

A Framework for Local Coexistence Discussions

**A report of the Advisory Committee on Biotechnology and 21st
Century Agriculture (AC21) to the Secretary of Agriculture**

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EXECUTIVE SUMMARY

The Advisory Committee on Biotechnology and 21st Century Agriculture (AC21) is a broad-based, diverse group of agricultural experts and stakeholders charged with: examining the long term implications of the use of biotechnology on agriculture and the work of the United States Department of Agriculture (USDA or the Department); and providing guidance to USDA on pressing individual issues, identified by the Office of the Secretary, related to the application of biotechnology in agriculture. The AC21 has on several occasions considered the complexities and implications of the interactions among different agricultural production systems—production using conventional crops, genetically engineered (GE) crops, identity-preserved non-GE crops, and organic crops—and the need for coexistence among them.

In November 2012 the AC21 issued a report entitled “Enhancing Coexistence: A Report of the AC21 to the Secretary of Agriculture,” which offered a series of recommendations around five major interconnected themes to the Department. That report is available on the AC21 website. In the intervening years, USDA has devoted significant efforts towards implementing those recommendations for which it has appropriate legal authority. USDA also recognized that some of the recommendations in that report called for actions that the Department could not implement under existing legal authorities.

In 2015, the AC21 was given a new charge as a follow-up to one of the recommendations in the 2012 report that could not be implemented. The charge was to develop an approach by which farmers could be encouraged to work with their neighbors to develop joint coexistence plans at the state or local level and to consider how the Federal government might assist in that process. This report is a response to that new charge.

To address its charge, the AC21 developed two guidance documents included in this report, which can serve as stand-alone documents as well. They are:

- A model to support localities in convening local coexistence discussions, which may aid farmers in identifying ways to work more effectively with their neighbors on coexistence issues. It provides a suggested framework for broad-ranging discussions among farmers around the production challenges they face, a suggested structure for bringing local discussions about, and a description of potential resources to support such efforts.
- A description of factors for farmers to consider relevant to production of IP crops and how that production can be affected by neighboring crops and management practices. The document also provides thoughts on topics relevant for discussions with neighboring farmers.

Accompanying these documents are the following recommendations to USDA:

- 1. The Secretary of Agriculture should endorse and promote the use of the documents and the convening of local discussions when deemed appropriate at the local level.**
- 2. USDA should engage with State Departments of Agriculture, commodity and grower groups, NGOs, and private industry to make them aware of the new resource documents and USDA support for local initiatives to bolster coexistence, and suggest that these organizations make the two documents freely available to farmers.**
- 3. USDA should make available the two documents to a broad range of USDA agencies and programs, including field staff, and suggest that local offices make the documents available to farmers as resources.**
- 4. USDA should identify and make available a list of additional available resources that might help localities convene local coexistence discussions and work to make appropriate local personnel available on request when communities/localities seek to convene coexistence discussions.**
- 5. USDA should develop metrics to evaluate whether the models document is being used at the local level and the effectiveness of the resulting discussions.**
- 6. USDA should explore policy considerations with respect to obtaining additional authority to provide incentives to encourage farmers to develop joint coexistence plans.**
- 7. As markets and the complexity of coexistence evolve, maintaining a stakeholder dialogue through a group such as the AC21 will continue to be valuable.**

AC21 members also recognize a number of important elements that provide context for the committee's recommendations and the tools it offers in this report:

- The agricultural landscape continues to grow more and more complex, due to the increasing diversity of products available, the changing domestic and international regulatory landscape, and the increasing demands by consumers for more information about the foods they consume.
- All of these trends lead to the need for increased transparency within the agricultural community, with trading partners, and with consumers.
- Enabling coexistence is essential for farmers to be able to maximize their opportunities and take full advantage of the wide variety of technologies available to them. The issues around coexistence are particularly relevant for farmers growing

identity-preserved crops (whether non-GE, organic, or other value-added crops). The ability to meet contractual standards is essential for obtaining the associated premiums.

- It is significant that diverse stakeholders have been brought together to construct a model framework to help farmers work together to address their intersecting commercial and management concerns. Farmers have a long history of working together to resolve issues, and there is much more that unites farmers than divides them.

In this report the AC21 has also sought to provide additional context around the increasing complexity of agriculture with additional discussions on the expanding range of new products and the challenges and opportunities those products may offer to farmers and the marketplace, and on the ongoing need of farmers for high-quality seed suitable for their individual production requirements.

The AC21 provides this report cognizant of the evolution of agriculture and of the importance of the use of new technology in all forms of agriculture to offer new opportunities for farmers. The AC21 thanks USDA for the opportunity to contribute and encourages USDA to maintain a mechanism for broad stakeholder dialogue around the interactions among different production systems in the future.

Introduction: The Importance of Coexistence

The following is a report from the United States Department of Agriculture's Advisory Committee on Biotechnology and 21st Century Agriculture (AC21). This work is the third AC21 effort specifically focusing on the topic of coexistence, which has most recently been defined by the AC21, for the purposes of its November 2012 report to the Secretary of Agriculture, to mean

the concurrent cultivation of conventional¹, organic², identity preserved³ (IP), and genetically engineered⁴ (GE) crops consistent with underlying consumer preferences and farmer choices.

USDA Secretary Vilsack, in remarks to the AC21 on December 14, 2015, noted the importance of providing farmer and consumer choices:

...we have great diversity in American agriculture in terms of its size, in terms of its products, in terms of production methods and technology. And that's one cornerstone of the rural and agricultural economy in this country. Embracing diversity has helped, in my view, to make American agriculture resilient... We truly need diversity in agriculture. We need diversity in production methods, crops produced, and in the farming community itself. And failing to recognize and act on that fact, in my view, compromises agriculture's future, and I would argue the future of our country.

IP production, especially for food products, is increasing in importance in U.S. agriculture. Enabling coexistence is essential for farmers to be able to maximize their opportunities and take full advantage of the wide variety of technologies available to them. The diversification of agriculture, from IP production to crops produced for local markets, offers benefits for rural communities, bringing jobs and income back to those communities and bringing new interest in farming opportunities for a new generation of farmers and ranchers. Equally importantly, the ability to successfully produce diverse crops and practice coexistence comes about when all producers share social responsibility and take their neighbors' concerns into consideration in their farm management decisions. Coexistence is a continuous process requiring ongoing attention in each growing cycle. Without that

¹ "Conventional" crops in this paper refer to crops produced from non-GE crop varieties that are not produced in compliance with the requirements of the Organic Foods Production Act. They may be grown with the intent of entering the general commodity stream, in which case they may be mixed with GE varieties of the crop, if commercial GE varieties exist; or they may be grown under identity preservation conditions and enter the market specifically as non-GE products-

² "Organic" refers to those crops or products produced in compliance with the USDA Organic Regulations (7 CFR Part 205).

³ An "identity preserved" crop is a crop of an assured quality in which the identity of the material is maintained from the germplasm or breeding stock to the processed product on a retail shelf.

⁴ Genetically Engineered" is meant to include biotechnology-derived organisms produced through the application of 1) *in vitro* nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles or 2) fusion cells beyond the taxonomic family, that overcome natural physiological reproductive or recombinant barriers and that are not techniques used in traditional breeding and selection.

attention, conflicts can arise. When successfully practiced, however, coexistence in rural communities can show that complex issues among individuals with different approaches to farming can be effectively resolved. The AC21 believes that this example can be an important one in a polarized and contentious world.

Previous Work by the AC21 on Coexistence and the Charge for this Report

Coexistence has been recognized by USDA as important for the future of agriculture for many years. The AC21 has taken up the topic in its deliberations a number of times over the past ten-plus years. As far back as 2006, in an AC21 report entitled, "Opportunities and Challenges in Agricultural Biotechnology: The Decade Ahead," managing coexistence was noted as an emerging challenge. In a 2008 report entitled, "What issues should USDA consider regarding coexistence among diverse agricultural systems in a dynamic, evolving, and complex marketplace?," the AC21 identified a series of factors enabling and a series of factors potentially inhibiting coexistence, and called on USDA to take note of these factors and take steps to promote coexistence.

Most recently, in 2012, the AC21 responded to a 3-part charge from the Secretary of Agriculture specifically focusing on the economic interactions among farmers using different production methods, namely:

- What types of compensation mechanisms, if any, would be appropriate to address economic losses by farmers in which the value of their crops is reduced by unintended presence of genetically engineered (GE) material(s)?
- What would be necessary to implement such mechanisms? That is, what would be the eligibility standard for a loss and what tools and triggers (e.g., tolerances, testing protocols, etc.) would be needed to verify and measure such losses and determine if claims are compensable?
- In addition to the above, what other actions would be appropriate to bolster or facilitate coexistence among different agricultural production systems in the United States?

In response to this charge, the AC21 provided a report entitled, "Enhancing Coexistence: A report of the AC21 to the Secretary of Agriculture," which offered a set of 5 detailed and interconnected recommendations in 4 major theme areas: Compensation Mechanisms, Stewardship and Outreach, Research, and Seed Quality. The report is available at the following address:

http://www.usda.gov/documents/ac21_report-enhancing-coexistence.pdf .

A very brief synopsis of the AC21's recommendations in that report is as follows:

- The AC21 recommended that USDA gather information on actual economic losses to farmers caused by unintended GE presence, inasmuch as there was no consensus on whether existing data adequately documented such losses or justified the establishment of a compensation mechanism. Having such data, the Secretary, if

he/she determined that there was adequate justification to establish a compensation mechanism, should set up a pilot program for such compensation, modeled after crop insurance.

- USDA should also provide incentives for neighbors to develop joint coexistence plans to help mitigate production concerns around unintended GE presence. Incentives for cooperating neighbors might possibly be derived through alterations in crop insurance premiums or conservation benefits. USDA would oversee the adequacy of such joint plans.
- USDA should work with a wide variety of partners and agricultural stakeholders in a broad-based campaign to strengthen the understanding of the importance of coexistence, and make available appropriate tools and mechanisms to strengthen stewardship.
- USDA should fund additional research in a number of areas relevant to the promotion of coexistence in agriculture, including on assessment and improvement of gene flow mitigation methods for seed and crop production, improved genetic tools for limiting unwanted gene flow, and on aggregating data on unintended presence of GE material in seed intended for IP uses.
- USDA should work with the seed industry on ensuring that a diverse and high quality commercial seed supply exists for all farmers, including those supplying products for GE-sensitive customers.

It is the AC21's understanding that USDA has worked at implementing, in spirit or in detail, all those AC21 recommendations from the 2012 report for which the Department has appropriate legal authorities for their implementation. Elements of each of the 5 recommendations have been implemented over the past several years. An overview of the main areas of implementation was provided to the AC21 by USDA and is included as Appendix A.

It is significant to note that USDA has gathered initial data⁵ describing organic farmer economic losses due to unintended presence over the years 2006-2014⁶ and that efforts to gather additional data are ongoing.

On the specific recommendation in the 2012 report that USDA should provide incentives for neighboring farmers to develop joint coexistence plans, USDA was informed by its legal counsel that it currently lacks the authority to provide financial incentives, even on a pilot-project scale. As a result, in December, 2015, USDA provided a new charge to the AC21 to seek alternate means to promote farmer cooperation. The AC21 has worked to address the following questions:

⁵ Data were self-reported and aggregated by the National Agricultural Statistics Service (NASS). An analysis of data through 2014 can be found in the 2016 USDA Economic Research Service bulletin, Economic Issues in the Coexistence of Organic, Genetically Engineered (GE), and Non-GE Crops, which may be found at the following address: <http://www.ers.usda.gov/media/2022027/eib-149.pdf> . No data were collected on actual contractual specifications associated with any of the losses.

⁶ USDA NASS, 2014 Organic Producer Survey, Table 19: Table 19. Value of Organic Crops Loss from Presence of Genetically Modified Organisms (GMOs) -- Certified and Exempt Organic Farms: 2014 and Earlier Years. https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Organics/organics_1_019_019.pdf

Is there an approach by which farmers could be encouraged to work with their neighbors to develop joint coexistence plans at the state or local level? If so, how might the Federal government assist in that process?

This report is the committee's response to those questions. For information about how this report was developed, please see Appendix B.

Coexistence is an Ongoing Process but is Not New

As noted in the AC21's 2012 report, "Coexistence is not a new practice in agriculture, nor has it failed in recent times. Farmers operate within communities and most work with their neighbors towards their common success." Cooperation between farmers is integral to coexistence. Successful cooperation is brought about both in informal settings, e.g., through conversations over fence lines or over cups of coffee, as well as in response to broader initiatives that address common goals, such as pollinator protection or watershed management. In its deliberations, the AC21 considered a number of such initiatives, and observed that they incentivized participation with a range of inducements and motivations. Moving toward such common goals is a dynamic and continuous process. Key to the success of each, however, is farmer awareness and willingness to engage, to consider personal and community benefits, and to make adjustments in farm practices based on that assessment.

Coexistence, when successful, can mitigate potential economic implications arising from the movement or mixing of agricultural products in those markets that require separation or segregation. The challenge is how best to support farmers' natural inclinations to be good neighbors using voluntary incentives rather than regulatory mandates. Meeting the challenge requires broad and robust involvement from the entire farming community and providing incentives to engage in coexistence discussions. At the same time, it should be acknowledged that the underlying issue of unintended GE presence may be of unequal importance to those on different sides of a fence line, as contractual specifications may be far more rigorous on one side of the fence than the other. The issue of GE pollen movement may in many instances have far greater implications for the organic or IP non-GE producer than his GE producer neighbor. But the AC21 has recognized that all farmers benefit from understanding the complex considerations in IP production, and can benefit from sharing information on production practices and common concerns.

What This Report Will Do

This report is intended to respond to the Secretary's charge on promoting local dialogue on coexistence in several ways:

- By building on the previous work of the AC21 to explore the complexities in the choices farmers make about which crops to grow and how to grow them, choices that underlie the challenges of coexistence;
- By providing two tools that farmers and local communities may use to help farmers improve existing operations and/or identify opportunities to pursue potential new market segments, as well as providing opportunities for community dialogue;

- By offering the two tools as suggestions rather than mandates for local activities, in keeping with the farmer-focused voluntary spirit that underlies rural communities and reflecting the diversity of local circumstances; and
- By offering suggestions for increased involvement by a range of local organizations and institutions that may help initiate and facilitate local discussions of coexistence opportunities and challenges.

The two tools that are provided in this report are:

- A document entitled, "A Model for Convening Local Coexistence Discussions," which provides a suggested framework for broad discussions among farmers around the production challenges they face, a suggested structure for bringing local discussions about, and a description of potential resources to support such efforts;
- A guidance document entitled, "Factors for Farmers to Consider When You or Your Neighbor Are Growing an Identity-Preserved (IP) Crop," which discusses coexistence, how to meet IP requirements, and issues to consider relevant to discussions with neighbors.

These two documents are the central elements of this report, but are also envisioned as stand-alone documents that should be widely disseminated wherever appropriate. The Recommendations section of this report details ways that USDA can help support their use.

The two documents are also envisioned as tools to help USDA address Recommendations II and III in the AC21's November 2012 report. Both of these critical recommendations relate to the Stewardship and Outreach theme, and these two documents are intended precisely to respond to those recommendations, which are summarized below.

Recommendation II calls for USDA to:

spearhead and fund a broad-based, comprehensive education and outreach initiative to strengthen understanding of coexistence between diverse agricultural production systems. USDA should design and make available to the agricultural community voluntary and outcome-based strategies for facilitating production of all types of identity-preserved (IP) products...

Recommendation III builds upon these themes:

USDA should work with agricultural stakeholders, including, but not limited to, technology providers, seed companies, commodity and farmers' organizations, agricultural trade and marketing companies and organizations, public organizations, and State and local governments to develop a package of specific mechanisms that: (1) foster good crop stewardship and mitigate potential economic risks derived from unintended gene flow between crop varieties and unintended presence in general; and (2) promote and incentivize farmer adoption of appropriate stewardship practices...

The AC21 offers the two documents for consideration and use by USDA.

Specific recommendations for their use and promotion by the Department are provided immediately following the documents (see page 31). After the recommendations, this report discusses a set of additional challenges and opportunities that can impact the success of farmers and their coexistence efforts.

STAND-ALONE DOCUMENT I:

A Model for Convening Local Coexistence Discussions

About this document

This document is part of a larger report from The United States Department of Agriculture’s Advisory Committee on Biotechnology and 21st Century Agriculture (AC21), an external advisory body composed of a range of experts from industry, the farming community, academia, and civil society. The work of the committee in recent years has focused on bolstering coexistence between farmers growing conventional⁷, identity preserved⁸ (IP), genetically engineered⁹ (GE), and organic¹⁰ crops. The Committee has also been interested in the relationships between farmers using different production systems. This document offers suggestions on how communities may opt to bring farmers together to explore relevant production issues to foster trust and strengthen opportunities for all.

