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RECLAIMED WATER AND FLORIDA NATIVES

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Abstract. **A demonstration landscape area using Florida native plant species mulched with St. Petersburg's recycled mulch and irrigated with St. Petersburg's reclaimed water was laid out around the Water Quality Assessment Laboratory at 1635 3rd Avenue North, St. Petersburg, FL 33713, in June 1989. The species included: American Beautyberry (*Callicarpa americana*), Blackhaw (*Viburnum obovatum*), Blazing Star (*Liatris* spp.), Blue-eyed Grass (*Sisyrinchium atlanticum*), Coral Honey Suckle (*Lonicera sempervirens*), Fahkahatchee grass (*Tripsacum dactyloides*), Rain Lily (*Zephyranthes simpsoni*), Red Anise (*Illicium floridanum*), River Birch, (*Betule nigra*), Rusty Blackhaw (*Viburnum rufidulum*), Rusty Lyonia (*Lyonia ferruginea*), Salvia (*Salvia coccineus*), Saw Palmetto (*Serenoa repens*), Simpsons' Stopper (*Myricanthes fragrans* var. simpsonii), Winged Elm, (*Ulmus alata*), Yellow Anise (*Illicium parviflora*) and Yellow Jessamine (*Gelsemium sempervirens*).**

Reclaimed water quality application rates and mean rainfall levels were regularly monitored from June 1989 to November 1990. The growth and maturation of selected plant species was measured and the vegetative condition of all species was observed and recorded throughout the same time period.

The growth responses to reclaimed irrigation water and the salt tolerance of selected species was evaluated and recommendations for the selection and suitability of salt tolerant species for inclusion in xeriscapes are included.

The ever expanding need for the reuse of treated wastewater to conserve potable water supplies and protect groundwater sources is evidenced by the fact that there are now over 200 sites recycling treated wastewater in Florida alone. Fifteen of these sites supply reclaimed water to domestic households for irrigation purposes. St. Petersburg still has the largest reclaimed water distribution system with over 6000 domestic customers and a total of 6000 acres under irrigation.

Previous studies on the effects of St. Petersburg's reclaimed water on the growth and maturation of commonly occurring ornamental plants in Central Florida have been published by Parnell, (1), (2) and Robinson and Parnell, (3). The expanded use of reclaimed water in natural systems and wetlands restoration projects and the increasing use of indigenous species in creative and xeriscape landscaping requires that further studies be implemented on the effects of this new resource on locally occurring plant species. This paper represents a preliminary review of 18 months of observations on 17 species of Florida native plants.

Materials and Methods

Seventeen species of Florida native plants were planted in an area 15 feet wide and 100 feet long on the eastern and southern sides of the Water Quality Assessment Laboratory. The area was enclosed by a retaining wall and the soil surface was raised approximately 2 feet above ground level. Top soil was used to build up the level and one 40 lb bag of Lesco sulfur coated 24-5-11 fertilizer was applied to the area before planting. The surface of the soil was covered with a 4 inch layer of St. Petersburg's yard waste recycled mulch.

An underground irrigation system was installed to cover the whole area as uniformly as possible. The system was calibrated to deliver 0.5 inches of irrigation water in a 30 minute irrigation period. Throughout the investigation from June 1989 to November 1990 the irrigation system was automatically activated every other day at 5:00 a.m. and delivered approximately 8 inches of supplemental irrigation per month.

Reclaimed water was sampled and analyzed for chloride concentration monthly. Rainfall levels were obtained from the records at the nearby Albert Whitted Water Reclamation Facility.

The initial size of 10 native plant species was measured in June 1989 by calculating the sum of plant height and mean width (Table 1). All plants within a single species were selected so that they were of similar size at the outset of the investigation. Final sizes were calculated by a similar method in November 1990. Growth indices were obtained by dividing final size by initial size. In addition to the measurements, observations on the growth and condition of the plants were monitored throughout the investigation.

