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PURDUE WEED SCIENCE

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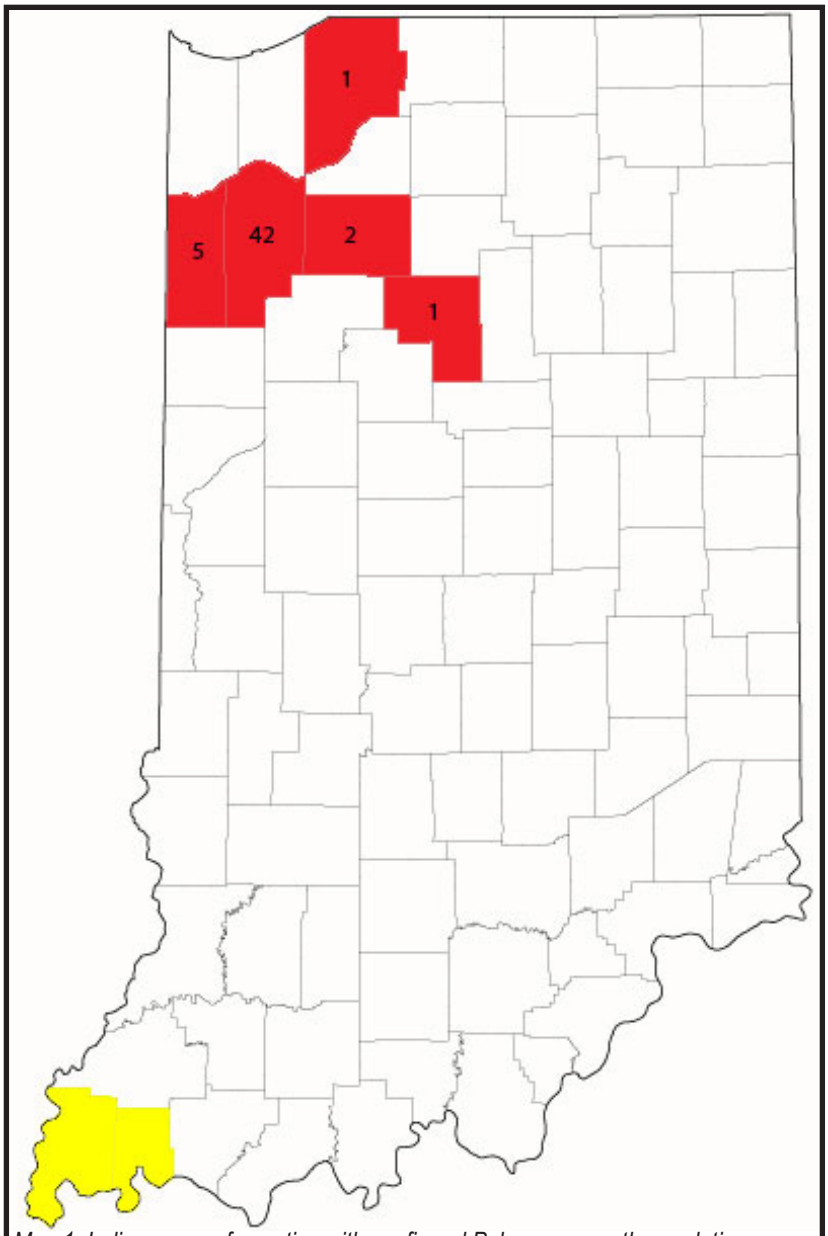
# Palmer Amaranth Populations Confirmed in Indiana

Purdue weed scientist's with the assistance of Purdue extension educators and various agricultural industry reps have identified corn and soybean fields in northwestern Indiana that have Palmer amaranth infestations. At least 50 fields across five counties have been confirmed to have Palmer amaranth, with several fields having overwhelming infestations (Map 1). Palmer amaranth plants were also found along roadsides and in drainage ditches throughout the area of infested fields. This is not the first discovery of Palmer amaranth in Indiana, but is the most significant as previous populations appeared to be confined to select river bottoms in southwestern Indiana. The large number of infested acres and dense infestations in multiple fields across at least four counties indicates that these populations have been present for at least a couple of years. The majority of fields observed with Palmer amaranth infestations have survived multiple applications of glyphosate and PPO inhibiting herbicides.




*Map 1. Indiana map of counties with confirmed Palmer amaranth populations. Counties in red represent most recently confirmed populations with the numeral representing the number of known locations per county. Yellow counties represent previously confirmed populations.*

## The Impact of Palmer Amaranth

The spreading of manure from beef and/or diary operations with feed rations that contained cotton seed/cotton seed hulls from the southern U.S. that was infested with palmer seed is suspected to be the source of the populations found in northern Indiana. The overwhelming majority of Palmer amaranth populations in the southern U.S. are glyphosate resistant and it is assumed that this why multiple applications of glyphosate have failed to control the transplanted populations in northwest Indiana.

Palmer amaranth is by far the most competitive of the amaranth species and has had significant economical impact on cotton production in the southern United States. Entire cotton fields have been abandoned solely due to the lack of control of glyphosate-resistant Palmer amaranth. Southern producers have also reverted back to using hand rouging crews to combat competition from Palmer amaranth. Palmer amaranth plants grow rapidly in the summer heat, upwards of 2 inches/day, and can reach heights greater than seven feet. The seed production capabilities of Palmer amaranth are equally impressive with individual female plants capable of producing over 500,000 seeds.

