How Long Can Roundup® Residues Stay on Plastic Mulch?

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Glyphosate is the most used herbicide in the world, and it is commercially sold as Roundup®, Rodeo®, Accord®, Glyphomax®, Rattler®, Touchdown®, among other brand names. This is a non-selective herbicide that is sprayed on bed-tops before the crop is planted and in row-middle applications. The latter is widely used in polyethylene-mulched vegetables, strawberries, and ornamentals. In double-cropped cucurbits (e.g. cucumber, squash, zucchini, cantaloupe, etc.) after strawberries, glyphosate is applied to kill green foliage before planting the second crop.

The label of this herbicide indicates that it has little soil activity and it is rapidly broken down by microbes. However, injury symptoms have been reported in situations where glyphosate has been applied on polyethylene mulch before crop transplanting. There is no information on whether the herbicide is deactivated by sunlight (called photodegradation) on plastic mulch and on how long this process takes. Therefore, studies were conducted to determine the extent of photodegradation over varying sunlight and humidity exposure periods.

To achieve that objective, tomato was used as the test crop and black low-density polyethylene film was sprayed with a labeled rate of 1 lb of glyphosate/acre. Sunlight-exposure times were 0, 1, 2, 3, 4, 5, 7, 9, 11, 13, and 15 days after application. No rainfall or sprinkler irrigation occurred during the trial.

The results indicated that 15 days after application, there was still enough glyphosate to significantly reduce tomato growth by 70% (see picture and figure 1), which suggests that glyphosate breakdown takes more that 2 weeks when applied on the polyethylene mulch, especially if no rainfall or sprinkler irrigation has been used to wash the herbicide away. This is particularly important from the grower’s standpoint, since it is a common practice transplanting the crop shortly after glyphosate application.
Figure 1. Effect of length of sunlight exposure with glyphosate-applied mulch on tomato plant fresh weight.

Y = 3.24 + 0.005x^2, R^2 = 0.92