Results and Discussion

The chloride concentration of the reclaimed water applied to the landscape area varied between 100 and 500 parts per million (Fig. 1). Lowest concentrations occurred in the winter months. Figure 1 includes the mean monthly rainfall added to the monthly 8 inches of supplemental reclaimed water irrigation data for the period under inves-

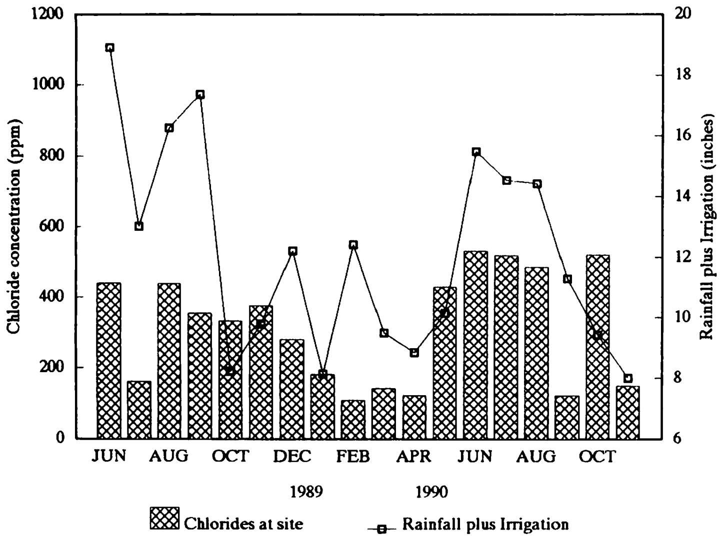

Fig. 1. Irrigation levels and Reclaimed Water Chloride Concentration at Experimental Site from June 1989 to November 1990.

tigation. Total irrigation levels varied between 8 and 19 inches per month throughout the experimental period, with low irrigation levels occurring in the winter months.

Table 1 shows the species, numbers and sizes of plants that were included in the investigation. The following comments are included on these species.

One large and two medium sized River Birch trees were included in the landscape. The two smaller trees died 5 months after they had been planted. The remaining large tree was still alive at the end of the investigation but was in poor condition with excessive defoliation and leaf burn. The trees probably did not receive enough water and were somewhat salt sensitive. The Winged Elm tree showed good growth after it became established, but extensive leaf burn became evident in the lower regions where the reclaimed irrigation water impacted the leaves. This species shows salt sensitivity to direct contact but can withstand increased salt levels in the root zone.

The nine species of shrubs included in this investigation showed a range of reactions to irrigation with reclaimed water. Two varieties of Beautyberry, one with purple and the other with white berries were included. All plants survived throughout the experiment and grew well. Minimal leaf burn was noted but the increase in size was much greater in the plants with purple berries than in those with white berries. This is partly due to the fact that the white berried form is from a more northerly climate.

Blackhaw showed maximum growth throughout the experiment and is an excellent plant for use in this type of landscape. Rusty Blackhaw grew well to start with in the south facing side of the landscape, but slowed down and showed 80% leaf burn in November 1990. This species can thus tolerate salts in the root zone, but the leaves are extremely salt sensitive. Blazing Star plants grew well and flowered in the first part of the investigation but only one plant survived the winter of 1989.

Red Anise plants did not grow well from the start of the investigation and suffered from excessive leaf burn and stunted growth. All plants died before the end of the investigation and appeared to be extremely salt sensitive. Yellow Anise on the other hand grew very well and showed no leaf burn whatsoever. This species, although closely related to the former species, appears to be salt tolerant.

The Rusty Lyonia plants all died before the end of the experiment. The reasons for this are not clear, as leaf burn was not noted. The lack of a suitable microrhizal fauna in the soil and the encroachment of the Fahkahatchee grass may have deleteriously affected this species.

The Salvia's grew and flowered extremely well in 1989 and re-seeded in 1990 producing a large area of plants that grew up to 5 feet high. This species can thus be used

Table 1. Growth and Survival Data for Florida Native Plant Species included in the Experimental Landscape Area.

Species and plant types	# Planted June 1989	# Survived to Nov. 1990	Initial Size[z]	Growth Final Size	Increase
A. TREES					
River Birch	3	1	–	–	–
Winged Elm	1	1	–	–	–
B. SHRUBS					
Beautyberry (purple berry)	4	4	928	4,004	4.3
Beautyberry (white berry)	4	4	744	1,022	1.4
Blackhaw	5	5	198	3,622	18.3
Blazing Star	30	1	–	–	–
Red Anise	3	0	160	–	–
Rusty Blackhaw	6	6	200	2,173	10.9
Rusty Lyonia	7	0	100	–	–
Salvia	4	60+	–	–	–
Simpsons' Stopper	6	5	612	2,669	4.4
Yellow Anise	3	3	465	2,459	5.3
C. GROUND COVER					
Blue-eyed Grass	100	0	–	–	–
Coral Honey Suckle	100	84+	–	–	–
Rain Lily	100	500+	–	–	–
Yellow Jessamine	30	78+	–	–	–
D. GRASSES					
Fahkahatchee grass	1	1	430	10,368	24.1
E. PALMS					
Saw Palmetto	20	20	108	1,953	18.1

[z]Size is the sum of plant height and mean width measured in inches.

in this type of landscape, but it needs to be cut back severely in winter.