**Palmer amaranth**
*October 3, 2012*

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## Palmer Amaranth Identification

The identification of Palmer amaranth is critical to keeping track of where this weed has established itself in Indiana. Unfortunately, it is suspected that the recently identified populations have been misidentified over the last couple of years allowing it to spread without proper control. Without close inspection Palmer amaranth can be confused with other more commonly known amaranth species such as: Redroot or smooth pigweed and waterhemp. The following publications will assist you in correctly identifying amaranth species

http://www.ppdl.purdue.edu/PPDL/weeklypics/4-30-12.html
http://www.ksre.ksu.edu/library/crpsl2/s80.pdf
http://bulletin.ipm.illinois.edu/pastpest/articles/200122g.html

Simplified steps that Purdue weed scientist's recommend to identifying pigweeds is to:

1. Look for hairs or pubescence on the stem to differentiate Redroot/Smooth pigweed from waterhemp and Palmer amaranth
2. Observe the petiole lengths. The petiole is the structure that attaches the leaf blade to the stem of the plant. Palmer amaranth will have a petiole that is as long or longer than the leaf blade itself (Pic 1 and 2). Common waterhemp will have petioles that are shorter than the leaf blade.

Some other characteristics that will help differentiate Palmer and waterhemp is the growth pattern and female seed head structures. If you look at the main growing point from above the plant Palmer amaranth, it will appear to have a rosette shape with ovate leaves and long petioles, similar to a poinsettia (Pic 3). Palmer amaranth will have multiple seed heads, but will be distinguished with one main seed head that can reach 2 to 4 feet in length. The seed heads of female Palmer amaranth plants will also be spiny, you will know when you grab one.

The presence of spines (hardened seed bracts) in female Palmer amaranth seed heads can cause people to call it spiny amaranth. Spiny amaranth is predominantly a weed of pastures and livestock holding lots and has bushy growth habit. Spiny amaranth has spines throughout its lifecycle especially at all node axil's. Spiny amaranth is also a monoecious plant (male and female flowers on one plant), where as Palmer amaranth is dioecious (separate male and female plants) with only females having spiny flowering structures.

*Pic 1. Palmer amaranth leaf with long petiole that is a key identifier of Palmer amaranth plants.*

*Pic 3. Palmer amaranth plant from above, notice the rosette leaf pattern that is similar to a poinsettia plant.*

*Pic 2. Palmer amaranth leaf with petiole bend back over the blade to demonstrate the length of the petiole being longer than the blade itself.*

# Palmer amaranth Control and Management

The management and control of Palmer amaranth must be aggressively proactive. Producers should also treat all Palmer amaranth with equal vigilance regardless of glyphosate sensitivity. The key to management of Palmer amaranth is to control it at its most vulnerable stage, germination. The use of preemerge residual herbicides is critical in both corn and soybean.

There are a large number of corn preemerge herbicides that include atrazine premixes that will substantially reduce the amount of plants that emerge and require postemerge applications. There are also a large number of postemerge corn herbicides that will control Palmer amaranth including HPPD inhibitors and growth regulators. In fields heavily infested with Palmer amaranth, it is recommended to grow corn for multiple years as the number of effective herbicides and MOA rotation is far greater than that of soybeans.

Soybean fields with Palmer amaranth must start clean with tillage or an effective burndown and receive a preemerge residual herbicide. This is the most critical part of a Palmer amaranth soybean control program as postemergence options are limited and variable. There are a large number of preemerge soybean herbicides available for Palmer amaranth control, although flumioxazin and sulfentrazone containing products will provide the most residual activity. Chloroacetamide herbicides, dinitroanilines, and higher rates of Sharpen-based herbicides can help as well. Postemergence products are limited to the PPO inhibitors and Liberty (Liberty Link beans only) and the effectiveness of these products can be variable. PPO inhibiting herbicides often referred to as burners and blazers, include Cobra, Reflex, Flexstar, and Ultra Blazer and must be applied to small plants to achieve full control. Liberty in Liberty Link beans can be an effective management technique if one doesn't want to grow continuous corn. However, you should also use residual herbicides and remember that Liberty is effective on small (2-3") plants; the efficacy of Liberty on large plants and heavy infestations will be variable. In heavy infestations producers should overlap residuals by also applying a residual herbicide at the postemergence application. The fomesafen products (Reflex and Flexstar), have residual properties as well as postemerge efficacy. Other postemerge residuals include Dual II Magnum, Outlook, and Warrant. These products will not control emerge weeds and thus should be tank mixed with a postemerge herbicide.

Specific herbicide programs and rates will vary between soil types and production practices. Purdue Weed Science will be working to produce an in-depth Palmer amaranth identification, control and management publication in the next couple of months.

Information listed here is based on research and outreach extension programming at Purdue University and elsewhere.

The use of trade names is for clarity and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current and update precautions and restrictions. Copies, reproductions, or transcriptions of this document or its information must bear the statement:

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