



**Glufosinate Use in Arizona**  
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**Comments submitted by the Arizona Pest Management Center**  
**University of Arizona**

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**Who We Are**

The Arizona Pest Management Center is host to the University of Arizona's expert IPM scientists including Ph.D. entomologists, weed scientists and plant pathologists with expertise in the strategic tactical use of pesticides within IPM programs that protect economic, environmental and human health interests of stakeholders and the society at large.

Dr. Peter Ellsworth is Director of the APMC, State IPM and Pesticide Coordinator for Arizona and Professor of Entomology / Extension IPM Specialist with expertise in developing IPM systems in cotton and other crops and measuring implementation and impact of IPM and pest management practices. Dr. Al Fournier is Associate Director of the APMC / Adjunct Associate Specialist in Entomology, holds a Ph.D in Entomology, and has expertise in evaluating adoption and impact of integrated pest management and associated technologies. He serves as a Comment Coordinator for the Western IPM Center, representing stakeholders in the desert Southwest states. Mr. Wayne Dixon holds a B.S. in Computer Information Systems and develops tools and data used in IPM research, education and evaluation, including management of the APMC Pesticide Use Database. Dr. William McCloskey is an Associate Professor and Extension Specialist in Weed Science, with experience in field crops, including cotton, and tree fruit and nut crops.

These comments are the independent assessment of the authors and the Arizona Pest Management Center as part of our role to contribute federal comments on issues of pest management importance and do not imply endorsement by the University of Arizona or USDA of any products, services, or organizations mentioned, shown, or indirectly implied in this document.

### **Our Data and Expert Information**

Through cooperative agreements with Arizona Department of Agriculture, the Arizona Pest Management Center obtains use of, improves upon, and conducts studies with ADA's Form L-1080 data. Growers, pest control advisors and applicators complete and submit these forms to the state when required by statute as a record of pesticide use. These data contain information on 100% of custom-applied (i.e., for hire) pesticides in the state of Arizona. Grower self-applied pesticide applications may be under-represented in these data. In addition, the Arizona Pest Management Center is host to scientists in the discipline of IPM including experts in the usage of this compound in our agricultural systems. We actively solicit input from stakeholders in Arizona including those in the regulated user community, particularly to better understand use patterns, use benefits, and availability and efficacy of alternatives. The comments within are based on the extensive data contained in the Arizona Pest Management Center Pesticide Use Database, collected summary input from stakeholders and the expertise of APMC member faculty.

### **Arizona**

Table 1: Reported glufosinate use, acres treated. Source: Arizona Pest Management Center Pesticide Use Database.

<b>Year</b>	<b>Crop</b>	<b>Reported Acres Treated</b>
2011	Cotton	793
2012	Cotton	1405
2013	Cotton	356
2013	Fallow	50
2014	Cotton	2551
2015	Corn	16
2015	Cotton	5976

Glufosinate is primarily used in cotton in Arizona and has seen an increase in use over the past few years from about 800 acres treated in 2011 to nearly 6,000 acres treated in 2015. Liberty Link cotton is a transgenic cotton modified to be resistant to glufosinate herbicides as part of a systematic weed management scheme, similar to Roundup Ready cotton but reliant on a different active ingredient and mode of action. In 2015, two new cotton herbicide technologies, 2,4-D resistance and dicamba resistance, were introduced into transgenic cotton varieties. Starting this year, many cotton varieties now are resistant to both glufosinate and glyphosate, or are resistant to 3 herbicides, either glyphosate plus glufosinate plus dicamba or glyphosate plus glufosinate plus 2,4-D. These new technology and herbicide use patterns are increasing in importance in large part due to the confirmation of glyphosate resistant weeds, primarily, *Palmer amaranth* (pigweed) in Arizona and of many other species in other parts of the cotton belt. Glyphosate is the active ingredient in Roundup herbicide.

