or realigning the current agricultural system? It is always difficult to find a solution in hindsight—better to alter what we are doing to minimize the problem in the future.

It was suggested that we not make the mistake of regarding the current agricultural system as normative. Natural ecosystems should be regarded as normative—we should attempt to take a "natural system" viewpoint that marries sustainability with biotechnology. On the other hand, without knowing society's short- and long-term goals it would be unwise to choose an alternative system or alter the present system.

Increasing farm size has had adverse effects on rural communities. There is a trade-off between efficient land use and social well-being. Traditionally we have measured agricultural success in terms of increased yields. Social factors must be taken into consideration also.

On one hand, it was suggested that biotechnology be viewed as a tool that has potential in organic as well as conventional agricultural production—the biotech

---

Biotech should not be viewed as a solution in itself. It is a tool to be blended with other improved management practices. Its usefulness should be judged on a case-by-case basis.

There is need for more funding for research for smaller projects with emphasis on alternative agriculture.

solution to root rot has a potential role in organic agriculture, for example. On the other hand, such statements are viewed as industry propaganda, in conflict with the views of organic farmers.

In view of the fact that traditional breeding has not been deemed anathema to organic agriculture, clarification was sought regarding resistance to genetic engineering. In response, concerns were voiced about gene transfer across species barriers.

The Roundup Ready® technology has been credited by farmers as providing more free time, which has broad social implications. Growers who previously worked full time may now seek off-farm employment—since farming profit margins are lean—which could result in increased unemployment in rural communities.

Biotech should not be viewed as a solution in itself. It is a tool to be blended with other improved management practices. Its usefulness should be judged on a case-by-case basis.

There is need for more funding for research for *smaller* projects with emphasis on alternative agriculture.

Research on transgenic organisms continues to be objected to on the basis of ethical/religious concerns: in the opinion of many, scientists are making decisions that are the bailiwick of the deity. On the other hand, it was suggested that the critical boundary was crossed, not in the 1980s and 1990s, but 10,000 years ago when growers began selecting for superior characteristics, thus altering the genotypes of plants grown for food. It was suggested that one way to improve dialog between the pro- and anti-GM camps is to not use morality judgments. On the other hand, for some, ethical/religious views dictate *approval* of GM crops from the point of view of potential to increase agricultural productivity where it is most needed: in the developing world.

Undeniably, there are problems with modern agriculture, but is the system described by Frederick Kirschenmann without difficulties? Is it a choice of problems? Kirschenmann's system is less capital-intensive, and, to a greater degree, uses resources found within the farm, accessing strengths within natural systems. Organic farms are more labor- and management-intensive and thus are more costly in those terms.

Given that the agriculture industry is in need of pragmatic solutions, it makes no sense to use expensive technologies to increase production of commodities that are already overproduced. In particular cases, however, biotech has an im-

portant role, *e.g.* as in saving the Hawaiian papaya industry.

As stated above, one significant advantage accruing from the Roundup Ready® technology is the fostering of reduced-tillage systems, with significant savings in time and energy. The question was raised as to whether "sustainable" practices may reduce tillage even more. In fact, monocrop systems in particular benefit from reduced tillage. It was stated that multi-crop systems are even better than reduced tillage approaches, because they continuously change the system dynamics. Climate change may mitigate against monocropping. If monocropping persists, it is possible that hypoxic zones will increase in size.

There is a need to move to perennial crops—perhaps to 40 to 50% trees and grasses. On the other hand, it would be difficult for conventional farmers to make such changes. Genetic engineering of perennial crops would meet with the same opposition as with annuals.

The question was raised as to whether "sustainable" systems are scalable. The problem is not the size of the farm but rather the structure of the system. The industrial agricultural approach, generally viewed as highly efficient, is not necessarily the most efficient, nor is it impossible to change.

Monsanto did not foresee that the Roundup Ready® technology would greatly increase the adoption of no-till agriculture, and thus be such a time-saver for farmers. It's an example of simplification, the value of which is difficult to calculate. Certainly the value of time saved is much greater than the cost of the technology. Rootworm *Bt* biotechnology may further simplify farming; in not having to apply granular pesticide while planting, twice as much area may be sown per unit time, and buying, storing, and handling of insecticides (for control of corn rootworm) is expected to be reduced.

Labor is an important issue on the farm. Organic agriculture is more labor-intensive than its conventional counterpart, often requiring long hours worked by laborers. How many are willing to work 12 hours per day in the field? Land and capital are more plentiful in the midwest, favoring the less labor-intensive system. On the other hand, if labor is plentiful, there is less need for capital. The situation differs from society to society. But, even in South Africa, *Bt* cotton has been readily adopted because of the reductions in labor and pesticide applications that it fosters. In tropical environments many constraints exist beyond those met by farmers in the United States—year-round insect-predation and disease, poverty, and food shortages. Particularly because the high-input Green Revolution bypassed Africa, biotechnology is viewed there by some as an additional tool to

The contentiousness between the "organic" and "biotech" camps leaves little opportunity for finding common ground.