More information about the work of the AC21 can be found at http://www.usda.gov/wps/portal/usda/usdahome?navid=BIOTECH_AC21&navtype=RT&parentnav=BIOTECH

For the purpose of this document, coexistence is defined as the concurrent cultivation of conventional, organic, IP, and GE crops consistent with underlying consumer preferences and farmer choices.

Introduction

Farming has become an increasingly complex business. All farmers deal not only with the uncertainties of temperature, pests and diseases, and precipitation, but also with other external forces—such as changing market demands, fluctuating crop prices, new marketplace quality requirements or requirements in individual contracts, and environmental regulations. Being a successful farmer means balancing these conflicting

⁷ “Conventional” crops in this document refer to crops produced from non-GE crop varieties that are not produced in compliance with the requirements of the Organic Foods Production Act. They may be grown with the intent of entering the general commodity stream, in which case they may be mixed with GE varieties of the crop, if commercial GE varieties exist; or they may be grown under identity preservation conditions and enter the market specifically as non-GE products.

⁸ An “identity preserved” crop is a crop of an assured quality in which the identity of the material is maintained from the germplasm or breeding stock to the processed product on a retail shelf.

⁹ Genetically Engineered” is meant to include biotechnology-derived organisms produced through the application of 1) *in vitro* nucleic acid techniques, including recombinant deoxyribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles or 2) fusion cells beyond the taxonomic family, that overcome natural physiological reproductive or recombinant barriers and that are not techniques used in traditional breeding and selection.

¹⁰ “Organic” refers to those crops or products produced in compliance with the USDA Organic Regulations (7 CFR Part 205).

demands on his or her land, wallet, and time, to come up with the individual short- and long-term approaches that work best. Farmers are constantly making choices—about what and where they plant, how they grow and manage their crops, when to harvest them, and where and how they will market them.

Part of making those choices is managing inherent risk and maximizing opportunities. Farmers seek opportunities where they can, which may mean seeking new markets, growing new varieties or new crops, or testing out new management approaches. All this means that farmers are seeing increasing diversity in their crops and production systems, both on their own farms and in U.S. agriculture as a whole. A major strength of American agriculture is its ability to adapt to new markets and to changing market and consumer expectations.

Ensuring the availability of a range of production methods and systems for farmers will be necessary to ensure the continued resilience and growth of U.S. production, the protection of U.S. land and water resources, and the strength of our farming communities. Identity Preserved (IP) production, some of which is certified as organic, and bulk commodity (i.e., non-IP) production are the basic choices, but also some farmers are growing GE crops. Most, but not all of the GE crops are intended for commodity uses, but some are IP as well. For some crops (e.g., soy and corn), the vast majority of commodity production is GE. As many of these production methods and crop types are being used in neighboring areas, enhancing communication and gaining a better understanding of producers' challenges can enhance farmers' ability to successfully grow their crops side by side. And indeed, some farmers may choose to grow crops for multiple markets—perhaps both commodity and IP crops, with some of the IP production being organic—within their own farms.

No one production approach or agricultural risk mitigation strategy will be applicable to all areas or all types of production. The goal of this document is to share information about the challenges and opportunities for each type of production, highlighting the choices for each and the ways those choices can affect neighboring operations. Understanding opportunities and intrinsic risks and also enhancing neighbor-to-neighbor communications can help solve problems and promote successful outcomes for all. Bringing about these successful outcomes promotes coexistence among different production types.

Considerations for All Production Types

All farmers strive to produce high-quality crops for their consumers and to steward U.S. land and water resources. Organic and other IP production practices and techniques provide specific assurances to their customers (whether processors or direct consumers) about the characteristics of the product they are purchasing and/or the process by which the product was grown. Non-identity preserved agricultural production has a different form of documentation and personal records for its practices. While these operations may appear significantly different on the surface, a closer look will find many similarities between their practices. All farmers face the same issues of weather and pests, but may employ different measures to mitigate them.

Considerations for Commodity Production, Whether Conventional or GE

Commodity production provides considerable flexibility and allows access to many different technologies, allowing for adaptation to conditions in a variety of different environments. Commodity production can incorporate many different practices and systems in order to be as efficient and effective as possible when producing food, feed and fiber. Seed varieties (which may or may not contain GE traits) may be chosen based on regional growing conditions and challenges that take into account annual precipitation, disease, insects, tillage practices, fertility requirements, and length of growing season. Other considerations are the management of invasive weed species, crop rotations and soil types.

Considerations for Identity Preserved (IP) Production, Including Seed Production

IP production refers to a system of cultivation, handling, and marketing practices that maintain the integrity and purity of agricultural commodities. IP is a system of standards, records, and auditing that must be in place throughout the entire crop production, harvesting, handling, and marketing process.

Two areas in which IP production is commonly used are: (1) in the production of seeds; and (2) in products intended for niche markets (e.g. food grade soybeans and blue corn). Seed production is generally carried out under IP conditions (and may enter into IP contracts) to ensure the desired characteristics of the seed are preserved and to enable producers to receive the higher premiums commensurate with the special handling required and consumer demand. Buffers or other isolation methods are often used to protect these crops from cross-pollination. These methods protect the purity of the crop and also limit any effects on any neighboring crops. Seed is both an IP product in itself as well as an essential component for the production of other IP (and non-IP) crops. Use of appropriate seed has become a central consideration for crop production for those markets that seek to avoid the unintended presence of GE material in those crops.

Considerations for Certified Organic Production

One specialized form of IP production is organic production. Organic production not only maintains the identity of the crops, but also must meet specific standards set forth by the USDA in order to be certified as organic under USDA regulations: http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=3f34f4c22f9aa8e6d9864cc2683cea02&tpl=/ecfrbrowse/Title07/7cfr205_main_02.tpl. Organic is a labeling term for food or other agricultural products that have been produced using cultural, biological, and mechanical practices provided for in USDA organic regulations that support the cycling of on-farm resources, promote ecological balance, and conserve biodiversity. This means that organic operations must maintain or enhance soil and water quality, while also conserving wetlands, woodlands, and wildlife. Synthetic fertilizers, sewage sludge, irradiation, and genetic engineering may not be used. Only products that have been certified as meeting the USDA's requirements for organic production and handling may carry the USDA Organic Seal. USDA regulations require a

three-year period for any field during which no prohibited substances may be applied before the resulting crop is eligible for organic certification. Organic growers, in order to maintain their certification, must use only approved products and methods.

Challenges and Opportunities for All

Farmers pride themselves on being good stewards of the land and water quality and being cooperative and neighborly in their communities. It is important to realize, though, that the management decisions that a farmer makes have the potential to affect his/her neighbor's farming operation—whether the decision is on how weeds or pests are controlled, the inputs that are used, or even the choice of crops or varieties to be grown and where they are planted. In a world of increasing diversity in production and increasing demands and/or expectations placed on farmers by buyers, consumers, and the government, individual responsibility and respect for everyone's farming operations are key. Having conversations among neighbors¹¹ broadens everyone's understanding of the common and the unique challenges farmers face.

Local discussions on coexistence can often focus on the movement of pollen from GE fields to neighboring crops. The AC21 has recognized, though, that the opportunity for wide-ranging discussions on all the issues of concern to neighboring farmers can highlight the many ways that farmers can cooperate and respect each other's operations.

This document is not intended as prescriptive advice. Instead, it provides information for agricultural producers, agronomists, applicators, crop consultants, agricultural associations, commodity councils, trade associations, marketing agencies, agents, brokers, extension educators, land grant universities, State Departments of Agriculture, and others and a potential framework for personal and local conversations. Having farmers share their needs, experiences and concerns can bolster local production opportunities and strengthen communities.

Discussion Topics

Bringing farmers together can enable neighbors and communities to share experiences in addressing the external factors that all farmers face. In addition, it can bolster a common understanding of the ways in which the agricultural approaches each farmer employs can impact his or her neighbors. These broad discussions among farmers using diverse approaches for crop production can empower communities to take advantage of new opportunities and find locally appropriate, rather than externally driven, solutions. The topics described below directly or indirectly impact management factors that growers consider as they develop management plans. They are offered as potential starting points to begin those discussions.

¹¹ It is important to recognize that in some instances those who determine what will be farmed on a given piece of land and how it will be farmed may not be those who actually farm the land. Effective coexistence discussions may involve not only neighboring farmers but also the rest of the agricultural team involved in decision-making.

Environmental Factors

Topography characteristics such as slope can cause variations in soil quality and moisture. Slope can affect yield and influence the soil's ability to retain moisture equally across a field. Steep slopes affect plant growth by potentially reducing or increasing the amount of sunlight, wind velocity, and the type of soil present on the gradient. This condition can also speed up the rate of erosion and runoff, resulting in reduced soil quality while moving soil and material to other parts of a field or adjacent land. Areas with less topographical variation generally do not have such variability.

Prevailing Winds can move pests, pathogens, pollen, topsoil, and other particulate matter from one field to the next. Understanding the direction of prevailing winds can assist a producer in mitigating risk and taking steps to use buffers to minimize impact.

Temperature and Humidity can create environmental conditions where rapid reproduction of insects and diseases can harm or impact plants in any growth stage. Treatment will depend on economic and ecological factors relating to pest levels and the production systems in use. Limitations exist, depending on what approved products or control methods are available and economically feasible. Temperature and humidity can also affect pesticide effectiveness and drift.

Cross-pollination can be a challenge for some production systems. IP systems typically try to restrict cross-pollination from outside fields. Prevailing winds, temperature and humidity can create environments where pollen remains viable longer. Although some crops are self-pollinating, where pollen moves only a few feet, others shed pollen to pollinate similar plants. In some cases pollen can travel great distances before it is rendered inactive.

Agricultural Activities

No-till, Strip till, Minimum, and Conventional tillage practices

The choice of tillage system by one producer can affect his/her neighbor's choices as well. In particular, the different systems involve greater or lesser amounts of soil disturbance, with potential for movement of soil and associated materials.

No-till practices are a method where crops are grown in successive years without turning or disturbing the soil, thereby conserving moisture in the soil profile and greatly reducing the amount of erosion and the resultant transfer of material, weed seeds and soil pathogens. Weeds are generally controlled through the use of herbicides, rather than mechanical tillage. Some production systems cannot feasibly utilize no-till or strip till practices.

Strip till is another tillage practice that combines some benefits from conventional tillage and no-till practices. Under strip till, only the portion of the soil that will contain seed in a row is disturbed. This method also has some of the benefits associated with conventional tillage such as soil drying and warming.

Minimum tillage is a method having the goal of minimizing soil manipulation for the production of a given commodity. It is a method that does not turn the soil over, but generally only disturbs the top 4-5 inches, in contrast with more intensive tillage, in which plowing alters the soil structure.

Conventional tillage, which may be more or less intensive, is generally used for preparing seed beds, managing residues, and mechanically controlling weeds. Although many farmers try to limit the number of passes over a field, some farm operations may make multiple passes over a field with tillage equipment. More aggressive tillage can pulverize the soil into fine particles so that wind and water may more easily move soil containing weed seeds and soil pathogens from field to field.

Isolation methods

Buffers can be utilized to maintain the integrity and purity of agricultural commodities. Buffers can be natural or man-made. They can be trees, shrubs, grass strips, crops or simply a break in cultivation. They generally do not fully prevent airborne drift, but they limit exposure or risk of cross-pollination from a compatible crop, as well as disease and insect movement. Buffers are often employed in IP production to restrict the inflow of pollen into their fields, and may also be used in a single farming operation when different types of production need to be kept separate. Neighboring farming operations may also jointly employ buffers to achieve agreed-upon objectives.

Physical isolation may also be used as a means to restrict pollen flow from another crop. Isolation distances required vary by crop and location. Another method that can be used is temporal —isolation—that is, coordinating the timing of planting of neighboring crops so that when one crop's pollen sheds, the neighboring crop will not be ready to receive the pollen and cross-fertilization cannot occur.

The use of isolation methods has become of central importance for production of crops, either non-GMO/non-GE or certified organic, for GE-sensitive markets. If isolation methods do not succeed in preventing pollen flow between IP and non-IP crops, sometimes crops produced can fall out of specifications for a particular high-value market.

Hedgerows and Windbreaks

A hedgerow planting involves establishing a living fence of shrubs or trees in, across, or around a field. Hedgerows are established on all types of farms to delineate field boundaries and serve as fences, while also protecting water and soil resources and providing wildlife and pollinator habitat, among other functions. They may also harbor natural enemies of pests, intercept pesticide and pollen drift between farms, and serve as a means of introducing biological diversity into perennial cropping systems in lieu of crop rotation.

Cover crops

Cover crops are often planted for seasonal cover and other conservation purposes. Cover crops include grasses, legumes, and forbs. Cover crops improve availability of phosphorus, potassium, and other soil nutrients; add organic matter and feed the soil food web; protect the soil from erosion and compaction; suppress weeds and disrupt pest and disease life cycles; provide habitat for beneficial organisms; and some (legumes) can fix nitrogen. Cover crops are an important component of organic crop rotations and their use is a key practice for soil and nutrient management.

Application of inputs

Regardless of production method, how inputs are used and how well those inputs work are affected by soil type, plant growth stage, precipitation, and atmospheric conditions. For all forms of agriculture, timing is also critical for pest and weed

management, as well as for fertilizer and manure applications. Fertility can be provided in different forms such as commercial fertilizers (e.g. urea, MAP, potash) or other nutrient sources such as manure or compost. All farming operations also share common issues related to the use of inputs with respect to food and feed safety requirements, as well as water quality runoff issues.

Weed and pest control are accomplished by a variety of means—physical, biological, chemical, and cultural. Different crops and farming systems employ different practices for such control. Pest and weed management are important issues that farmers share at their borders. Following label instructions when applying pesticides is not only a legal requirement but is important to minimize potential impacts on neighboring fields. The occurrence of weeds that have developed resistance to widely used herbicides creates management issues that challenge farmers to communicate and work cooperatively to minimize their impact.

Cutting and Mowing are mechanical means of controlling weeds, particularly noxious and invasive weeds, and pest habitat. Timing is crucial, and to prevent pollen flow, they should be done while plants are in vegetative stage before seed set occurs, stopping seeds from being moved by wind and water from the field.

Crop Rotation can enhance soil health because various plants have different nutritional requirements and thus use diverse nutrients in the soil. There are some synergistic effects from crop rotations that can be beneficial to producers. Rotation of crops also assists in the disruption of disease cycles by removing the host plants for insects and pathogens. It may be required in certain production systems, such as organic agriculture.

Harvesting practices can affect whether a crop that meets contractual specifications can be delivered. It is important to clean equipment carefully to minimize opportunities for residue from the previous crop to impact the purity of crop being harvested. This is especially true when using borrowed or rented equipment.

Transport equipment can also introduce unintended presence of undesired materials. Careful cleaning of transport equipment can minimize this risk.

Storage

Farmers are always faced with decisions on how best to store their crops, and whether separate storage--always a scarce resource--is needed for particular segments of their production. Organic, products intended for use as seed, and other IP products need to be segregated from other products during storage, processing, and handling. Storage facilities that will be housing the various classes of products are generally cleaned and all other product material, is removed from the area while controlling the presence of insects and diseases as well. The sanitation of these facilities aids in preserving the quality of each type of stored product.

Other topics of interest for discussion

Contractual Obligations

Farmers use varying approaches to the marketing of their crops, often contracting for their crops prior to planting and guaranteeing a price for the grower. Much, but not all, IP, including organic production, is contracted in this way, and those contracts may include initial specifications for seed variety, seed purity and acceptable levels of unwanted materials in the harvested crop. It is the producer's responsibility to meet the requirements of those contracts. Contracts establish the requirements that must

be met in producing the crop, which might also include growing practices, test weight, protein, moisture, damage, foreign material, point and time of delivery and the compensation if contract parameters are met.

Farm Program Opportunities

Farmers may benefit from evolving Federal and State incentive programs designed to preserve environmental health, water, and land resources, which may impact the choice of production methods used on-farm. Sharing information about these programs and about farmers' participation in them can strengthen participation in the programs and may sometimes offer opportunities for joint action by neighbors.

Convening discussions

The discussion topics above are relevant to all farmers and are, of course, often the subject of conversations over fence lines and cups of coffee. Communities may choose to seek to engage in a more formal way on these topics when there is a reason to do so, on topics related to the needs of IP production or more generally on agricultural management issues in the area. Some considerations and potential benefits of such a dialogue are:

- It may be useful to gather stakeholders to discuss a potential new IP production opportunity and discuss with the community what might be required in order to successfully produce it;
- There could be local concerns or individual tensions relating to any of the issues above that might be more productively addressed in a community setting;
- There might be a more general education/extension outreach opportunity to discuss the issue of coexistence in a region.

