You Ain't From Around Here! Exotic Invasive of the Quarter: Witchweed (*Striga asiatica*)

By: Jennifer Gagnon, Virginia Tech

Witchweed parasitizing a corn plant. Photo by: USDA APHIS PPQ Archive.

Looking back in the annals of You Ain't from Around Here! I realized I have never written about a parasitic invasive. And it just so happens, that the next up and coming species to be wary of is an obligate root hemiparasite!

Let me take just a minute to discuss what it means to be an obligate root hemiparasite. A parasite is a living organism that must obtain some or all of its nutrition from a host plant. A hemiparasite means that the parasitic plant has green leaves and can photosynthesize to produce its own carbon; however, the majority of its carbon comes from the host plant (holoparasitic plants are unable to photosynthesize, and must obtain all of their nutrition from host plants). Root parasites connect to their host plants via haustoria – specialized roots which can tap into the root system of the host plant and sieve away the fruits of its photosynthesizing labors. And obligate means the parasite must have a host in order to complete its lifecycle. So, this quarter's exotic invasive is witchweed, a plant that can photosynthesize, but must obtain some of its nutrition from the roots of a host plant in order to complete its lifecycle.

Witchweed is a native to Asia and, ironically enough, one source stated that it can be used to treat internal parasites in humans. It parasitizes tropical and subtropical annual grasses, such as corn, sorghum, sugarcane, rice and certain weedy grasses. Infected host plants use all their energy feeding the parasite. Symptoms of infection include stunted growth, wilting, chlorosis (yellowing of the leaves) and decreases in productivity (95-100% reduction in grain yield). Unlike many of the other invasives we've learned about, witchweed devastates important agronomic crops in its homeland as well.

The date and mode of witchweed's arrival in the United States are not known (although the fact that it belongs to the **Broom**rape family may shed some light on its mode of transport). The first plants were discovered by a graduate student from India, who recognized the parasite from his country.

Before the flowers of this plant open, they self-pollinate, which means that a lone individual plant is capable of reproduction. And reproduce it will. A single plant can produce 500,000 seeds in its one-year lifetime. The tiny dust-like seeds are disseminated (spread) by wind, water and humans. Since witchweed plants cannot survive without a host, the seeds remain viable in the soil (for up to

10 years), until they sense the root exudates of a host plant. Then they germinate. Very clever. However, this clever trait can also be used to the detriment of witchweed, as will be discussed in the control section.

Although this species is not at all wide-spread in the United States (it's only found in a few counties in North and South Carolina) it is worth keeping an eye on because of its proximity to Virginia and its devastating effect on valuable crops. Control of this species has been very successful (I'm not used to writing that statement in these columns!). In fact, over 99% of the infestation has been eradicated (from 450,000 acres to 5,000).

How to identify the witchweed:
Stems: stiff, branched, 6-12" tall, covered with coarse, short, white hairs
Flowers: vary in color from red, purple, white to yellow; less than 0.5" in diameter; emerge in July
Fruit: the microscopic dust-like seeds form in small capsules; the seeds themselves come in many different shapes and are often twisted and
irregular due to crowding while they develop in the capsule.
Leaves: bright-green, linear and round, about 1" long, nearly opposite
Roots: succulent, round, white, no hairs

A witchweed plant (top) and a magnified look at the seeds (bottom). Photos by: Florida Division of Plant Industries Archives, FL Department of Agriculture & Consumer Services and Julia Scher, USDA APHIS PPQ.

How to control the witchweed:
Control involves three steps:

- Locating and mapping the infested areas. These surveys are conducted by federal and state governments as well as private landowners.
- Quarantining the infested areas to prevent human spread. The movement of soil, plants or machinery from infested lands may be limited.
- Eradicating includes both preventing existing plants from producing seeds and destroying the seed bank. Existing plants can be eliminated using herbicides (with active ingredients of paraquat or glyphosate) before the plants start to flower. To destroy the seed bank (recall, seeds can stay viable for 10 years), a method called suicidal germination is used. This tricks the seeds into germinating by making them believe a host plant is present (ok, a bit of anthropomorphizing, I know). To do this, ethylene gas is injected into the soil (ethylene gas is produced by fruits –it's what causes peaches in a paper bag to ripen quickly). The seeds germinate, realizing their folly far too late. In the absence of a host plant, they quickly die.

If you prefer a control method other than injecting ethylene gas into your soil, you can plant a trap crop such as cotton, sunflowers or linseed, which stimulate the seeds to germinate, but are not suitable host plants. These trap crops should be grown for at least 3 years.

Now, if you are an astute observer and need some cash, the USDA Animal and Plant Health Inspection Service (APHIS) is offering a $25 reward to anyone who spots and reports this weed. Just call APHIS at 919/716-5590. This is a wonderful opportunity to earn enough money to purchase a couple gallons of gas!

Although I haven't come across any other exotic invasive parasites yet, parasites in general are fascinating (at least to us plant geeks). There are many different types and some are majorly weird! To learn more, visit "The Parasitic Plant Connection" at www.parasiticplants.siu.edu.

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