United States Department of Agriculture
Natural Resources Conservation Service

2016 – 1
2017 – 1 Renewal

Plant Enhancement Activity – PLT19 –Herbicide resistant weed management

Enhancement Description
Adoption of multiple agronomic principles to manage herbicide resistant weeds in annually planted crop fields.

Land Use Applicability
Cropland

Benefits
The number of weed species becoming herbicide resistant is increasing at an alarming rate and other weed species are evolving to possibly become resistant. Without a comprehensive management strategy to control the weeds that have already become herbicide resistant and to mitigate the evolution of potentially resistant weeds, many acres of conservation tilled land may be converted back to conventional tillage. This conversion will reverse the gains achieved over the years by conservation tillage leading to diminished soil health and greater erosion rates. By implementing this enhancement, the identified resource concerns (i.e., soil quality, soil erosion, plants and water quality) will be improved and sustained at a high level by the recommended management system.

Conditions Where Enhancement Applies
This enhancement applies to all acres of annually planted cropland. These acres can be organic, transitioning to organic, or non-organic.

Criteria
1. Develop a crop rotation for each enrolled acre that prevents back to back growing seasons of the same or similar crops on the enrolled acre, or crops grown back to back that utilized the same herbicide chemistry for weed control. If the current crop rotation only contains two crops, an additional crop different from the original two must be added. Exceptions to the crops grown back to back limitation: crops grown using flooded conditions for weed control (i.e., rice, lotus or taro) or new crop rotations developed as a result of this enhancement that utilize a sod base rotation.
2. The crop rotation developed as a result of Criteria #1 must be grown in a manner to maintain a Soil Tillage Intensity Rating (STIR) as determined by RUSLE2 that is lower than the previous rotation/system.
3. Develop a herbicide rotation for each enrolled acre that avoids repeated use of herbicides with the same mode of action (MOA). The same herbicide used independently shall not be used in more than two consecutive applications (i.e., two split applications in a growing season, or two consecutive single applications in two years). An herbicide with the same MOA may be used in tank mixed, prepackaged, or sequential mixtures that include multiple MOAs with substantial control of the potentially resistant weed(s).

4. When herbicides are used for weed control, a pre-plant residual shall be used with any pre-plant burn down herbicide used. Residuals shall be also be used with post-plant burn downs, early post-emerge applications and lay-by applications.
5. Scout the enrolled acreage to facilitate early weed identification, weed mapping of the problems areas, and a more timely response to weed pressures.
6. In the event of herbicide resistant weed escapes on the enrolled acres pre-harvest but after lay-by treatments, hand weed or hoe the escaped weeds prior to flowering.
7. For organic or transitioning to organic systems where a plant ecotype becomes resistant to a NOP approved herbicide, hand weeding or hoeing of the enrolled acres at least 3 times during the growing season shall be accomplished before the weeds reach maturity (i.e., flowering).
8. Post-harvest, where fields will be temporarily fallow and adequate growing conditions exist for weed growth (i.e., pre-frost), the fields shall be mechanically (this does not include tillage) or chemically treated to prevent adding seed to the weed seed bank and weed spread.

Note: If the use of a high residue cover crop or mixtures of high residue cover crops is desired as an additional management option for weed management, refer to "PLT20-High Residue Cover Crop or Mixtures of High Residue Cover Crops for Weed Suppression and Soil Heath." This enhancement and PLT20 are complementary.

Adoption Requirements

This enhancement is considered adopted when all of the criteria have been met on the land use acre.

Documentation Requirements

Written documentation for each year of this enhancement describing the following items:

1. Crop rotation
2. Crop planting system used to manage residue
3. Scouting reports
4. Herbicides used- their MOA and date of application
5. Dates of hand weeding or hoeing, if applicable
6. Dates of post-harvest chemical or mechanical treatment, if applicable

References

Boerboom, C., and M. Owen. 2006. Facts about Glyphosate-Resistant Weeds. The Glyphosate, Weeds, and Crop Series. GWC-1. Purdue University.

Campbell, J., C. Mallory-Smith, A. Hulting, and D. Thill. 2011. Herbicide-Resistant Weeds and Their Management. PNW 437. University of Idaho.

Gunsolus, J.L. 2008. Herbicide Resistant Weeds. University of Minnesota-Extension. WW-06077. http://www.extension. Umn.edu/distribution/cropsystems/dc6077.html.

Price, A.J., K.S. Balkcom, L.M. Duzy and J.A. Keltron. 2012. Herbicide and Cover Crop Residue Integration for *Amaranthus* Control in Conservation Agriculture Cotton and Implications for Resistance Management. Weed Technology. In press.

Price, A.J., K.S. Balkcom, R.L. Raper, C.D. Monks, R.M. Barentine, and K.V. Iversen. 2008. Controlling Glyphosate-Resistant Pigweed in Conservation Tillage Cotton Systems. Conservation Systems Research. Special Publication No. 09. USDA-ARS-NSDL, Auburn, AL.

Sustainable Agriculture Research and Education (SARE). 2010. Managing Cover Crops Profitably. 3rd ed. Handbook #9. College Park, MD.

Whitaker, J.R., A.C. York, D.L. Jordan, A.S. Culpepper, and L.M. Sosnoskie. 2011. Residual Herbicides for Palmer Amaranth Control. The Journal of Cotton Science. 15:89-99.

Utah State Supplement 2015 for PLT18

Notes:

1.Where to find MOA on the label
http://www.extension.iastate.edu/CropNews/2010/1220hartzler.htm

2. To find the description of the mode of action of an herbicide use the following table:
http://wssa.net/wp-content/uploads/HerbicideMOAClassification.pdf

Enhancement Name	Enhancement Code	Potential Duplicative Practices (code)	Incompatible Enhancements
Herbicide Resistent Weed Management	PLT18	328 – Conservation Crop Rotation 595 – Integrated Pest Management	none

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Operations & Maintenance, Conservation Measures, and Client Acknowledgement

Operation and Maintenance
Operation: Maintenance:
Conservation Measures
Actions that must be implemented by the landowner/manager during practice implementation:
Client's Acknowledgement Statement
The Client acknowledges that: a. They have received a copy of the enhancement and understand the contents and requirements. b. It shall be the responsibility of the client to obtain all necessary permits and/or rights, and to comply with all ordinances and laws pertaining to the application of this practice. **Cooperator:** _____ **Date:** _____ **Planner:** _____ **Date:**