

Cogongrass, *Imperata cylindrica* (L.) Beauv.: A Good Grass Gone Bad!¹

Nancy C. Coile² and Donn G. Shilling³

INTRODUCTION: Cogongrass was imported into Florida at Gainesville and Brooksville in the 1940s in hopes that it would be a good forage grass and would help control soil erosion (Hall 1983; Willard 1988). As with many too-good-to-be-true cases, cogongrass proved to be unsuited for forage and its ability to spread and displace desirable vegetation outweighed any soil erosion control considerations.

Cogongrass has features that minimize herbivory. The rough edges of mature leaves cause mammals to avoid chewing the foliage. In fact, the leaf edges may cause abrasions on persons who walk barelegged through a patch of cogongrass. Silica bodies throughout the leaves add to the unpalatability for grazing animals.

Cogongrass responds to stress by producing underground stems (rhizomes) and stress induces flowering. Rhizomes allow for spread and the production of additional plants with the same genetic makeup. Dense stands of cogongrass crowd out other species in the area. Rhizome production allows cogongrass to proliferate to the point where it has been designated the worst perennial grass weed of southern and eastern Asia and one of the 10 worst weeds worldwide (Holm *et al.* 1977).



Figures 1-3. *Imperata cylindrica* (L.) Beauv., Cogongrass. **Fig. 1.** A) portion of a stem with attached roots and four elongated rhizomes; B) stem with leaves; C) the plume-like inflorescence composed of many paired flowers. **Fig. 2.** Note the flowering plant at the center back. **Fig. 3.** Portion of a leaf blade, showing the off-center midrib and the scabrous leaf margins. (Photography credits: Luanne M. Marsh, Fig. 1; Jeffery W. Lotz, Figs. 2 & 3).

¹ Contribution No. 28, Bureau of Entomology, Nematology and Plant Pathology- Botany Section.

² Botanist, FDACS, Division of Plant Industry, P. O. Box 147100, Gainesville, FL 32614-7100.

³ Associate Professor, Agronomy Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

Cogongrass has an allelopathic effect on other plants -- chemicals produced by cogongrass inhibit growth of other plants (Hussain *et al.* 1992). This suppressive feature may be another reason there are monotypic stands of cogongrass.

Cogongrass has the very efficient C_4 type of photosynthesis (the process of converting the energy of sunlight into food energy). Corn and several other C_4 plant species with this type of photosynthesis are usually better able to survive in hot and/or dry climates than are the more common C_3 plants.

With all these features for endurance, it is no wonder that cogongrass has proved to be a pest. In addition, cogongrass has few, if any, competitors or other control species to slow its growth and spread outside its native area. There are many plants, insects, nematodes, and pathogens which hold cogongrass in check in the Old World tropics, where it is native. To use the vernacular phrase, cogongrass has "gone bad" in Florida and in many other areas.

In the United States, cogongrass has been documented in Louisiana, Mississippi, Alabama, South Carolina and Florida (Bryson and Carter, *in press*). Cogongrass is listed by the USDA Animal and Plant Health Inspection Service, Plant Protection and Quarantine and the Florida Department of Agriculture & Consumer Services, Division of Plant Industry as a noxious weed. Cogongrass threatens pine plantations, pastures, range, and natural habitats.

DESCRIPTION: In Florida, cogongrass is most noticeable as luxuriant stands of yellowish-green grass growing along the roadsides and usually in full sun. There are many scattered patches of cogongrass along I-75, US 441, and other highways through central and north Florida. Cogongrass extends from these highways into lightly wooded stands, pastures, range, and reclaimed phosphate mine areas. Cogongrass may form large stands in the phosphate mine reclamation sites and other disturbed areas.

The growing tip of the rhizome is very sharp and may grow through the roots of other plants. The rhizomes (Fig. 1, A) of cogongrass, like those of Johnsongrass, *Sorghum halepense* (L.) Pers., have many scale-like, non-green leaves called cataphylls. Most grasses do not have such obviously scaly rhizomes.

