General

1. **Clearfield® Production System for CLHA-Plus Sunflower.** Only use Clearfield® or Clearfield®Plus Sunflower herbicides on Clearfield®Plus Sunflower hybrids.

2. **Compliance.**
   a. Good Agricultural Practice: Always follow local Good Agricultural Practice. Where and when possible, use integrated weed management techniques such as controlling emerged weeds before seeding the Clearfield®Plus Sunflower crop.
   b. Applicable Law: Always comply with all applicable laws and follow herbicide label instructions to achieve best possible weed control.

3. **Stewardship:**
   a. Clearfield®Plus sunflower producers are asked to follow specific management practices that prevent or delay the development of herbicide resistance and preserve the usefulness of this technology. These practices were developed by BASF, University, and Institute researchers. They are in line with good agricultural practices (GAP) and should apply across crops and years to promote a sound technology management.

**Stewardship Practices for Clearfield®Plus Sunflowers**

**Avoiding Crop Injury**

1. **Avoiding mis-application.** Note that Clearfield®Plus seed bags and Clearfield® the suffix “CL Plus” “CP” or “CLP.”

2. **Use of Group B herbicides (referred to below).** To avoid severe crop injury, do not apply any unregistered Group B herbicide that is not a Clearfield® or Clearfield®Plus Sunflower herbicide to Clearfield®Plus hybrids.

**Outcrossing via Gene Flow**

University and Institute researchers have demonstrated that the herbicide tolerance trait in Clearfield®Plus sunflowers can move (outcross) into a wild sunflower population, transferring the tolerance trait into the resulting offspring which then may exhibit resistance to imidazolinone (IMI) herbicides. Following the listed Stewardship Practices herein will minimize outcross populations and reduce the development of herbicide resistance by other weed species.

**Resistance Management**

1. Always grow Clearfield®Plus sunflowers in rotation with other crops such as small grain cereals or maize.
   a. This practice breaks the cycle of continuous sunflower production and allows the use of herbicides that have a different mode of action than the IMI herbicides.
   b. Crop rotation is also a basic recommended agronomic practice in that it reduces disease and insect pressure in sunflower fields.

2. In the rotation crop, use herbicides that have a mode of action different than the IMI herbicides which are AHAS or ALS-inhibitors (HRAC group B or WSSA group 2).
   a. This reduces the selection pressure from a continuous use of ALS-inhibiting herbicides.
   b. Volunteer Clearfield®Plus sunflowers can typically be controlled with one of the alternate mode of action herbicides in a rotation crop (See Volunteer Management below)

3. Do not cultivate Clearfield®Plus sunflowers on land with a history of heavy wild sunflower infestation.
   a. This will reduce the threat of outcrossing of Clearfield®Plus sunflowers with wild sunflowers.

4. Control wild sunflowers in adjacent areas to Clearfield®Plus sunflower fields (such as in road ditches, field borders, or fence rows) with mechanical means or by using an herbicide with a non-ALS mode of action.
   a. This will minimize the potential of outcrossing of Clearfield®Plus sunflowers with wild sunflowers.
   b. This can aid in reducing vectors of disease, and damaging insects harbored by nearby wild sunflower species.

5. Control emerged wild sunflowers prior to planting Clearfield®Plus sunflowers with a non-ALS burn down herbicide or by mechanical means.
   a. This practice reduces the reliance on ALS herbicides for weed control thereby reducing the selection pressure for weed resistance.
   b. It also can eliminate any wild sunflower biotypes that may already be resistant to ALS herbicides.

6. Do not use solely ALS herbicides on the same field more than two (2) out of four (4) years.
   a. Using sequential or tankmix partners with multiple modes of action will also aid in reducing the probability of weed species resistance development in any given field.

**Volunteer Clearfield®Plus Sunflower Management**

1. **Good Field Hygiene.** After growing Clearfield®Plus Sunflower crops, volunteer Clearfield®Plus Sunflower may appear within the field and potentially in neighboring fields as a result of normal agricultural practices and perhaps from pollination between neighboring Sunflower crops. Always employ good field hygiene and in particular:
   a. control weeds in the Sunflower crop
   b. avoid field-to-field mechanical movement of seed with seeding or harvesting equipment
   c. stimulate germination of volunteer Sunflower plants post-harvest so that such plants can be controlled with herbicide or mechanical tillage.

2. Control volunteers in the following crop. To control volunteer Clearfield®Plus Sunflower, use either (a) appropriate non-Group B** herbicides or (b) a combination of appropriate non-Group B herbicides with Group B herbicides. Using more than one mode of action herbicide is a proven practice to reduce the chance of the development of herbicide resistant weeds. Please contact your local Clearfield® Sunflower herbicide retailer / distributor or BASF representative to determine the best herbicide options available for volunteer Clearfield®Plus Sunflower control.

- For additional information including specific herbicide recommendations to control volunteer Clearfield®Plus Sunflower visit: www.clearfield-stewardship.com.
- Group B herbicides, i.e., ALS inhibitors, are products based on the following chemical families: imidazolinones. For more information on herbicide groups, visit: http://www.hracglobal.com/pages/classificationofherbicidesiteofaction.aspx