Fort Hood Revegetation Pilot Project
Interim Report
January 21, 2005

Participants

Project Managers – Dr. Dennis Hoffman (BREC) & Dr. William Fox (TWRI)

Texas Water Resources Institute (TWRI) -	Dr. C. Allan Jones
	Dr. B.L. Harris
	Dr. Scott Keating
Blackland Research & Extension Center (BREC) -	Dr. Bill Dugas
	Mr. June Wolfe
	Mr. Jason McAlister
	Ms. Lisa Prcin
Natural Resource Conservation Service (NRCS) -	Mr. James Alderson
Directorate of Public Works (DPW-Ft. Hood)	Mr. Steve Burrow
Integrated Training Area Management (ITAM-Ft. Hood)	Mr. Jerry Paruzinski

Introduction

Restoration of drastically disturbed lands requires a systematic approach affecting multiple aspects of the natural resource spectrum (soils, vegetation, water quality, etc.). Efforts to control large scale erosion on Fort Hood's military training areas have been on-going for the past decade. USDA-NRCS efforts have centered on reseeding, ripping and recently, the construction of erosion structures within active gullies.

The current Texas Agricultural Experiment Station research centers on the evaluation of alternative restoration and erosion control practices, particularly the use of composted dairy by-products as a means to increase soil fertility and the success of reseeding activities. The following report addresses past and current efforts in the development of a best management protocol for the use of compost in revegetation programs.

Areas of Interest

Soil Fertility - Soil fertility levels on rangelands are naturally lower than many other natural systems. Vegetation has evolved within these systems in response to the naturally low fertility; however, significant impacts of military training combined with increased erosion rates can reduce the ability of the system to recover after disturbance. The use of composted dairy by-products containing moderate levels of organic nutrients has been hypothesized as a means to increase the ability of disturbed soils to support desired vegetation mixes. The current research activities include the monitoring of soil fertility pre- and post-treatment to evaluate the potential benefits of added nutrients through compost treatment.

Water Quality – Water quality is a concern for landowners and stakeholders associated with riparian and lake systems in Central Texas. Issues surrounding the North Bosque River Watershed and increased levels of phosphorous in Lake Waco encourage the need to evaluate potential nutrient loading in waterbodies associated with the use of dairy by-products as a treatment to increase vegetation cover in efforts to combat erosion. The current research activities are designed to monitor both small scale impacts of nutrient loading as well as landscape level impacts. Evaluation of water quality is a cornerstone of the current research activities and will continue with future research endeavors.

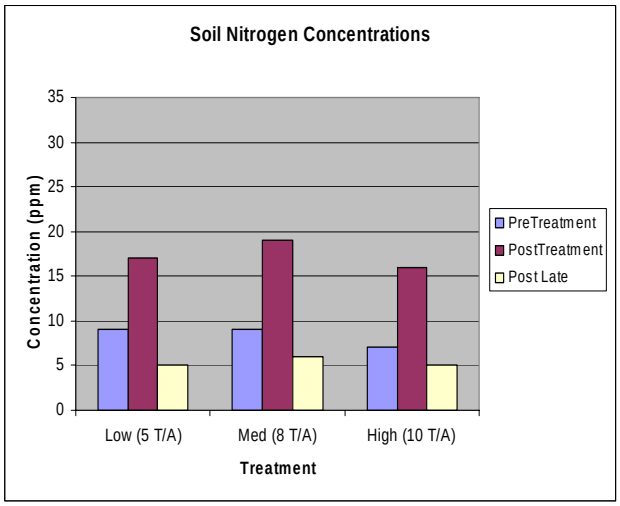
Vegetation – Though many best management practices have been introduced in the past to control erosion, the best means both economically and biophysically is to maintain a health vegetation cover of desired species. Current activities associated with the project focus on monitoring vegetation response to compost treatment including evaluation of bareground, vegetation cover and species diversity. Another significant component of the vegetation activities centers on reseeding and evaluation of multiple seed mixes to identify success in revegetation.

