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LEAF AND STEM PRODUCTION OF TRIMMED MANGROVE SOUTHEAST, FLORIDA 1994

GARY COLIN DOYLE
Horticulture plus, Inc.
6170 69th, Street
Vero Beach, FL 32967

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Abstract. **Three species of mangrove, *Rhizophora mangle* (red mangrove), *Laguncularia racemosa* (white mangrove) and *Avicennia germinans* (black mangrove) were trimmed regular and periodically to a height of approximately four feet above substrate. Following an average of 240.67 days, trimming was performed to remove the regrowth. One meter squared quadrats were selected in the mangrove fringe waterward of mean high water. Within these quadrats mangrove stems were cut at the previously established trimming height. The leaf and stem material was then measured, counted, weighed and leaf tissue analyzed for mineral content. By comparing this data with literature values reported by Odum et al. (1982) and with the source data (Lugo & Snedaker, 1975); which indicate a mean standing stock of leaves 6,660 kg/ha (dry weight), the trimmed mangrove produced more standing stock of leaves on average per year than untrimmed mangrove. Net leaf production yielded 9,155 kg/ha at the average of 240.67 days and 13,879 kg/ha calculated at 365 days.**

Introduction

In reviewing available research data, no studies were found which address the productivity of mangrove in a managed trimming program. This study addresses the effects of trimming mangrove in relation to the statistical productivity resulting in leaf and stem detrital export. The mangrove studied were Red (*Rhizophora mangle*), White (*Laguncularia racemosa*), Black (*Avicenniaceae germinans*) and Buttonwood (*Conocarpus erecta*).

It has been noted that a 2 meter height mangrove forest has the same leaf areas and mass as a 20 or 30 meter height forest because leaf surface area is strictly a function of available sunlight. the data collected for this study was based upon a baseline trimming height of 1.22 meters above substrate, whereby, the regrowth material is periodically and regularly trimmed to maintain that height. The trimmed plant material is left to become litter fall or detrital export for food supply to the marine environment.

Trees and shrubs (a shrub is also a woody plant similar to a tree) are highly compartmented, perennial, woody plants. Tree biology and anatomy are the same for trees throughout the world. Tropical trees respond as other trees to trimming. Trimming is one of the oldest agricultural treatments practiced throughout the world and has been the subject of studies for over two centuries. Proper trimming can regulate shape, size, health, flowers, fruit, wood quality and growth.

Methodology

Since 1969, the management practice of trimming mangrove to regulate size and shape has been conducted as a method to allow riparian property owners visual access of water views while maintaining the functions which mangrove provide to the environment. This practice was documented at the John's Island development located within Indian River County, Florida. John's Island is located 7.2 km north of Vero Beach on State Road A1A.

Selected sampling areas consisted of mangrove trimmed regular and periodically prior to 17 November 1992. Trimming was discontinued (approximately 2 years) until Permit Exemption Status was noted by the State of Florida, Department of Environmental Protection in the last quarter of 1993. trimming was then resumed to return mangrove to the previously established trimming configuration and height of 1.22 m above the substrate.

Dates of resumed trimming were recorded to establish the time lapse between trimming and sample collection. Sample collection consisted of average areas of growth and are species specific. Growth (+/-) of these samples was noted at all sites. One meter squared quadrats were selected in the mangrove fringe waterward of mean high water excluding green buttonwood (*Conocarpus erecta*). Within each quadrat, mangrove stems were cut at the previously established trimming height of 1.22 m above the substrate. These stems were then removed and bagged to prevent loss of sampled material. Each mangrove stem was then measured and dissected into 0.30 m increments beginning from the tip growth downwards. Miscellaneous leaf drop was counted separately and listed. No flowers or seeds were retained.

By species, the number of sterns and the cut end diameters (measured in centimeters) were recorded. Leaves were removed and counted by total numbers per section, identified and bagged. Stems were separated and bagged. Samples were then refrigerated pending delivery to an independent laboratory (Pioneer Laboratory, Ft. Pierce, FL) for certified analysis. Samples were weighted as submitted and then processed for drying, grinding and weighing as dry material. Data was recorded and totaled by species for each of the one meter squared quadrats sampled. Leaves were inspected and counted for feeding by arboreal folivore (crustaceans, caterpillars, etc.). Tissue analysis for complete nutrient (mineral) content was performed on leaf tissue.

Results and Discussion

By comparing research data it has been established that properly trimmed mangrove produced through regrowth more standing stock of leaves per year than untrimmed mangrove.

Table 1. Net leaf production of trimmed mangrove.

6,660 kg/ha[z]	Natural, untrimmed @ 365 days
9,155 kg/ha	Trimmed production (regrowth) @ 240 days
13,879 kg/ha	Trimmed production (regrowth) @ 365 days

[z]Mean average of red, white and black mangrove leaf production by dry weight. Calculation of net primary production export for standing leaf crop in kilograms carbon per hectare (Beever, 1975).

