

Black-senna [*Seymeria cassioides* (J.F. Gmel.) Blake]: A Root Parasite of Importance to Forestry in Florida¹

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INTRODUCTION: Some 44 species of flowering plants which parasitize the roots of other plants occur throughout much of the southern United States (Mann and Musselman 1979). These parasitic species belong to five plant families: Krameriaceae, Olacaceae, Orobanchaceae, Santalaceae and Scrophulariaceae (Musselman and Press 1995). Generally, these interesting plants show little host specificity and are capable of parasitizing the roots of a wide variety of woody plants (Musselman and Mann 1978). Little is known regarding the pathogenic potential of most of these parasitic plants, but black-senna, *Seymeria cassioides* (J.F. Gmel.) Blake (figwort family, Scrophulariaceae), sometimes inflicts serious and economically important damage to young pines (*Pinus* spp.), especially on scarified sites in the lower Gulf and Atlantic Coastal Plains (Fitzgerald and Terrell 1972; Fitzgerald *et al.* 1977; Grelen and Mann 1973; Laird and Wolfe 1973; Mann *et al.* 1971). Black-senna occurs in parts of VA, NC, SC, GA, FL (Fig. 1), AL, MS, LA, TX, TN and the Bahama Islands in both seasonally wet pine flatwoods and well-drained pine-oak ridges, savannahs, swales, hills and open pine woodlands (Godfrey and Wooten 1981). On drier sites, black-senna sometimes occurs together with combleaf seymeria, *Seymeria pectinata* Pursh, a close relative with which it may be confused. In pot studies, combleaf seymeria has demonstrated a capability to parasitize pines, but its field impact on these hosts is unknown (Musselman and Mann 1978).

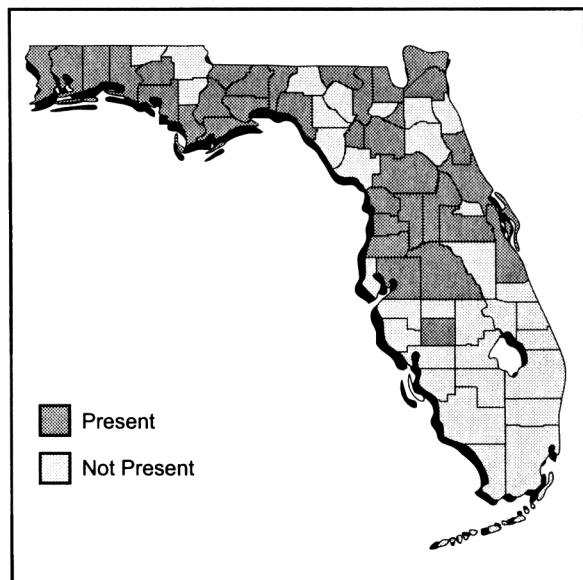


Fig. 1. Counties in Florida in which *Seymeria cassioides* is known to occur (Wunderlin *et al.* 1995).

The common names black-senna, senna-seymeria and yaupon black-senna have been applied to *S. cassioides*. Black-senna and senna-seymeria are probably references to the similar appearances of the flowers and divided leaves in members of the genus *Senna* (family Leguminosae). Yaupon black-senna, on the other hand, may refer to the fact that this species often cohabits sites with yaupon holly, *Ilex vomitoria* Aiton.

DESCRIPTION AND BIOLOGY OF THE PARASITE: Black-senna is an erect, profusely branched, glandular pubescent annual with squarish stems (Fig. 2). Plants may grow to 1.2 m in height, but are more typically in the range of 75-90 cm. The opposite leaves are usually less than 1 cm long, but may grow to 1.5 cm. Leaves are divided into 4 to 7 pairs of filiform segments (*S. pectinata* has broader lanceolate segments). Young foliage and stems are light green, but a distinct reddish-purple coloration is not uncommon, especially in sunlight and as plants mature. Senescent or dead plants may appear nearly black (Laird and Wolfe 1973; Mann *et al.* 1969; Mann *et al.* 1971; Musselman and Mann 1978). Herbarium specimens are black due to irioid compounds (Cronquist 1981) which become apparent as chlorophyll deteriorates.

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Fig. 2. *Seymeria cassioides*. A) Large plant near a seriously damaged 6-year-old slash pine. B) Close-up of foliage, flower buds and a single yellow flower. (Photography credit: G.M. Blakeslee.)



Fig. 3. Seed capsules of *Seymeria cassioides*. (Photography credit: Jeff Lotz, DPI Photo File #703065-1.)

