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 conventional[1], organic[2], identity preserved (IP), and genetically engineered (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.

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 responsibility and take their neighbors' concerns into consideration in their farm management decisions. Coexistence in rural communities can show that complex issues among individuals with different approaches to farming can be peacefully resolved. The AC21 believes that this example can be an important one in an increasingly polarized and contentious world.

Previous work by the AC21 on coexistence and the charge for this report

[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 205).

Coexistence has been recognized by USDA as important for the future of agriculture for many years, and 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 devoted considerable effort to 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. The AC21 wishes to express its appreciation to USDA for these efforts. Elements of each of the 5 recommendations have been implemented over the past several years. An overview of the main areas of implementation may be found at the following web address:

http://www.usda.gov/documents/response-summary-november-2012-ac21-report.pdf .

It is significant to note that USDA has gathered initial data documenting organic farmer economic losses due to unintended presence over the years 2006-2014[3] 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, the AC21 understands that USDA has been informed by its legal counsel that it currently lacks the authority to provide such incentives even on a pilot-project scale. As a result, USDA, in December, 2015, provided a new charge to the AC21 to seek alternate means to promote farmer cooperation. The AC21 has worked to address the following questions:

> **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 A.

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

[3] USDA National Agricultural Statistics Service, 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

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, protection of reintroduced wild predator species, or watershed management. In its deliberations, the AC21 considered a number of these 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. The key to 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.

For successful coexistence, which mitigates potential economic implications arising from the movement or mixing of agricultural products in those markets that require separation or segregation, the issue is the need to support farmers' natural inclinations to be good neighbors using voluntary incentives rather than regulatory mandates. The challenge is bringing about broad and robust involvement from the entire farming community and incentivizing coexistence discussions, while acknowledging that the underlying issue of gene flow may be of unequal importance to those on different sides of a fence line. 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 potential new markets, 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
- 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 having 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 meet 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...

Therefore, the AC21 offers the following documents for consideration and use by USDA. Specific recommendations for their use and promotion by the Department are provided after.

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 conventional commodity crops, identity-preserved non-GE crops, and organic 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

Introduction

Farming has become an increasingly complex business. All farmers deal not only with the uncertainties of temperature, pests and diseases, and fluctuating precipitation, but also with other external forces—such as changing market demands, fluctuating crop prices, new quality requirements imposed by the marketplace or in individual contracts, water runoff and input use restrictions. Being a successful farmer means balancing these conflicting 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 our 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 conventional (non-identity preserved) production are the basic choices, but also some farmers are growing genetically engineered (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 conventional production is GE. As many of these production methods and crop types are being used in the 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 some conventional commodity crops, some IP crops, and some organic crops—on their own farms.

No one production approach or agricultural risk mitigation strategy will be applicable to all areas or all producers. The goal of this document is to share information about the challenges and opportunities each type of producer faces, highlighting the choices each confronts and the ways those choices can affect their neighbors. 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 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 Conventional Production

Conventional producers generally have considerable flexibility and have access to many different technologies, allowing them to adapt to conditions in a variety of different environments. Producers adopt many different practices and systems to be as efficient and effective as possible when producing food, feed and fiber. Producers may choose the variety of seed (which may be non-GE or GE) 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 in the production of seeds and products intended for niche markets (e.g. food grade soybeans and blue corn). Seed producers generally produce under IP conditions (and may enter into IP contracts) to ensure the desired characteristics of the seed are preserved and to receive the higher premiums commensurate with the special handling required and consumer demand. They often establish buffers or use other isolation methods to protect their crop from cross-pollination. This has become additionally relevant with the growth of certain markets that seek to avoid the unintended presence of GE material in those crops. So seed is both an IP product in itself as well as an essential component for the production of other IP (and non-IP) crops.

Considerations for Certified Organic Production

One specialized form of IP production is organic production. Organic producers not only maintain the identity of their crops, they must also meet specific standards set forth by the USDA in order to be certified as organic http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=3f34f4c22f9aa8e6d9864cc2683cea02&tpl=/ecfrbrowse/Title07/7cfr205_main_02.tpl. These practices generally avoid the use of synthetic inputs, exclude the use of GE crop varieties, and emphasize practices for maintaining or improving natural resources on the farm. The challenges faced by organic producers include the control of pests such as pathogens, insects and weeds, while maintaining the integrity of their product. Organic production is a comprehensive, documented management system starting from seed selection through planting, harvesting, and processing, and is audited by USDA-accredited certifiers.