Efforts should be initiated and managed at the State or local levels to foster trust amongst individuals who have relationships with the local community. However, the most productive discussions will likely involve many relevant stakeholder perspectives. Some of the roles that may be considered in structuring such discussions are:

- Initiator—calls the meeting, get everyone there
- Neutral/trusted host/convenor to bring different perspectives together
- Subgroup host/convenors to gather information and perspectives among like-minded stakeholders
- Technical experts—educating, gathering information
- Facilitation and process specialists

Each situation and each community or region is different, but Table I offers some possibilities for organizations that communities may choose to involve in discussions in the roles listed above. The entities who might be initiators or convenors might vary depending on the kind of situation.

TABLE I.

Potential Venues and Conveners and Roles They Might Play

Type of organization role(s)	Potential
• State Departments of Agriculture	1, 2, 4, 5, 3?
• County Departments of Agriculture	1, 2, 4, 5, 3?
• State and County Extension	1, 2, 4, 5
• Crop Improvement Associations	1, 3, 4
• Natural Resources Conservation Service (NRCS)	1, 2, 4
• Water Districts	4
• Community Supported Agriculture (CSA's) Coalition and local chapters	1, 3, 4
• Chamber of Commerce	1, 2
• State Agricultural Marketing Boards	1, 3, 4
• State Task Force	1, 2, 4
• State Farm Mediation Boards	2, 4, 5
• Coalition of Agricultural Mediation Programs	2, 4, 5
• County and Town Associations	2, 5
• Land Grant Universities	1, 2, 4, 5
• Crop/commodity/trade/grower associations	1, 3, 4
• American Farm Bureau Federation	1, 2, 3, 5
• National Farmers Union	1, 2, 3, 5
• Major retailers with contractual relationships with farmers	1, 3
• Seed contractors (could be biotech providers who work with their contractees to help them understand what's needed to meet their specs)	1, 3, 4
• Third-party certifiers (e.g. organic, non-GMO, etc.)	3, 4
• American Seed Trade Association.	1, 2, 3, 4, 5

Category classification

- 1 *Initiator—calls the meeting, gets everyone there*
- 2 *Neutral/widely respected host/convenor to bring different perspectives together*
- 3 *Subgroup host/conveners to gather information and perspectives among like-minded stakeholders*
- 4 *Technical experts—educating, gathering information*
- 5 *Facilitation and process specialists*

Because each situation will be different, this document does not attempt to define how discussions should be structured nor what the end result(s) should be. Discussions likely would include a statement of the opportunity or problem, an exchange of views, and a discussion of options moving forward. Discussions may help identify a customized approach that will work for a particular region, or may stimulate new individual farmer-to-farmer discussions that can identify common interests and identify and resolve problems. Local

conditions will vary and may affect production practices relating to coexistence. A key feature of these efforts, it must be emphasized, is that these would be voluntary discussions and participation by any stakeholders would also be strictly voluntary.

It is necessary to point out that, depending on the reason such discussions are convened, some conversations may be more challenging than others, and careful analysis of the particular situation and planning will be necessary to achieve the maximum likelihood of success. Ongoing dialogue may be helpful in some instances.

It is also important to note that the National Association of State Departments of Agriculture has expressed interest in these activities, and its members could serve a role in helping to get activities off the ground in some instances.

Organizing and Supporting Local Meetings and Other Coexistence Activities

Local meetings might be organized specifically for one of the purposes above, or it might be economical or practical in some instances to piggyback, with another meeting's permission, on an existing meeting structure. Local conservation or extension meetings might provide such opportunities. There is a possibility that local USDA officials from the NRCS or the Farm Service Agency (FSA) could be able to help with these efforts if local communities requested their participation.

There may be funds available to support local activities from a number of sources, public or private. Private funding sources might particularly be tapped when an entity is seeking to discuss the potential for a new IP crop production opportunity in a particular location. USDA has no funds that would specifically be earmarked for these activities. However, it is conceivable that there would be entities that might support joint public-private activities in these areas. In some years and in some areas, funds from USDA's Sustainable Agriculture Research and Education (SARE) Program might be sought on a grant application basis. Specialty Crop Block Grant funding from USDA's Agricultural Marketing Service (AMS) might be sought in some instances where there is the potential to solely enhance the competitiveness of specialty crops (fruits, vegetables, tree nuts, dried fruits, horticulture, and nursery crops (including floriculture)). Applications for specialty crop projects must be submitted to the appropriate State Department of Agriculture to be considered for funding. States, too, may have programs for promotion of sustainable agriculture that could be considered as possible resources. States, counties, or extension services might have access to other funds from particular programs, e.g., EPA Clean Water Act Section 319 funds or NRCS' Environmental Quality Incentives Program (EQIP) under some circumstances. Involvement of these entities may be very helpful in identifying specific resources that may be available. In addition, there are a number of foundations that provide area- or region-specific funding for local projects.

It is also worth noting on the farmer-to-farmer level that a new FSA initiative was recently announced to enroll 20,000 acres of organic land or land adjacent to organic lands in the continuous Conservation Reserve Program (CRP). The financial assistance is available from the USDA CRP, a federally funded voluntary program that contracts with agricultural

producers so that environmentally sensitive land is not farmed or ranched, but instead used for conservation benefits. CRP participants establish long-term, resource-conserving plant species, such as approved grasses or trees (known as “covers”) to control soil erosion, improve water quality and develop wildlife habitat. In return, FSA provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years. For conservation buffers, funds are available for establishing shrubs and trees, or supporting pollinating species, and can be planted in blocks or strips. Interested organic producers can offer eligible land for enrollment in this initiative at any time. Organic producers and their neighbors might jointly avail themselves of this option.

An ongoing process

It is the hope of the AC21 that this model for local, community-based discussions can serve as a flexible mechanism that can be invoked on a routine basis whenever a community finds it appropriate to do so, and that USDA can find creative approaches to encourage these efforts. Looking for ways that farmers can identify overlaps in their activities and share efforts toward common goals is another tool to strengthen U.S. productivity and the strength of communities.

Additional information

Another portion of the larger AC21 report containing this document is a separate guidance document entitled, “Factors for farmers to consider when you or your neighbor is growing an identity-preserved (IP) crop.” This document may also provide useful information for communities on individual farmer-to-farmer discussions. It is available at: [WEB ADDRESS](#).

Stand-Alone Document II:

**Factors for Farmers to Consider When You or Your Neighbor
Are Growing an Identity-Preserved (IP) Crop**

Note: This document is intended as a framework of general factors for farmers to consider that can be adapted to local conditions, and as a source of useful reference materials. More information about some of these topics, particularly in regard to the Seeds and the Other Challenges and Considerations sections, can be found in the full report of USDA’s Advisory Committee on Biotechnology and 21st Century Agriculture, entitled X, which is available online at

http://www.usda.gov/wps/portal/usda/usdahome?navid=BIOTECH_AC21&navtype=RT&parentnav=BIOTECH .

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- VII. Finding Additional Information-----

Opportunities

Secretary of Agriculture Tom Vilsack, in remarks to the United States Department of Agriculture's Advisory Committee on Biotechnology and 21st Century Agriculture (AC21), made these observations:

...we have great diversity in American agriculture in terms of its size, in terms of its products, in terms of production methods and technology. And that's one cornerstone of the rural and agricultural economy in this country. Embracing diversity has helped, in my view, to make American agriculture resilient... We truly need diversity in agriculture. We need diversity in production methods, crops produced, and in the farming community itself. And failing to recognize and act on that fact, in my view, compromises agriculture's future, and I would argue the future of our country.

One key mechanism for increasing the diversity of agricultural production in the United States is through the production of identity-preserved (IP) crops. IP is a system that preserves the characteristics of a product throughout the supply chain, from seed to sale. The choice to grow IP crops is generally driven by marketplace needs. Farmers use IP to gain premiums when they market unique crops (such as seeds, certified organic crops, or particular varieties) in order to achieve an agreed-upon standard of quality and purity in their harvested product, as well as commit to specified production practices. Historically, in specialized production sectors, the growers and the rest of the value chain take responsibility for meeting any quality standards for the product's market demand, often through contractual arrangements.

IP crops can include, among other things:

- Crops intended for non-GMO/non-GE¹² markets
- Seed intended for planting
- Certified organic crops
- Certain GE/GMO crops (e.g., those with new functional traits)
- Crops produced using specific varieties and providing specified characteristics under contract (e.g., blue corn segregated specifically to produce blue corn chips).

IP production offers opportunities for farmers to derive premiums for their products in return for following more specific management practices. Those management practices may often include a greater awareness of what varieties neighbors are growing and, sometimes, working with those neighbors so that everyone's production objectives can be met. IP production may in some cases also be subject to specific regulatory requirements or specifications from independent third parties.

Producing the increasingly diverse set of crop varieties for different markets depends on farmers working together to find solutions that jointly work for their production needs and enable all parties to access their intended markets. Though this document is primarily

¹² This term has been used here because USDA has used the designation "non-GMO/non-GE" as an allowed designation under a process-verified program administered by the Agricultural Marketing Service.

focused on issues for farmers growing IP crops, the information in it should be relevant to all farmers. Being a good neighbor means respecting what your neighbors are growing, working with them, and preserving choices for every farmer.

It is important to note that farmers are always looking for new opportunities to improve their harvest and often to diversify their production. Farmers can, and often are, choosing to devote portions of their cropland to new IP opportunities while retaining non-IP production on other portions. The production issues such a farmer may face on his or her own farm can mirror issues that can occur between neighbors.

Coexistence¹³ Is a Shared Responsibility

It is important for today's farmer wishing to serve an IP market to have knowledge about neighboring crops, the rotation plan in those fields, and, sometimes, the input plan used there.¹⁴ Good communication among farmers with neighboring fields as to the crops, rotation plans, farming protocols and the specific hybrids or varieties being produced has become a key to successful IP production in many instances, and can be an important tool for fostering coexistence among growers producing for diverse markets.¹⁵ Coexistence is a two-way street: it builds on the shared social responsibility of farmers and requires collaboration and compromise on both sides of the fence line.

Farmers, and especially those producing IP crops, need to fully understand the requirements of their markets as well as the nature and dimensions of any buffers needed to achieve the specifications to satisfy that market.

Understanding how neighboring crops might affect a farmer's ability to produce an IP crop for his/her intended market will help the farmer plan appropriately to meet his/her production needs. All farmers can foster coexistence when they understand the potential geographic spread beyond their field borders of pollen, crop pests (e.g., insects, pathogens, nematodes, viruses, or weeds) and inputs being used on their own fields. Any farmer whose choices could potentially affect his/her neighbor's ability to market their crops should strive to minimize the potential for conflict. Often, but not always, coexistence problems can be eliminated or reduced by adjusting rotation plans, seed choices, planting times, or physical isolation, e.g., buffers.

When a farmer has information about neighboring crops, it is possible to assess the likelihood for such potential problems. There are a few different situations to consider:

¹³ For the purpose of this document, coexistence is defined as the concurrent cultivation of conventional, organic, identity preserved (IP), and genetically engineered (GE) crops consistent with underlying consumer preferences and farmer choices.

¹⁴ In some areas of the country information about planting of crops that may be affected by neighboring crops may be provided via local pinning maps or web-based location services.

¹⁵ It is important to recognize that in some instances those who determine what will be farmed on a given piece of land and how it will be farmed may not be those who actually farm the land. Effective coexistence discussions may involve not only neighboring farmers but also the rest of the agricultural team involved in decision-making.

- Crops are being grown for the same buyers or for markets having similar requirements: There is likely no coexistence issue and no need for either party to adjust behavior.
- The same crop is being grown for buyers or markets with different requirements: there could be a potential coexistence issue that would justify significant horizontal, vertical or timing segregation.
- Different crops are being grown for buyers or markets with different requirements: there may be instances in which a potential coexistence issue might justify some segregation by both parties.

Here are a few practical things to think about:

- Can my neighbor and I work together on joint buffer areas or use other approaches for physical separation that could protect my crop and provide economic benefits for us both?
- Would it make sense for us to adjust our relative planting times to minimize potential impacts of our crops on each other?
- If my neighbor adjusts his/her plantings or practices to help me grow my IP crop, what can I do to help him/her more successfully produce his/her crop?

IP Production and Contracts

Much IP production is contracted beforehand by entities in the food, feed, and fiber supply chain. However, certified organic products, which are identity-preserved, and IP non-GMO/non-GE products may also enter their corresponding product streams without prior contracting. When contracts are used, they often indicate:

- 1.** Specifications for contract compliance as well as, sometimes, a discount schedule for imperfections and/or a bonus schedule for superior quality;
- 2.** A description of the testing protocols and standards to be applied to determine whether contract specifications are met as well as the reasons deliveries would be rejected;
- 3.** Buyers' rights to inspect the field or crop at any time;
- 4.** Requirements for approval by a company or its 3rd party representatives; and/or
- 5.** Delivery on buyers' call, under specified conditions and timing.

It is important to consider your ability to meet these requirements prior to entering into an IP production contract.

Also significant is the fact that some IP producers do not contract beforehand but strive to meet overall market standards for their products and sell directly into those markets (particularly the organic market). In general such producers, while striving to abide by market standards, face less certainty regarding market access and acceptability.

Meeting IP Requirements

Although the precise management practices that may work best for IP production will vary by crop, region, and growing environment, a number of tools or considerations are generally relevant. These include:

- Understanding the biology of the crop and the particular characteristics of the variety being grown, in particular its pollination behavior (e.g., whether it is self-pollinating or cross-pollinating);
- Knowing what is being grown on neighboring fields and the potential implications of those crops on your management decisions (see section on coexistence below);
- Starting with seed appropriate for IP needs (see seed section below);
- Having an intimate knowledge of local wild plants to identify possible cross-pollination with seed crops;
- Using crop rotation schemes to reduce pollen exposure from volunteer plants;
- Handling of crop to minimize, as much as practical, the potential for mixing during planting, harvesting or cleaning operations;
- Using staged planting times to temporally isolate the crop from unwanted pollen from sexually compatible crops growing nearby;
- Identifying and selecting fields/plots for crops potentially affected by crops on neighboring farms to minimize, as much as is practical, the potential for pollen flow to or from an IP crop;
- Using physical isolation to minimize, as much as practical, the potential for cross-pollination (distances are largely based on each crop's biology and reproductive system, i.e., whether self- or cross- pollinated). This could include, for example, using buffer rows, forested windbreaks, or conservation land;
- Careful tracking and recordkeeping of your crops;
- Cleaning and inspection of planters, harvesters and other equipment pre- and post-harvest;
- Using module markers in harvest (modules being large compacted units of harvested material, especially cotton);
- Disposing of plant material (e.g., residue from planter clean-out) as appropriate;
- Using cleaned or dedicated transportation vehicles, storage bins, conditioners and ginning facilities as appropriate;
- Managing how people, machines, and equipment move from field to field (e.g., if planting both IP and conventional crop, work in IP field first, then in conventional one);
- Visually inspecting and rogueing all genetic stocks on a continuous basis to remove off-types and weeds;
- Inspecting fields multiple times and possibly enlisting third party inspection or verification;
- Applying post-harvest risk mitigation measures, such as not harvesting outside rows or selling outside rows on the commodity market, if cross-pollination is expected or known to have occurred.

Seed--A Critical Component

Farmers need to ensure that they start with seed with the appropriate characteristics¹⁶ to yield crops meeting the specifications required by their market. Farmers should deal with reputable seed companies and understand the information provided on the seed tag as required by the Federal Seed Act. Varietal purity provides assurance of low presence of any unintended genetics, but may not in itself guarantee that seed has the appropriate characteristics to meet specific IP production needs.

Some seed companies may also be willing to meet a farmer's specific quality requirements especially in regard to unintended GE presence. If a farmer will have specific seed needs, it is prudent to have conversations at least a year in advance, or preferably earlier, with seed companies to ensure that appropriate seed will be available in the form, function, and quantity that is required. Farmers producing for IP markets might also consider testing seed delivered to their farm before planting or, if they are producing under contract, might work with their contractor to assure that their starting seed is suitable to meet their production requirements.

Other Challenges and Considerations

- Some new crop varieties intended for specific new uses may have the potential to affect the functional properties of neighboring crops. For example, some food crops may be engineered to produce novel pharmaceutical compounds and such crops could have the potential to affect the functionality or marketability of neighboring crops for food uses. Although the particulars are likely to depend on the specific circumstances, extra care and stewardship when growing these crops is likely to be required to minimize the potential for economic impacts on neighbors.
- New technologies are constantly evolving for the development of new crop varieties, and different countries may choose different approaches to regulate (or not to regulate) the products of particular technologies. Differential regulation of new products could lead to trade challenges and some new products may be difficult to identify or determine how they were produced.
- Testing is often required for IP products. Depending on what is being screened for and the tolerance levels specified, sophisticated and expensive tests may be necessary.
- Some production protocols can also require third party verification.