Root systems (Fig. 1, A) of cogongrass are efficient at extracting water and minerals; they may extend to 2 meters (about 2 yd) deep. Cogongrass survives in dry, barren areas where other plants have difficulties.

Plants are usually about 1 meter tall (3 ft), but very rarely may grow to 3 m (9 ft) tall. Plants are similar to Johnsongrass. However, cogongrass leaves are longer than Johnsongrass; the stems (Fig. 1, B) are not as evident because the leaves obscure the stem; and the seedheads are covered with silky hairs. The basal leaves may be 1 m long and are much longer than the leaves higher up on the stem. In Australia, a common name for cogongrass is "blady grass" which is descriptive of the plant's leafy appearance. Leaves are up to 18 cm (about one-half inch) wide.

The leaf margins (Fig. 3) are scarious (translucent, dry) and are scabrous (rough). These rough edges will slice through skin like the leaves of *Leersia*, a grass found in the wet areas and commonly called cutgrass. The abrasions caused by the scabrous edges of cogongrass have caused some to incorrectly call the leaves saw-toothed. Gary L. Henry (Florida Department of Transportation, personal communication) has observed pigs with bloody chests and shoulders after running through cogongrass.

A quick identification feature for cogongrass is the off-center placement of the midrib, which is whitish. The off-center midrib is more apparent toward the tips of the leaves (Fig. 3).

The flowers (spikelets) are grouped into a large panicle (Fig. 1, C) about 10-20 cm (5 inches) long. Each tiny flower (spikelet) has a fuzzy, plume-like structure which can float the seed through the air. These hairy structures are shiny and give the panicle a silky appearance. When viewed with magnification, it is apparent that the spikelets are paired and one of the pair has a longer stalk. Each spikelet has two stamens and two feathery stigmas.

In Florida, cogongrass usually flowers late winter into May (Dickens and Moore 1974) or in the fall following frost (Willard 1988). Year-round flowering may occur in central and south Florida (Willard 1988). Stress, drought, cool temperatures and mowing, can force the plants into bloom at any time. It is not known whether the seed produced due to stress are capable of germination.

Variation in the plants, with as many as 17 biotypes (Charles Bryson, USDA, personal communication), indicates a species with strong adaptive potential. One variant of cogongrass is Japanese bloodgrass, whose red pigmented leaves have been praised by landscapers. Unfortunately, this red pigmentation is probably due to stress (e.g., cold) and is not consistent. The red coloration will revert to the normal green hue. These plants demonstrate the same aggressive growth features that ordinary cogongrass possesses. Since cogongrass is listed as a noxious weed, all subdivisions of the taxon (variants, subspecies, varieties, cultivars, etc.) are prohibited by both federal and State of Florida law.

CONTROL: Control of cogongrass in Florida is still problematic. Several herbicides have been tested on cogongrass, including glyphosate, paraquat, imazapyr, fluazifop, and sulfometuron (Dickens and Buchanan 1975; Buhler and Burnside 1983; Boonsritat *et al.* 1985; Lee 1985; Dean *et al.* 1988; Willard 1988; Townson and Butler 1990; Tanner *et al.* 1992; Akobundu 1993). Glyphosate or imazapyr are probably the best for Florida cogongrass where it can be applied. However, several treatments are necessary for effective control. Please refer to the control measures described in the IFAS publication "Cogongrass (*Imperata cylindrica* (L.) Beauv.) Biology, Ecology and Control in Florida" by Colvin *et al.* (*in press*).

Application of herbicides to kill cogongrass along roadsides does not present a problem of off-target drift. However, in wooded areas, care must be used to avoid herbicides which harm trees.

The dead leaves of cogongrass remain upright and do not decay easily. Dead leaves prevent herbicides from being effectively absorbed. For effective control, herbicides should be applied to green leaves. Living leaves allow the herbicide to be transported to rhizomes. When a herbicide reaches the rhizomes better control results.