Organic fields cannot be rotated with fields where conventional pesticides or herbicides are used, as 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 being cooperative and neighborly in their communities. It is important to realize, though, that 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 placed on farmers by buyers, consumers, and the government, individual responsibility and respect for everyone's farming operations are key. Having conversations among neighbors 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 crops of their neighbors. 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 following topics are offered as potential starting points to begin those discussions.

Environmental Factors

Topography characteristics such as slope can cause variations in soil quality and moisture. Slope can affect yield and influence the soils 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.

Insects and Diseases- 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.

Cross Pollination can be a challenge for some agricultural producers in 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

No-till practices are a method where producers grow crops year to year without turning or disturbing the soil. This practice conserves moisture in the soil profile, greatly reducing the amount of erosion and subsequently the 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 conservation tillage practice that combines some benefits from conventional tillage and no-till practices. Instead of disturbing the entire field, it protects the soil by only disturbing the portion of the soil in a row that will contain seed. This method also has some of the benefits associated with conventional tillage such as soil drying and warming.

Minimum tillage is a conservation method with the goal of minimum soil manipulation necessary 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. It is contrary to intensive tillage, which changes the soil structure using a plough.

Conventional tillage is a practice generally used for the purpose of preparing a seed bed, managing residue, and the mechanical control of weeds. Although many farmers try to limit the amount of passes over a field to accomplish the desired outcome of prepping a seed bed and managing residue, 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 by IP producers to restrict the inflow of pollen into their fields, and may also be used by individual farmers seeking to separate different types of crops they are producing, or by neighbors to jointly achieve desired objectives.

Farmers may also use physical isolation as a means to restrict pollen flow from another crop—the 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 growers producing 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 the 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 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 a key practice for soil and nutrient management.

Application of inputs

Regardless of production method, how farmers use inputs 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. Pest and weed management are important issues that farmers share at their borders. All farmers also share common issues related to the use of inputs with respect to food safety requirements, as well as water quality runoff issues.

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.

Other topics of interest for discussion

Storage

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

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 and 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, programs, 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/convener to bring different perspectives together
- Subgroup host/conveners 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 involve in discussions in the roles listed above. The entities who might be initiators or conveners might vary depending on the kind of situation.

TABLE I.

Potential Venues and Conveners and Roles They Might Play

Type of organization	Potential role(s)
• 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
• 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 (e.g., OR has one in place on GE vs Non-GE)	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 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/trusted host/convener 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, but discussions would likely 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 Natural Resources Conservation Service or the Farm Services Agency 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. Funds could come from public or private sources. 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 USDA's National Resource Conservation Service's 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 USDA Farm Service Agency (FSA) initiative was recently announced to enroll 20,000 acres on 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 community 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 .

Contents [Insert page numbers when used as a stand-alone document]:

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 crops. Identity preservation (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-GE[4] 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

[4] 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.

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 focused on issues for IP producers, the information in it should be relevant to all producers. 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.

Coexistence—Working With Your Neighbors

It is important for today's farmer wishing to serve an IP market to have knowledge about his/her neighbors' crops, rotation plan and, sometimes, his/her input plan.[5] 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. Coexistence is a two-way street: it builds on the shared 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 neighbors' crops might affect an IP farmer's ability to produce for his/her intended market will help the IP 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

[5] 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.

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 what his/her neighbor is growing, it is possible to assess the likelihood for such potential problems. There are a few different situations to consider:

- Neighbors growing the same crop for buyers or markets having similar requirements: There is likely no coexistence issue and no need for either party to adjust behavior.
- Neighbors growing the same crop for buyers or markets with different requirements: There could be a potential coexistence issue that would justify significant horizontal, vertical or timing segregation.
- Neighbors growing different crops 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 your 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 your crop and the particular characteristics of the variety you are growing, in particular its pollination behavior (e.g., whether it is self-pollinating or cross-pollinating);
- Knowing what your neighbors are planting and the potential implications of what they are planting on your management decisions (see section on coexistence below);
- Starting with seed appropriate for your 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 your 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 characteristics[6] 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 specialty 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. IP farmers 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.

[6] These characteristics may include purity, quality and traits.

