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16. Abstract

The TTI/TxDOT Hydraulics and Erosion Control Laboratory conducted a series of evaluation procedures to determine the field performance of flexible erosion control materials. The objectives of the study included determining the effect of flexible materials on the germination and growth of native grasses and evaluating the effectiveness of the materials for the prevention of erosion on typical steep, roadside slopes before the establishment of permanent vegetation. Researchers repeated the vegetation establishment and soil retention portions of the evaluations on two soil types with the option for two different slopes according to the manufacturer's preference.

Researchers conducted the vegetation establishment evaluation by hydraulically applying the seed and fertilizer mixture on the plot, installing the erosion control product according to the manufacturer's published literature, and collecting data periodically throughout the growing season. The apparent vegetative cover of each plot was averaged for every round of data collection. Results included the four rounds of vegetation coverage data or the final round of vegetation data, depending on the analysis level. Researchers calculated the minimum amount of vegetation established by statistically analyzing the data set for significantly different ranges in the coverage data.

Researchers conducted the erosion control portion of the study by artificially simulating various rainfall events with the greatest probability of occurrence during highway construction periods. The total dry sediment weight was calculated to achieve the total sediment loss per one hundred square feet of plot area. Researchers average the results of each series of simulated design storms for each round of data collection. The resultant total sediment loss was established by averaging the totals of each round of design storm values. Researchers established the maximum amount of sediment loss from statistically analyzing the data set for significantly different ranges according to the analysis level.

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THE PERFORMANCE OF FLEXIBLE EROSION CONTROL MATERIALS AND HYDRAULIC MULCHES

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Sponsored by the
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IMPLEMENTATION STATEMENT

The findings from this work will have immediate application in the planning, design, construction, and maintenance of sites requiring erosion control and vegetation establishment. Methods used to evaluate the field performance of erosion-control blankets (soil retention blankets) in two different application areas, with varying slopes and channels, should provide engineers and landscape architects with current performance characteristics related to the highway environment. Researchers studied different vegetation management techniques in typical roadside environments in order to formulate recommendations for specifications.

Results from the study support TxDOT's *Approved Materials List* included in the standard specifications for the construction of highways. Benefits of this research include an annually updated listing of the best performing erosion control materials and mulches that will encourage competitive marketing within the state of Texas. Associated products supported by research results, such as TxDOT's standard specification details and specification inserts will continue to keep TxDOT a pro-active leader in highway-related environmental concerns.

AUTHOR'S DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

NOTICE

The United States Government and the State of Texas do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

TABLE OF CONTENTS

LIST OF FIGURES

FIGURE **Page**

LIST OF TABLES

TABLE **Page**

SUMMARY

The erosion control industry and the Federal Highway Administration (FHWA) recognize a wide variety of generic materials that may be used as erosion control protection. For the past twenty years erosion-control blankets (referred to by TxDOT as soil retention blankets) that met the Texas Department of Transportation's (TxDOT's) standard specifications consisted of two products, American Excelsior Curlex® and Enkamat® 7020. Technically, products that did not meet the material-based specification were excluded from the specification and bidding process. In response to this practice, TxDOT searched for alternatives that would provide a fair system of selecting and specifying erosion control products based upon their performance. Therefore, a cooperative research study was initiated in 1989 between TxDOT and the Texas Transportation Institute (TTI) to help further this initiative.

Once the researchers determined TxDOT's needs and reviewed the current state-of-practice in erosion control, they recommended evaluating erosion control materials based upon their field performance rather than traditional laboratory testing. Since erosion-control blankets and mats were developed from the textile industry, a variety of laboratory tests were developed to describe standard strength properties such as tensile and shear strength, heat resistance, etc. These tests did not adequately describe or test field performance. Laboratory tests and field observations suggest there is great variation in strength, durability, soil-blanket interaction, and vegetation response between generic material classifications and manufactured brands of similar materials. Soil-fabric interaction, vegetation establishment, and installation methods are critical factors to consider in figuring out field performance characteristics.

The researchers developed evaluation methodologies for the Department's most pressing needs: erosion-control blankets in varying slope applications, flexible channel liners in varying shear stresses, and hydraulic mulches for vegetation establishment. A state-of-the-art facility was designed and constructed during a two-year period to accomodate these and other application areas. Today, the Hydraulics and Erosion Control Field Laboratory is a nine-hectare site that includes approximately three hundred linear meters by six vertical meters of fill embankment, ten at-grade channels, two reservoirs, pumping stations, rainfall simulators, and various instrumentation. Research methodology developed is supported by the erosion-control industry and other state departments of transportation as acceptable test methods for highway-related erosion control measures.

Since 1991, an annual evaluation of erosion control products have been studied at the Hydraulics and Erosion Control Laboratory. Data on specific field performance characteristics such as apparent vegetation coverage and sediment loss are collected and analyzed. Vegetation coverage is collected by a video/image capture process and analyzed through an interactive color analysis program. Artificial rainfall simulations provide the researchers with sediment loss ratios. TxDOT uses the data to support their *Annual List of Approved Materials* and develop standard installation detail sheets as construction document inserts. Private industry, TxDOT, and TTI cooperatively work together to further this important area of environmental research and development.

