

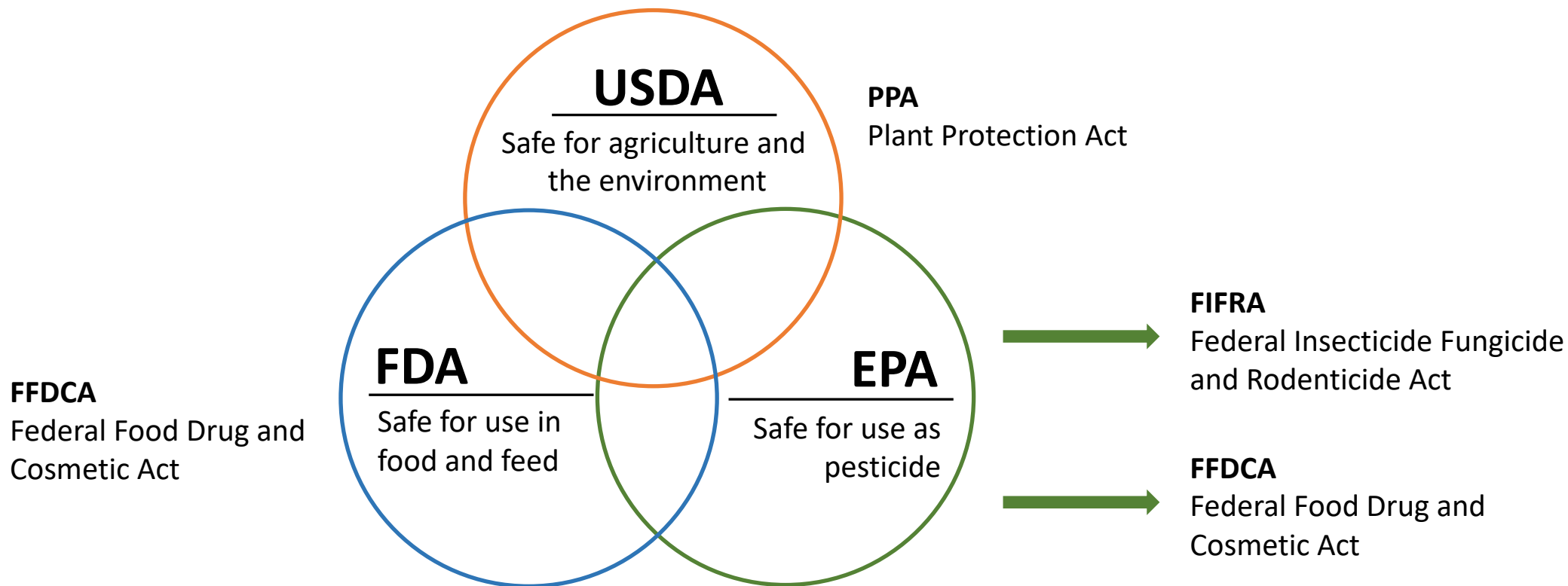
Regulating Biotechnology: U.S. EPA's Role Within the Coordinated Framework

March 31, 2026

SCRA Workshop: Nuts and Bolts of U.S. Regulatory
Dossiers for Genetically Engineered Crops

Shannon Borges, Acting Director
Biopesticides and Pollution Prevention Division
Office of Pesticide Programs

Each Federal Agency has specific triggers for regulatory oversight associated with its own laws and protection goals



Pesticide: Any substance intended for preventing, destroying, repelling or mitigating any pest; includes plant growth regulators

FIFRA

- Distribution, use and sale of pesticides:
 - Registration (§3)
 - Emergency exemption (§18)
 - State registration for special local need (§24(c))
- Re-evaluation of older pesticides (§4)
- Field testing and distribution of experimental pesticides (§5)
 - Experimental Use Permits
 - Small-scale testing of GE microorganisms