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

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

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. ***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.***

2. ***USDA should make the two documents available to a broad range of stakeholders through the use of social media.***

3. ***USDA should engage with State Departments of Agriculture, commodity and grower groups, NGOs, and private industry to make them aware of the new documents and USDA support for local initiatives to bolster coexistence, and suggest that these organizations make the two documents freely available to farmers.***

4. ***The Secretary of Agriculture should endorse the use of the documents and the convening of local discussions when deemed appropriate at the local level.***

5. ***USDA should identify and make available a list of available resources that might help localities convene local coexistence discussions.***

6. ***USDA should make appropriate local personnel available on request when communities/localities seek to convene coexistence discussions.***

7. ***USDA should develop metrics to evaluate whether the models document is being used at the local level and the effectiveness of the resulting discussions.***

8. ***USDA should explore obtaining additional authority to provide incentives to encourage farmers to develop joint coexistence plans.***

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 requirements for 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. A diversifying marketplace has led both to increasing marketplace demands as well as increasing choices for farmers in the production of non-commodity products.

At the same time, consumers' interest in food attributes has increased, while their knowledge about farming and production practices remains limited. This has sometimes led to consumer expectations that cannot be met based on the biological 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. There are, for example, unrealistic expectations on the part of some consumers for zero-pesticide residue and/or 100% GMO-free products. The food industry has not always been forthcoming to consumers about what are achievable expectations for product quality and purity, and about what constitutes safe products, nor have food producers and upstream commodity handlers generally been supportive of label disclosure of GE content on consumer products. In addition, new changes to U.S. labeling policies for GE products may add further as yet undetermined constraints and/or costs for producers.

Also, there is at present some uncertainty regarding the future status of new crop lines under development, inasmuch as 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. New technological developments may add layers of uncertainty for product developers and farmers: whether new varieties will require regulation under Agency GE regulations; whether any of those varieties or emerging technologies could be considered compatible with organic farming; and whether differences in regulatory approach for these products between the United States and its trading partners will cause trade frictions or disruptions. At the same time, however, these technological developments offer the possibility for a vast range of new crop varieties with traits of use and interest to producers and consumers, and offer the potential for more rapid crop improvement in a broad range of consumer crops.

The issues around coexistence have hitherto been limited to a small defined set of crops (largely corn, soy, canola, and alfalfa) used mostly for processing or for feed, but 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 and organic, apart from the particular specifications associated with those marketing channels. 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 product[7]-- 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 they 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. Testing at a sensitivity necessary to detect potentially commercially relevant levels of such products may not be feasible: 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. Therefore, these products are typically grown in so-called "closed-loop" systems designed to increase confinement, but some AC21 members believe that such measures may be inadequate.

There is no evidence that commodity streams have as yet been affected by current production of crops with functional traits. However, depending on the particular functional trait and the crop, regulatory and or market measures may evolve to strengthen assurances of containment and/or distribute risk in the future so that the economic opportunities offered by the crops can continue to be realized.

[7] 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 can 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, 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 indicates percent inert material and percent weed seeds. However, the Act does not require tags to indicate percent GE presence.
- Anecdotal information from AC21 members suggests that the level of unintended GE presence in non-GE seed varies substantially, from levels suitable for farmers to meet downstream 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 non-GE seed would aid producers serving GE-sensitive markets.

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 crop. 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 enable ongoing evaluation of the pool of commercially available non-GE and organic seed varieties and identification of market needs for producers serving GE-sensitive markets and to 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. (This report has now been provided to the Secretary of Agriculture.)
- 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 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 requiring that companies 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. However, AC21 members recognize the value in increasing transparency and the availability of useful information about seed purity for the entire food and feed supply chain.

It is important that farmers work with reputable seed companies. It is also noted that some specialty 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 may provide a niche market opportunity, and potentially higher premiums, for those companies willing to do so. In addition, greater involvement of buyers contracting with farmers for their IP production in the procurement and testing of seed for those farmers to use might sometimes help farmers meet their quality specifications, and may also sensitize the buyers to the challenges of procuring a sufficient supply of high-quality, non-GMO/non-GE seed.

Having noted these issues, the AC21 remains confident that the evolution of agriculture will continue and that new technologies will be brought to bear on all forms of agriculture to offer new opportunities for farmers. The challenges discussed are all manageable, and solutions will emerge at the local level as they always have—through continuous dialogue and compromise. The tools we have presented here can help inform and frame the work that lies ahead.

APPENDIX A: 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.