INTRODUCTION

A variety of laboratory tests describe standard strength properties such as tensile strength; shear strength; resistance to abrasion, cutting, and tearing; heat resistance; etc. (5). These tests are conducted using very small samples in the laboratory and do not adequately describe or test the field performance. Soil-fabric interaction, vegetation establishment, and installation methods are critical factors to consider in determining an erosion-control blankets' field performance and cannot be adequately addressed in an indoor laboratory condition.

Limited quantitative information on the field performance capabilities of erosion-control blankets and mulches marketed for similar applications existed in the late eighties. Subsequently, engineers faced a difficult task in making the appropriate selection of erosion control materials for highway use. The Texas Department of Transportation (TxDOT) and the Texas Transportation Institute (TTI) entered into a cooperative agreement in 1989. The main purpose was to develop evaluation procedures for erosion control products such as mulches, erosion-control blankets, and channel liners. From the beginning, the primary objective of the research program was to provide the manufacturers of erosion control related materials a timely and fair program through which their individual products can be evaluated for use within TxDOT's construction and maintenance activities. The research objectives included the following:

- To determine the acceptable performance level in fostering the establishment of vegetative cover and controlling sediment loss; and

- To determine acceptable application methods for hydraulic mulch products used for vegetation establishment within the highway rights-of-way.

Since beginning the research, the International Erosion Control Association (IECA) has been pursuing a program of developing industry standards. The IECA is an international organization serving as "*a global resource for people who share a common responsibility for the cause, prevention, and control of erosion.*" The research program conducted at the Hydraulics and Erosion Control Laboratory is nationally recognized as a full-scale laboratory and program devoted to the better understanding of erosion control product performance. This research parallels the IECA's efforts to establish standards for the erosion industry.

With TxDOT's commitment to specifying erosion-control blankets based upon their field performance, the Department changed its standard specification for Item 169: Soil-Retention Blanket (erosion-control blanket) for *Standard Specifications for Construction of Highways, Streets and Bridges*, 1993. Item 169: "Soil Retention Blanket" contains the following requirements:

> *Item 169 : Soil-Retention Blanket. It shall meet the requirements of and be approved by the Chief Engineer of Maintenance and Operations. A list of pretested and approved soil retention blankets will be maintained, and can be obtained by writing the Chief Engineer of Maintenance and Operations; 125 East 11th Street; Austin, Texas 78701-2483.*

In addition, TxDOT changed its standard specification for Item 164.2b: Seeding for Erosion Control, Cellulose Fiber Mulch (hydraulic mulches) to meet the following requirements:

> *Item 164.2(b): Seeding for Erosion Control, Cellulose Fiber Mulch. It shall meet the requirements of and be approved by the Director of Maintenance and Operations. A list of pretested and approved materials will be maintained and can be obtained by writing the Director of Maintenance and Operations; 125 East 11th Street; Austin, Texas 78701-2483 (10).*

The objective of this document is to describe the TxDOT/TTI Hydraulics and Erosion Control Laboratory facility, to provide general background on the research methods, to present the study results for erosion-control blankets (soil-retention blankets) and hydraulic mulches for the 1992 cycle, and to provide comparative assessments of the 1991 and 1992 combined results.

FIELD LABORATORY FACILITIES

LOCATION

The Hydraulics and Erosion Control Field Laboratory is part of TTI's proving grounds. The proving ground located at the Texas A&M University Riverside Campus is 6.5 km (4 mi) west of Bryan, Texas. The Field Laboratory site is bordered by runways to the north, east, and west and by an open field to the south. Harsh climatic conditions prevail since the site was originally a military airport facility located on a ridge above the Brazos River. The soils are generally poor, and the heat energy stored in or reflected from the surrounding pavement influences the facility conditions. These conditions are similar to those experienced in typical highway roadside environments and provide the most realistic conditions possible for conducting controlled experiments related to the highway roadside.

As with the first evaluation cycle, the second evaluation cycle occurred on the embankment located west of theRunway 35 terminus as shown in Figure 1. The slope study plots existed on a fill earth embankment that was 6.75 m (22 ft) in vertical height with 2:1 and 3:1 side slopes and sediment boxes at its base. The water supply system for the rain simulators was buried along the top of the embankment with access valves. The pump station located beside the north water reservoir next to the runway pavement provided water to the system. The weather station equipment was located on-site to provide continuous accurate climatic recording.

