WSRC-MS-92-513

SELECTION AND CULTIVATION OF FINAL VEGETATIVE COVER FOR CLOSED WASTE SITES AT THE SAVANNAH RIVER SITE, SC

by

S. Keith Salvo
Soil Conservation Service
U.S. Department of Agriculture
Raleigh, NC 27609

and

James R. Cook
Savannah River Technology Center
Westinghouse Savannah River Company
Aiken, SC 29802

A Paper for presentation at the
Waste Management '93 Conference
Tucson, Arizona
February 28 - March 4, 1993

SELECTION AND CULTIVATION OF FINAL VEGETATIVE COVER FOR CLOSED WASTE SITES AT THE SAVANNAH RIVER SITE, SC

S. Keith Salvo
Soil Conservation Service
U.S. Department of Agriculture
Raleigh, NC 27609

and

James R. Cook
Savannah River Technology Center
Westinghouse Savannah River Company
Aiken, SC 29802

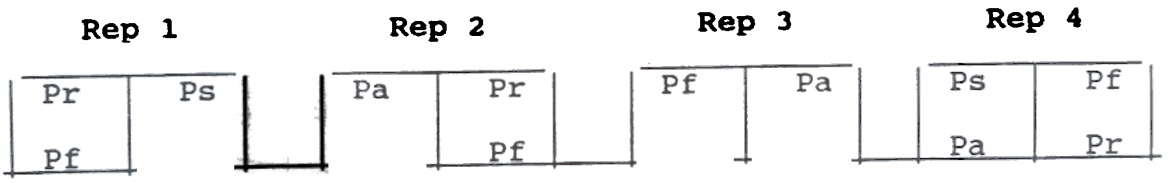
Abstract

Low-level, hazardous, and mixed waste disposal sites normally require some form of plant material to prevent erosion of the final closure cap. Waste disposal sites are closed and capped in a complex scientific manner to minimize water infiltration and percolation into and through the waste material. Turf type grasses are currently being used as a vegetative cover for most sites. Consequently, the sites require periodic mowing and other expensive annual maintenance practices. The purpose of this five year study was to evaluate alternative plant material for use on wastes sites that is quickly and easily established and economically maintained, retards water infiltration, provides maximum year-round evapotranspiration, is ecologically acceptable and does not harm the closure cap. The results of the study suggest that two species of bamboo (Phyllostachys bissetii and P. rubromarginata) can be utilized to provide long lived, low maintenance, climax vegetation for the waste sites. These large species of bamboo will also reduce the probability of intrusion by humans, animals and deeply rooted plant species.

Introduction

In 1985 a study was initiated by the U. S. Department of Agriculture, Soil Conservation Service (USDA-SCS) and the Savannah River Technology Center (SRTC) to evaluate alternative plant species for permanent cover on low-level waste disposal sites at the Savannah River Site. Due to the desired plant characteristics set forth by the SRTC, bamboo was chosen as the most likely plant to solve the problem. It's easily established, long lived, shallow rooted, ecologically sound, low maintenance, insect and disease free. Seven species were selected based on known degrees of temperature hardiness and rate of growth.

Figure 2. Site II Layout



Ps (P. aureosulcata), Pr (P. rubromarginata),
Pf (P. flexuosa), Pa (P. aurea)

All plots at both sites, including the control, were mulched with pine straw and irrigated during the first growing season to maintain soil moisture and enhance establishment of the bamboo. Weed control amounted to limited culling of large annual weeds by hand and use of post emergent herbicides to eradicate invading perennial woody plant species e.g. poison ivy, dewberry, trumpet-creeper, pine seedlings, etc. Every March, fertilizer (10-10-10) was broadcast over all plots at 1.5 lbs N/1000 sq ft the first three growing seasons and at 3.0 lbs N/1000 sq ft the last two growing seasons. Both sites were regularly monitored for disease, insect and other pest problems. There was no evidence of deer browse to the bamboo although the honeysuckle was heavily browsed each year.