Finding Additional Information

Much additional information about IP production and about isolation and buffer distances appropriate for your crop and your environment can be found through your local extension service or Land Grant University. Some additional sources available at the time of issuance of this guidance are:

University of California at Davis guide to isolation distances:
<http://anrcatalog.ucanr.edu/pdf/8192.pdf>

¹⁶ These characteristics may include purity, quality and traits.

Existing U.S. Seed Industry Production Practices that Address Coexistence:
<http://www.amseed.org/pdfs/issues/biotech/asta-coexistence-production-practices.pdf>

Indiana Hybrid Corn Certification Standards (Commercial), including isolation distances:
<http://www.indianacrop.org/ICIA/Media/ICIA/Certification-Standards/CORN-STANDARDS-2007.pdf>

APHIS Minimum Separation Distances to be used for Confined Field Tests of Certain Genetically Engineered Plants. See link under:
https://www.aphis.usda.gov/aphis/ourfocus/biotechnology/sa_guidance_documents

Organic risk management information, including isolation information for corn:
<http://organicriskmanagement.umn.edu/> .

Recommendations for the Use of Resource Documents

The AC21 believes that the usefulness of the two documents developed in response to this charge will depend critically on the efforts of all stakeholders and particularly of USDA to disseminate them widely, to offer leadership in promoting their use, to provide appropriate support for local education efforts on coexistence, and to monitor the effectiveness of these efforts. Accordingly, the AC21 makes the following recommendations:

- 1. The Secretary of Agriculture should endorse and promote the use of the documents and the convening of local discussions when deemed appropriate at the local level.***
- 2. USDA should engage with State Departments of Agriculture, commodity and grower groups, NGOs, and private industry to make them aware of the new resource documents and USDA support for local initiatives to bolster coexistence, and suggest that these organizations make the two documents freely available to farmers.***
- 3. USDA should make available the two documents to a broad range of USDA agencies and programs, including field staff, and suggest that local offices make the documents available to farmers as resources.***
- 4. USDA should identify and make available a list of additional available resources that might help localities convene local coexistence discussions and work to make appropriate local personnel available on request when communities/localities seek to convene coexistence discussions.***
- 5. USDA should develop metrics to evaluate whether the models document is being used at the local level and the effectiveness of the resulting discussions.***
- 6. USDA should explore policy considerations with respect to obtaining additional authority to provide incentives to encourage farmers to develop joint coexistence plans.***
- 7. As markets and the complexity of coexistence evolve, maintaining a stakeholder dialogue through a group such as the AC21 will continue to be valuable.***

Challenges and Opportunities Now and Into the Future

The IP guidance for farmers and the proposed model for local coexistence conversations are intended as tools to help American agriculture as it continues to expand and diversify. The continued success of American agriculture depends on its ability to adapt to the rapid pace of change in consumer and broader marketplace demands, in technology, and in regulatory

policies. While not specifically focused on local coexistence discussions, here are a few of the areas that present both challenges and opportunities that can affect farmers and the success of their coexistence efforts.

An Ever-Evolving Marketplace and Regulatory Environment

Farmers face a range of external challenges in the protection of land, water, and air resources, for the use of pesticides and fertilizers, for the protection of beneficial insects such as honeybees, and for adherence to a variety of other farm programs and requirements at the State and Federal levels. Sustainable agricultural production under these changing conditions is benefiting from continuous stakeholder engagement and continuous improvement strategies. A diversifying marketplace has led both to increasing marketplace expectations as well as increasing choices for farmers in the production of both commodity and non-commodity products.

The food industry helps shape consumer understanding about product quality, purity, and through its marketing activities. Consumer desires for particular product attributes are being transmitted to markets and to farmers more dynamically than ever before. While consumers' interest in food attributes has increased, their knowledge about farming and production practices generally remains limited. This has sometimes led to consumer expectations that may not be possible to meet based on the biological and economic realities of farming, where wind, weather, and other factors can impinge on the most careful management plans, especially as tools for detection become ever-more sensitive to even trace amounts of unwanted materials. In addition, changes to U.S. disclosure practices for GE products as provided in legislation enacted by Congress and signed by President Obama on July 29, 2016, may add further as yet undetermined constraints and/or costs for producers.

The U.S. regulatory system is also evolving to address new technological developments. There are current efforts at the Departmental and the White House levels to revise both Agency regulations for GE products as well as the overall framework under which the United States regulates GE organisms. At present, the regulatory status of products developed using new precise breeding technologies sometimes referred to as "gene editing techniques" (which include the use of tools such as CRISPR-Cas9, TALENs, meganucleases, and others) is not clear. The new techniques provide powerful tools for plant breeding and it is likely that they will be applied in breeding a wide range of crops. However, the integration of such products into domestic production and into domestic and international markets may pose both coexistence and trade challenges and opportunities.

The issues around coexistence between GE crops and other crops have hitherto been limited to a small defined set of crops (largely corn, soy, canola, and alfalfa) used mostly for processing or for feed. In the future, as GE varieties of other crops intended for direct consumer consumption, e.g., fruits and vegetables, enter the marketplace, coexistence issues will become relevant to a broader cross-section of producers, supply chains, markets, and consumers. The AC21 would like to stress that attention to coexistence at the local level will be critical for realization of potential producer, processor, and consumer benefits.

Opportunities and Challenges of New Products: Crops with Functional Traits

In the marketplace, there is a general expectation that commodity crops are fungible—i.e., that the components of that commodity stream are basically interchangeable with one another. This expectation also applies to the materials marketed in bulk as non-GMO/non-GE or as organic. The advent of new GE crops with so-called “functional traits”—i.e., crops with modifications intended to affect the potential use of the commodity crop or with modifications that affect the marketability of the crop as a commodity product¹⁷-- offers both opportunities and challenges for coexistence and the commodity crop marketplace. As noted in the previous AC21 report, “Without careful management, unintended presence of some crops with so-called ‘functional traits’ could potentially disrupt commodity streams because of the new traits they carry, even if present in very small quantities and even though the products themselves meet regulatory safety standards. AC21 members recognized that these situations might pose new challenges in the future.”

A few points regarding functional trait crops are important to note:

- As value-added crops, they offer economic opportunities for farmers willing to abide by strict protocols designed to ensure that contractual purity standards are met and that crops expressing the functional trait do not inadvertently enter the bulk commodity system.
- Management of these crops poses challenges because, in some instances, extremely low concentrations of material from a crop with a functional trait may have deleterious impacts on an associated commodity stream.
- Typical marketplace testing for unintended GE presence may not be sufficiently sensitive to assure that other product streams will be unaffected by the unintended presence of such products.
- These products are now typically grown under contract in so-called “closed-loop” systems designed to assure confinement, but some AC21 members believe that such measures may be inadequate.

There is no evidence that commodity streams have as yet been adversely affected by current production of crops with functional traits. However, as new functional traits are approved, there will be a need to communicate clearly to consumers the inherent value associated with such traits. Regulatory and or market measures may need to evolve to strengthen assurances of containment and/or distribute risk, in order that the economic opportunities offered by the crops can continue to be realized.

¹⁷ Some examples of products in this category are corn plants engineered to produce higher levels of an enzyme needed to break down starch for bioenergy production, and food crops engineered to produce new pharmaceutical substances. It is important to note, however, that not all crops with functional traits may necessarily have negative impacts on related commodity streams if they unintentionally appear in those product streams.

Seed purity

Seed purity is a crucial issue for farmers for meeting buyer specifications for their crops, especially for those farmers producing IP crops. As noted in the November, 2012, AC21 report,

“All AC21 members recognize the important role of seed quality in meeting their customers’ needs and in successfully fostering coexistence at the farm level. The continued success of agriculture depends on a diverse supply of high-quality seed that is of the purity necessary to meet each farmer’s needs. One key source of potential unintended presence entering into an identity-preserved production system is the starting seed... The seed industry’s challenge is to provide farmers seed that offers farmers as much of a cushion in his/her management of unintended presence as is economically viable.”

Farmers producing for IP customers or markets often are provided with detailed production protocols as part of their contracts, and fulfilling the conditions of their contracts requires adherence to those specifications. The specifications generally presume that the starting seed is of sufficient quality and purity such that, after following the required protocols and taking appropriate measures to control pollen flow into his/her fields, the resulting crop will meet quality requirements. Farmers producing for GE-sensitive markets need to bear in mind the following information:

- Because at present there is relatively small market demand for non-GMO/non-GE seed for crops in which GE varieties are widely grown, germplasm options for those markets may be limited and available germplasm may not always be optimal for particular local or regional conditions.
- Producers growing for GE-sensitive markets may find it advisable – or even necessary – to do advance contracting with seed producers to ensure that appropriate seed will be available for IP production as long as one to two years into the future.
- Under the requirements of the Federal Seed Act, purity data on seed tags includes percent inert material, percent other crop seeds, and percent weed seeds. However, the Act does not require tags to specify GE presence or percentage.
- The level of unintended GE presence in non-GE seed varies substantially, from levels likely suitable for farmers to meet downstream purity requirements with appropriate management during growth and handling, to levels that exceed typical downstream market requirements even before planting. Easier access to information about the GE content of seed intended for use in growing non-GE crops would aid producers serving GE-sensitive markets and food companies seeking non-GE ingredients.

Farmers growing crops for non-GE markets need suitable seed varieties and assurance that the seed that they purchase is of appropriate quality/purity to produce the desired crops. In its November, 2012, report, the AC21 made a number of recommendations regarding these issues, and it is the Committee’s understanding that USDA has taken a number of steps to help address the issue of seed availability:

- USDA has provided support for the Organic Seed Finder database, a database administered by the Association of Official Seed Certifying Agencies (AOSCA) with the assistance of the Organic Seed Alliance, which helps farmers identify sources of seed suitable for organic production.
- USDA asked the National Genetic Resources Advisory Council (NGRAC) to provide it advice on how best to work with the seed industry to: (1) enable ongoing evaluation of the pool of commercially available non-GE and organic seed varieties; (2) identify market needs for producers serving GE-sensitive markets; and (3) work with seed suppliers to ensure that a diverse and high quality commercial seed supply exists that meets the needs of all farmers, including those supplying products to GE-sensitive customers. (NGRAC's report has now been provided to the Secretary of Agriculture and the AC21, and is available on-line at <https://nareeeab.ree.usda.gov/sites/nareeeab.ree.usda.gov/files/nareeeab/2015%20NGRAC%20Report%20PreFinal%20for%20NAREEE%20Review.pdf>.)
- USDA has also had discussions with leadership at the American Seed Trade Association, which has indicated that efforts are underway to develop a process to facilitate the licensing of elite non-GE germplasm for further breeding for non-GE markets. This effort could bolster the availability of diverse, high-quality seed for non-GE producers.

The AC21 also recognizes the importance of USDA having a robust public system for the development of germplasm suitable for a range of farming needs.

With respect to the challenge of assuring that non-GE and organic seed intended for farmers serving GE-sensitive markets is of sufficient quality for its intended use, AC21 members note that all farmers benefit from having useful information about the characteristics and content of the seed they purchase. Some AC21 members believe that seed companies should routinely provide information about the GE content in non-GMO/non-GE seed, or that contracts for IP production should, as a general matter, include provisions relating to the supply of tested seed for those producers. Other AC21 members note that not all non-GMO/non-GE seed is intended to be used to service GE-sensitive markets, and that requiring companies to provide such information on all such seed would be unnecessary for many in the marketplace, would drive up costs for all producers, and would potentially expose seed companies to increased liabilities.

Still, AC21 members recognize the value in increasing transparency and the availability of useful research and information about seed purity for the entire food and feed supply chain. Farmers producing for GE-sensitive markets would benefit from additional research or a compilation of experience on a crop-by-crop basis describing a rough numerical relationship between starting seed purity of non-GE seed and the GE content of a final crop grown under IP conditions, while recognizing the many factors that could introduce variability in the outcome. AC21 members differ, however, as to whether there is a role for the Federal government in gathering this information, or whether it should be left to universities or the private sector.

It is important that farmers work with reputable seed companies. It is also noted that some seed companies may be willing to meet a farmer's specific quality requirements, especially in regard to unintended GE presence, or to provide specific information upon request on the purity of particular seed lots. Demand for such information in the U.S. and abroad will likely create new market opportunities for seed companies, and potentially higher premiums, for participants along the seed value chain. In addition, greater involvement of buyers contracting with farmers for their IP production in the procurement and testing of seed might sometimes help farmers meet their quality specifications. It may also sensitize the buyers to the challenges of procuring a sufficient supply of high-quality, non-GMO/non-GE seed.

As this report focuses on enabling solutions for successful coexistence at the local level, the AC21 remains confident that continued dialogue bringing farmers together with other farmers and with the entire value chain will expand opportunities for agriculture into the future. We encourage the next Secretary of Agriculture to follow through on the recommendations in this report and to continue to use the AC21 mechanism. Further, mirroring the multi-stakeholder process of the AC21, we encourage the government to expand the mechanisms to bring Federal agencies together to address more broadly the increasingly complex challenges and opportunities in our food, fiber, and feed system.

Status of Consensus on This Report

AC21 members who have joined in consensus on this report:

Russell Redding, Chair
Paul Anderson
Laura Batcha
Barry Bushue
Lynn Clarkson
Leon Corzine
Douglas Goehring
Melissa Hughes
Gregory Jaffe
David Johnson
Alan Kemper
Keith Kisling
Josephine (Josette) Lewis
Mary-Howell Martens
Marty Matlock
Angela Olsen
Jerry Slocum
Latreasia Wilson

AC21 members who have not joined in consensus on this report:

Isaura Andaluz
Charles Benbrook

Absent member

Darren Ihnen (but joined in consensus)

For information about affiliations of AC21 members, please see the list on page 60 or consult the AC21 web page.

Comments from members who have joined in consensus

Note: Provision of comments is optional and each comment represents the views of an individual member, not the policy or positions of USDA.

Laura Batcha

The committee's deliberation of the Secretary's charge "to develop an approach by which farmers could be encouraged to work with their neighbors to develop joint coexistence plans at the state or local level and to consider how the Federal government might assist in that process" opened doors for conversations among the diverse stakeholders reflecting the changing environment that food and agriculture are operating in.

The greatest challenge to producing the final report was developing the section on opportunities and challenges. It is here that the limitations of our charge were felt. The charge did not allow for problem solving regarding seed, and many committee members were aware that on-farm efforts to bolster coexistence and limit gene flow do not exist in a vacuum. The question of seed purity and identity are foundational.

- The level of unintended GE presence in non-GE seed varies substantially, from levels suitable for farmers to meet downstream purity requirements with appropriate management during growth and handling, to levels that exceed typical downstream market requirements even before planting. Easier access to information about the GE content of seed intended for use in growing non-GE crops would aid producers serving GE-sensitive markets and food companies seeking non-GE ingredients.

Focused attention on this issue by USDA, in my opinion, should be a top priority for the agency to move forward with a meaningful commitment to diversity in agriculture. Lastly there needs to be an open assessment by government and stakeholders regarding emerging issues such as weed resistance and pesticide drift in addition to AP gene flow in future advisory work.

USDA's and the Secretary's+ public statements regarding the critical need to embrace diversity in agriculture point the way for leadership and promise in agriculture. Although not dictating programs or regulatory regimes, two statements in the Executive Summary demonstrate an historic shift in the relationship between production and consumption.

- The agricultural landscape continues to grow more and more complex due to the increasing diversity of products available, the changing domestic and international regulatory landscape, and increasing demands by consumers for more information about the foods they consume.
- All of these trends lead to the need for increased transparency within the agricultural community, with trading partners and with consumers.

It is gratifying to see from the standpoint of the organic stakeholders who have been on the leading edge of this transformation. Future conversations and strategic policy work at the

federal level should further widen the stakeholders at the table and engage all the touch points in government. Rural economies, environmental safety, land conservation, risk management for farming communities, agricultural trade/ exports, and public trust in food and government will all benefit.

Barry Bushue

I have appreciated and enjoyed the opportunity to serve on the AC21 committee for the last several years. The November 2012 report provided robust discussions of coexistence and a list of recommendations for USDA to utilize to benefit and inform farmers. Following on from that, this report provides for practical suggestions and ideas to benefit farmers when considering planting Identity Preserve crops and in bringing together local farm communities to discuss coexistence.

There was no doubt a lot of discussion and on rare occasions considerable disagreement, but the final document represents the results of committee members willing to work collaboratively to find solutions and suggestions that work for farmers and the future of coexistence.

I am happy to sign on in consensus with this report with the following comments.

It is important to recognize the value of having coexistence discussions neighbor to neighbor as the most effective tool.

The NASS Organic Survey Results, confirmed that nationwide the amount of economic loss as a result of unintended presence of GE material, compared to overall production is incredibly small. I am sympathetic to any farmer who suffers loss, but the report shows that industry wide, it is a small percentage.

