

TECHNICAL PROPOSAL

PINELLAS COUNTY INNOVATIVE RECYCLING GRANT PROPOSAL February 1998

ABSTRACT

The Pinellas County Innovative Recycling Grant Proposal is being submitted to develop new, long term and stable markets for recycled yard waste and other organic recycled products. The results of this project will demonstrate that the techniques being proposed can be utilized for various applications anywhere in the state. The city of St. Petersburg is a partner (subcontractor) in this project. Recycled residential yard waste will be processed, loaded and transported to various project locations. It will then be applied to different land areas for the purpose of improving organic content in the soil and promoting the establishment of vegetation.

Field research and testing will be done before, during and after application. This will develop a database of technical information which will aid in developing future markets for recycled yard waste. The final report will also contain projections based on the data accumulated to make recommendations beyond the end of this project. The testing will be done by the University of Florida's Institute of Food and Agricultural Sciences.

Approximately 25,000 tons of yard waste will be used for various applications. The project locations were initially going to be at IMCAgrico phosphate mine. After three month's of ground work, they backed out one week before this proposal was due, and an agreement could not be reached. Negotiations are continuing with other project locations including a Southwest Florida Water Management District (SWFWMD) project with upland and wetland reclamation areas at Cockroach Bay in Hillsborough County and with Florida Power along an area with transmission lines.

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PROJECT DESCRIPTION

Yard Waste Processing. Processed yard waste that has been separated from the residential waste stream and ground into a mulch product will be provided to the project participants. Pinellas County and the city of St. Petersburg both have had active yard waste recycling programs since 1989. The processing of the material will not be charged to the grant, Ground material will be loaded onto contracted tractor trailers for transport to the project locations.

Transportation. It is necessary to transport the recycled mulch product that has been generated in our densely-populated community to markets outside the county. The city of Petersburg will contract with a private hauler to transport and deliver the recycled mulch to the project locations. The hauler will be required to pick up material at both the Pinellas County and city of St. Petersburg yard waste processing locations.

Product Receiving. The recycled mulch material will be delivered to the project locations and placed into rows for adequate storage and stability. The project recipient will then spread this material into each project area. There will be no charge to the grant for this activity.

Product Application to Decrease Erosion and Increase Organic Content.One of the project's goals is to demonstrate that yard waste organic material can be applied for the purpose of erosion control in combination with the planting of turf seeds. The scope of work includes delivery of yard waste to a project location where it will be applied over a large area (approximately two-acre site). The recycled mulch will be pushed into place and cut into the surface, mixing it with surface sand. Bermuda and Bahiagrass seed will be applied and monitored for growth and survival.

The project will examine two types of mulch for effectiveness in establishing turf grass. The first type of mulch product will be mulch that has undergone windrowing to destroy weed seed. The second type will be material that has not been windrowed. Testing will be done on both types to determine which type is best suited for this application.

Project Description (Con't)

Product Application on Upland Areas. This second project goal is to demonstrate the cost effectiveness and improved product quality of yard waste using sheet composting. The scope of this project is to apply approximately 1,000 tons of organic mulch material per acre over an estimated 25 acres.

One of the objectives of this project is to develop a low technology *sheet composting* process (placing ground yard waste in thick layers of one to two feet in depth) and allowing natural decomposition without any manipulation. This process produces a mature compost product over a long period of time for a low cost.

Project Application in Upland Restoration of a Coastal Wetland Area. The third goal is to demonstrate that mulch can be used in a coastal wetland reclamation project. Southwest Florida Water Management District (SWFWMD) through their Surface Water Improvement and Management (SWIM) program will use recycled mulch in phase II of the upland restoration project at Cockroach Bay near Ruskin in Hillsborough County.

The Cockroach Bay project is the largest, most complex habitat enhancement/restoration/creation effort ever developed for the Tampa Bay estuarine ecosystem. Recycled mulch will replace the traditional practice of mulching with exotics that have been removed and chipped while reclaiming upland areas. Not enough of this chipped material is currently available for the scope of the entire project.