Black-senna flowers are solitary in leaf axils, stalked, ephemeral (lasting only one day) and produced from August through October. The calyx is glabrous and consists of five narrow sepals united at their bases. The externally glabrous corolla (hairy in *S. pectinata*) consists of five bright yellow petals which are united into a short cylindrical base and expanded into five nearly equal, rounded lobes. Corollas are marked with reddish-brown lines internally. Four stamens are attached to the corolla tube at the position where the corolla lobes begin to diverge. The filaments are glabrous (filaments in *S. pectinata* are hairy). The pistil extends past the anthers and the superior ovary eventually develops into a 2-locular glabrous capsule (*S. pectinata*'s capsule is hairy). At maturity, the shiny brown capsule is *ca.* 3-5 mm wide (Fig. 3) and contains about 75 seeds. Seeds are wingless (*S. pectinata* seed are winged), ridged and furrowed, *ca.* 0.6 to 0.7 mm long (Gwynn *et al.* 1978; Radford *et al.* 1964; Godfrey and Wooten 1981). Seeds ripen in October-November and are released to overwinter on the ground where they germinate epigeously the following spring (Fitzgerald *et al.* 1975; Laird and Wolfe 1973; Mann *et al.* 1969; Mann *et al.* 1971; Mann and Musselman 1979; Musselman and Mann 1978).

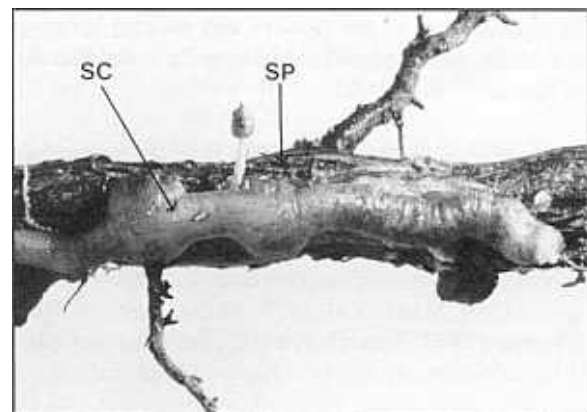


Fig. 4. Haustorial attachment; root of *Seymeria cassioides* (SC) attached to root of slash pine (SP). (Photography Credit: Jeff Lotz, DPI Photo File #703065-7.)

Roots emerging from newly germinated seed grow geotropically with apparently no specific attraction to pine roots. Plants that successfully contact and attach to pine roots (Fig. 4) grow rapidly through the summer and fall, successfully completing the plant's life cycle. Without contact and attachment to pine roots, the plants quickly cease growth and die prematurely (Fitzgerald *et al.* 1975; Mann *et al.* 1971; Stangle and Musselman 1981). The term 'hemiparasite' refers to plants which can germinate without a host plant but are later dependent upon their host plant(s) for growth and development (Jackson 1928). The term effectively describes the mode of black-senna.

Black-senna displays a notable affinity for *Pinus* spp. (Grelen and Mann 1973; Mann *et al.* 1971) and has been considered obligately parasitic on its pine hosts (Grelen and Mann 1973). However, it is capable of haustorial attachment to a variety of other tree species (Musselman and Mann

1978).

IMPACT ON SOUTHERN

PINES: While no detailed statewide or regional impact data exist, black-senna is capable of attacking all commercially important southern pines (Musselman and Mann 1978). Economically important pathogenic impact has been reported for only slash (*P. elliotii* Engelm.) and loblolly (*P. taeda* L.) pines (Fitzgerald and Terrell 1972; Laird and Wolfe 1973; Mann *et al.* 1969). Laird and Wolfe (1973) reported that up to 20 percent of 2-year-old trees were severely stunted or killed in one slash pine plantation in Florida. Fitzgerald and Terrell (1972) reported 50 percent mortality of 2- to 4-year-old trees in several loblolly pine plantations in Georgia. Growth losses have been reported for older loblolly pines in



Fig. 5. Six-year-old slash pine badly damaged by *Seymeria cassioides*; Washington Co., Florida. Note stunted growth, chlorotic foliage, tufting of needles at stem terminals and tree mortality (Photography credit: E.L. Barnard.)

Georgia (Fitzgerald and Terrell 1975), and damage on older slash pines has been observed in Florida (Fig. 5). Parasitized trees exhibit varying degrees of foliar chlorosis, poor growth, tufting of needles at branch tips and mortality depending upon the age and size of affected trees, the numbers of black-senna plants, etc. These symptoms may be confused with those caused by other factors such as nutrient deficiencies or adverse water table levels (Fitzgerald and Terrell 1975).