I did, however, feel that the data lacked any verification or clarification. There was little attempt to distinguish between various types of contracts or sales entered into by growers for higher profit margins or the contractual requirements on them to meet a standard that exceeds the USDA Organic standard.

There was no indication as to what standards the grower agreed to, what the source of the GE material could have been or whether the grower was able to sell their product on the open market.

All farmers, no matter what types of production or crops they raise are subject to loss if they fail to meet the contracts they entered into. These are business decisions we must all consider at planting time.

Having said that, I do believe that working closely with your neighbors is critical. And strongly believe that while we can and should always look to improve it, the NASS data shows that coexistence does work.

Hopefully the recommendations we make in this report will provide ideas to farming communities to recognize the value of working together and further enhance coexistence. I think all members of the committee recognize that the future holds some tremendous opportunities for new crops, new technologies and new markets, but also new challenges. I applaud Secretary Vilsack for his continued interest and encourage USDA to pursue the recommendations

I want to thank Michael Schechtman from USDA and Chairman Redding for guiding us through the process and keeping us on track.

Lynn Clarkson

Given the limitations of the Secretary's charge to AC21 and the diversity of the committee, I think this final draft is as good as we could do in supporting coexistence. I concur with appreciation to Dr. Michael Schechtman, Committee Secretary, and Russell Redding, Committee Chairman, for their good efforts in drafting. But I would like to offer the following comments.

The pressure for tending coexistence comes mostly with the advent of GMO crops, especially corn and alfalfa, that conflict in the market with non-GMO versions and with the development of functional GMO corn traits that can conflict in the market with both non-GMO and GMO corns. Much of this conflict will be sorted out by the market. An appropriate role for government will be, as usual, to define standards that help structure these evolving markets - domestic and foreign.

Markets would benefit from a definition of what Non-GMO means. What is the official US tolerance level for GMO traits in products labeled Non-GMO? It needs to be realistic but acceptable to concerned markets. For better or worse, the US government has now told the USDA to determine that standard. This is an opportunity to help markets structure themselves responsively to meet consumer demands.

Those serving non-GMO markets are challenged to find seed with sufficiently low adventitious GMO presence to satisfy current market standards. The market will again generally sort itself out to meet consumer distinctions. But by asking seed companies to deliver seed with a guaranteed GMO level of less than 0.5%, buyers are asking seed companies to accept a purity challenge much tighter than that used to guarantee varietal purity. Achieving such tight purity standards will require extreme isolation and extreme quality control of parent seed. In the US, that will come at a significant cost. Alternatively, companies needing non-GMO seed can look to the EU to provide seed with a guaranteed level of adventitious presence of no more than 0.1%. Some are already doing so.

With demand for organic foods and products growing at double digits year after year, finding enough organic growers to meet US demand for organic grains and oilseeds has been very difficult. This, too, will be sorted out by the market. Unfortunately for many, US demand is increasingly finding its organic crops in foreign countries that often lack the

cultural underpinnings of integrity. Currently over 75% of the organic soybeans used in the US come from foreign sources. Corn imports have been escalating and likely now approach or exceed 50% of US use. Many folks, myself included, would certainly welcome the tide of foreign organic crops being replaced by domestic US production. While the USDA can't mandate such evolution, it has helped and can help by including organic growers in the full range of agricultural programs. More efforts are warranted in verifying that imported organic crops really meet the US NOP standards. The organic market itself is doing much to encourage domestic production by paying at least twice the price of conventional crops for organic crops.

Other issues remain deserving of attention - especially the asynchronous permitting of crops and related pesticides, the asynchronous approval of biotech traits across international borders and the drift of chemicals and pollen across property lines.

It has been a pleasure serving with you and the other members of AC21.

Leon Corzine

I appreciate the opportunity provided to me by USDA as a member of AC21. I endorse this compromise report and offer the following comments as a supplement. This report is an extension of the November 2012 AC21 report therefore I refer to and include my comments from that report as well.

I want to thank Secretary Vilsack for the charge to the committee and leadership of AC21 for helping AC21 work through the issues as we created this report. I appreciate USDA recognizing the importance of input from and including family farmers on AC21. We are a diverse group and no one like the farmers involved have the understanding of what we do and what works on the farm. Writing a report like this would have no value without farmer involvement.

"A Framework for Local Coexistence Discussions" is a very good compromise report. It is timely as farmers continue to look at added value opportunities today's marketplace and new technologies offer. The report offers voluntary guidelines farmers and end users can look to as contracts are developed. Farmers may need cooperation from neighbors to achieve contractual obligations. As these opportunities present themselves communities and neighbors may have opportunities as well. As these fence row and community discussions and meetings occur, it is important to note report recommendations on coexistence need to be integrated into ongoing meetings such as extension and other agronomic gatherings. These need to continue to be voluntary meetings and good background is provided in the report. Agriculture across the US is very diverse so a specific template will not work for all. The voluntary guidance offered in the "Model for Convening Local Coexistence Discussions" should be recognized as such.

I appreciated USDA following through on AC21 recommendations from our November 2012 report. Perhaps the most important one was the need for information on economic loss by unintended GE presence. USDA collected some data, which significantly, showed very low

economic losses. However, it is important to note that while USDA made a good attempt to collect the data, their organic survey was missing some important elements and even the reported losses are questionable due to the following:

- 1) Data was self-reported.
- 2) "Organic Plus" is an important element in evaluating loss. "Organic Plus" are contracts that go beyond organic contract requirements. Some end users are putting additional specific requirements on the organic producers that go beyond USDA organic standards. They are generally tolerances for GE or other materials and are test based. Organic farmers are given additional money to sign these contracts that have these specific additional requirements. Organic contracts are "process based" and not based on testing. The presence of GE in organic product is not a violation of USDA's organic regulations. Therefore, economic loss from GE presence is not possible under those regulations, unless procedures are not followed by the farmer.
- 3) Organic "Plus" contracts which do put contractual tolerance presence limitations are different from organic contracts and need to be reported as such. The report did not differentiate putting into question the losses reported as organic GE presence losses.
- 4) No data was collected on actual contractual specifications.

Until these issues are corrected the data is flawed and not useful as we move forward.

We put a lot of time and effort on seed. Seed quality is important to all farmers. The report needs to differentiate between seed quality and seed purity. Purity does not necessarily mean quality and vice versa. The Federal Seed Act has very high standards and as a farmer I feel the industry does a good job of meeting those standards. The advancement in genetics as well as new GE traits have been a large part of the increased efficiency and sustainability on our family farms. We are better stewards of our farms with new seed technology.

Seed purity is important also to all growers. The current seed purity standards work very well for the vast majority of farmers. When we look at Identity Preserved opportunities (including Organic Plus) purity becomes very important. Most of the contracts our family farm researches provide guidance or even provide the seed to meet those contractual obligations. Seed companies chose whether to participate in those contracts or not. It is important seed companies are not all forced to provide seed for these tight tolerance contracts because it would raise the cost for all farmers and that is not needed or wanted.

USDA and the US Congress need to thoroughly evaluate and determine the need before any policy changes are made. Any changes in policy, additional studies, or other such actions need to be based on accurate data and sound science, and need to consider any potential domestic and international policy implications.

I appreciate the work of the United States Department of Agriculture and the Advisory Committee on Biotechnology and 21st Century Agriculture. Modern agriculture is making great strides in protecting our environment and improving our soils. It is important we have

research into new technology to continue increasing productivity while lowering our environmental footprint. As a 5th generation farmer working with my son (the 6th generation) we are definitely leaving the farm better than we found it. Sustainability and stewardship are not just words on our farm. Continued improvement is our mission. As we enhance coexistence new identity preservation opportunities will continue to come forward and farmers will be able to meet those opportunities as we continue improving the stewardship of our farm while meeting the needs and desires of society.

Once again I am pleased to join this report in consensus with my comments attached. It is an honor for me to participate and represent farmers in the process. Thank you for the opportunity!

Douglas Goehring

I am honored to serve on the AC21 board. We had a very diverse group of individuals from across the country covering many aspects of the value chain from the production to the processing and marketing of commodities, including NGOs. I am in consensus with the AC21 report "A framework for local coexistence discussion". I would however offer a few comments that emphasize and qualify a few areas that I believe will continue to foster communication and cooperation.

Our diversity in agriculture is one of our greatest strengths offering the greatest amount of choices to the consumer. It has also meant that US agriculture has been the driver of innovation purely out of necessity. We know there are stark differences in agricultural operations across the US even if they are producing the same commodity because of precipitation, temperature, soil type, topography, length of growing season, pest, pathogens, noxious weed species, etc... US farmers adopt and implement different practices and systems to match the environment and challenges they are operating in. We need to be ever so cautious about a prescriptive practice or standard that processors or the public may want to impose on agriculture without understanding the unintended consequences that effect cost, quality and yield. A utopian concept may not work in the real world of agriculture where there are and have always been inherent risk.

When convening local coexistence discussions we can encourage farmers to be a part of the conversation by thinking in terms of the inherent risk and challenges they deal with every day. Farmers adopt and implement different practices and systems to enhance soil health, conserve moisture, prevent wind and water erosion, crop rotations to manage disease, pest and weeds. They utilize different tillage practices and equipment to manage soil erosion, water retention, pest and disease. The various types of production practices and systems that exist can invite more conversation that will be productive and effective and I believe will be a holistic approach, capturing the various types of farms in a community. We have seed producers, identity preservation (IP) producers, and organic producers who are managing for all of the same issues and production purity standards. A broad approach on mitigation and managing risk will help all farmers relate to the challenges they operate under every day and encourage them to think about how they may manage differently to prevent soil, weeds, insects, pathogens from moving to adjacent fields or how to minimize

impacts on their fields using buffers. Ultimately it has the greatest potential to help them relate to the challenges that some deal with when producing a crop under various conditions. It is "inclusive versus exclusive".

Melissa Hughes

I concur in the signing of the AC-21 Report, with the following thoughts.

In early August, 2016, as this report was in its final drafting phase, President Obama signed a law requiring the mandatory labeling on consumer food packaging if a food or its ingredients contains GMOs. The USDA has been charged with implementing the details of the statute and has begun this process as the AC-21 Committee reaches the end of its work for this administration.

Although it was not possible for the AC-21 Committee to consider the impact of this new statute on its work, the new paradigm created by this statute shows how starkly the AC-21 Committee is separated from the realities of supermarket shelves and consumer kitchens. Most remarkably, the report barely acknowledges the fact that farmers in US Agriculture grow food. Instead, the report focuses on the growth of "crops" and the new technologies of "crops" and "products."

This dynamic, this segregation of food from farmers has led to the crisis of US Agriculture today. The crisis where most consumers do not know or understand where their food comes from, and therefore have no interest in the value that farmers bring to our lives. Consumers look for cheap and cheaper food, which does everything to drive farmgate pricing down, leading to devastation on farms and in communities across the United States.

Recent research has shown the benefits of organic agriculture in returning wealth to rural America. By lowering poverty rates more than SNAP benefits, or by adding \$2000 to annual income in rural areas, organic agriculture is providing benefits to those areas that industrial agriculture and cheap food have stolen. Organic consumers, because of their awareness of how their food was grown, are willing to pay the farmers the value of their work. Organic farmers benefit from that deep connection to their consumers and this returns wealth to local rural communities.

Yet non-organic farming institutions seem to want to hide from the consumer. Most farmers, including the farmers on AC-21, revel in the connection to the consumers. But institutions, councils, associations, some represented on AC-21, balk at the connection to consumers. Common conversations at AC-21 included thoughts that consumers do not know what they want, or that they are making their choices based on "fear-mongering" and other marketing. Agricultural leadership continues to advocate for a lack of transparency in the food system, and that lack of transparency causes mistrust.

This is arcane, antiquated thinking, and the institutions do their constituents a disservice by perpetuating the desire to hide and remain obscure from the consumer. As we now see, however, the marketplace demands are overwhelming the non-organic producers – demanding things like cage-free, and now, GMO Labelling. US agriculture institutions, and

at times I fear also the USDA, have failed to keep up, and US farmers will be forced to make radical investments in their infrastructure to meet the new demands, but it will take time for the consumer understanding of that value to catch-up.

There is a partnership to be had between consumers and the farmers. There is learning and education on both sides. Consumers seek transparency, and farmers seek return for the value they bring. Secretary Vilsack described it best when pointing out that we are all able to lead our lives without growing our own food because of farmers. It is time to throw out old-school thinking about anything but partnership. The future is not farmers vs. consumers, it is farmers and consumers.

As we move forward, I hope that the AC-21 conversation will continue, or will morph into an even higher and more engaged and influential discussion. I do believe that the forces at the table of AC-21 must continue to confer, and to seek common ground, and to lead from the middle.

My deep thanks for the opportunity to serve on AC-21.

Gregory Jaffe

I concur with this report. The information about how to address coexistence at the local level should be helpful to USDA and many of its partners at the state and local level. I hope that the current Secretary of Agriculture (and the Secretary of Agriculture in the next administration in 2017) will distribute the report throughout the country and stress to all stakeholders the need to work together to solve coexistence issues. However, there are two additional areas (identified below) that need to be addressed by USDA if successful coexistence is to be achieved.

1. USDA Should Increase its Efforts to Collect Data on Economic Losses Incurred by Farmers Due to Unintended Presence of Genetically Engineered Material. The AC21 report "Enhancing Coexistence" that was submitted to the Secretary of Agriculture in late 2012 recommended that USDA conduct research to quantify the economic losses incurred by farmers due to unintended presence of genetically engineered material. The progress reports to the AC21 identifying how USDA is implementing that recommendations have identified some minimal data collected on economic losses that were reported by some organic farmers. However, USDA has not designed a specific study on this issue nor have they attempted to collect data from the different stakeholders who might have relevant data (such as grain handlers or farmers growing non-GMO seeds for overseas markets). In the four years since the AC21's "Enhancing Coexistence" report, a much more thorough collection of data on this subject should have been conducted by USDA instead of what they actually did. Until the extent of economic losses is well characterized using data from a variety of sources, it will be difficult for USDA or the AC21 to really determine the best solutions for achieving successful coexistence. Therefore, USDA needs to make a better and more sustained effort collecting economic loss data in 2017.

2. Damage from Drift of Unwanted Pesticides is a Coexistence Issue that Needs USDA's Involvement. This past summer, there has been an unusually high number of reports of crop damage related to misuse of the herbicide dicamba. The Environmental Protection Agency issued a Compliance Advisory in August, 2016, stating that "Based on cropping patterns and the number of acres of non-resistance crops adversely affected, extension experts across the country believe that illegal use of dicamba products on adjacent or nearby dicamba-resistant cotton and soybean crops caused the observed crop damage." In addition, EPA stated that there were over 100 complaints of damage in Missouri estimated to involve more than 42,000 acres as well as complaints of dicamba damage in Alabama, Arkansas, Illinois, Kentucky, Minnesota, Mississippi, North Carolina, Tennessee, and Texas. The economic impact of damage due to drift of pesticides is as important a coexistence issue as economic losses due to unintended presence of genetically engineered material.

When drift damage was reported during the summer of 2016, the AC21 was too far along in its deliberations to address this issue in the current report. However, it is critically important that USDA do everything it can to prevent damage to neighboring crops from pesticide drift. Farmers planted cotton and soybeans seeds genetically engineered to be tolerant to dicamba because USDA had cleared them through its oversight under the Plant Protection Act. EPA, however, has not yet approved any dicamba formulation for use post-emergence on those two crops (there is an application pending for a low volatility formula of dicamba to be used in conjunction with those engineered seeds). The seeds and the corresponding herbicide are "one cropping system" yet there was asynchronous approval of the two components of that system by USDA and EPA.

USDA should not allow genetically engineered seeds that are tolerant to an herbicide to be grown until the corresponding herbicide's use on those seeds has been approved by EPA. In addition, USDA needs to ensure that purchasers of herbicide-tolerant seeds understand the conditions under which those seeds and the corresponding herbicide can be used to limit potential economic damage to their neighbors. USDA could achieve that by requiring seed developers to include labels on the seed package explaining how to use the herbicide safely or by requiring language in the seed purchase agreement about which herbicide formulations can be used and how they should be applied. USDA also should provide educational materials and training to ensure farmers use the cropping system in a manner that does not affect neighboring farms. It is critical that USDA not only ensure that engineered herbicide-tolerant seeds are safe to use but specify the conditions for their use that will avoid coexistence problems with neighboring farms.

Alan Kemper

I thank Secretary Vilsack for the opportunity to serve on AC21. The report may not be perfect but it goes a long way toward improving coexistence in agriculture

Keith Kisling

I appreciate the opportunity to serve as a member of the AC21 committee for these past few years, and I am pleased to sign on in consensus of the final report. While I feel that this report represents collaboration and compromise from the entire group, I want to make the following comments.

I'd like to incorporate by reference my comments from the 2012 report. As a wheat farmer, I firmly believe that trade implications should always be considered in conversations about technology, regulations, and coexistence.