We must move away from polarization and view the total array of technologies and systems; every grower has unique challenges and needs to be able to select the best combination of technologies available. We must set policies that maximize grower choice.

reduce constraints and increase productivity. But could there be an EU-market backlash—rejection of African commodities? Intra-regional trade is far more important in Africa than intercontinental. Any commodities exported to Europe would probably have to be non-GM.

Achieving sustainability in agriculture, by definition, requires a long-term view, taking account of externalities like soil erosion, hypoxic zones, and effects on wildlife. Can conventional farmers be made to alter their practices to achieve greater sustainability, in the absence of direct financial incentives?

The contentiousness between the "organic" and "biotech" camps leaves little opportunity for finding common ground. In general terms, Frederick Kirschenmann's approach is to adjust to the flow of change, and the alternative is to shortcut the natural flow. Yet, the two need not be mutually exclusive. It was suggested that *Bt* technology will be accepted as a component of organic agriculture within 10 years.

With the fundamentally different anti and pro-biotech mindsets, is it possible to agree to disagree and move on to consider problems of global dimensions in the hope of finding common ground to form the basis of progress? For example, greenhouse gas mitigation. Does biotechnology impact it, and, if so, how? Again the point was made that, this meeting is not broadly representative. We need to seek means of obtaining broader representation at NABC meetings. Norman Borlaug has stated that it takes a lot of people to start something that can then be stopped by just a few. Another problem of global dimensions is whether we can sustain the growing population; does biotechnology have a useful role to play?

As stated above, the prevailing agricultural system is not closed to the concept of change. Farmers have to be adaptable to survive, and many will try sustainable approaches if they make sound economic sense. No one solution fits all. We must move away from polarization and view the total array of technologies and systems; every grower has unique challenges and needs to be able to select the best combination of technologies available. We must set policies that maximize grower choice.

Economists say that, partly as a result of GM crops, commodity supplies have

There is a strong need for funding for long-term research that is independent and not linked to criteria related to industrial profits.

been increased, forcing prices down. GM canola reduces food cost by $0.50/year per person—an undetectable change. Biotechnology is one of many factors contributing to decreased food prices. However, a discussion on the high cost of packaging would be more meaningful.

The EPA does not view GM foods as inherently risky. They examine for risks and determine how to manage any that are identified.

Consumer Issues and Trade

There is a strong need for funding for long-term research that is independent and not linked to criteria related to industrial profits.

Because nature is dynamic, some feel that it will be impossible to contain transgenes indefinitely and that, sooner or later, the products of unwanted transgenes will enter the food supply; we may be heading for a consumer catastrophe. On the other hand, it was pointed out that transgenes, like all others, are already throughout nature. One objective of the "terminator" seed technology was to help control gene flow.

There is no consumer demand for GM food. Biotech is benefiting industry and

Biotech is benefiting industry and conventional farmers, not consumers.

conventional farmers, not consumers. On the other hand, organic farmers are under threat—although it should be borne in mind that the GM "taboo" as it relates to organic food was insisted upon by the organic industry. Eventually, tolerance levels need to be established that will foster co-existence of conventional with organic farming. Organic standards were drawn up with the precautionary principle in mind.

"Reductionist" scientists tend to miss sight of the system as a whole. Conven-

Eventually, tolerance levels need to be established that will foster co-existence of conventional with organic farming.

What is the role of the land grant universities?

tional farming isn't working for growers, pointing to the need to look at alternatives in terms of farming systems and new ways of making money.

If GM crops are substantially equivalent to their non-GM counterpart, on what basis are they patentable? This question was posed several times in the workshop and plenary sessions. Substantial equivalence lies in the harvestable component, whereas patentability results from the transgene that confers, for example, resistance of the crop as a whole to insect predation.

What is the role of the land grant universities (LGUs)? Some argued that the LGU mission—doing research for the common good—has been lost. On the other hand, the transgenic papaya research was done at LGUs, with direct benefit to the people of Hawaii. That consumer expenditure on food has been decreasing for many years is an indication that LGUs are working in the public interest, perhaps too successfully.

Adoption of biotechnology in agriculture has been faster than what the public

That consumer expenditure on food has been decreasing for many years is an indication that land grant universities are working in the public interest, perhaps too successfully.

can understand—causing significant confusion and concern. There is a need to advance the debate, to foster mutual understanding. It is important to note that adoption of GM crops has not been limited to industrial agriculture; rates of adoption are rapid also in China and other developing countries, resulting in reductions in application of insecticides. Some feel that the successes of biotech need to be tempered with publicity on its failures.

