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Parasitic Weed -- A New Pine Problem

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Closeup of flower buds and flowers. Its prolific seed production gives senna seymeria a potential for rapid spread

Landowners throughout the southern pine region should be alert for an annual weed known as senna seymeria. This weed was recently discovered to be a parasite on the living roots of slash pine (*Pinus elliottii* Engelm.). When numerous it weakens and kills seedlings. It has the potential to become a serious problem because it grows on a wide array of pine sites and is capable of spreading rapidly, especially where the soil is scarified before planting and seeding. The objectives of this article are to help landowners identify the parasite in various stages of development and to offer suggestions for its control.

As other weeds, senna seymeria, is difficult to identify in the infant stage but is readily distinguished after height growth begins. To aid landowners in identification, photographs with this article show plants of several ages.

Newly germinated plants remain in the cotyledon stage until their roots at-

tach to pine roots. In the laboratory the plants die within four to eight weeks if they do not make contact with pines. They grow rapidly in height after the roots are joined, averaging about three inches weekly. Maximum height is 30 to 40 inches. When the weeds occur in dense clusters, as is common in the field, many develop slowly and fail to reach full size and produce seed.

Foliage is light green until early summer, when it often turns purple. Flowering begins in late August and continues into October, with mature plants bearing hundreds of bright yellow flowers about one-half inch in diameter. This is an ideal stage to locate senna seymeria, because its distinctive flowers stand above the native grasses. Plants die soon after the seeds ripen in October. Stems and branches dry out and become woody, and often remain upright during the winter. Many empty seed capsules stay on the branches until spring, making the

dead weeds easy to recognize.

Senna seymeria is not a newcomer to the South. It was reported in South Carolina in 1788, and in other states during the early 1800s. Its role as a parasite apparently went unnoticed until 1968, when it was found attacking slash pine seedlings on sandy, flatwoods soils about 20 miles northeast of Panama City, Florida. The parasitism was first reported in *Forest Science*, September 1969.

The first indication of a problem was chlorotic, dying, and dead seedlings in three- and four-year-old direct-seeded stands of slash pine. Scattered patches of trees up to one-half acre in size were affected over areas of several hundred acres. The sites had been disked before sowing to reduce grass competition and promote tree growth.

Parasitism was suspected when senna seymeria was observed growing near most afflicted pines. When the pines were dug up, evidence of parasitic action was

found where roots of the two species met. Subsequent tests with herbicides applied to the foliage demonstrated that chemicals were transferred through the roots from one species to the other, confirming that union of the roots was physiologically functional.

Weed populations on typical infested areas ranged from 500 to 2,000 per acre when the problem was first noticed. How did so many weeds become established in a few years? Before this question is answered, two facts should be noted. First, pine is apparently the only host. The authors have examined thousands of acres and have never found *senna seymeria* growing without pine close by. This observation is supported by greenhouse tests in which weed seeds germinated but plants failed to grow in pots containing 21 species of grasses, forbs, sedges, and woody plants that are prevalent in northwest Florida. By contrast, plants started in pots with pines grew rapidly. The second pertinent fact is that loblolly (*Pinus taeda* L.) and longleaf (*P. palustris* Mill.) pines have been parasitized in the greenhouse, and it seems logical to assume all southern pines are suitable hosts.

This basic information on the hosts suggests how *senna seymeria* became a widespread problem so quickly. Soils on the 50,000-acre tract are primarily sandy and wet. The water table is at or near the surface three to six months of the year. The tract was clearcut in the 1950s, and burned over frequently thereafter. The predominant cover was wiregrass, except in shallow drains and ponds. Longleaf and slash pines that had been left behind by the loggers were scattered over the area. These trees probably served as nuclei of infestations that spread rapidly when reforestation was begun.

Between 1961 and 1966, about 20,000 acres were direct-seeded to slash pine. Nearly 70 percent of this acreage was burned and mound-disked (bedded) in strips for seedbed preparation. The rest, primarily on dry sites, was flat-disked or burned prior to seeding.

Heaviest infestations of *senna seymeria* occurred originally on the drier sites. Presumably the seeds were killed where water stood on the surface for long periods. But the weed has gradually spread over the entire tract, though on the wet parts it is largely confined to the ridges of mounded beds. At the same time, populations have increased everywhere and sometimes number 10,000 weeds per acre.

The largest pines killed were about seven feet tall. The maximum size subject to mortality is probably related to



Senna seymeria 3 and 8 inches tall. At this stage, plants make rapid growth

Below: Left—Clump of weeds in early July. The plants are about 2 feet tall, and the branching is characteristic. Right—closeup of 2-foot plant with numerous flower buds





Hundreds of seed capsules remain on the dead plant in winter, making identification fairly easy

the number of weeds attacking a tree. *Senna seymeria* has since been observed in many older stands near Panama City and elsewhere, but no merchantable-size trees have been found chlorotic or dead. On areas where the weed was present, the soil had been scarified by logging a few years earlier. Weeds were absent in adjacent, uncut stands, probably because the mat of pine litter prevented seeds from reaching mineral soil.

The large number of seeds produced by a mature plant contributes to the rapid spread. Seeds are borne in round capsules about 0.1 inch in diameter. Large, open-grown plants have up to 2,000 capsules, each containing about 75 seeds. With as few as 100 large weeds per acre, 15 million seeds can be produced.

One end of the capsule opens and seeds are dropped, when wind shakes the plant. Practically all seeds are released in the fall. While the small seeds are probably carried by the wind for short distances, they do not have wings or other appendages for wide dispersal. Seeds are also scattered by water movement.

In northwest Florida the time of seed dissemination and germination seems to preclude control by prescribed burning, even after pines are large enough to

withstand fire. Seeds mature in early November, when new pine growth is still succulent and air temperatures are too high for safe burning. Seeds stay on the ground over winter and germinate in late April after grasses and pines have started growth and the weather is again warm. It is not known if fire can be used to check the parasite in other regions.

Pines must be at least eight to ten feet tall to withstand prescribed burning. But if burns are delayed until the trees reach this height, weed infestations may become heavy enough to cause substantial mortality and growth loss. Prescribed burning is probably most useful in preparing the site before reforestation. It should be done in the summer after most weed seeds from the previous year have germinated and before the new seed crop is mature. The fire probably will not give complete control, for there are indications that some seeds remain dormant and germinate in the second year.

The best procedure is to start control measures as soon as the parasite is detected. Areas around residual pines or

natural reproduction should be watched closely for they are likely to be the starting point for infestations. Since their foliage is succulent, the weeds are highly susceptible to herbicidal sprays. Herbicides in low concentration—about 25 percent of that used for hardwood control—can be applied with a back-pack mist blower with little or no injury to pines. While spraying will be effective throughout the growing season, late summer is probably best because then the weeds are large and easily detected while the pines are highly resistant.

Senna seymeria is a threat throughout most of the southern pine region. It has been reported in the Atlantic and Gulf Coastal plains from Virginia to Texas, and extending inland to Tennessee. It has not been observed in Oklahoma and Arkansas. The weed is adapted to a wide array of soils ranging from dry sands to heavy, wet, silt loams. Landowners should be alert for infestations, especially following site preparation, and take prompt action to eradicate the weed, even if it is found only in small numbers.



Four-year-old slash pines killed by parasitic weeds, which are most evident in the center of the picture