International Seed Federation
Seed is Life

HOW TO TALK ABOUT

Plant Breeding Innovation

A DISCUSSION GUIDE

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A DISCUSSION GUIDE

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SETTING THE TONE

Tips for demonstrating confidence, intelligence and optimism

OPTIMISM
OPENNESS, OWNERSHIP, HONESTY

- Be open to other people's points of view.
- Take ownership of your words and put positive energy into them – use the active voice.
- Use storytelling techniques to share interesting insights and fascinating facts about plant breeding and its benefits. For example:

"Did you know that we'll need to feed around 9 billion people by 2050? The good news is that plant breeding innovation is helping farmers grow more food on existing land with optimized inputs to increase food security."

INTELLIGENCE
INFORM, INTEREST, INSIGHT

- Adapt to the needs of your audience – show you're interested in them, demonstrate empathy and maintain their interest.
- Look for interesting angles and insights – support what you say with your knowledge and experience.

CONFIDENCE
CLEAR, CONCISE AND CALM

- Be clear about what you want to say and concise in how you say it. Avoid technical jargon and don't go into lecture mode.
- Simplify your language to suit the audience without patronizing them.
- Stay calm and collected – it's a conversation not a conflict, and don't be too clinical.

CHOOSING YOUR WORDS

- Use 'plant breeding innovation' in full – not PBI.
- Use 'plant breeding methods' or 'tools' – not techniques or technologies.
- Specify 'plant' when talking about 'breeding methods'.
- Describe plant breeding methods as 'the latest' or 'most recent' not new.
- Describe varieties and seed as 'improved' rather than new.
- We 'develop' new varieties, we don't create them.

NOTE:
The term 'plant breeding innovation' reflects the continuum of innovation in plant breeding. It does not focus on a group of techniques, nor is it defined by them. Using this term sets the tone for an open dialogue about the evolution and outcomes of plant breeding.

TALKING POINTS

Introduction & Guidance

Our mission is to develop and deliver improved plant varieties using constantly evolving plant breeding methods within a positive policy environment where future innovation is encouraged and protected. We have a shared responsibility to communicate this to our stakeholders.

This three-part framework is designed to guide the conversations we're currently having about plant breeding innovation so that our communications are aligned worldwide.

Each section begins with guidance on how to talk about the theme, and includes headline messages and supporting statements. To personalize the content for different audience groups, please illustrate with simple examples from your country or region.

1 **BENEFITS OF PLANT BREEDING INNOVATION**
For consumers, farmers and the environment.

2 **METHODS OF PLANT BREEDING INNOVATION**
Focus on gene editing applications such as targeted mutagenesis (e.g. CRISPR-Cas9) and cisgenesis.

3 **PUBLIC POLICY FOR PRODUCTS OF PLANT BREEDING INNOVATION**
The importance of having consistent criteria among countries when determining the scope of regulatory oversight for plants developed through the latest methods and the impact on the seed sector, consumers, farmers, traders and academic institutions.

PLANT BREEDING INNOVATION

Part 1: The Benefits

How to talk about the benefits

Position plant breeding innovation as beneficial
Investing in innovation benefits (1) consumers, (2) farmers and (3) the environment.

Paint a picture of the future
By 2050 there will be 9.7 billion people on the planet and not enough resources to sustain them.

How plant breeding innovation is essential to overcoming global challenges
- Extreme weather
- Land pressure
- Limited resources

Illustrate how plant breeding innovation contributes to the food security – noting that it plays a significant part, but is not the only part
- **In 1960:** 1 hectare was enough to feed 2 people
- **By 2025:** 1 hectare will be needed to feed 5 people
- **By 2050:** farmers will need to produce 70% more food than today to sustain the world's population (Source: UN)

Consider a world without plant breeding innovation – what would this look like?

NOTE:
This is very much a journey of discovery. Plant breeders are still exploring the possibilities and the potential of plant breeding innovation. While it's good to communicate this excitement, be careful not to over-promise on the benefits it can bring.

PLANT BREEDING INNOVATION

Part 1: The Benefits

1. CONSUMER BENEFITS

headline messages

- Plant breeding innovation enables us to meet consumer expectations with improved plants that provide longer-lasting, fresh, nutritious and affordable food, as well as fuel and fiber.
- Plant breeding innovation contributes to the health and well-being of consumers and has the potential to improve quality of life.

supporting statements

Innovations in plant breeding can contribute to:

- vegetables with a higher resilience to transport and storage
- cereal varieties suitable for gluten-intolerant/celiac disease
- crops with increased nutrients
- optimized bio-fuels as an alternative to fossil fuels
- hypoallergenic plants for clothing and furnishings
- flowers, trees and turf for sustainable green spaces.