FFDCA

- Establishes tolerances (maximum residue levels) for pesticide chemical residues in/on food and feed (§408)
- Tolerances apply to both domestic and imported foods
- Pesticides can be exempted from the requirement of a tolerance – i.e., no maximum residue limit established

Protection Goals

FIFRA Standard

- EPA may register a pesticide if, when used in accordance with widespread and commonly recognized practice, it generally:

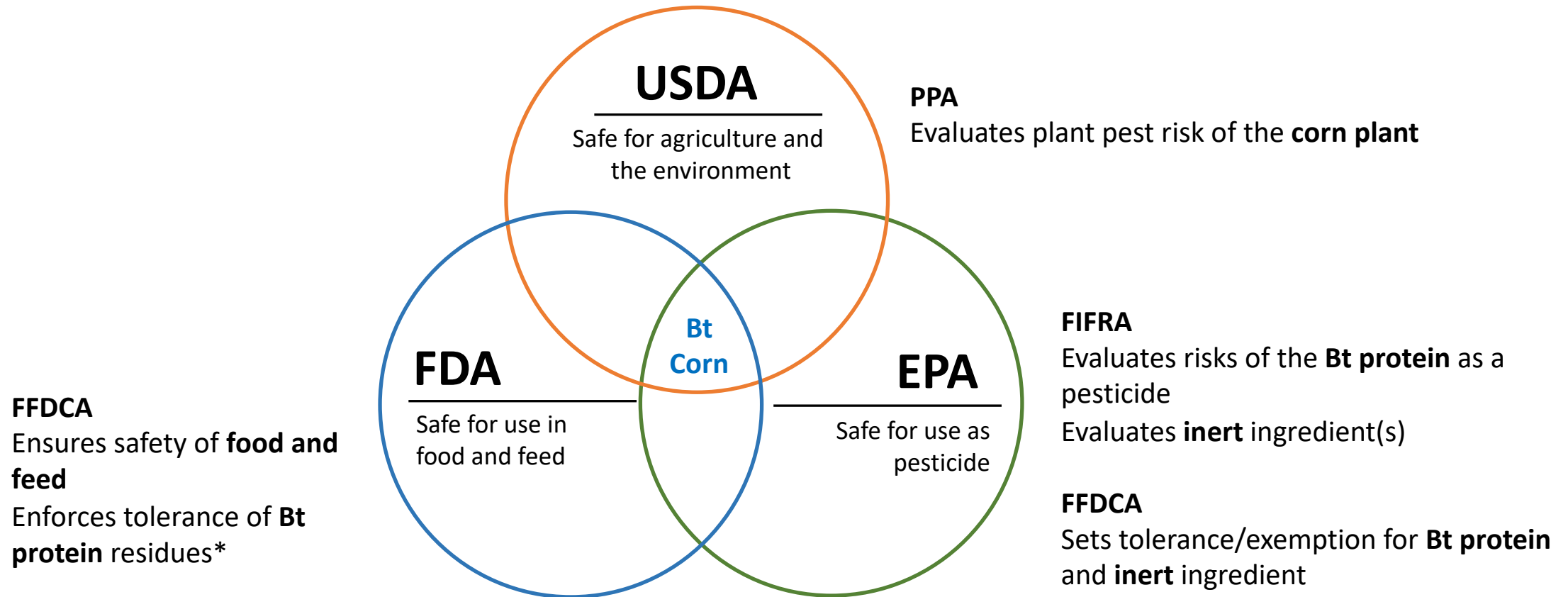
Will not cause unreasonable adverse effects on human health or the environment

FFDCA Standard

- EPA may establish a tolerance or tolerance exemption if it is determined to be safe:

Safe means that there is a **reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information**

Example of regulatory oversight: Food plant that produces a pesticides (Bt corn)



*To date, all Bt protein PIPs have been exempt from requirement of a tolerance

Biopesticides: Certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals; includes products of biotechnology that are pesticides

Biopesticides include:

- Microbial pesticides – bacteria, fungi, viruses, protozoa
 - Biochemical pesticides – pheromones, plant extracts, minerals, etc.
 - **Emerging technology pesticides**
-