One participant suggested that although consumers want labeling, industry is resisting because it will lead to consumer questions. Various industries joined forces to fight a labeling initiative in Oregon—why? Consumers with ethical and other objections to GM food need information to avoid what they do not wish to

Adoption of biotechnology in agriculture has been faster than what the public can understand—causing significant confusion and concern.

eat. In addition to ethical objections, others wish to avoid GM foods because the FDA does not require tests for allergenicity or other hazards in food deemed to be substantially equivalent. Some feel that a leaf should be taken out of the European book—Americans should be circumspect when it comes to all GM foods. Again, it was suggested that those wishing to avoid GM foods should eat organic. One participant made clear that, notwithstanding the activist mantra, none of the alleged StarLink™ health concerns were borne out upon testing by the National Academy of Sciences. It was suggested that the Europeans are labeling for reasons other than for safety, *e.g.,* politics, and to satisfy activist-group demands. Although at least one poll has shown that the overwhelming majority of American consumers want labeling of GM foods, it was pointed out that survey results are strongly influenced by how questions are asked.

Respect for the elegance and complexity of natural systems is not limited to the organic paradigm and could provide common ground for meeting participants and society as a whole. Other fundamental points that met with consensus were that we must protect our planet and agriculture must be sustainable. Despite idealogical objections and other concerns related to genetic engineering, we must emphasize agreements in related areas and build constructive dialog from there. Genetic engineering has become a lightning rod—the biotech industry should not have to answer for all of agriculture's ills.

Genetic engineering has become a lightning rod—the biotech industry should not have to answer for all of agriculture's ills.

The biotech industry views itself as the provider of biological improvements, moving away from chemical-based agriculture, which should meet with the approval of the "organic" community. Mergers and consolidations—viewed with suspicion—were, at least in part, simply acquisitions of seed companies driven by needs for commercial channels for business products. The agriculture industry's tendency to concentrate is not new. Consolidation is everywhere—*e.g.*, retail supermarkets. Monsanto controls only 12% of the seed-corn trade. There was consensus that Monsanto should not be the sole focus of debate. Major concerns that should not be laid primarily at Monsanto's door include gene escape, biopharming, and genetic engineering of trees.

Increasingly diverse plant pharmaceuticals are under development, requiring discussions involving scientists so that society will understand the processes and products.

SYNTHESIS

Six key themes emerged from the discussions.

- Systems
- Risk
- Rights
- Perceptions
- LGUs
- Crossroad

Systems

One overarching theme was the need to take a systems perspective or utilize an ecological framework for long-term sustainability. An important issue within that theme was the role of modern reductionist science and technology, and particularly biotechnology. An underlying question that continued to surface involved the complementarity or antithetical relationship between a systems perspective and logical positivism and biotechnology. At the same time, some tension was expressed between those who seek to reduce complexity, to simplify, and to specialize, and those who embrace complexity. One person observed that "complexity breeds expense" (and expense is to be avoided), whereas another noted that "complexity breeds delight." With those distinctive orientations, participants questioned whether biotechnology could be compatible with the goal of sustainable systems and enhance the capacity of the community to renew itself.

It was suggested that to use biotechnology in a systems framework, one must avoid employing the technology as a shortcut to address a symptom or problem in the system, but should, instead, use the new technologies to expand our understanding of complex systems. It was noted that there is beauty, elegance, and complexity in agricultural systems. We should support research that helps us understand those systems, even if we disagree on specific technologies.

Risk

A second theme was risk and a number of issues surrounding it. It was acknowledged that risk characterization, risk assessment, and risk management are distinctive yet interrelated, complex and often-controversial activities. A critical component is risk characterization and definition. What should be considered within the framework of risk assessment? There was general agreement that it should encompass human-health and environmental risks, broadly defined to include allergenic proteins, insect resistance, non-target organisms, and gene flow. Some participants, however, believed it should include economic, social, and ethical risks, such as those associated with corporate control of the food system, inequitable distribution of benefits and risks, as referenced in a 1996 National Research Council report, *Understanding Risk: Informing Decisions in a Democratic Society.*

Public participation in the overall process is essential to the success of risk-assessment, management, and policy decisions.

Some noted that risk assessment is often framed by experts in technical terms that biological and physical scientists can address, ignoring some of the broader and more diverse concerns of society, and, thereby, undermining the public's trust in risk analysis. As a consequence, a number of people suggested following the precautionary principle in making decisions in an uncertain world. More specific issues included the time frame and timing for risk assessment, since certain risks may not surface until months or years later or when a particular activity or process is scaled up. Others noted the importance of improved communication and access to information and reports. Finally, public participation in the overall process was seen as essential to the success of risk-assessment, management, and policy decisions.