According to Dr. William McCloskey, Extension Weed Science Specialist for the University of Arizona, glufosinate is a very important active ingredient for weed management in Arizona

cotton. It plays an absolutely critical role in the management of glyphosate-resistant Palmer amaranth (pigweed) in cotton and other crops. Recent research has shown that the growth regulator herbicides dicamba and 2,4-D when sprayed alone do not kill all sprayed plants and glufosinate has proven to be an effective tank-mix partner for increasing efficacy. Glyphosate-resistant Palmer amaranth has become a rapidly expanding problem in several agricultural areas of the state, including Maricopa, Pinal, Pima and Cochise Counties. Also, Bayer Crop Science has a large number of seed contracts in Arizona, and glufosinate is a critical weed management tool for these crops, as spraying glufosinate is a requirement of the seed contracts. In Arizona, we have seen expanded production of pecans and pistachios, particularly in Cochise County in the Southeastern part of the state. Glyphosate resistant Palmer amaranth is becoming a problem in some of the orchards and recently hairy fleabane resistant to glyphosate has been found. Glyphosate resistant Palmer amaranth is also a problem in some New Mexico pecan orchards in the Las Cruces area. Glufosinate is critical to management of glyphosate-resistant Palmer amaranth and other weed species in these orchards. As glyphosate resistant weed species spread it is likely that glufosinate use will increase in Liberty corn and in other markets such as urban landscapes in Maricopa County.

Area Agricultural Agent and Resident Director of the Safford Agricultural Center of the University of Arizona, Dr. Randy Norton, agrees that this an important technology that should be maintained for cotton in Arizona. Glufosinate is applied after planting to kill off any cotton plants that are not resistant to it. Thereafter it is used as a primary weed management tool in glufosinate resistant transgenic cotton systems. They see good weed control with glufosinate in the Sulfur Springs valley (Cochise County). It is important for growers to retain the access to this technology, which is so important in the management of glyphosate-resistant Palmer amaranth.

One Pest Control Advisor (PCA) in central Arizona has not been convinced of the effectiveness of glufosinate for weed control in cotton. "It does not provide an effective level of control and it is too expensive. Seed contracts require its use at the high rate. It only works on weeds 1" tall or shorter." In his experience, it is not effective, even against Palmer amaranth. He also commented that more Arizona cotton growers need to start using residual herbicides again, but that growers complain that to do so is too expensive. There has been too much reliance on glyphosate. Glyphosate at maximum rate is not as effective as it used to be on a number weeds, including pigweed and morning glory. Dr. McCloskey has heard from several Arizona PCAs who would like to see more residual herbicide use (which incidentally would make glufosinate more effective) but it has been difficult to convince growers to use DNAs due to cost, low commodity prices, etc. It is in fact difficult to control Palmer and morningglory with glufosinate with the current label. You have to use a preemergent herbicide pre-plant incorporated. Liberty label changes expected next year will allow a higher use rate of Liberty but it will still take two sequential applications appropriately timed to be successful. As far as expense, next year there will hopefully be two generics on the market to compete with Liberty (there was one generic in 2016 but it was not widely appreciated or known).

A different Pest Control Advisor (PCA) in Southeastern Arizona indicated that glufosinate is an important and effective herbicide in management of pecan orchards. Several trade names are available in the tree and vine market, including Rely 280, Interline and Lifeline. "Glufosinate is used for weed control in orchards, because more weeds are becoming tolerant to glyphosate. We are trying to alternate to other modes of action, including pre-emergent herbicides. But we have to be very careful with pre-emergent products because of potential damage to the crops. To avoid over-reliance on glyphosate, we rotate to glufosinate and paraquat. Glufosinate has to be used with care. It is not as forgiving as glyphosate. Applications require adequate amounts of water, and you must treat weeds when they are small, and apply at the right time of day. But they get good control when it is used properly. It is not a silver bullet, but it has an effective role in the program." There is an anticipated price reduction of glufosinate expected in the near future. When the price drops, he anticipates it will become increasingly important in cotton.