Benefits:

Environment

- Lower hazard profile
- More target specific
- Less persistent in the environment
- Useful in Integrated Pest Management programs
- May reduce use of chemical pesticides

Growers

- Short restricted entry interval
- Typically exempted from requirement of a tolerance
- Low/no pre-harvest intervals
- Provide additional pest management tools

- **Plant-Incorporated Protectants (PIPs)**

- ❖ DNA, RNA, and protein,
e.g., *cry1Ab* gene and Cry1Ab protein
- ❖ Selectable markers and their genes
e.g., CP4 Enolpyruvylshikimate-3-phosphate (CP4 EPSPS)
synthase and *cp4 epsps* gene

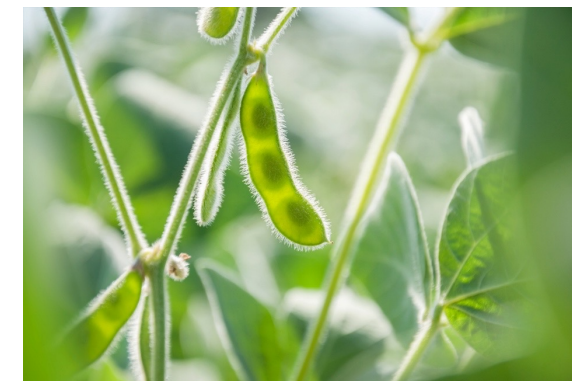
PIP: Defined as a **pesticidal substance** that is intended to be produced and used in a living plant, or in the produce thereof, and the **genetic material necessary for production of such a pesticidal substance**. It also includes any **inert ingredient contained in the plant** or produce thereof.

- **Genetically-Engineered Microbial Pesticides**
- **Microbial Pesticides Introduced into Mosquitoes (e.g., *Wolbachia* bacteria)**
- **Genetic Modifications in Pest Animals Intended for Use as a Pesticide (e.g., GE mosquitoes)**
- **Exogenous dsRNA “Sprayable” Products**
- **Certain Peptides and Proteins (e.g., Harpin Peptides and GS-Omega/Kappa-Hctx-Hv1a Peptide)**