2. FARMER BENEFITS

headline messages

- Through improved seed, plant breeding innovation provides yield stability, despite a changing climate.
- Plant breeding innovation creates plants that can resist pests and diseases, enabling more choice and flexibility for farmers, and potentially fewer crop inputs.
- Plant breeding innovation provides quality seed which meets the challenges and needs of farmers.

supporting statements

- Improved seed adapted to farmer's needs leads to more reliable harvests and stable incomes.
- Thanks to innovations in plant breeding we can:
  - reduce the cost and time required to bring improved seed to farmers
  - rapidly adapt crops and plant varieties to changing climate
  - increase effective options for weed, disease and pest management
  - increase food production under environmental stress factors caused by climate change and extreme weather conditions.

3. ENVIRONMENTAL BENEFITS

headline messages

- Plant breeding innovation results in improved seed that can increase yields while decreasing greenhouse gas emissions and reducing environmental impact.
- By developing new seed varieties that are better able to withstand attacks from pests and diseases we can reduce and optimize the use of crop inputs.
- Improved seed varieties that increase yield result in more crop per acre. This means that more forest, flora and fauna can remain untouched by agricultural production, preserving natural habitats.

supporting statements

- Plant breeding innovation can result in plants that survive and even thrive in extreme weather conditions.
- Increasing yields on less land using conservation tillage supports soil health and optimizes the use of farmland, fuel, labor and water while more efficiently using crop inputs.

PLANT BREEDING INNOVATION

Part 2: The Methods

How to talk about the methods

Refer
to 'methods' or 'tools' as opposed to techniques in order to enable a conversation within a broad scope of plant breeding innovation.

Describe
'plant breeding methods' as 'the latest' or 'most recent' – not new.

Present
the methods as an 'evolution' that has already involved continuous refinement and ingenuity over thousands of years, and will continue into the future with the right policy environment.

Focus
on the benefits of the products, rather than the applications or methods

Emphasize
that these methods are based on the same basic breeding principles as Mendel's Law of Genetics and the fact that plant breeders need genetic variations to make improvements.

Highlight
that although the latest methods may have changed, the final products are indistinguishable from those produced via traditional breeding methods.

Explain
that the main benefits of the latest methods are to give plant breeders a wider choice of tools, and to increase efficiency.

headline message

- The evolution of plant breeding is the foundation of a secure, safe, nutritious and diverse food supply.
- Some methods may continue to change yet they are based on the same plant breeding principles farmers and plant scientists have used for thousands of years: planting seeds, observing the characteristics and selecting the most desirable.
- The latest methods build on a strong history of innovation by plant breeders, and are essential to address the challenges faced by agriculture in an efficient and sustainable manner.
- Now we can make specific changes in plants that enable them to survive and thrive in changing climates, and develop immunity to different pests and diseases.

supporting statements

- Gregor Mendel described the principles governing the genetic laws of inheritance in plants in 1865.
- An increased understanding of plant physiology, molecular biology and genetics has enabled the accelerated development of more efficient breeding methods to develop new varieties that would probably not have been achieved by conventional breeding alone.

Specific methods have been developed which:

- enable rapid identification of characteristics in a plant that help increase its resistance to disease, and its adaptability to environmental and nutrient conditions; and
- enable plant breeders to 'switch off' undesirable charachteristics, or amplify desirable ones.

Part 2: The Methods

CISGENESIS

In addition to crossing and selection, cisgenesis allows the quick transfer of specific characteristics between plants that can naturally cross.

This is useful particularly in crops where cross-breeding takes a decade or more, such as trees and potato.

Cisgenesis has been applied to potato to create a variety resistant to 'late blight', a devastating disease traditionally controlled by fungicides. Three different resistance genes were combined into a commercial potato cultivar within a few years. Compare this with the introduction of a single resistance gene through conventional breeding which took almost 50 years.

TARGETED MUTAGENESIS

Methods such as targeted mutagenesis can be used to precisely target tiny changes in plants, similar to what happens in nature. This can support both the generation of genetic diversity and the efficiency of selecting better plants.

Examples include site-directed nuclease technology such as CRISPR-Cas9.

Since the 1930s, spontaneous and induced mutagenesis have resulted in more than 3000 varieties including:

- peanuts with tougher hulls
- semi-dwarf rice with higher yields
- virus resistant cocoa plants
- canola with healthy fatty acid composition
- disease resistant Gold Nijisseiki Japanese pear
- Ruby and Rio Red grapefruit.

NOTE ON CRISPR-Cas9

- CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats, and Cas for the CRISPR-associated protein.
- CRISPR-Cas acts like a pair of molecular scissors able to snip precisely at a plant's DNA.
- CRISPR-Cas9 enables plant breeders to turn genes on or off by editing DNA in specific locations.
- In 2015, scientists used CRISPR methods on barley and a relative of broccoli, demonstrating that subsequent generations were indistinguishable from those bred conventionally.
- Plant scientists and breeders are working on CRISPR-Cas9-edited versions of crops such as corn, soybeans, canola, rice, and wheat, with new characteristics like drought and disease resistance—both critical features for farmers trying to deal with a changing climate and the fact that the world population is growing faster than our food supply.
- CRISPR can also be used to remove allergens in foods such as peanuts, or to make food more nutritious, while using genes that naturally occur in the plant.