Results of Test Plots

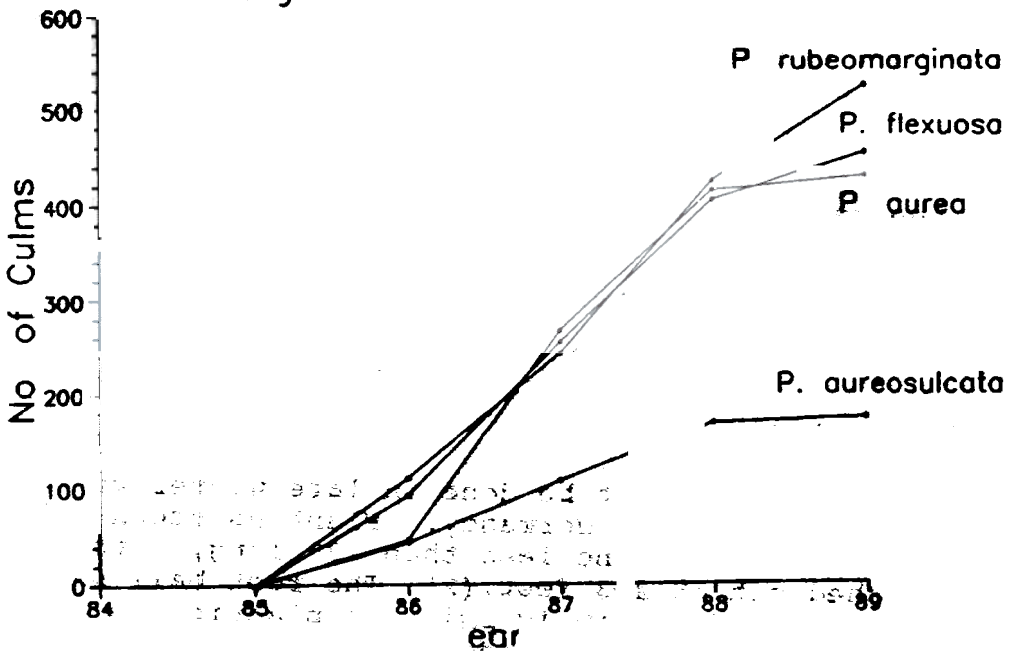
Site I

First year transplant survivability at Site I was excellent for P. bissetii with 100% and P. nigra with 91%, while P. dulcis was poor with 50%. Initial survival rate obviously impacted the rate of stand density development.

After four growing seasons, accurate culm counts of P. bissetii could not be made and after the fifth growing season the plots were completely covered, passable only by rodents, rabbits and other small animals. At the end of the evaluation period (Fall 1989) , the P. nigra or P. dulcis plots were still sparsely populated with culm counts low when compared to the P. bissetii, as shown in Figure 3.

The P. nigra and P. dulcis plots were also heavily infested by herbaceous weeds while the P. bissetii plots had only a few scattered weeds in each plot. Although herbicides were used in all plots to eradicate invading perennial woody plant species, most of the weeds in the P. bissetii plots were naturally eliminated by the shade and mulch created by the dense stand of bamboo.

Figure 4 Test Plot II Results



selected having characteristics suitable for bamboo growth. The site, containing the Orangeburg loamy-sand(1), was part of a twenty-acre tract that had recently been clear-cut during a timber harvest. Initial site preparation was done with a bulldozer using a root rake to remove stumps and clear debris. Once this was completed the site was disked and raked. Early in March 1991, site preparation was completed by using a single blade mold board plow to cut one-foot deep furrows ten feet apart.

The most successful bamboo species from each test plot P. bissetii and P. rubromarginata, were selected for transplanting. The plants were trimmed to about four feet in height with a bush hog mounted on a hydraulic arm. On March 20, 564 clumps of bamboo were transplanted to the nursery area, 317 P. bisset ti and 247 P. rubromarginata. The clumps were removed from the test plots with a backhoe and separated using axes and bush knives. They were transported to the nursery area by truck and placed into the furrows about ten feet apart. They were immed iately covered with soil. The following morning the plants were individually watered.

On April 15, the newly planted bamboo clumps were examined. Both species showed positive signs of growth in 95% of the clumps. In early summer, three types of herbaceous ground cover were seeded at the nursery area. Kobe lespedeza, Lespedeza striata, was seeded in the alleyways between the bamboo plants to prevent

References

1. Rogers, Vergil A., **Soil Survey of Savannah River Plant Area, Parts of Aiken, Barnwell, and Allendale Counties, South Carolina**, U.S. Department of Agriculture, Soil Conservation Service, June 1990.

2. Li, Guoging, **Improved Cultivation Techniques of Bamboos in North China**, Chineese Acadeny of Forestry, Beijing, China.

3. Kim, S. I., **Effect of Fertilizer upon New Bamboo Grove**, Research Reports of the Office of Rural Development, Suwon, Korea, December 1966.

4. Kim, Sa-Il, Chae, Byung-Chan, and Whon, Joo-Sang, **Effects of Planting Density of Mother Bamboo on the Establishment of Bamboo Groves**, Research Reports of the Forest Research Institute, no. 23, 1976.