I would also like to thank USDA for their responsiveness to the recommendations of AC21's 2012 report. The committee asked for data on organic losses related to GE presence, and that data showed very low levels of loss. Even with those losses, there were limits to the data gathered. For example, the data was self-reported and not independently verified. The data also did not indicate whether the grower lost organic certification, or whether the losses were due to not meeting specific IP contract conditions; in fact, no data were collected on what contractual specifications for these farmers were. Wheat is one of the most complicated crops in terms of subsets of production, and it's helpful to see that in a high-stakes segregation situation, the system for other crops is working.

From a grower perspective, I applaud USDA and think locally convened, voluntary coexistence conversations are a good idea. The most effective way to ensure enthusiastic and broad participation is to make sure that these conversations cover a wide array of topics relating to coexistence between neighbors with different farming methods so that issues important to all growers are discussed.

I have enjoyed working with USDA and my colleagues in this committee and thank USDA for introducing these worthwhile charges. I hope that this report offers a way forward for collaborative, voluntary conversations on coexistence. It is my hope that these conversations will foster increased communication and cooperation between farmers.

Mary-Howell Martens

The charge, as presented to the AC21 by the Secretary, asked us to outline strategies for improve cooperation on a local scale. This is a worthy approach, and certainly we have crafted a document that provides some valuable new guidance suggestions and insight.

The document breaks some fresh ground by presenting unwanted genetic adventitious presence as a shared issue that requires equally shared responsibility, but in my opinion, for all of its carefully constructed language, our response fails substantively to effectively speak to the reality of both the Secretary's core challenge and the ethical basis of 'co-existence'.

At the very heart of co-existence is the reality that when trespass occurs, whether it is physical, chemical, biological or genetic, there is a 'Trespasser' who perpetrates the situation and a 'Trespassed Against' who is the innocent and often unwilling recipient of the material.

In most legal senses, the perpetrator is both liable for damages and is expected to stop doing whatever caused the trespass. However, in modern agriculture, this age-old model of property rights, neighborly co-existence and cooperative respect has too-often broken down with both genetic and chemical trespass, leaving the 'trespassed against' party with little recourse to either recoup damages or to require their neighbor to stop the trespass. Agricultural products have become more difficult to control, more difficult to keep within property boundaries, but rather than requiring the perpetrator to try harder to prevent drift, laws have been re-written to absolve and negate perpetrator responsibility. The burden has fallen entirely on the 'trespassed against', to erect barriers, to alter crop rotations, and to accept financial loss from damage.

This has created a very unequal situation, where one party experiences no harm from their action and the other party can neither adequately defend themselves nor seek redress. This is NOT a situation of equally shared burden, nor is it either a perpetrator-less or a victim-less choice.

Therefore it is disingenuous for this report to claim that both parties are equally invested in finding a mutually agreeable situation. In real life, this is simply not true. In most cases, the perpetrator who benefits from the products will see little reason to change (or even discuss) their practices for, after all, they are not being harmed. The risk and the potential harm are highly unequal, and no amount of 'guidance' from USDA will achieve true fair co-existence without a strong element of enforcement.

The AC21 is a diverse group of stakeholders, all strongly committed to their constituencies and their ideals. As a group, we have achieved a high level of respect for each other, a surprising appreciation for each other's challenges, and a good understanding of the Secretary's goal and charge. The development of this document has truly been an exercise in active, applied co-existence, a case study in first staking out territory and then listening to each other long enough to care about each other's reasoning. This is the fundamental reason I concur with the document, because it does represent a tangible example of comprehension, cooperation and compromise, a process of finding common ground, showing that this can still occur in an increasingly divisive world when all parties are sincerely committed to cooperation. There is nothing intrinsically wrong with the document, other than not adequately reflecting real life and actual situations.

Farming has never been easy, but as the climate changes and weather becomes more erratic, and as grain prices are increasingly set on a global scale, crop diversity is truly the best tool in the 'risk management' basket, far better than crop insurance. The more crop and market diversity on any farm, the less likely it will be negatively impacted by extreme weather or capricious markets.

However, with diversity must also come the awareness that the choices we make can have the potential to negatively impact our neighbors, and that it must be our responsibility to do everything we can to prevent such unintended consequences. Regardless of the 'nobility' and hardship of farming, it is never our right to hurt someone else, especially other farmers, and especially our neighbors.

The biggest deficiency of the AC21 report is the failure to include a recommendation for third party mediation and enforcement. In order for true co-existence to function, there must be a means for the 'trespassed against' neighbor to obtain assistance and support if their neighbor fails to cooperate and or fails to take effective measures to prevent drift. Without a third party with sufficient enforcement authority, there is no recourse if the 'local discussions' we so gently suggest in the report fail to work.

Therefore, it is my hope that as we leave this administration and this AC21, the USDA will carry forth this lens, as a context to evaluate all forms of off-property trespass:

1. That while farmers should have the right to make the choices they believe best for their own farm, it is firmly the financial, legal, agronomic and practical responsibility of a farmer to prevent the drift of chemical, biological, genetic or physical material off their property.
2. If drift is the result of failure of adequate guidance/requirements of a product label, then the regulatory agencies and product manufacturers that develop and enforce the labels are held responsible for changing the label requirements and/or reformulating the product in such a way that it is unable travel past the users' property boundaries.
3. If financial or physical harm to neighbors occurs as a result of off-property drift, it is the perpetrator, product manufacturer and regulatory enforcement agency's responsibility to pay for the damage and, more importantly, to prevent the trespass from continuing.
4. It is my hope that the USDA will adopt the lens and the ethical standard where the 'rights of the trespassed against' take precedence over the 'rights of the trespasser'.

Thank you for granting me the highly enriching and enjoyable opportunity to serve as a member of the AC21.

Angela Olsen

Thank you for the opportunity to serve as a member of the AC21. I am pleased to join this report in consensus, but qualified with the comments, context, and additional perspectives provided herein. I also incorporate, by reference, my comments to the November 2012 AC21 report.

This AC21 Report – "A Framework for Local Coexistence Discussions" – is the result of the diligence, hard work, and discussions of the AC21, and for many members, reflects compromised positions and in some instances, continued areas of respectful disagreement among Committee members. Notwithstanding these compromised positions, this report contains many positive, practical, and proactive recommendations on: (1) factors for farmers to consider when growing an identity preserved (IP) crop; (2) approaches and considerations to convene local coexistence discussions; and (3) ways in which the Federal government may assist in that process. I applaud USDA's leadership for bringing together the AC21 to discuss these important topics. Secretary Vilsack asked the AC21 to engage in

these challenging discussions, to compromise, and to “lead from the middle” – I believe that as a Committee, we have delivered well on that directive.

Convening Local Coexistence Discussions – Education, Outreach, Communication

For decades, a hallmark of US agriculture has been the ability of farmers to pursue diverse cropping systems and respond to consumer demand for high-value IP and specialty crops. The diversity and dynamism of the US agriculture industry would not be possible but for the past and continuing success of coexistence. As the AC21, we have had robust discussions about how coexistence has been accomplished through local and regional farm level practices; many of these practices are outlined in this report.

The food and agriculture community, across diverse production systems, has developed many effective tools and methods that help prevent inadvertent comingling of crops, foster crop diversity, and promote farmer choice, all of which facilitate the ability of growers to respond to the needs of the marketplace. The stand-alone document within our report “A Model for Convening Local Coexistence Discussions,” highlights many important considerations and suggestions on how communities may opt to bring farmers together to discuss relevant production topics and to strengthen opportunities and choices for all growers. Several key takeaways relating to this topic from our discussions at the AC21 meetings include: (1) any program that is developed should be voluntary, flexible, and take into account the local and regional diversity in agriculture and needs of the marketplace relating to coexistence; (2) because of biological differences in crops, any program should be designed to be flexible and responsive to the specific agronomic and coexistence needs of individual crops and cropping systems; and (3) the most effective way to bring growers together to have these discussions is to identify topics that are relevant to all farmers (e.g., pest management or weed control; water management; tillage systems; conservation practices; Federal and State incentive programs designed to preserve environmental health, water, and land resources; considerations for IP production, including agricultural practices and education on contractual obligations; and other agricultural topics that were discussed during AC21 meetings).

Another important point to emphasize from our discussions – which may not be clear in this report – is that when looking to meet a particular specification in an IP contract, unintended presence in crops can occur at many points up and down the entire value chain.

Notwithstanding the lengthy discussion about seed in this report, seed is but one factor of many that should be considered in the continuum from on-farm planting, to grain processing, and up to food processing, manufacturing, and sale. Other potential sources of unintended presence include, but not are limited to: machinery or livestock; wind and pollen flow; comingling of product at or after harvest, in on-farm storage systems, or during transport; or comingling in other facilities downstream. When looking to meet a particular specification in an IP contract, all potential sources of unintended presence should be considered – seed is only one consideration of many throughout the entire value chain.

Seed Quality

Seed quality standards are based upon market expectations and are bound by the limits of biological systems. Therefore, thresholds or tolerances are a component of seed quality standards. There is an ongoing commitment within the seed industry to ensure that quality

seed continues to be available to all growers. Advanced planning, communication, and cooperation during the process of seed production are fundamental to this commitment. Tracking, recordkeeping, testing, and other measures with appropriate management systems are essential parts of seed product development and the commercial lifecycle to address quality assurance and seed product integrity. The US seed industry routinely employs seed production best practices to manage genetic purity, including: seed production isolation; rogueing of off-types; and prevention of physical mixing during the entire seed production process, including seed harvesting and processing. These tools, in conjunction with appropriate genetic based tools, help allow the industry to meet market specifications and provide diversity and choice to growers.

Maintaining a seed variety's trueness to type is critical for market acceptance, regardless of the type of seed being produced. As an example, the breeding strategy for most hybrid crops has been to conduct basic germplasm development and breeding in a conventional (i.e., non-GE) background; if GE traits are to be introduced, elite conventional breeding lines are "converted" to an equivalent line containing the GE trait through a backcrossing program. In general, US breeding companies have adopted a rigorous and documented quality management system to help prevent unintended physical mixture and gene flow between GE and non-GE breeding lines.

The seed industry operates in a marketplace that is responsive to grower preferences and demand, and the industry is confident in and proud of the products it sells. Several key points were discussed extensively during the AC21 meetings, which bear emphasis here:

- Farmers should communicate with seed companies regarding their specific seed needs 1-2 years in advance of planting, so that seed companies can meet the demand with supply. It also is advisable to work with reputable seed sellers.
- All seed companies must follow the requirements of the Federal Seed Act. Under this Federal law, purity data on seed tags includes percent inert materials, percent other crop seeds, and percent weed seeds.
- Certain seed companies may choose, as part of their business and marketing models, to test for GE presence or percentage and provide such information on the seed bag – likely for a premium price – to cater to a small niche market that may be trying to meet certain IP contract specifications. As was discussed during AC21 meetings, certain companies already do offer this option in the marketplace. Not all companies will choose to enter into this market, and they should be free to decide what product offerings best fit their business and marketing models.
- Not all non-GMO/non-GE seed is intended to be used to service GE-sensitive markets; therefore, providing such information on all seed would be unnecessary for most in the marketplace, and would unnecessarily drive up costs for all producers.

Policy Considerations

Prior to making any policy changes, seeking additional authorities, conducting further studies, or implementing recommendations and suggestions discussed in the 2012 and 2016 AC21 reports, USDA should confirm that any specific such actions are based on actual verified data, grounded in sound science, account for potential domestic and international policy implications, and are legally defensible. In addition, definitions used in the AC21

reports reflect compromised positions by AC21 members, and should be used for the limited purpose of reviewing the AC21 reports, and not for other purposes.

NASS Organic Production Reports – USDA collected initial data that was self-reported by individual producers who believe that the value of their crops was reduced by unintended presence of GE materials, thus causing them economic losses.

- In 2014, 31 certified organic farms (0.25% of the 12,634 farms reporting) reported GE-related economic losses totaling \$506,552 (0.009% of the 2014 total organic production of \$5.5 billion).
- In 2015, 32 certified organic farms (0.25% of the 12,818 farms reporting) reported GE-related economic losses totaling \$520,671 (0.008% of the 2015 total organic production of \$6.2 billion).

USDA should not make any policy changes based on these reported data because first, reported economic losses are extremely small relative to overall organic production, and second, there are data gaps and limitations on that gathered information. Limitations on the data include, but are not limited to: (1) the data were self-reported and were not independently verified in any way; (2) data were not reported by commodity; (3) no data were collected about whether the producer had lost his/her organic certification, or whether the reported loss was due to not meeting IP contract specifications (the presence of detectable GE residue in organic product does not in itself constitute a violation of USDA's organic regulations; instead, the value of the organic product may be diminished based on tolerance levels set by private buyers); (4) no data were collected on actual contractual specifications associated with any reported losses (e.g., were the specifications realistic?); and (5) no data were collected on whether the producer knew the source of any unintended presence of GE material in the organic crop (e.g., was the source from a producer's own farm, a neighboring farm, or elsewhere in the value chain?).

US Regulatory Framework – Currently there are efforts at USDA and the White House Office of Science and Technology Policy (OSTP) to update both USDA's regulations for GE organisms and the Coordinated Framework under which the US regulates GE products. The US regulatory system currently has the authority and responsibility to ensure that all crops and crop products, regardless of the processes used to select, breed, or develop them, do not have adverse impacts on consumers or the environment. The US government has a well-established history of making regulatory decisions that: are based on the best available scientific and technical information; protect health and the environment; are risk-based; and are based on the attributes of each product within the scope of the reviewing agency's authority and the environment into which it is being introduced (not based on the process by which the product was created). These and other key points were reinforced in OSTP's recently released document "National Strategy for Modernizing the Regulatory System for Biotechnology Products" (9/16/2016), as continuing principles underlying any future regulation of GE products in the US. In the context of these OSTP efforts, it should be noted that there are current efforts by the US government to work toward consistent policies across countries to minimize trade impacts.

Conclusion

I appreciate USDA's strong interest in the continued coexistence of different cropping systems that facilitate grower and consumer choice, without undermining the exceptional record of innovation, productivity, and product stewardship in US agriculture. Thank you to USDA's leadership for bringing together the AC21 – a diverse group of individuals – to collaborate, to compromise, and to engage in thought leadership on the important topic of coexistence.

Comments from members who have not joined in consensus

Note: Provision of comments is optional and each comment represents the views of an individual member, not the policy or positions of USDA.

Isaura Andaluz

Nature

Nature is superior to technology. It inherently seeks to regain balance. Compacted soils, stripped of life by herbicides, pesticides and nitrates, litter the US like shriveled corpses. Attempts to resuscitate them by pumping nitrogen gas into the soil fail. Instead, glyphosate-resistant weeds flourish as they seek to extract excess nitrates. The palmer amaranth, an edible weed for humans and animals, continues to outsmart the biotech industry, becoming resistant to each herbicide introduced, such as the volatile dicamba and 2-4D.

It is already known that the palmer amaranth can build a resistance to dicamba in only three generations. Why decimate millions of acres of land – killing and polluting everything in sight, when these weeds could be pulled before they set seed and even used for animal feed? In the end, nature will always win.

Seeds are the memory of life. They have been stewarded by farmers who for thousands of years have saved and replanted seeds that have evolved and adapted to change. Resistance to pest, disease and salinity are traits developed by nature and not by a biotech company. These seeds have not just fed us, they have been the foundation of communities and a way of life. When did growing one's own food become synonymous with poverty? But now, with GE contamination, staple crops are at risk. Corn is a sacred and staple food crop in the southwest of the US. Grown for hundreds of years, it is now on the verge of extinction, if not already extinct in uncontaminated forms.

The Charade of Coexistence

In the March 2016 AC21 meeting, I re-emphasized the importance of GE-free seed for farmers who replant. Once seed is contaminated, it is gone forever. The GE traits are patented, preventing "research," and the traits cannot be bred out. Mr. Kemper, an AC21 member, commented that the only seeds that need to be kept clean of contamination are the ones in the Svalbard Vault (comments missing in March 2016 transcript). The implication is that the "unintended presence" of GE material is inevitable. If we have to learn to live with what we call contamination, there is no real coexistence. This report is not about how to coexist, it is about how to divide up the spoils.

Coexistence was not an issue in the past because a farmer could breed out the contamination. That is no longer possible because seeds are not just genetically modified, but genetically engineered and patented. This is a fundamental distinction on a genetic and legal basis. Thus, there is no way that a farmer with a contaminated lot can coexist like in past years. It does not matter that the GE product is "legal," farmers should not have to succumb to genetic pollution.