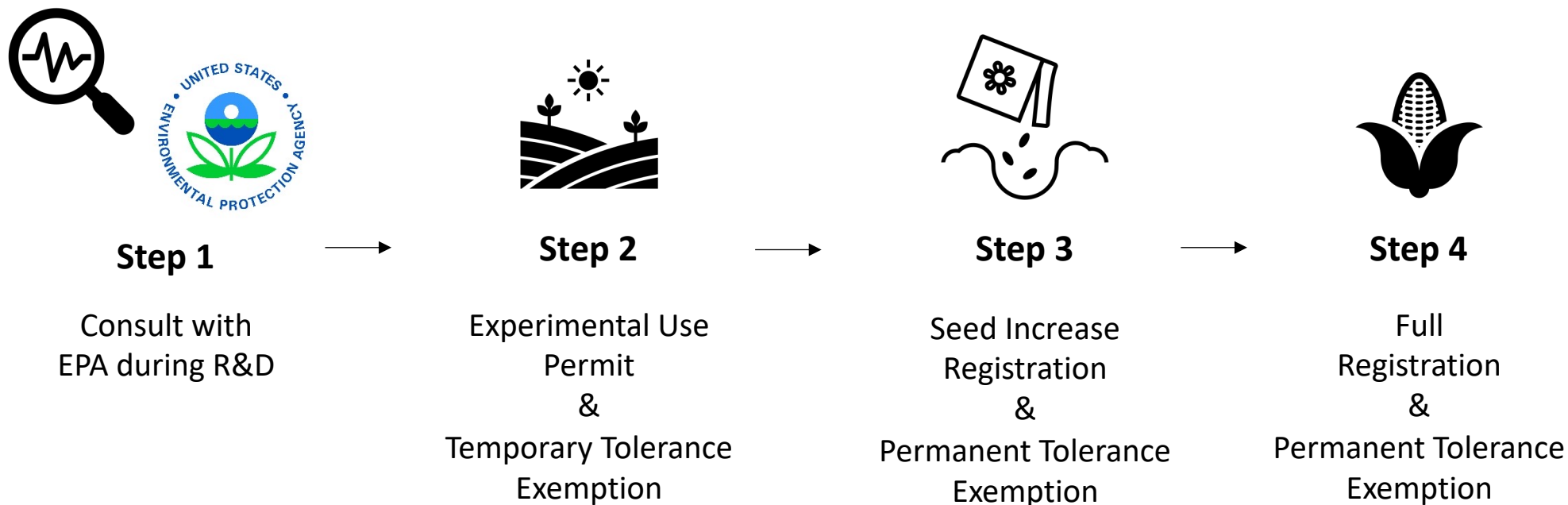


Plant Incorporated Protectants

- PIPs have resulted in reduced chemical usage
- Registered 100+ PIP products to date
 - Majority are *Bacillus thuringiensis* Cry protein-based for insect control
 - Mainly corn, cotton, and soy
 - RNAi (DvSnf7) for corn rootworm recently approved
 - First dsRNA approved for control of a macroorganism
 - Plant disease resistant PIPs
 - Viral coat proteins (papaya, plum)
 - Defensin proteins (citrus greening)
 - Resistance proteins (VNT1 in potato)
- All PIPs registered to date have a tolerance exemption
- Changing future of PIP landscape
 - Increased product diversity (minor crops)
 - Greater involvement of smaller developers



PIP Development and EPA



40 CFR 174 – Plant-Incorporated Protectants

- Established in 2001
- Created regulatory procedures with respect to confidential business information, adverse effects reporting, FIFRA exemptions, and tolerance exemptions
- 40 CFR 174.25 – PIPs from sexually-compatible plants are exempt from FIFRA requirements
- 40 CFR 174.705 – PIP inert ingredients from sexually-compatible plants are exempt from FIFRA requirements
- 40 CFR 174.500 – PIP tolerance exemptions
- 40 CFR 174.507 – Tolerance exemption for nucleic acids that are part of PIPs
 - Applied to an RNAi PIP (DvSnf7)

40 CFR 172 – EUPs

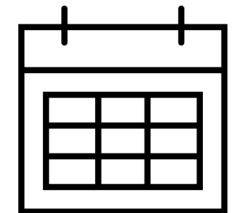
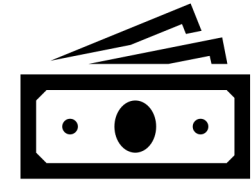
- EUPs required > 10 acres cumulative per pest

40 CFR 158 – Data Requirements for Biopesticides

- 40 CFR 158.2100 – Microbial pesticides – used to inform data requirements for PIPs (no codified PIP-specific data requirements)
- 40 CFR 158.75 – Allows EPA flexibility in determining data needs for registrations

Pesticide Registration Improvement Act (PRIA) Timelines – PIPs

EPA Code	Action	Decision Timeline	FY 25'-26' Fees
B800	New PIP, tolerance exemption	17 months	\$259,297
B884	New PIP, seed increase registration	19 months	\$240,090
B750	New PIP, Experimental Use Permit, temporary tolerance	12 months	\$192,074
B771	New PIP, Experimental Use Permit, temporary tolerance, 75% credit for commercial registration	13 months	\$192,074



