Is Diverse Morphology of Cogongrass in Mississippi Related to Edaphic Characteristics or Biotypic Variation?

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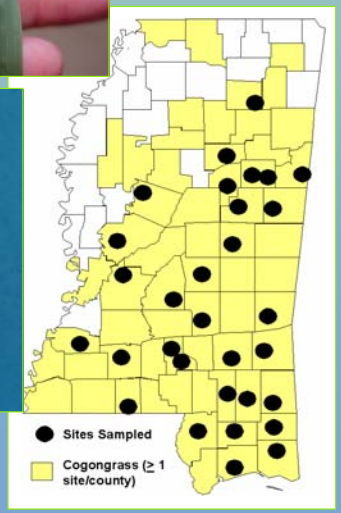
Cogongrass [*Imperata cylindrica* (L.) Beauv.], a non-native, aggressive, perennial is considered the World's seventh worst weed and has invaded all continents except Antarctica (Holm et al. 1977; Falvey 1981). Cogongrass was first introduced into the Southern United States in 1911 as contaminated packing material in Mobile County, Alabama (Dickens and Buchanan 1971; Dickens 1974). Soon thereafter, cogongrass was introduced intentionally in Florida and Mississippi as a potential for livestock forage and for erosion control. Cogongrass was deemed unacceptable as forage and was too invasive for soil stabilization. Without effective herbicides in the early twentieth century, cogongrass began to spread from points of entry. Cogongrass is now established in Alabama, Florida, Georgia, Louisiana, Mississippi, Oregon, South Carolina, Texas, and Virginia (Bryson and Carter 1993; Byrd, and Bryson 1999, Faircloth et al. 2005).

Cogongrass is a major threat to agriculture, forest, right-of-ways, and natural areas in the Southeastern United States. Over the past decade, this invasive has moved north in Mississippi and other southern states. At least one infestation of cogongrass has been detected in 75% of the 82 counties in Mississippi.

Cogongrass specimens, as near anthesis as possible, were collected and specimens pressed, dried, and maintained at the Southern Weed Science Research Unit herbarium at Stoneville, MS. Soil samples were also taken from within each cogongrass population and sent to the Soil Testing Lab at Mississippi State University for analysis. Samples were collected from 31 sites in 29 Mississippi counties and at least one from each of the 10 physiographic regions or land resource areas within the state. Cogongrass inflorescence width and length and widest leaf width and length were recorded from pressed specimens.



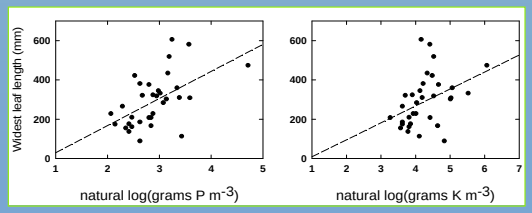
For comparisons plant variables tested were inflorescence length, width, and length to width ratio (L:W) and widest leaf length, width, and L:W. Soil variables tested were pH; % organic matter (OM); grams/m3 of P, K, Ca, Mg, Zn, S, Na, and nitrate-N; % base saturation of: K, Ca, and Mg; and % sand, silt, and clay (hydrometer method).

All variables were tested for normality using the K-S test and probability plots. Non-normal variables were natural-log transformed (ln). Only pH, %base saturation of K, nitrate, and clay content were not corrected with this transformation. Pearson correlations were used to determine which variables were correlated before running linear regressions on normalized data.

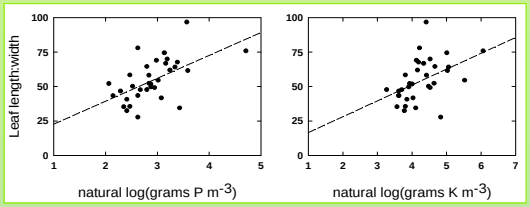
Averaged over all samples, cogongrass leaves ranged from 9- to 52-cm tall and 4- to 7-cm wide; inflorescences ranged from 7- to 20-cm long and 1- to 12-mm wide. Averaged over all samples from cogongrass populations, soil properties ranged from 28 to 86% sand; 10 to 49% silt; 6 to 43% clay; 1 to 5% organic matter; 4.4 to 7.4 pH. Extractable (g/m3) ranged from 3 to 112 for P, 7 to 434 for K, 90 to 2293 for Ca, 24 to 782 for Mg, 1 to 36 for Zn, 86 to 473 for S, 34 to 180 for Na, and 2 to 5 for nitrate. Percent base saturation of K ranged from 1 to 26; Ca ranged from 6 to 88; and Mg ranged from 3 to 39.

Correlations (significant at 0.05 level) were found between:

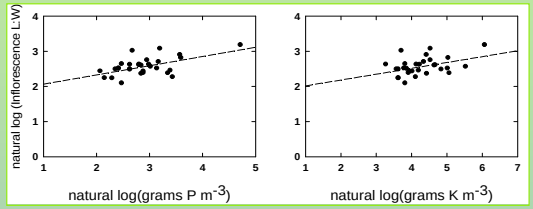
ln(P) → widest leaf length
ln(P) → Leaf L:W
ln(K) → widest leaf length
ln(K) → Leaf L:W
Leaf L:W → ln(Inflorescence L:W)



P and K influence on cogongrass leaf length

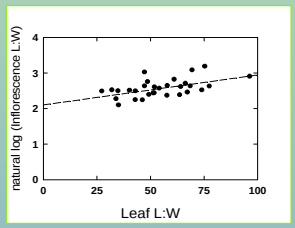


P and K influence on cogongrass leaf l:w ratio



P and K influence on cogongrass inflorescence l:w ratio

Correlation between cogongrass leaf and inflorescence l:w ratios



These results suggest a strong positive influence of soil nutrients, especially P and K, on growth and reproductive output of cogongrass. Although, growth and reproductive parameters were variable among cogongrass populations, there were no correlations between spatial distribution and leaf and inflorescence lengths, widths, and L:W ratios. In the future, additional cogongrass morphological parameters will be measured and compared to soil parameters.

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