Herbicide Tolerance Management Plan (HTMP) for [product common name]

Purpose

The purpose of this Herbicide Tolerance Management Plan is to provide an overview for how [company x] will encourage the proper use and effective management of herbicides in [crop x] with the newly introduced tolerance to [herbicide x].

Objective

Educate and inform growers on responsive management of the technology to:

- Enable integration into common agricultural practices.
- Minimize the risk of herbicide resistance development.
- Promote sustainable and responsible herbicide use.
- Maximize product value, longevity and effectiveness of the herbicide-tolerant trait and herbicide.
- Identify additional or changing needs over the lifecycle of the product.

Crop and Herbicide Information

- **Product common name** [*ABC 1234*]
- **Crop Name:** [*species*]
- **Herbicide-Tolerant Trait(s) identification:** [*OECD unique identifier, common name, genetic elements*]
- **Herbicide(s) tolerance introduced:** [*Specify the name of the herbicide(s) the newly introduced trait(s) are tolerant to]*
- **Mode(s) of Action:** [*Specify the mode(s) of action and mode of action group(s)]*
- **Recommended Application Rate(s):** [*Specify the recommended rate(s)]*

A. General Elements and Best Practices

This section describes basic/typical elements and best practices that should be included in any herbicide tolerance management plan. These aspects are relevant across crops and traits.

1. In Field Best Management Practices (BMPs)

Promote the use of a diversified weed management program as described below. Additional information on these practices can be found at www.manageresistancenow.ca, as well as guidance on resistance management labelling for herbicides, fungicides/bactericide and insecticide/acaricide products developed by the Pest Management Regulatory Agency found here Regulatory Directive DIR2013-04, Pesticide Resistance Management Labelling Based on Target Site/Mode of Action - Canada.ca.

1.1 Pre-Planting Considerations

- Rotate crops/traits to reduce weed pressure and break the herbicide use pattern.
- Start with a clean field, using either a burndown herbicide application or tillage, and to optimize herbicide performance by controlling weeds early when they are small and actively growing.
- Thorough cleaning of equipment between sites, thereby avoiding movement of plant material between sites to reduce the spread of weed seed.

1.2 Herbicide Application Guidelines

- Follow the recommended herbicide application rate and timing, found on the label.
- Combine two or more herbicides with different effective mode of action as a single mixture (where the mixture is registered and supported for use) and rotate herbicides.
- Calibrate equipment regularly to ensure accurate application.
- Use proper nozzle types, pressure settings, and water volumes.

1.3 Resistance Monitoring

- Implement a system for monitoring herbicide efficacy and weed populations.
- Conduct regular field scouting to detect any signs of reduced herbicide effectiveness. Scout fields after herbicide applications to facilitate the early identification of weed shifts and/or weed resistance.
- Keep accurate records of each field to track application history and rotations.

1.4 Integrated Weed Management (IWM)

- Incorporate cultural practices such as cover cropping and mulching.
- Consider strategic tillage.

- Prevent and eliminate weed escapes in field borders and fence rows.
- Refer to Manage Resistance Now 'How to manage herbicide resistance in your fields' https://manageresistancenow.ca/weeds/wfs-how-to-manage-herbicide-resistance-in-your-fields/.

1.5 Mitigation

- Contain resistant populations by implementing measures that avoid allowing weeds to reproduce by seed or to proliferate vegetatively.
- Provide recommended control measures, which may include additional herbicides, tank-mixes or cultural practices.

2. Education and Training

2.1 Farmer Training

- Provide comprehensive training programs for farmers on herbicide-tolerant trait technology and resistance management including the above-mentioned information.
- Where possible, utilize licensing and/or contracts or bag language to ensure that users of these technologies agree to implement the defined stewardship practices.
- Communicate information through multiple channels which include herbicide labels, supplemental labeling, company use guides, point of sale communications, media, websites [insert web address], farmer meetings and training of retail networks.

2.2 Extension Services

- Leverage existing extension services to disseminate information on best practices and updates on herbicide resistance management.
- Provide retail networks with training and support to enable communication on the agronomic practices and requirements that support stewardship of the specific product sold.
- Where possible establish retail agreements with sellers that require retailers to provide guidance to customers at sale and ongoing.
- Actively engage with academic scientists, extension specialists and crop consultants to support research and foster discussion on the introduction and use of new technologies.

3. Reporting and Documentation

3.1 Promote Record-Keeping, including:

- The maintenance of detailed records of herbicide use, application rates, and field history.