The timing for application of herbicides is critical. Late fall is an excellent time to apply herbicides because plants are then sending carbohydrates into the roots and rhizomes for storage. Along with the carbohydrates, the herbicides will be translocated to rhizomes. If cogongrass is to be controlled, the rhizomes must be killed.

Cultivation can be part of control for cogongrass (Wilcut *et al.* 1988). However, cultivation alone can do more harm than good because a single disking often simply spreads the rhizomes. For more effective control, it is essential to apply a herbicide after cultivation or burning (Willard *et al.* 1990).

LITERATURE CITED:

- Akobundu, I. O. 1993. Chemical control of cogongrass (*Imperata cylindrica* (L.) Raeuschel) in arable fields. WSSA Abstracts. 1993 meeting of the Weed Science Society of America, Denver, CO. p. 6.
- Boonsritat, C., K.S. Chee, and S.C. Lee. 1985. Asian-Pacific Weed Science Society Tenth Conference. pp. 99-106.
- Bryson, C.T. and R. Carter. 1994. Cogongrass, *Imperata cylindrica*, in the United States. Weed Science. *In press*.
- Buhler, D. D. and O.C. Burnside. 1983. Effect of spray components on glyphosate toxicity to annual grasses. Weed Science 31: 124-130.
- Colvin, D.L., J. Gaffney and D.G. Shilling. 1994. Cogongrass (*Imperata cylindrica* (L.) Beauv.) biology, ecology and control in Florida. University of Florida, Institute of Food and Agricultural Services, Gainesville, Circular SS-AGR-52, Weeds in the Sunshine Series. 4 p.
- Dean, C.E., D.G. Shilling and T.R. Willard. 1988. Management of noxious-exotic grasses on highway rights-of-way. Florida Department of Transportation State Project 99700-7352, Final Report. 117 p.
- Dickens, R. and G.A. Buchanan. 1975. Control of cogongrass with herbicides. Weed Science 23: 194-197.
- Dickens, R. and G.M. Moore. 1974. Effects of light, temperature, KNO₃, and storage on germination of cogongrass. Agronomy Journal 66: 187-188.
- Hall, D. W. 1983. Weed watch--cogongrass. Florida Weed Science Society Newsletter 5: 1-3.
- Holm, L. G., D.L. Plucknett, J.V. Pancho, J.P. Herberger. 1977. The world's worst weeds, distribution and biology. The University Press of Hawaii, Honolulu. 609 p.
- Hussain, F.N. Abidi, S. Ayaz and A-U-R Saljoqi. 1992. Allelopathic suppression of wheat and maize seedling growth by *Imperata cylindrica* (L.) Beauv. Sarhad Journal of Agriculture 8(4): 433-439.
- Lee, S.A. 1985. Bud development in the rhizomes of *Imperata cylindrica* (L.) Beauv. after glyphosate treatment. MARDI Research Bulletin 13(3): 219-224.
- Tanner, G.W., J.M. Wood and S.A. Jones. 1992. Cogongrass (*Imperata cylindrica*) control with glyphosate. Florida Scientist 55: 112-115.
- Townson, J.K. and R. Butler. 1990. Uptake, translocation and phytotoxicity of imazapyr and glyphosate in *Imperata cylindrica* (L.) Raeuschel: effect of herbicide concentration, position of deposit and two methods of direct contact application. Weed Research 30: 235-243.
- Wilcut, J.W., R.R. Dute, B. Truelove and D.E. Davis. 1988. Factors limiting the distribution of cogongrass, *Imperata cylindrica*, and torpedograss, *Panicum repens*. Weed Science 36: 577-582.
- Willard, T.R. 1988. Biology, ecology, and management of cogongrass (*Imperata cylindrica* (L.) Beauv.). Ph.D. dissertation, Department of Agronomy, University of Florida, Gainesville. 127 p.