Recycled mulch will be utilized as a 9 to 12 inch deep ground cover to assist establishment of woody and herbaceous plantings in a reclaimed upland site. The purpose of the recycled mulch is to suppress competition from weed growth and nuisance species long enough for new plantings to become established. The SWFWMD project manager would like fresh mulch that has undergone a weed seed kill temperature rather than aged, windrowed mulch. The fresh mulch material will last longer once applied and will suppress weed establishment better than older mulch.

Project Testing and Evaluation. One of the duties and responsibilities of the subcontractor, city of St. Petersburg, is to contract with and monitor the work of the University of Florida's Institute of Food and Agricultural Sciences (IFAS) that will provide field testing for these projects. (Their attached

Project Description (Con't)

letter referenced the IMC-Agrico phosphate mine, but the same testing protocol will be followed.) Each project area will be evaluated for soil organic content levels, weed seed content, grass seed germination and survival rates, and will be monitored for erosion control. The overall project will be evaluated based on results from before and after studies during the first year and projections for two to three years beyond the scope of the project. It will also include final recommendations.

PROJECT COSTS

Administrative cost	\$ 25,000
Loading cost	\$ 25,000
Trucking cost	\$200,000
Testing and Evaluation	<u>\$ 25,000</u>
TOTAL	\$275,000

Estimated project cost to be borne by project participants (and not charged to innovative grant):

- Yard waste separation and handling costs = \$17,714
- Yard waste grinding cost (@\$8.56/ton for 25,000 tons = \$214,000)
- Material storage at project locations
- Project site preparation
- Mulch application at project locations

PROJECT TIME LINE

<u>Date</u>	<u>Description</u>
3-16-98	DEP announcement of grant recipients
3-19-98	Project advertises by public bid for hauling of mulch
4-01-98	St. Petersburg City Council approves joint projectwith Pinellas County
4-07-98	Pinellas Board of County Commissioners approves project with St. Petersburg
4-10-98	Trucking contract bid opening
4-16-98	Pinellas County receives and signs grant agreement from DEP
5-15-98	Commence delivery of mulch by contracted trucker to project locations
	This project requires 175 tons of windrowed mulch

Project Description

6-01-98	Delivery of 100 tons of fresh mulch
6-01-98	Commence delivery of regular mulch to upland area
9-01-98	IFAS scientist provide quarterly reports on organic content, weed seed content and turf establishment, erosion evaluation and comparison studies for project effectiveness
12-01-98	Quarterly report (same data as 9-01-98 above)
3-01-98	Quarterly report (same data as 9-01-98 above)
5-01-99	Completion date for delivery of mulch
6-01-99	Final report due from IFAS research team
6-30-99	DEP deadline to encumber grant expenses
7-15-99	Report with final recommendations to DEP

Advanced Technologies

1. **Potential Large Market** The primary objective of this innovative grant project is to determine the market potential of providing processed yard waste to public and private sector entities for low cost land reclamation activities. The grant will allow a thorough investigation of providing large quantities of recycled organic materials for large organic users. One of the elements of land reclamation is improving the soil's organic content for long term establishment of vegetation. It is estimated that approximately 175 tons per acre will increase the organic content of sandy soils to the percentage necessary for turf establishment. This equates to a market potential of over 875,000 tons of recycled organic material per year.
2. **Market Availability.** Since the upland and wetland reclamation in Florida will be increasing in the next few years, the potential for growth is significant. The location and size of wetland and upland areas for the distribution of recycled yard waste mulch is extensive. The closer the end markets to the supply of recycled materials, the lower the costs.

A nine-inch blanket application on cleared uplands reclaimed for new plantings utilizes mulch to suppress competitive and invasive plant growth and represents a significant new environmental use of recycled mulch. For example, the conditions necessary to destroy exotic Brazilian pepper in Florida involves waiting until the trees do not have berries or if they do have berries they must be chipped and placed in piles high enough to heat to 145 degrees Fahrenheit for three hours before exotic removal can be successful. This project intends to demonstrate that these limitations and preconditions can be eliminated when a 9 to 12 inch applications of mulch is applied over the chipped pepper plants.