AC21 Report: A Framework for Local Coexistence Discussions - Stand-Alone Documents

In the new AC21 report, everything becomes IP (identity preserved), except GE (genetically engineered). The assumption is that because a non-GE crops (IP) receives a “premium,” they therefore must assume full responsibility to keep the product free from unintended presence. This is not true coexistence. AC21 member, Greg Jaffe stated, “...comments that the USDA received during the public comment period [for Coexistence] ... illustrate just how polarized the debate is. One is from BIO, the [biotech] industry trade association, which states, ‘Ultimately, growers seeking a premium from IP crops are responsible for implementing the necessary practices to preserve them.’ That comment sounds like ‘It is not my problem, it is their problem.’”¹⁸ This is exactly what the AC21 report now requires of farmers, “It is the producer’s responsibility to meet the requirements of those contracts.”¹⁹

The Report incorrectly places the responsibility for keeping fields free of pollution with the non-GE farmer. Traditionally, property owners would “fence out” the stray cattle. But if the cattle entered their property, the owner could do what they pleased with the cattle. Now the tables have been turned. If the GE material (plant, seed, pollen) lands on the non-GE owner’s property, the GE manufacturer can sue the owner.

This report institutionalizes that IP and organic farmers must assume contamination through the voluntary guidelines. If issues arise, farmers and property owners are to work with their local and state agencies to create coexistence plans. The problem is that the list of conveners are not unbiased and most, if not all, promote GE crops. In fact, agencies like the our local universities (New Mexico State) and the American Farm Bureau have lobbied in New Mexico against farmers’ rights on several occasions. This is further confirmed by the section on “Meeting IP Requirements,” parts of which come directly from biotech planting guides (e.g., Using crop rotation schemes to reduce pollen exposure from volunteer plants).

A presentation and public comment letter by the NASDA (National Association of State Departments of Agriculture) emphasized the need for guidelines to deal with coexistence. But their primary motive was exposed under the “Bottom Line” slide of the NASDA’s presentation to AC21: “Avoids the race to regulate by the federal government.”

Kathleen Merrigan states she is not a supporter of mandatory GMO labeling because of “the costs and complexity.”²⁰ But somehow it is okay to expect that any farmer who does not want GE traits in their crops has to assume all costs and liability because they supposedly get a “premium” price.

¹⁸ Jaffe, Greg, “Coexistence of Biotech, Organic, and Conventional Crops: Facts, Issues, and a Path Forward,” North American Agricultural Biotechnology Council, The Pennsylvania State University, June 2-3, 2015, pg. 41.

¹⁹ AC21 Report, Other topics of interest for discussion, Contractual Obligations.

²⁰ Merrigan, Kathleen. “Thinking across Time: A 20-Year Perspective on Biotech Policy,” North American Agricultural Biotechnology Council, The Pennsylvania State University, June 2-3, 2015, pg. 19.

Market Demand

The November 2012 AC21 report defines "coexistence" as: "...the concurrent cultivation of conventional, organic, identity preserved (IP) and genetically engineered (GE) crops consistent with *underlying consumer preferences and farmer choices*." Yet, in the September AC21 meeting, Secretary Vilsack made it clear that "agricultural production would reflect agriculture's capacity, and not what the market demanded."

At the USDA Stakeholder Workshop on Coexistence, at North Carolina State University (March 2015), Errol Schweizer (Whole Foods) presented on current market trends. From 2010 to 2014, the demand for non-GMO products had increased 426%; demand for organic products increased 77%. This clearly demonstrates a growth market and that consumers do not want GE products.

The Workshop was highly skewed toward GE, with presenters repeatedly commenting, "GE is safe." Twice, I have asked Secretary Vilsack for a response to a letter organic participants submitted to him, requesting he visit an organic farm and hold a balanced workshop. In the September AC21 meeting, both he and Alan Kemper (AC21 member) simultaneously told me that it was a "workshop" not sponsored by USDA, thus did not have to reflect a balanced view. So much for notions of coexistence.

"Regulate or incent it," is how Secretary Vilsack recently talked about US agriculture. The Report reflects this, as do the North American Agricultural Biotechnology Council 2015 Proceedings where GE farmers are to be incentivized to participate in coexistence.

Dismantling of AC21

The AC21 reports are quoted frequently by government departments (e.g., GAO) and elected officials. AC21 is NOT a diverse group of people. The majority of the members are pro-GE, current or former American Farm Bureau representatives or are associated with biotech. This committee serves to rubberstamp and institutionalize what these GE groups want, thus it should be dismantled.

Nowhere to Turn

President Obama recently stated "...he wanted to help ensure that a healthy planet is passed onto the generation of his daughters...".²¹ He is failing. He appointed Tom Vilsack as USDA Secretary, re-released the GE alfalfa in 2011, and signed the Stabenow Labeling Bill the day after the Democratic Convention that prohibits the labeling of seed, among other restrictions.

How did we get here? Kathleen Merrigan states that the first proposed organic rule in 1997 did not include a prohibition on biotech, even though the majority of existing private and state organic standards in the country included such a prohibition.²² "It did not take brilliant minds to look into the future and realize there may be the same sorts of threshold issues

²¹ Obama Makes Climate Change Personal with Call for Action in Home State Hawaii, Guardian, September 1, 2016.

²² Merrigan, op. cit., pg. 19.

that consumers would demand for an organic product around GM in the same way it is for pesticides. It was a really big decision and it actually went to President Clinton.”²³

Postscript

“Nature abhors the unnatural.” (Masanobu Fukuoka)

Charles Benbrook

I do not concur with this report for three reasons.

First, the report does not represent a serious or meaningful response to the charge given to the AC21 by the Secretary. Our recommendations boil down to the USDA and agricultural community should hold meetings, and local coexistence discussions should be facilitated. Such meetings are unlikely, and even if they occur, there is no reason to believe they will foster changes in farming practices of sufficient scope to have a meaningful impact on coexistence.

If our work, and developments impacting coexistence over the last five years, had produced evidence that coexistence challenges are widely accepted, and are being effectively addressed, and hence do not pose significant problems, I would concur with what is, in effect, a “do no harm” set of recommendations. But unfortunately, I conclude from the work of this AC21 that:

- Coexistence challenges are in the eye of the beholder, and are growing more common and consequential, both in terms of rural culture and quality of life, and profitability on the farm,
- Many farmers and agribusiness interests do not accept responsibility for costs and lost income imposed on non-GE, IP producers (i.e., they are in denial re market access coexistence issues, to one degree or another),
- The scope and seriousness of coexistence challenges are being driven largely by international policy and market developments, an important reality impacting U.S. agriculture that has largely been ignored by this AC21,
- Because the U.S. government has largely abdicated its role in shaping international norms, policies, and coexistence strategies, farmers and the food industry in the U.S. are losing control over the forces shaping the use and acceptance of GE crops and related technology, and as a result, the coexistence challenges of the future, and
- New and serious coexistence challenges have emerged, or are on the horizon, as a result of the approval of a new generation of multi-herbicide tolerant crops, challenges that this AC21 was unwilling to address in a meaningful way.

Second, I do not concur with the discussion in the report on seed quality, nor the decision to not make clear-cut, seed quality recommendations. In particular, I object to the decision to not include in our report a call for stakeholders, including the USDA, to come together and

²³ Jaffe, op. cit., pg. 50.

put in place a mechanism to provide information to farmers on the probable increase in AP a grower can expect from gene flow from nearby GE production fields.

There was support for this recommendation among a sizable portion of AC21 members, and what seemed a workable compromise was reached at our final meeting.

The objections raised against presenting the basic concept, and encouraging work to compile and make the information available to farmers, were ideological and ungrounded.

In my opinion, a straightforward discussion of these seed quality challenges and information needs would have constituted the single most helpful and constructive recommendation from our five years of meetings. I regret that some members of the committee felt it necessary to, in effect, deny farmers access to information that could help them secure and thrive within value-added IP markets.

My third reason for non-concurrence is I disagree with a number of statements in the report regarding progress made, the effectiveness of ongoing coexistence efforts, and the value of dialogue within this AC21. I also doubt that a similarly constituted and managed AC21 in the next Administration will fare any better.

It is regrettable that the Secretary provided AC21 such a narrow charge, because we were never able to more than acknowledge the existence of the core drivers of coexistence challenges.

This tactical decision by USDA undermined this AC21's ability to seriously address the most important issues (e.g., the need for, and basis to set market thresholds for AP; how to set and enforce seed quality thresholds designed to assure access to high-value, IP markets; and, the responsibility of technology developers to help cover costs imposed on non-GE, IP producers as a result of gene flow).

Our inability to reach agreement on big-ticket items reflects the deep divisions in the food and agricultural community, and among some consumers, on many aspects of GE crop and animal technology. These divisions are the roots feeding coexistence challenges. A properly balanced AC21 composed of well-informed individuals representing the range of views across society is rarely going to be able to agree on major changes in policy or priorities, or even on problem identification. But still, decisions have to be made and actions taken. Inaction that preserves a dysfunctional status quo is, of course, also a consequential decision.

My suggestion to the new Secretary, if he or she chooses to reconstitute AC21, is to use the committee to vet specific policy issues or proposals. The charge to the committee could include:

- Laying out the most commonly mentioned options to resolve a given problem, or address an emerging challenge,
- Explain the pros and cons, costs and uncertainties inherent in each option, and
- Suggest a way forward that has potential to maximize positive outcomes and minimize conflicts and collateral damage.

An AC21 report that covers the above ground will not shield agency heads and political leaders from their responsibility to make a decision and take action, or perpetuate inaction. Nor will spelling out pros and cons of policy options appease all stakeholders and prevent litigation or other opposition. But such a report should help shape a path forward that thoughtfully addresses underlying challenges in ways most people will see as affordable and effective, while minimizing the chances of creating new problems, or just “kicking the can down the road.”

I appreciate the opportunity to serve on this AC21, and hope that some good will come from our collective efforts.

ADVISORY COMMITTEE ON BIOTECHNOLOGY AND 21ST CENTURY AGRICULTURE MEMBERSHIP

Russell C. Redding, Pennsylvania Secretary of Agriculture, of Doylestown, Pennsylvania
(Chair)

Isaura Andaluz, Executive Director, Cuatro Puertas, of Albuquerque, New Mexico

Paul C. Anderson, Executive Director, International Programs, Donald Danforth Plant
Science Center (retired), of St. Louis, Missouri

Laura L. Batcha, Chief Executive Officer and Executive Director, Organic Trade Association,
of Putney, Vermont

Charles M. Benbrook, President, Benbrook Consulting Services, of Enterprise, Oregon

Barry R. Bushue, Farmer, Former Vice-President of the American Farm Bureau Federation
and President of the Oregon Farm Bureau, of Boring, Oregon

Lynn E. Clarkson, Farmer and Chairman, Clarkson Grain Company, of Cerro Gordo, Illinois

Leon C. Corzine, Farmer, of Assumption, Illinois

Douglas C. Goehring, North Dakota Commissioner of Agriculture, of Menoken, North
Dakota

Melissa L. Hughes, Corporate Counsel and Director, Government Affairs, CROPP
Cooperative/Organic Valley Family of Farms, of Viroqua, Wisconsin

Darrin Ihnen, Farmer and former Chair, National Corn Growers Association, of Hurley,
South Dakota (absent)

Gregory A. Jaffe, Director, Biotechnology Project, Center for Science in the Public Interest,
of McLean, Virginia

David W. Johnson, President, The Johnson Group, of La Crosse, Wisconsin

Alan R. Kemper, Farmer and former President, American Soybean Association, of
Lafayette, Indiana

Keith F. Kisling, Farmer and former Chairman, Oklahoma Wheat Commission, of
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Angela M. Olsen, Senior Advisor and Associate General Counsel, DuPont Company and
Pioneer Hi-Bred, of Arlington, Virginia

Jerome B. Slocum, Farmer and President, North Mississippi Grain Company, of Coldwater,
Mississippi

Latresia A. Wilson, Vice-President, Black Farmers and Agriculturalists Association, Florida
Chapter, farmer, and physician, of Ocala, Florida

Ex officio members

Ronald Carleton, U.S. Environmental Protection Agency
Julia Doherty, Office of the U.S. Trade Representative
Ritu Nalubola, U.S. Food and Drug Administration
Kelley Rogers, National Institute of Standards and Technology

Note: Under the AC21 Charter, *ex officio* members may not join in consensus on AC21 reports.

Michael Schechtman, AC21 Designated Federal Official

Appendix A: Summary of main USDA activities initiated in response to the November, 2012 AC21 report
(Adapted from document provided by USDA to the AC21 for its December, 2015 meeting.)

Compensation measures plus relevant new market-related information

New Economic Research Service (ERS) study underway on the economic implications of coexistence

ERS is planning to publish a report within the next several months that broadly examines the economic issues related to coexistence of organic, genetically engineered (GE), and non-GE crop production, including adoption trends for these crops and their identity-preserving differentiated product markets and labels. American consumers continue to fuel a fast-growing market for organic food, and a market for non-GE conventional products has emerged as well. The U.S. also has continued strong domestic and international demand for commodity crop production, much of which involves GE crops. In order to maintain the integrity of GE-differentiated markets, organic and conventional non-GE farmers are using a variety of practices to avoid the presence of GE material in their crops. The ERS report examines commonly used coexistence practices used during crop production, and discusses the economic losses from the presence of GE material in organic crops.

Improvement of crop insurance options for farmers not growing commodity crops.

Since 2012, USDA has eliminated the insurance premium surcharge for organic farmers, added price elections for 52 crops, and created the contract price addendum, which is available for 73 crop types. The contract price addendum allows producers to use their contract price to establish crop insurance guarantees rather than USDA-established prices. In its first year of operation, nearly 10 percent of the organic policies utilized the price addendum. Overall, these changes contributed to a 25 percent increase in organic acreage covered by crop insurance. From 2012 to 2015, there has been a 24 percent increase in the number of organic policies. There are continuing efforts to increase the number of organic crops with price elections. In addition, as provided for in the latest Farm Bill, USDA can now offer farmers insurance under Whole Farm Revenue Protection, a crop insurance policy that allows producers to ensure every commodity on the farm. This tool offers the potential to provide a safety net for people who have never before had the option of crop insurance. Beginning with the 2016 crop year, the Whole Farm Revenue Protection insurance policy will be available to producers in all States.

New USDA Market News Report with Non-GE/GMO Commodity Focus

On September 2, 2015, the Agricultural Marketing Service (AMS) Livestock, Poultry, and Seed Program (LPS) started publishing a weekly Market News report focusing on non-GE/GMO grain commodities. This national weekly report is issued on Wednesdays and highlights the corn and soybean trade; other commodities will be added as the Market News

contact base is increased. The report is available at:
http://www.ams.usda.gov/mnreports/gl_gr112.txt.

Consultation with Office of General Counsel (OGC) on current authority to implement compensation-related coexistence measures. OGC has indicated that USDA currently lacks the legislative authority to implement a crop insurance program that would address economic losses to farmers resulting from unintended presence of GE material. OGC has also indicated that USDA currently lacks the legislative authority to implement a program to incentivize the development of joint coexistence plans by neighboring farmers. Also see Research, below, on survey of GE-related losses incurred by organic farmers.

Potential use of conservation programs in some instances to facilitate farmers' measures to promote coexistence

Conservation programs administered by Natural Resources Conservation Service (NRCS), and the practices used to implement conservation, must focus on natural resource concerns. Although genetic isolation is not a natural resource concern, there may be occasional opportunities where producers can mutually achieve conservation and coexistence goals. However, because NRCS does not have the expertise for addressing genetic isolation issues, it would need to rely heavily on USDA and university scientists for the needed technical information. With this information, NRCS could consider the potential usefulness of its conservation practices in some circumstances to address coexistence concerns, and application of the practices could be attempted first on a localized, pilot-scale basis.

Stewardship and Outreach

Seeking public input through the Federal Register on how to foster communication and collaboration to strengthen coexistence. On November 4, 2013, USDA published a notice requesting public input for a 60-day comment period, and subsequently extended the comment period for an additional 60 days. There were 4,171 comments received. In brief, relatively few commenters offered comments that were directly responsive to the items in USDA's request for information. Many or most of those who provided comments who did not specifically address the issues on which USDA requested information had serious concerns or issues they wished to raise, but much of their comments were outside the scope of the intended discussion. The majority of commenters generally opposed the growing, production, and marketing of GE products, and some favored banning GE crops. Many commenters raised concerns not included in the Request for Information, including GE labeling, potential human and animal health effects from ingesting GE-derived products, effects of pesticide use, what was referred to as "contamination" risks for heirloom and conventional seed stocks, international trade, and consumer rights, among others. Most comments that referenced the AC21 report opposed the premise that coexistence would provide adequate protection for organic farmers and consumers. A number of comments described the burden of addressing unintended GE presence as falling disproportionately on organic and conventional growers, and argued for additional regulatory controls on the commercial production of GE crops. In contrast, other comments argued that coexistence is nothing new for agriculture and is generally working. Many expressed the view that the

responsibility for preventing what was referred to as “contamination” of IP and organic production should lie with GE growers and the GE industry. Most commenters who opposed coexistence did not discuss any of the AC21 report’s recommendations in detail.