CONTROL: Efforts to control black-senna with herbicides have produced variable results (Fitzgerald and Terrell 1975; Mann *et al.* 1969; Mann *et al.* 1971). However, the efficacy, economics, logistics and environmental considerations associated with chemical control strategies render such approaches questionable. Prescribed burns may provide useful control if timed during the summer months, well after black-senna seed germination and before new seeds have matured (Grelen and Mann 1973; Mann *et al.* 1971). Poorly timed fires and intensive site preparations where black-senna populations pose a threat may exacerbate infestations since establishment and growth of the parasite is enhanced on exposed or highly scarified sites (Fitzgerald *et al.* 1977; Fitzgerald *et al.* 1975; Mann *et al.* 1969; Mann *et al.* 1971).

SURVEY AND DETECTION: Look for characteristic plants (Fig. 2) in association with young pines exhibiting foliar chlorosis, needles tufting at branch ends, poor growth and mortality. Excavation and examination of pine roots may reveal characteristic haustorial structures of the parasite (Fig. 3).

LITERATURE CITED

- Cronquist, A. 1981.** An integrated system of classification of flowering plants. Columbia University Press, NY. 1262 p.
- Fitzgerald, C.H., M. Reines, S. Terrell, and P.P. Kormanik. 1975.** Early root development and anatomical parasite-host relationships of black-senna and slash pine. *Forest Science* 21: 239-242.
- Fitzgerald, C.H., R.C. Schultz, J.C. Fortson, and S. Terrell. 1977.** Effects of *Seymeria cassioides* infestation on pine

- Fitzgerald, C.H., and S. Terrell. 1972.** *Seymeria cassioides*, a parasitic weed on pine. Bulletin, School of Forest Resources, University of Georgia. 2 p.
- Fitzgerald, C.H., and S. Terrell. 1975.** Control of *Seymeria cassioides* with phenoxyalkanoic acid herbicides. pp. 226-229. In Proceedings, 28th Annual Meeting, Southern Weed Science Society. Raleigh, NC. 338 p.
- Godfrey, R.K. and J.W. Wooten. 1981.** Aquatic and wetland plants of Southeastern United States. University of Georgia Press, Athens. 933 p.
- Grelen, H.E., and W.F. Mann, Jr. 1973.** Distribution of senna seymeria (*Seymeria cassioides*) a root parasite on southern pines. Economic Botany 27: 339-342.
- Gwynn, T.M., III, L.J. Musselman, and W.F. Mann, Jr. 1978.** The floral and seed biology of *Seymeria cassioides* (Scrophulariaceae). Beitrage zur Biologia der Pflanzen. 54 (1): 105-124.
- Jackson, B.D. 1928.** A glossary of botanic terms, with their derivation and accent. 4th ed. Duckworth, London. (Reprinted by Hafner, 1971). 481 p.
- Laird, P.P. and R.W. Wolfe. 1973.** An evaluation of senna seymeria damage in a slash pine plantation on the Apalachicola National Forest in Florida. U.S. Department of Agriculture, Forest Service, Southeastern Area State and Private Forestry. Report No. 74-1-7. 8 p.
- Mann, W.F., and L.J. Musselman. 1979.** Native root parasites and forestry in southeastern United States: a review. pp. 24-33. In Musselman, L.J., A.D. Worsham, and R.E. Eplee (eds.). Proceedings, The Second International Symposium on Parasitic Weeds, July 16-19, 1979. North Carolina State University, Raleigh, NC. 269 p.
- Mann, W.F., Jr., H.E. Grelen, and B.C. Williamson. 1969.** *Seymeria cassioides*, a parasitic weed on slash pine. Forest Science 15: 318-319.
- Mann, W.F., Jr., B.C. Williamson, and J.M. McGilvray. 1971.** Parasitic weed -- a new pine problem. Forest Farmer 30(6): 6-8.
- Musselman, L.J. and W.F. Mann, Jr. 1978.** Root parasites of southern forests. U.S. Department of Agriculture, Forest Service. General Technical Report SO-20. 76 p.
- Musselman, L.J. and M.C. Press. 1995.** Introduction to parasitic plants. pp.1-13. In Press, M.C. and J. D. Graves (eds.). Parasitic Plants. Chapman & Hall, London. 292 p.
- Radford, A.E., H.E. Ahles, and C.R. Bell. 1964.** Manual of the vascular flora of the Carolinas. The University of North Carolina Press, Chapel Hill. 1183 p.
- Stangle, C.M., and L.J. Musselman. 1981.** Some growth aspects of *Seymeria cassioides*. U.S. Department of Agriculture, Forest Service. Southeastern Forest Experiment Station. Research Note SO-276. 3 p.
- Wunderlin, R.P., B.F. Hansen, and E.L. Bridges. 1995.** Atlas of Florida vascular plants. University of South Florida. URL: <http://www.usf.edu/~isb/projects/hb-atlas.html>.