Economics – Large scale implementation of best management practices requires evaluation of cost/benefits and understanding of return on investment. The project maintains all economic materials including transactions and will be evaluating costs per acre treated in comparison to alternative best management practices.

Results

Soil Fertility – Soil nitrogen analysis (Figure 1-2) indicated significant concentration increases after composted dairy manure application to the treatment area that were reduced to pretreatment levels by plant growth during the 2003 growing season. Soil phosphorus concentrations demonstrated little impact from applications of composted dairy manure.

Figure 1 : Comparison of soil fertility between March 2003(pre treatment), June 2003 (post treatment) and November 2003 (post treatment late).



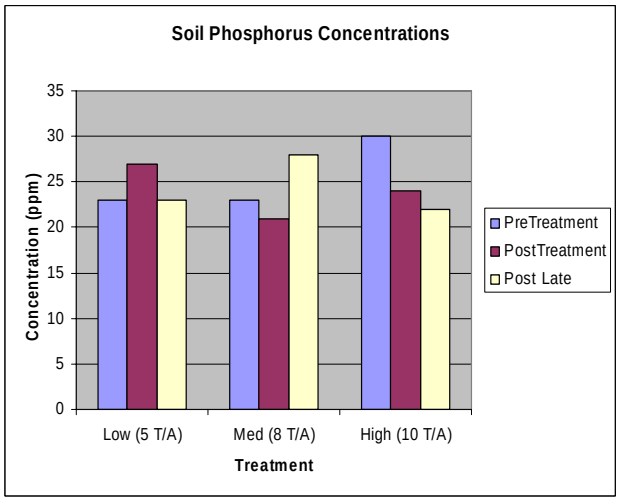
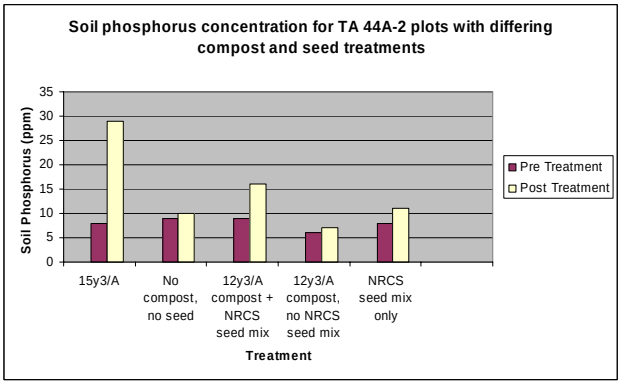
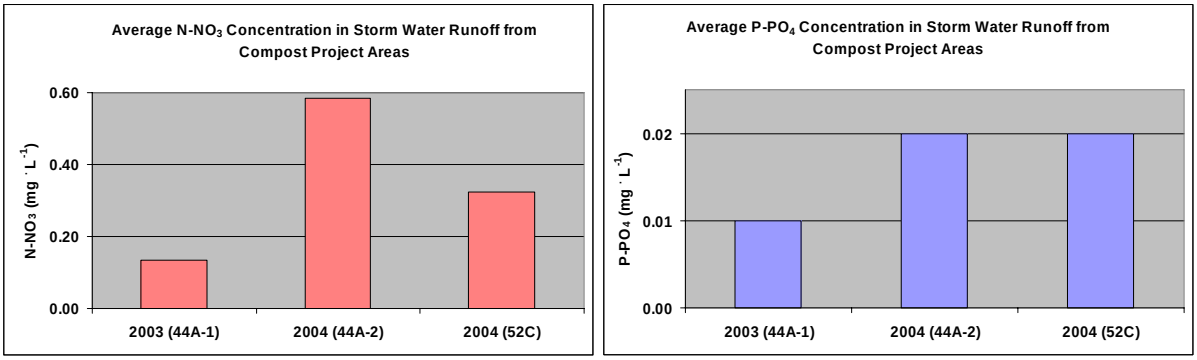


Figure 2: Comparison of phosphorus concentrations between January 2004 (pre treatment) and June 2004 (post treatment).