Among the relatively small number of comments that were directly responsive to USDA’s specific requests in the Request for Information, many highlighted the need for additional information—whether about best practices in crop production or contracting, about economic damages, about seed purity, about locations of neighboring plantings, or other topics, or a general need for increased education around any of these issues or the science underlying them. Some highlighted the need for confidentiality for some information that might be provided to the government. Some commenters discussed the issue of farmer-to-farmer communication. Some noted the value of such communications and indicated that such communications may take place but do not guarantee particular behavior changes. Other farmers, in discussing their neighbors, did not express an interest in entering into dialogue with them. Some called for local, crop-specific solutions led by farmers and educators.

□ **Holding a stakeholders workshop on coexistence.** In order to continue the discussion on how to foster communication and collaboration to strengthen coexistence, USDA decided to hold an invitation-only stakeholder workshop on coexistence, which took place on the campus of North Carolina State University in Raleigh, NC, on March 12-13, 2015. At the workshop, USDA focused on activities either completed or under development in response to the AC21 recommendations and solicited comments from participants and members of the public in following weeks. USDA listened carefully to the views offered at the workshop.

□ In its official requests for comment, approximately 475 comments were received, from organic farmers, conventional farmers, and farmers that grow genetically engineered (GE) crops, as well as national, regional, and State trade organizations representing each of these; seed companies; organic product retailers; consumer rights, environmental protection, and other nonprofit advocacy organizations; consumers of organic foods; scientific research organizations, and members of the public. The majority of commenters categorically opposed the growing, production, and marketing of GE products, and many questioned whether agricultural coexistence is even possible. A broad range of concerns was expressed. Many commenters objected to the invitation-only restriction for the workshop and thought it to be a “lost opportunity” for a balanced dialogue about GE crops and coexistence and a smaller number of commenters offered the view that the workshop had been a useful forum for promoting coexistence.

While most commenters stated their concerns generally and without reference to the workshop, some did specifically address the workshop discussions, presentations, existing and proposed USDA initiatives, and conclusions drawn during the workshop. With regard to the slate of USDA initiatives, the following items (described throughout this document) received the most support:

- Work to bolster the purity of USDA germplasm repositories and develop best management practices for GE seeds

- Support for the Organic Seed Finder (with a recommendation from some that USDA develop a comparable non-GE seed finder as well)
- Use of Natural Resource Conservation Service (NRCS) programs where applicable to facilitate achievement of coexistence goals
- All of the ongoing research efforts through the Agricultural Research Service (ARS), ERS, the National Institute for Food and Agriculture (NIFA), and the National Agricultural Statistics Service (NASS), including work on restricting gene flow or characterizing its impacts, studying the potential economic impacts of coexistence, and surveying organic producers for losses (with a recommendation from some that non-GE producers also be surveyed)
- The use of the AMS Process Verified Program for identity-preserved products (though some in the organic industry worried that it could create a weaker label than “organic” or discourage producers or brands from transitioning to organic).

An APHIS proposal for voluntary submission of conflict analyses and coexistence plans by developers also received some support from organic producers although a number of those commenters thought such efforts should be made mandatory and/or completed by USDA in the absence of a voluntary plan. In addition, a number of commenters offered the view that APHIS should revise its Part 340 regulations to institute mandatory restrictions on pollen flow from commercial GE crops. There was relatively little support for USDA proposals on an overall outreach and education strategy and on farmer toolkits and for the new USDA website on coexistence.

Provision of informational materials describing voluntary and outcome-based strategies for facilitating production of all types of identity preserved products

Information was developed which was provided at the Raleigh workshop about the use of pinning maps, grower zones, screenable markers, pollen-excluding traits, and procedures in place in the organic industry to prevent commingling and unintended presence.

Toolkits providing resources that encourage communication, planning, and crop-specific practices to reduce unintended gene flow or post-harvest mixing, as well as information on contract issues and incentives, plus other relevant informational materials

USDA is now hosting a Web site devoted to informational resources about coexistence. The site consolidates and presents coexistence-related information and resources from across all USDA agencies, as well as partners in the States, industry, and scientific communities. Content on the site is intended to help support continued discussion and engagement regarding agricultural coexistence. There are a series of factsheets that define agricultural coexistence, explain its importance, and highlight key aspects supporting coexistence in different sectors of U.S. agriculture. USDA welcomes additional refinements and updates to these materials. USDA may explore developing additional toolkit products for the Web site that will support ongoing dialogue about coexistence and encourage adoption of best practices. USDA looks forward to expanding the information and resources

for the Web site, as well as ideas about additional toolkit products that are needed to help advance coexistence.

Separately, in the spring of 2015, the National Organic Standards Board (NOSB) published two discussion documents for public comment: "Discussion Document on Excluded Methods Terminology" and "Prevention Strategy Guidance for Excluded Methods." With the first document, the NOSB sought to update the definition of excluded methods in order to clarify and modernize the terminology in light of new technologies. With the second, the NOSB sought to solicit input and feedback from the organic community on precautions that organic producers and handlers should take to prevent and minimize GMO presence in organic production and processing. USDA's Agricultural Marketing Service (AMS) expects the NOSB to make recommendations based on these documents in May 2016, after which AMS can consider further guidance or rulemaking actions.

Use of AMS Process Verified Programs to verify non-genetically engineered crops/processes

The USDA Process Verified Program provides companies that supply agricultural products or services the opportunity to assure customers of their ability to provide consistent quality products or services. It is a fee for service program and is limited to programs or portions of programs where specified process verified points are supported by a documented quality management system. The specified process verified points are identified by the supplier. Companies with approved USDA Process Verified Programs are able to make claims associated with their process verified points and their verified process points are documented and available for public view on the AMS website. The USDA Process Verified Program does not relieve the company of meeting regulatory requirements issued by other Federal Departments or USDA Agencies. In February 2015, AMS approved the first USDA Process Verified Program (USDA PVP) for Non-GE/GMO products. The program is currently approved only for the bulk food grade corn and soybeans processed at one SunOpta facility in Minnesota. The process specifies that products verified as Non-GMO are made from ingredients that were not produced using genetic engineering (GE) and meet SunOpta's standard of 99.1% Non-GMO/Non-GE minimum (or testing specification 0.9% GMO/GE Maximum). AMS expects the first retail launch of a Non-GMO/Non-GE USDA PVP marketing claim on a retail label in 2016. Several other applications for similar Non-GE/GMO PVP claims are in process.

Research

Gathering information from farmers about actual economic losses incurred as a result of unintended GE presence

The 2014 Organic Survey was conducted as a collaborative effort between USDA's National Agricultural Statistics Service (NASS) and its Risk Management Agency (RMA). The survey population was those producers certified as meeting the USDA standards for organic production, those exempt from certification, and those transitioning to certified organic production. In the survey, among many other questions, respondents were asked to answer

several questions related to economic losses received from unintended presence of GE material in an organic crop produced for sale. Results from the survey were published on September 17, 2015. The survey established that such losses exist and that those losses came to roughly \$6.1 million over the years 2011-2014. This compares to \$5.5 billion in overall sales for organic farmers as a group in the one year 2014. The number of farmers reporting losses, 0.65% of farmers surveyed, was very small relative to the overall response rate to the survey instrument. Further analysis suggests that while less than one percent of all organic farmers in California, Indiana, Maine, Minnesota and Michigan experienced losses due to the unintended presence of GE material, between 5 and 10 percent of organic farmers in Illinois, Nebraska, Oklahoma, and Texas experienced losses. However, commodity-specific estimates cannot be reported due to data limitations.

Funding or conducting research relevant to crop stewardship and gene flow risk mitigation. Under USDA's Biotechnology Risk Assessment Research Grants (BRAG) program, starting with the FY 2013 Request for Applications (RFA), relevant topics in these areas (e.g., assessment of the efficacy of existing techniques for mitigating unintended presence on a crop by crop basis and/or in seed production/multiplication systems on a crop by crop basis; and development of novel strategies to mitigate unintended presence of GE traits in non-GE production systems) have been included as priority funding areas.

Relevant funded research projects include, among others: three projects studying technologies to inhibit gene flow either by developing male sterility, pollen confinement, or plastid transgene containment; one project investigating the impact of GE traits on insect migration; one project investigating the control of seed dormancy for reducing fitness of GE plants in the environment; and one project studying an inexpensive, in-the-field detection method for monitoring GE organisms in the environment. These research projects are ongoing. In addition, a National Academy of Sciences public workshop on the environmental effects of GE and non-GE crops in Washington, D.C. was funded in 2015.

Conducting research on landscape-scale gene flow in alfalfa.

USDA scientists have an ongoing research project to examine the movement of the Roundup-Ready herbicide resistance trait in alfalfa in the field. The three main project objectives are: (1) to assess the role of feral alfalfa in transgene transmission; (2) to determine the impact of pollinator behaviors on pollen-mediated gene flow; and (3) to analyze the flow of transgenes from Roundup-Ready alfalfa (RRA) seed production fields to conventional alfalfa seed fields in different environments.

Feral alfalfa management. USDA scientists confirmed that genetically engineered alfalfa has dispersed into the environment. The data suggest that eradicating feral alfalfa along road sides and minimizing seed spillage would be effective strategies for minimizing transgene dispersal. Manuscript in review.

Pollinator-mediated gene flow. USDA scientists analyzed the rate of inadvertent carry-over of GE alfalfa pollen in honey bee hives. The adventitious presence (AP) of GE pollen was extremely low. Thus, hive movement resulting from standard beekeeping practices is unlikely to result in cross-pollination between transgenic and GE-sensitive alfalfa seed varieties. By contrast, USDA results show that alfalfa leaf cutter bees (ALCB) frequently

forage at ranges that exceed previous estimates. However, the rate of GE trait detection in harvested seed is dramatically lower than that detected in pollen, indicating that pollinator-mediated cross-pollination between transgenic and conventional alfalfa seed varieties occurs at extremely low rates, despite regular ALCB foraging visits across field edges. Manuscript accepted (*Apidologie*, 2016).

Field-to-field transgene transmission. To better understand how landscape affects gene flow from transgenic to conventional alfalfa seed production fields USDA scientists are analyzing seeds collected from different zones in 24 commercial fields. Results regarding gene flow and AP in alfalfa seed and hay have been shared extensively through outreach efforts at industry meetings, conferences, and through personal communication with growers, industry representatives and academia. 10 publications/presentations given in 2015. Manuscript in preparation.

Conducting research on the control of corn pollen germination. USDA researchers and land-grant university researchers are collaborating in long-term research that focuses on developing strategies for deploying genes to control pollen germination on receptive corn plants on which the pollen lands. These “gametophytic incompatibility genes” can limit undesired outcrossing among corn market classes. The private sector is also working on this trait, and new corn hybrids that will not accept GE pollen are becoming available for some specialty types in organic systems. Future research may include development of similar systems for other types of specialty corn, as well as genetic studies to look for similar systems that might be found in other crops.

Work with seed industry on specialized seed availability and farmer-seed industry interactions

USDA has had discussions with the American Seed Trade Association (ASTA) regarding the availability of seed to meet grower demand for the GE, identity-preserved non-GE, and organic markets and about resources for seed purchasers about best production practices for coexistence. As noted at the USDA Stakeholders Workshop on Coexistence held in March, 2015, it is challenging to accurately forecast total annual organic commercial grain production and demand, and seed production for relatively small markets requires advance planning—seed for specialized markets is not produced absent specific, known demand. For such organic and non-GE markets (and particularly for crops for which most overall demand is for GE crop varieties rather than for organic or non-GE seed), ASTA has indicated that it is imperative that growers talk with seed producers well in advance of signing production contracts, and at least a year ahead of planting, preferably longer. ASTA also indicated that it has efforts underway to develop a process to facilitate the licensing of elite germplasm for further breeding for non-GE markets. With regard to provision of information to farmers about coexistence practices, ASTA has stressed the role of State and local channels in providing the most accurate best practice information related to specific crops and geographies.

Seed Quality

Support for the development of an “Organic Seed Finder” database. The Agricultural Marketing Service (AMS) National Organic Program (NOP) awarded a one-year contract to the Organic Seed Alliance (OSA) and its partner, the Association of Official Seed Certifying Agencies (AOSCA), in February 2014. The objective of this contract is to better understand the organic seed market, communicate about the organic seed market and resources – including the Seed Finder database - to certifying agents and organic operations, and identify needs for increased sources of specific types of organic seed. The project was intended to provide USDA with: reports about organic seed needs; educational outreach materials about the organic seed market, seed finder database, and other resources; and specific targeted reports about the types and locations of certain types of organic seeds available to organic producers. AMS did not provide additional support to the Organic Seed Finder database in 2015.

Development of an approach for examining trueness-to-type of holdings in the USDA/ARS National Plant Germplasm System (NPGS). A plan has been developed to prioritize NPGS accessions (samples) for closer examination of their trueness-to-type. There are roughly 574,000 NPGS accessions of about 15,000 plant species in the NPGS. But only about 20 of these species include genetically-engineered varieties that have been granted non-regulated status by USDA’s Animal and Plant Health Inspection Service (APHIS). Roughly 5-6% of the total 574,000 accessions in the NPGS belong to these 20 species and were either acquired since GE varieties began commercial cultivation in the U. S. or were regenerated in the field since then. These 30,000 or so accessions (90%+ from the three crops soybean, corn, and cotton) are the focus for current re-examination of stewardship procedures and practices (see subsequent paragraph). Staff have initiated a small-scale project, in collaboration with seed industry partners, focused on identifying cost-effective means for testing and monitoring genebank samples and breeding stock for the unintended presence of transgenes in one major crop. This project provided important practical information for developing the updated best management practices described in the subsequent paragraph.

Development of updated procedures and best management practices for GE traits in plant germplasm and breeding stocks

The Agricultural Research Service (ARS) has revised and updated Agency-wide procedures and practices for handling GE traits and unintended presence of the latter in USDA/ARS crop breeding stocks and genebank collections. The procedures and practices focus on the five major crops with widely cultivated varieties that incorporate deregulated GE traits: cotton, maize, soybean, alfalfa, and sugarbeet. These procedures and practices encompass five major elements:

- 1.** Well-documented, reviewed, and accessible best management practices (BMPs) for maintaining seed purity in both breeding and genebank programs.
- 2.** Testing for purity at critical control points.
- 3.** Mandatory purity testing of new varieties or enhanced germplasm prior to formal release.

4. Guidelines for mitigating the effects of unintended presence of GE traits in breeding stocks and germplasm accessions.
5. Communication strategies for disseminating information about Agency procedures and practices and for handling future occurrences of unintended presence of GE traits.

The updated procedures and practices have been reviewed internally and by numerous external stakeholders, including the National Genetic Resources Advisory Council. They have also been provided as a courtesy to members of the AC21.

On-going evaluation of the pool of commercially available non-GE and organic seed varieties and identification of market needs for producers serving GE-sensitive markets. On-going evaluation of the pool of commercially available non-GE and organic seed varieties and identification of market needs for producers serving GE-sensitive markets. USDA reestablished the National Genetic Resources Advisory Council (NGRAC) as a subcommittee of its National Agricultural Research, Extension, Education and Economics Advisory Board in 2012. Among the work projects for the NGRAC is to develop a plan for how USDA should work with industry and other stakeholders to accomplish this goal. The Committee met several times in 2013 and 2014 and submitted an interim report to the Secretary of Agriculture in August 2014. The NGRAC met again at the end of March 2015 and completed its final report in response to the AC21. The report will be delivered to the Secretary by the second week of December 2015.

APPENDIX B:**Development of this AC21 report**

The AC21 has met 4 times to discuss the current charge. The Committee considered presentations from outside experts and USDA representatives, and listened to comments from members of the public on the Secretary's charge at each of its plenary sessions. In addition, at its first meeting on this charge in December, 2015, the AC21 established three subgroups to help frame information for the full AC21's consideration on three relevant subtopics, namely, Guidance document, Models and Incentives, and Venues and Conveners. These subgroups met a total of 11 times to help gather information and perspectives for consideration by the full Committee. The Committee also had the benefit of all of the earlier coexistence work it and earlier versions of the AC21 had produced. All of the presentations, public comments, meeting summaries from plenary sessions and working group meetings, and earlier reports of the AC21 are available on the USDA AC21 web page (at

<http://usda.gov/wps/portal/usda/usdahome?contentid=AC21Main.xml&contentidonly=true>).

This paper reflects the range of input received and is shaped by the broad collective substantive expertise of the Committee members. It is intended to capture areas of both agreement as well as areas of disagreement among members, and provides a set of concrete recommendations for USDA action. This report was initially drafted by the AC21 Chair and Designated Federal Official based on Committee discussions, with input and review during the report finalization process.