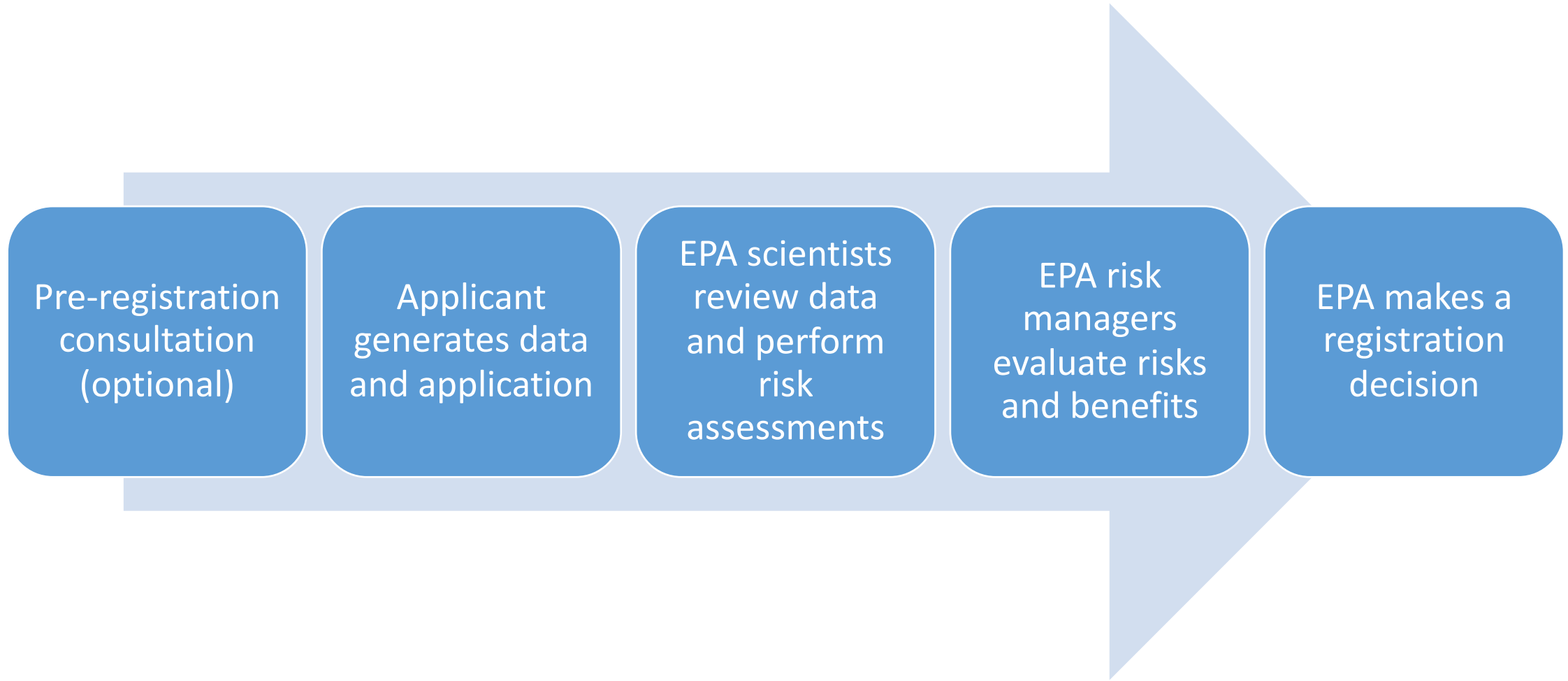
Purpose and requirements

- Enables developer to generate the data for full registration
- Testing on a cumulative total (per pest) of over 10 acres of land or 1 acre of water requires an experimental use permit.
- A tolerance or tolerance exemption is needed if the pesticide could enter the food supply.
- EUP data requirements are usually a subset of registration data
 - Including information reviewed for the FFDCA 408 tolerance exemption (temporary or full)
- EPA evaluates all **active** and **inert** ingredients
 - Inerts for PIPs are frequently herbicide tolerance selectable markers.