Additional sources of detritus production would result from (1) natural leaf drop below the baseline trimming height of four feet, (2) natural leaf drop from above the baseline trimming height previous to trimming and (3) flower and seed production from above and below the baseline.

Arboreal folivore feeding on leaves was significantly higher on the trimmed lower growing mangrove foliage compared to taller growing untrimmed mangrove.

Sampling locations and testing for mineral content of leaves indicated that fertilizer from developed home sites was not detected and thereby, not influencing growth rates.

Observation of flower and seed production for all mangrove species trimmed was noted to flourish below the four foot trimmed height.

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1996-1997 OVERSEED TRIALS ON FAIRWAY AND PUTTING GREEN BERMUDAGRASS[1]

S. F. ANDERSON AND A. E. DUDECK
Environmental Horticulture Department
University of Florida, IFAS
Gainesville, FL 32611

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Abstract. **Thirty-seven cool-season turfgrasses were overseeded on a 'Tifway' bermudagrass fairway and on a 'Tidwarf' bermudagrass putting green at Gainesville, FL. Studies were established from 25 to 27 October 1996 and terminated on 30 May 1997. In the fairway test, grasses with best seasonal turf quality scores, which averaged 6.4 on a scale of 1 to 9 where 9 = best, included perennial ryegrass cultivars, 'Academy'; 'Gator II'; 'HWY'; 'LRFB7'; 'MB45'; 'Plaisir'; 'Premier II'; 'Resort'; a blend of equal parts of 'Image', 'Lynx', and 'Pegasus' perennial ryegrass; and a mixture of 80% 'Citation III' perennial ryegrass with 20% 'Winterplay' rough bluegrass. In the putting green test, grasses with best seasonal turf quality scores, which averaged 6.5, included 'BARUSA Pt4' rough bluegrass; a mixture of 80% 'Citation III' perennial ryegrass with 20% 'Winterplay' rough bluegrass, and a mixture of 60% 'Sabre II' rough bluegrass with 40% 'AT 90163' colonial bentgrass. Serious bermudagrass competition during establishment as well as during the relatively warm winter growing season account for the atypical results in both overseed studies.**

Throughout the southern United States, golf courses, sports turfs, and some home lawns are overseeded annually with cool-season turfgrasses during winter months. This practice results in live, green, turf ground covers and improves playing surfaces when bermudagrass or other warm-season turfgrasses go dormant (Turgeon, 1996). Turfgrass breeders and seed producers continue to develop new grasses resulting in numerous cool-season grasses for overseeding. In addition to new cultivars, seed producers also formulate new grass mixtures and blends. Timely trials are needed to evaluate performance and to provide information to potential users of these grasses (Anderson and Dudeck, 1994; Anderson and Dudeck, 1995; Anderson et al., 1995, Anderson and Dudeck, 1996). The objective of these studies was to evaluate suitability of selected cool-season turfgrass species, cultivars, mixtures, and blends for winter overseeding of a bermudagrass putting green and a fairway in north Florida.

Materials and Methods

Research plots were located at the G. C. Horn Turfgrass Field Laboratory, Gainesville, FL. Two separate but concurrent studies were conducted during the 1996-1997 winter period: one under fairway conditions and another under putting green conditions. Thirty-seven entries of cool-season grasses listed in Table 1 were overseeded on a 'Tifway' bermudagrass (*Cynodon* spp.) fairway on 25 Oct. 1996. The same grasses were overseeded on a 'Tifdwarf' (*Cynodon* spp.) bermudagrass putting green on 27 Oct. 1996. Bermudagrass control plots, which were not overseeded, were included in both studies.

Prior to seeding, the putting green site was topdressed with an Arredondo fine sand (loamy, silicious, hyperthermic Grossarenic Paleudult), which was identical to underlying soil. Topdressing rate was 7.4 ft^3 per 1000 sq ft (approximately one-eighth inch of soil). The fairway site was scalped to 0.5 inch with a mower and was not topdressed before overseeding.

A shaker bottle was used to hand seed all plots accurately and uniformly within a 4 by 6 ft seeder box. Small seeded grasses such as bentgrass (*Agrostis* spp.) and bluegrass (*Poa* spp.) were diluted with a small amount of soil prior to hand seeding. Perennial ryegrass (*Lolium perenne*) was seeded at a rate of 15 pure live seed (PLS) per square inch on the fairway and 50 PLS per square inch on the putting green (Table 2). Bluegrass and Red fescue (*Festuca rubra trichofylla*) were seeded at a rate of 30 PLS per square inch on the fairway and 100 PLS per square inch on the putting green. Bentgrass was seed-

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