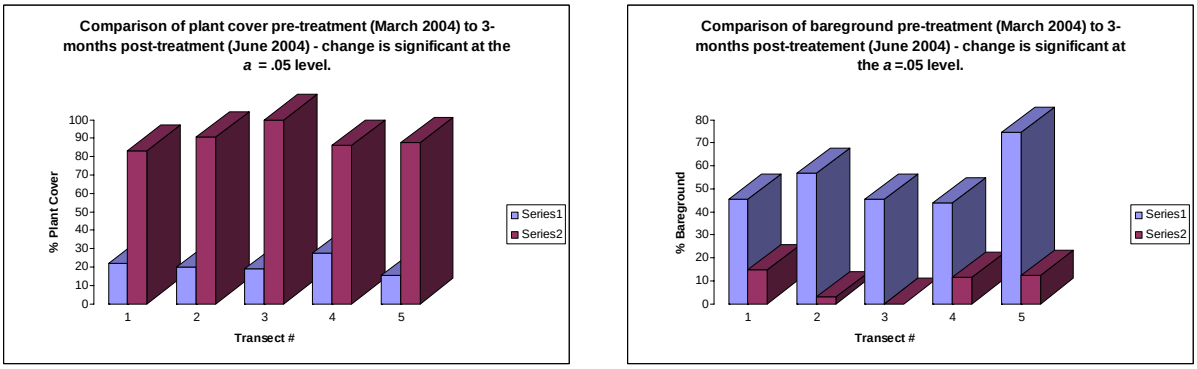
Water Quality – Data collected from storm water runoff samples (Figure 3) were compared to data from 8 years of in stream storm water sample data collected on Fort Hood. The data collected from the composted dairy treatment plots were within the parameters of water samples collected from Fort Hood area streams (Stream Nitrogen average = 1.6 ppm; Stream phosphorus average = 0.1ppm).

Figure 3: Comparison of Nitrogen and Phosphorus concentrations in storm water samples (2003/2004).



Vegetation – Maintaining sustainable military training lands poses significant challenges to rangeland managers. Traditional methods often do not measure up to the disturbance regimes impacting these systems. Evaluation of trends on vegetation takes several years of data collection to accurately understand the impacts of best management practices. However, initial results (Figure 4) indicate a positive response may be taking place on treated areas. The following figure depicts a decrease in bareground and increase in vegetation cover for a 100 acre plot established in spring of 2004. The results illustrate that there is a potential for positive influence of compost and its nutrient value in restoration practices. Further data and research is in place and planned and will continue to be monitored over the next 2-3 growing seasons to evaluate long-term impact of the practice.

Figure 4: Comparison of bareground and plant cover changes between March 2004 (pre-treatment) and June 2004 (3-months post-treatment).



Economics – The economic feasibility of using compost in the restoration of military training areas is difficult to evaluate and there is little precedence of compost use on large scale land application. We will analyze the practice on a cost per acre treated for each of treatment protocols. Efforts to refine protocols and further understand benefits will continue as we attempt to value the cost/benefit of the experimental practice. Final outcomes will compare to alternative restoration/erosion best management practices (reseeding, gully plugging, ripping, etc.).

Conclusions

Soil and water data indicated that vegetation in the treatment areas responded favorably to applications of composted dairy manure. Nitrogen data (Figure 1) demonstrated that the nitrogen fertility levels increased post treatment and was removed by plant growth during the post application months (May-November). Native range species (bluestems, Indian Grass, and other warm season grasses) remove nutrients (luxury uptake) and store them in their large root systems. Stored nutrients will be available for plant growth in future seasons. Storm water runoff data demonstrated that there have been no measured environmental impacts from applications of composted dairy manure. Preliminary evaluations of vegetative responses are inconclusive at this early date. However visual evaluations indicate that improvements in vegetation can be seen at both ground level and in aerial photographs (Photo 1).

Photo 1: Photo taken of the 2003 demonstration clearly show treatment area vs. non-treatment areas. Photo taken late spring 2004.