New Technologies. This project will implement a new concept in composting yard waste called *sheet composting*. This method allows efficient microbial decomposition with minimal manipulation. One of the serious drawbacks of producing compost from recycled yard waste is the cost of manipulation to achieve optimum decomposition. Specifically these costs are: windrow formation, turning, watering, monitoring, screening and stabilizing. These procedures can more than double the cost of compost. The sheet composting method takes advantage of the natural composting

Advanced Technologies (con't)

method relying on the environment to supply the elements necessary for organic waste composition. Ground yard waste is layered one to two feet thick on sandy soil. This allows a greater amount of material to be exposed to air, rainfall and sunlight which satisfies the microbial needs for waste decomposition. The lack of manipulation is compensated by using the material on projects of long-term need.

This project also offers a new technology in using recycled mulch for slope stabilization. The mulch material is mixed with sand on slopes. The fibers of the mulch help to hold the sand in place during rainfall and to reduce erosion.. At the same time the mulch aides in water retention and assists in the germination of the grass seed for turf establishment.

TECHNOLOGY TRANSFER

This innovative grant project will utilize recycled yard waste for the purpose of improving soil organic content to establish vegetation for soil stabilization. This project utilizes two technologies: sheet composting and slope stabilization by incorporating mulch directly into the top layer of the soil.

1. **Sheet composting** Sheet composting involves a low technology process where shredded yard waste is applied in two-foot horizontal layers above the soil. This method exposes a large amount of organic material to the natural conditions that will accelerate organic decomposition without mechanical manipulation. Its main application would be in large areas of land that require improvement of soil organic content for vegetation establishment. This long-term decomposition process produced an inexpensive and high quality compost.

- a. Closure requirements for sanitary landfills Sheet composting technology can be easily transferred to the closure requirements of sanitary landfills. At these facilities the Florida Department of Environmental Protection requires the establishment of vegetation on the final contours of the landfill. Sheet composting can be started on the landfill on non-operating areas and transported to the completed final elevations. The compost then is mixed with the final cover to increase organic content and ultimately establish vegetation.
- b. Power Utility Companies Sheet composting can also be utilized by local power utilities. The electric utility companies in Florida own and maintain large strips of land to accommodate their transmission towers. Sheet composting can be utilized under these towers for weed control and eliminates the need for mowing for a minimum of two years. When the compost becomes mature it can be incorporated into the soil and seeded. The seeds would germinate and create attractive grass meadows that could be maintained easily and at a lower cost than present maintenance projects.
- c. Highway Right-of-Ways. Another use for sheet composting is in the Florida interstate highway right of way maintained by the Florida Department of Transportation. Turf grass on slopes of overpasses has a high mortality rate, and the soil sometimes erodes. Mulch using the sheet compost method can be placed in 8 to 16 inch layers acting as a stabilizing blanket while new shrubbery is planted. Once the shrubs are established, they will hold the soil in place for long-term soil stabilization. The mulch would also add organic content to the soil for healthier turf and shrubbery.

Technology Transfer (con't)

- d. *Agricultural industry* The agricultural industry is another area where there is a need for low cost compost. If the organic content of the soil is increased, it will increase crop yields and help protect the root systems from disease.
2. **Slopes** In the state of Florida there is a universal problem of establishing turf grass on slopes because of sandy soils low in organic content, droughts and large quantities of rain in short periods of time. To help correct this problem recycled yard waste mulch can be mixed in the top layer of soil to help hold the soil in place during heavy rainfall. It will also help the sandy soil hold moisture to establish the new turf grass. As the mulch decomposes, it will provide compost to the plants on the slope.
 - a. *Florida Department of Transportation.* This is a large state agency that constructs and maintains slopes along the highway. Overpass sod must be maintained to eliminate the weakening of the road bed structure. In many situations, the sandy soils cannot retain enough moisture to maintain the growth of the sod. Adding mulch fibers to the soil will aid in water retention and encourage the grow of turf seeds. In the seeded areas organic mulch will hold the sandy slopes so they will not wash out during heavy rains.
 - b. *Sanitary Landfills.* These can also benefit from using mulch as a slope retention system. Most sanitary landfills in Florida use the area method for landfilling municipal solid waste. These cells of solid waste are constructed on top of one another to build to higher elevations. These slopes can be as steep as a ratio of four to one. On these slopes, washouts develop from heavy rainfall and poorly established vegetation thereby exposing the solid waste. The organic mulch fibers will help hold the slope in place and assist in moisture retention to establish vegetation.
 - c. *Coastal Wetlands.* The conditions that create a need for wetland establishment is the result of Florida's explosive growth. Florida by the early 1970's had lost about 50 percent of its original coastal estuaries, most sacrificed to residential development. Tampa Bay has lost about 40 percent of its mangrove habitat and 80 percent of its coastal estuary ecosystem where fish go to spawn.