- Documentation of signs of reduced herbicide efficacy or weed resistance.

3.2 Feedback and Incident Reporting

- Establish a mechanism for contacting the company about products to request additional information, identify potential concerns on product performance, report misuse, report any incidents of herbicide resistance or adverse effects, or provide any other feedback reporting.
- Farmers concerned about the potential presence of resistant weeds, or any incidence of repeated non-performance associated with [company x branded products] should report to the local [company] representative, retailer, or support line at [1-800-xxx-xxxx].
- Ensure contact information is widely available on packaging, websites, and printed materials.
- Ensure timely and appropriate follow-up to inquiries.

3.3 Responding to product performance issues and resistance.

- Act upon immediately.
- Gather information on the nature of the concern.
- When required, samples or additional information may be collected.
- When possible, work collaboratively with other parties.
- Provide additional guidance to the grower to address the concern.
- Notify regulatory agencies as required.
- Where claims include weeds previously not identified as resistant to the herbicide used, engage academics and extension specialists to assess if resistance is present in the biotype using international recognized methodology such as those developed by the WSSA (www.wssa.net) and International Survey of Herbicide. Resistant Weeds (www.weedscience.org/documents/resistancecriterion.pdf),
- Communicate information to farmers.

4. Review and Adaptation

4.1 Regular Review

- Schedule regular reviews of the HTMP to incorporate new research findings and technologies.
- Maintain publicly accessible updated information on agronomic practice suggestions and requirements (e.g. product use guide).

4.2 Adaptation

- Modify the HTMP as needed based on the changing landscape of herbicide resistance management.
- Use information from customer feedback, industry or academic sources and regulatory agencies to review and modify the agronomic practice suggestions and requirements if required to ensure they remain current and appropriate.

B. Specific considerations for [product common name]

This section describes elements and best practices that are specific to the biology of the modified crop and the novel trait present in that crop. What is included in this section will be different from product to product. The following provides various examples of text that could be included as relevant to the crop and trait.

1. Volunteers

Choose options as applicable below:

- This product [*does/does not*] impact the control of volunteers compared to currently available herbicide tolerance in [*crop x]* and [*will/will not*] result in changes to usual agronomic practices and herbicide selection or result in reduced sustainability or have significant impacts on soil conservation. [*if it does impact, describe how*]
- When adding a control method(s) to an existing herbicide tolerant crop: [*x tolerance technology*] has been used since [*year*]. [*newly introduced herbicide tolerance controlling x, y, z*] will add additional herbicide options offering improved weed control and potentially less applications. This in turn will sustain or enhance options for soil conservation.
- The addition of [*newly introduced herbicide tolerance control x, y, z*] will require [*minimal/standard/extensive]* additional knowledge transfer and education with farmers and retailers.
    - *Describe what knowledge is required, e.g. that [herbicide x,y,z] will not control volunteers from this crop, but other options exist that will be specific to the cropping system*
    - *Provide a table of options that are specific and commercially available in Canada for control of [product common name] volunteer or reference if described elsewhere. Examples should include both scenarios where the succeeding crop in the rotation plan:*
        a) *does not have the same herbicide tolerances as [product common name]*
        b) *has the same tolerance to one or a combination of the herbicide tolerances in [product name]*

- Refer to Manage Resistance Now factsheet on managing herbicide-tolerant volunteers https://manageresistancenow.ca/weeds/managing-herbicide-tolerant-volunteers/

2. Selection of herbicide tolerant weeds

The selection of herbicide tolerance in weeds can result from continued application of the same herbicide in subsequent rotations.

- This product allows the option for growers to increase the diversity of herbicide modes of action in [*crop x*] which can reduce selection pressure on any one mode of action. Best Management Practices as described in this document will be used to promote practices to limit the selection pressure, monitor for the occurrence of resistance and develop solutions if resistant biotypes to the herbicide modes of action(s) in [product] is observed. This includes consideration for the presence of local weedy relatives that have already developed resistance to one or more herbicide.

3. Introgression/gene flow

Choose options as applicable below:

- *There are no related species grown or present in Canada, so no potential of introgression,*
- *Introgression could occur to [species x,y,z], describe impact and control measures, e.g.*
    - *Crop is biannual and during cultivation year flow and pollen production is unlikely,*
    - *Trait does not confer ecological advantage to the plant or it's relatives should gene flow occur,*
    - *If present in cultivated fields, will be controlled as described above for volunteers,*
    - *Reference CFIA biology document where applicable.*