Rights

A third theme was the broad question of consumer rights, consumer information, and consumer safety. Embedded in that issue was the specific topic of labeling, which was recognized as being very complex. Should it be part of the regulatory process? Should labeling be required as part of the "pride in ownership" chain of the product? Concern was expressed regarding the complexity of labeling in the food-supply chain, from seed, to processor, *etc.,* to multi-ingredient products. How can labels be exact, correct, yet informative? Should they be related to the process or the product? Should they address composition, content, derivation process, characteristics? Should there be symmetry in labeling other products? Is this simply a marketing ploy, or is it a mechanism to allow choice for consumers? Several discussants noted that organic foods are, in effect, providing choice. Perhaps. Tolerances need to be incorporated into the approval process. Others wondered if labeling is often a substitute for direct contact between producer and consumer. Since survey data have been mixed, it was unclear whether consumers really want labels. Labeling may be just one of a number of tools needed to inform and empower consumers.

Perceptions

A related issue, and fourth theme, was consumer perceptions, acceptance, and preferences. There have been many surveys of consumer attitudes to, and perceptions of, agricultural biotechnology. Efforts to address these attitudes and perceptions must begin with an understanding of the diverse reasons why people hold those views. Some studies have shown that people have particular

perceptions of biotechnology based on issues as diverse as human and animal health, environmental sustainability, economic concentration, social justice and equity, sanctity of nature, and religious values. Moreover, some cited studies have shown that, as public knowledge increases, perceptions both of benefits and of risk/costs of the new technologies increase. In review, a facilitator recalled the point being made that the more people know of GM food, the less they like the idea. Finally, some participants noted that the focus needs to be on what the public and consumers want, rather than on what they will accept. However, what they want—and why—is very complex.

LGUs

A fifth theme was the role of the public research system and the land grant universities. The LGUs have a significant role to play in biotechnology, sustainable agriculture, organic agriculture, minor-crop research, environmental and resource management, nutritional and dietary health, and community and economic development. However, there is a lack of funding for these institutions, and, in particular, for organic farming, alternative farming approaches, ecology, long-term sustainable systems, and non-proprietary research. One question raised was, "Is science for sustainability possible in an era of specialized, expert knowledge and commercialized, private knowledge?" A strong, independent public-sector research system was identified as a critical component for generating knowledge in these important areas.

Crossroad

Finally, the overarching theme of the meeting, *Science and Society at a Crossroad* was revisited at many of the break-out sessions. Major changes are occurring in population, the environment, climate, energy, science, and the food system, and various groups from government, industry, university, non-profit organizations, and producer communities have often talked past each other and their positions have become polarized. We are at a crossroads and need to find areas of common ground for the common good. We need to focus on how we can communicate and work together to pursue common goals. Several participants noted that we need to think not in terms of "either/or" but rather in terms of "both/and."

We need to focus on how we can communicate and work together to pursue common goals. We need to think not in terms of "either/or" but rather in terms of "both/and."

Themes, discussion leaders, and recorders for the break-out workshop sessions.

Theme	Discussion Leader	Recorder
Science and Society at a Crossroad	*Phillip Bereano* *University of Washington* *Seattle, WA*	*Elizabeth Jaeger* *Oregon State University* *Corvallis, OR*
	Karla Chambers *Stahlbush Island Farms* *Corvallis, OR*	*C.Y. Hu* *Oregon State University* *Corvallis, OR*
	Eugene Rosa *Washington State University* *Pullman, WA*	*James Zuiches* *Washington State University* *Pullman, WA*
Sustainability, Environmental, & Production Issues	*Bill Boggess* *Oregon State University* *Corvallis, OR*	*Bruce Chassy* *University of Illinois* *Urbana, IL*
	Brewster Kneen *The Ram's Horn* *Sorrento, BC*	*Linda Kirk Fox* *Washington State University* *Pullman, WA*
	Kurt Volker *Syngenta Crop Protection* *Yakima, WA*	*Kevin Kephart* *South Dakota State University* *Brookings, SC*
Consumer Issues & Trade	*William Aal* *Tools for Change Institute* *Seattle, WA*	*Randy Woodson* *Purdue University* *West Lafayette, IN*
	Gregory Jaffe *Center for Science in the Public Interest* *Washington, DC*	*Martin Lemon* *Monsanto* *Roseville, CA*
	Cathleen Kneen *The Ram's Horn*	*James McFerson* *WA Tree Fruit Res.*
Commission	*Sorrento, BC*	*Wenatchee, WA*