PLANT BREEDING INNOVATION

Part 3: Public Policy for the Products of Plant Breeding Innovation

How to talk about public policy

Explain the objectives:

- To agree a consistent approach to determining which categories of products will not fall under current GMO regulations.
- To implement this approach so that we have a consistent scope of regulatory oversight.

Explain the rationale:

Guiding governments through existing regulation towards a common end point will provide plant breeders with legal certainty regarding access to innovation.

Be clear:

Agreement on a consistent approach will ensure science-based public policy that facilitates innovation, collaboration and trade of the products of plant breeding methods.

HEADLINE MESSAGES & SUPPORTING STATEMENTS

Reasearch & Development

- Plant breeders need a clear policy framework and predictability to enable a long-term approach to the investment in developing new varieties.

The development of new varieties from concept to commercialization takes many years and considerable investment.

Movement of Seed & Trade

- A consistent approach is needed to facilitate the movement of seed around the world.
- A "level playing field" for all products reduces trade disruptions.
- Inconsistent policies and practices put plant breeders at a competitive disadvantage and make it more costly to get innovative products onto the market.

Rules & Regulations

- Plant varieties are already subject to various rules and regulations, so any additional regulation may be unnecessary.
- The cost of over-regulation:
  - means it takes longer to develop new varieties as pre-market assessments are needed before a new variety can enter the market.
  - limits access to the latest breeding methods for most companies.

Part 3: Public Policy for the Products of Plant Breeding Innovation

The importance of a consistent approach to the scope of regulatory oversight & the impact of not having this.

The importance of a consistent approach:	The impact of not having a consistent approach:
Governments Enabling innovation helps countries to meet their development goals. Ultimately it benefits the national economy, contributing to increased employment, education and standards of living.	Without a consistent approach, a country limits its own innovation and economic development and hence limits the opportunities for its citizens to prosper.
Consumers A consistent approach for policy makers on plant breeding innovation will enable food retailers to continue providing a wide variety of high quality products at affordable prices.	Without a consistent approach, consumers will face increased costs, reduced choice and possibly food shortages.
Farmers A consistent approach will ultimately secure farmers' access to better seeds in a timely and cost effective way as it generates the conditions for innovation and meets the needs of sustainable agricultural production. A consistent approach, therefore, enables farmers to stabilize or increase yields.	Without a consistent approach, improved varieties will not be developed, or accessible to farmers. This affects their livelihood and prosperity as they are not able produce stable or increased yields.
Plant breeders Having a consistent approach enables the conditions supporting continued innovation, strengthening the plant breeders' toolbox and allowing a clear path to market.	Without clear public policy, the use of plant breeding methods may be stalled at the development stage, or less accessible to most plant breeders.
Academic institutions Enhanced innovation in plants provides greater opportunities for collaboration across the public and private sectors worldwide.	If products are subject to different requirements in different countries, this will limit investment and stifle research collaborations.
Traders A consistent approach will facilitate the creation and trade of better seed and commodity products.	Inconsistent policies and practices will hinder the innovation and trade in seed around the world and could lead to trade disruptions/barriers.

OVERVIEW OF THE CONCEPT PAPER:

Consistent Criteria for the Scope of Regulatory Oversight

Our audience:
The concept paper is aimed at well-informed political or government science advisors in key countries, hence the terminology is technical and not intended for the general public.

Our ask:
We want governments to consider plant varieties developed using the latest breeding methods as those produced using earlier methods. In the concept paper, the underlying principle for determining these consistent criteria is:

"Plant varieties developed through the latest breeding methods should not be differentially regulated if they are similar or indistinguishable from varieties that could have been produced through earlier breeding methods."

Our goal:
For governments to implement consistent criteria for the scope of regulatory oversight.

NOTE:
When considering the criteria for the scope of regulatory oversight, the question is not whether there is adequate regulation of foods and plants but rather the extent to which a specific pre-market review and clearance process is justified for plant varieties developed using certain plant breeding methods.

OUR PROPOSAL

The genetic variation in the final plant product would not be covered under the scope of existing biotech/GMO regulations for plants if:

(a) there is no novel combination of genetic material (i.e. there is no stable insertion in the plant genome of one or more genes that are part of a designed genetic construct), or;

(b) the final plant product solely contains the stable insertion of inherited genetic material from sexually compatible plant species, or;

(c) the genetic variation is the result of spontaneous or induced mutagenesis.

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