One Simpsons' Stopper plant died from unknown causes, but the rest showed good growth and maturation throughout the investigation and are highly recommended for use with reclaimed irrigation water in xeriscape conditions.

Blue-eyed Grass was the only ground cover species that did not survive to the end of the investigation. This plant did well to start and flowered profusely, after which it died out. The reason for this is not immediately clear but is probably related to high chlorides in the irrigation water. The other ground cover species, Coral Honeysuckle, Rain Lily and Yellow Jessamine all grew and flowered well and multiplied throughout the investigation.

Fahkahatchee grass and Saw Palmetto were highly salt tolerant and grew extremely well with the use of reclaimed water as an irrigant. The grass grows up to 8 feet tall and 9 feet wide and the Saw Palmetto produces much underground tuberous growth. These factors should be taken into account before planting these species in a xeriscape landscape situation. It is recommended that the dwarf form of Fahkahatchee grass be used in most landscapes.

To sum up the 17 species investigated, the two species of trees (River Birch and Winged Elm), three species of shrubs (Blazing Star, Red Anise and Rusty Lyonia) and one ground cover (Blue-eyed Grass) did not grow well under the experimental conditions. Rusty Blackhaw grew fairly well but showed excessive leaf burn. All other species used in this investigation can be recommended for use with reclaimed water as an irrigant and may be included in xeriscape landscaping.

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COMPOSTING THE EASY WAY

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Abstract. **The virtues of composting are widely extolled, but most instructions for doing so are: (1) Unsuited to mid-Florida conditions, and (2) much too strenuous for any but the young and physically robust to attempt. This paper explains the scientific principles involved in composting and describes the novel, physically undemanding method for doing so developed by this septuagenarian author. Compost is particularly valuable for gardeners who delight in propagating their own plants. But for propagation, one needs a potting bench and storage facilities for containers and other accessories. A snug composting/propagation area is described that is quite invisible to the neighbors, but which for 30 yr has provided the author with plants for the garden, exercise for the body, and tranquillity for the soul.**

For well over 50 yr, I have been reading advice on composting in various bulletins, magazines and newspapers, little of which is much help to any gardener who is past the vigor of youth and/or gardening in an area of light sandy soils.

The usual advice is to build a pile of alternating layers of plant material and "good loam soil" and fork it over completely once or twice a year. That made sense when I was a sinewy young undergraduate student earning my 25 cents per hour working on the big compost heaps behind the Department of Horticulture at the Ontario Agricultural College. For a septuagenarian gardener in hot, humid mid-Florida, such a procedure would be impossibly onerous. Moreover, good soil of any kind is almost impossible to find in mid-Florida. Nevertheless, for 30 yr, I have happily composted our garden waste to improve this impossibly lean soil and done so without excessive exertion and without close neighbors even realizing that I have a row of compost heaps and a very convenient garden work area where I can propagate to my heart's content. Over the years, the house next door has changed hands several times. Each time that I offer the new neighbors the chance to choose some plants from my little nursery, they express surprise at being introduced to my efficient little "compost factory" and work area, since they have never realized it is there.

Any gardeners who want to make the most of nature's bounty and who like to "make" their own plants need something similar. Come share 30 yr of experience in how to do so. But first, let's look into the "why, what and how" of scientific composting.

Why compost? The first obvious reason is because it is good gardening and excellent environmental practice. (Please do not say "Because it is good for the ecology"! If that admonition is puzzling, consult a good dictionary.) Water and fertilizer give only temporary sustenance to plants in lean sand soils. Composting constantly recycles the plant tissues produced by that water and fertilizer and does so in a totally natural way. Composting is also good citizenship. If that sounds odd, consider that a 1988 University of Florida study found that it costs approximately 5 cents a pound to handle garden trash as municipal waste (4). Think of that when you put leaves, lawn clippings, prunings, etc. out for the trash collector, particularly if you do so in non-recyclable plastic bags. Composting also affords excellent *productive* exercise. No way could I imagine myself doing something as totally unproductive as jogging when I can get my necessary exercise gardening, most particularly composting.

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