Containment

- PIPs: Out-crossing of pollen must be prevented regardless of test plot size if no tolerance or tolerance exemption. Dependent on biology of crop.
 - Example for corn: spatial isolation (e.g. distances to prevent out-crossing), reproductive isolation (e.g. bagging or detasseling corn), temporal isolation (e.g. planting times to prevent synchronous pollination)
- Without a tolerance (or exemption), harvested crop/produce must not enter commerce (e.g., crop destruction must be employed)
- Guidance on Small-Scale Field Testing and Low-level Presence in Food of PIPs:
 - www.epa.gov/pesticide-registration/prn-2007-2-guidance-small-scale-field-testing-and-low-level-presence-food

Registering PIPs – General Process



- A tiered testing approach is used, starting with acute toxicity tests and moving to longer, more complex testing as needed based on evidence of toxicity or uncertainty.
- To evaluate the safety of PIPs for human health and the environment, EPA considers data and other information (e.g., scientific rationale) to address the following topics:
 - Product analysis – describes the pesticide
 - Human health (toxicology) – defines hazard to humans
 - Exposure and environmental fate – describes exposure to humans and nontarget organisms and persistence in the environment
 - Nontarget organism effects – defines hazard to nontarget organisms
 - Gene flow – evaluates potential to spread gene
 - Resistance management – informs strategy to reduce resistance development

Helpful Links:

- [Public Symposium on Regulation of Plant-Incorporated Protectants](#)
- [Leveraging Experience to Support Contemporary Risk Assessments](#)

- Hazard
 - Toxicity of the pesticide
 - Specificity for target pest
- Exposure
 - How much is in environment at any given time + over time
 - PIPs may be expressed at low levels, contained within plant material, and not persistent
 - Low levels are toxic to target pest, but generally not to nontarget organisms
 - Exposure is low, but it isn't zero – so, need hazard data
- Risk
 - Risk considers exposure and hazard

Since 2001, PIPs moved between sexually compatible plants through conventional breeding are exempted from regulation under FIFRA and FFDCA (40 CFR 174.25). (Exception: adverse effects reporting requirements apply)

In 2023 EPA finalized a rule to allow PIPs to be exempt from FIFRA registration and FFDCA tolerance requirements in cases and provides exemptions from FIFRA registration and FFDCA tolerance requirements for:

1. PIPs in which genetic engineering has been used to insert or modify a gene to match a gene found in a sexually compatible plant; and
 2. Loss-of-function PIPs in which the genetically engineered modification reduces or eliminates the activity of a gene, which then helps makes the plant resistant to pests
- A required notification process to increase transparency and public confidence in these products.
 - Developers of PIPs in the first exempted category require an EPA confirmation that their PIP is eligible for the exemption.
 - Developers of PIPs in the second exempted category can determine on their own whether the exemption applies.

- Biopesticides - www.epa.gov/pesticides/biopesticides
- Pesticide Registration Manual - www.epa.gov/pesticide-registration/pesticide-registration-manual
- Registration Fees under PRIA - www.epa.gov/pria-fees
- Pesticide Registration - www.epa.gov/pesticide-registration
- Plant-Incorporated Protectants - www.epa.gov/regulation-biotechnology-under-tsca-and-fifra/overview-plant-incorporated-protectants
- Current and Previously Registered PIPs and their Risk Assessments - www.epa.gov/ingredients-used-pesticide-products/current-and-previously-registered-section-3-plant-incorporated
- Tips for Plant-Incorporated Protectant (PIP) Experimental Use Permit (EUP) Program Submission - www.epa.gov/regulation-biotechnology-under-tsca-and-fifra/tips-plant-incorporated-protectant-pip-experimental
- Guidance on Small-Scale Field Testing and Low-level Presence in Food of PIPs - www.epa.gov/pesticide-registration/prn-2007-2-guidance-small-scale-field-testing-and-low-level-presence-food
- PIP Data Symposium: www.epa.gov/regulation-biotechnology-under-tsca-and-fifra/plant-incorporated-protectants-data-symposium
- Biotechnology and Emerging Technologies Seminar: <https://www.epa.gov/regulation-biotechnology-under-tsca-and-fifra/biotechnology-and-emerging-technologies-seminar>
- Unified Website: <https://usbiotechnologyregulation.mrp.usda.gov/>