Many coastal wetland restoration and creation projects occur throughout Florida's five water management districts when each has Surface Water Improvement and Management (SWIM) projects that are active. Also, the water management districts regulate private mitigation projects in the state where commercial and development activities are occurring along coastal wetland areas. One other future area where mulch can be used is in mitigation banking where wetlands are created and credits are sold or bought.

COST EFFECTIVENESS

1. **Lower processing costs** This innovative grant is a cost-effective yard waste recycling initiative to provide new uses for large quantities of yard waste which are available and will continue to be available-- in all Florida counties. It will demonstrate a low cost, low manipulation program for producing compost from residential yard waste. Substantial savings are achieved when sheet composting is compared to traditional composting methods. The costs that Pinellas County and the city of St. Petersburg have identified for traditional composting range from \$19 to \$25 per ton.. This includes costs for size reduction, loading, transfer, turning, stabilization and screening.

The sheet composting recycling project eliminates the effort and expenditures associated with the manipulation of organic yard waste to produce compost. The costs associated with windrowing, turning, monitoring, adding moisture, stabilizing and screening would also be eliminated. It is estimated that over 40 percent of the processor's cost could be saved by using the sheet composting method over the traditional method. This represents a savings of \$8 per ton on processing costs. In a 25,000 ton per year project this equates to an anticipated saving of over \$200,000 annually.

2. **Reduced land requirements.** The sheet composting method also saves on land space that would have been required for windrow composting. The costs associated with space requirement are land acquisition, site preparation and maintenance. The average windrow composting facility requires 10 acres of land to process 25,000 tons of organic waste per year. The sheet composting method requires approximately 2 acres to process the same quantity of material. The estimated land cost and site preparation is \$100,000 per acre. The land space requirement for sheet composting of the traditional windrow method saves 8 acres on a facility of 25,000 tons per year for a total estimated preparation cost of \$800,000.

3. **Lower environmental risk.** Operators of yard waste recycling facilities must be responsible to the public they serve. The facility should operate in a manner that safeguards the public health,

Cost Effectiveness (con't)

safety and the environment. The general public may be concerned about having a yard waste facility in their community. These facilities must be designed with the proper buffers and setbacks to properly control fugitive dust, odor and noise.

The traditional composting facility commonly uses grinders, windrows, windrow turners, stabilization storage areas, loading and on site movement of materials and screening. Each step in handling the material increases the risk of a nuisance complaint. The sheet composting method allows the material to compost on the site of final destination with minimal manipulation and ultimately minimal environmental risk.

To protect the surrounding neighborhood from possible nuisances, the site should be designed with a minimum setback of 200 feet around the site. For a two acre site that prepares yard waste for sheet composting, setbacks of five acres would be needed. A ten acre site that composts yard waste utilizing the traditional method would require a setback of over 12 acres. The processing of yard waste for sheet composting versus the traditional composting method saves over seven acres of land designed for environmental setbacks with a land cost savings of over \$ 100,000.

NON-TRADITIONAL MATERIALS

The Pinellas County Innovative Recycling Grant Proposal will focus entirely on developing new, long term, stable markets for recycled yard waste. Yard waste is one of the largest portions of the waste stream in Pinellas County amounting to over 22 percent of all municipal solid waste. The material in this project will be collected primarily from residential homes utilizing either segregated curbside collection or community collection centers. The Pinellas County yard waste processing center receives yard waste from 12 of its municipalities. The city of St. Petersburg collects yard waste from neighborhood drop off centers and from municipal parks maintenance areas.

The yard waste recycling projects operated by both Pinellas County and the city of St. Petersburg have had to limit the amount of yard waste received due to lack of markets. The results from this project for a non-traditional material will foster new markets for all Florida cities and counties.