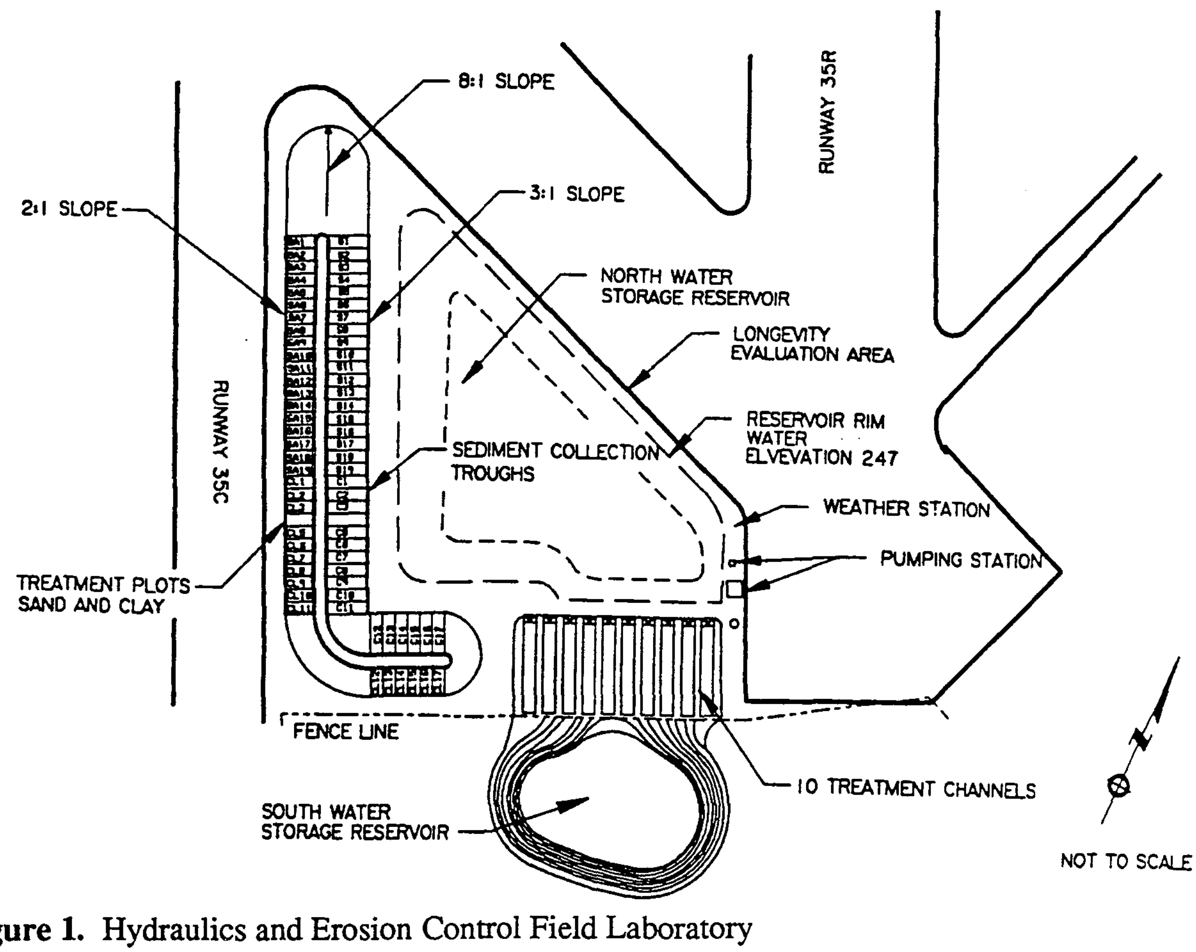

Figure 1. Hydraulics and Erosion Control Field Laboratory

EARTH EMBANKMENT

Researchers constructed the earth embankment in 1990 from two types of soil located within the 5 ha (12.5 ac) site. One half of the embankment was built and capped with a sandy loam soil (SL) (K= 0.38), and the remaining portion was built and capped with a clay soil (C) (K= 0.20). Post-construction soil samples were analyzed by SASI, Inc. with reference made to the *National Soils Handbook*, July 1983, Figure 603-1, "Soil Texture Triangle" (7). The K value was determined on post-construction soil samples using the SCS soil erodibility nomograph from *Predicting Rainfall Erosion Losses - A Guide to Conservation Planning (11)*. The physical properties of these two soils were a fair representation of the erosive properties frequently encountered in highway construction sites in Texas.

The "L-shaped" embankment cross-section shown in Figure 2 has a total length of 267 m (876 ft) at the crest and a vertical height of 6.75 m (22 ft). The cross-section of the embankment was finished with a minimum 152.4 mm (6 in) soil cap with a 2:1 slope on the south and west facing slopes and a 3:1 slope on the north and east facing slopes. The top of the embankment is 7.31 m (24 ft) wide as shown in Figure 2. The original construction was governed by TxDOT's 1982 *Standard Specifications for Construction of Highways, Streets and Bridges* (9). Compaction was controlled by the density control method in accordance with test method Tex-114-E and test method Tex 115-E. The Tex-114-E test method was a two-part test to decide the compaction ratio to select the density of soils and base materials in place. The Tex-115-E test was a field method for determination of in-place density of soils and base materials. The TxDOT District 17 laboratory in Bryan and subsequently the certified TTI Field Laboratory manager conducted field work and testing.

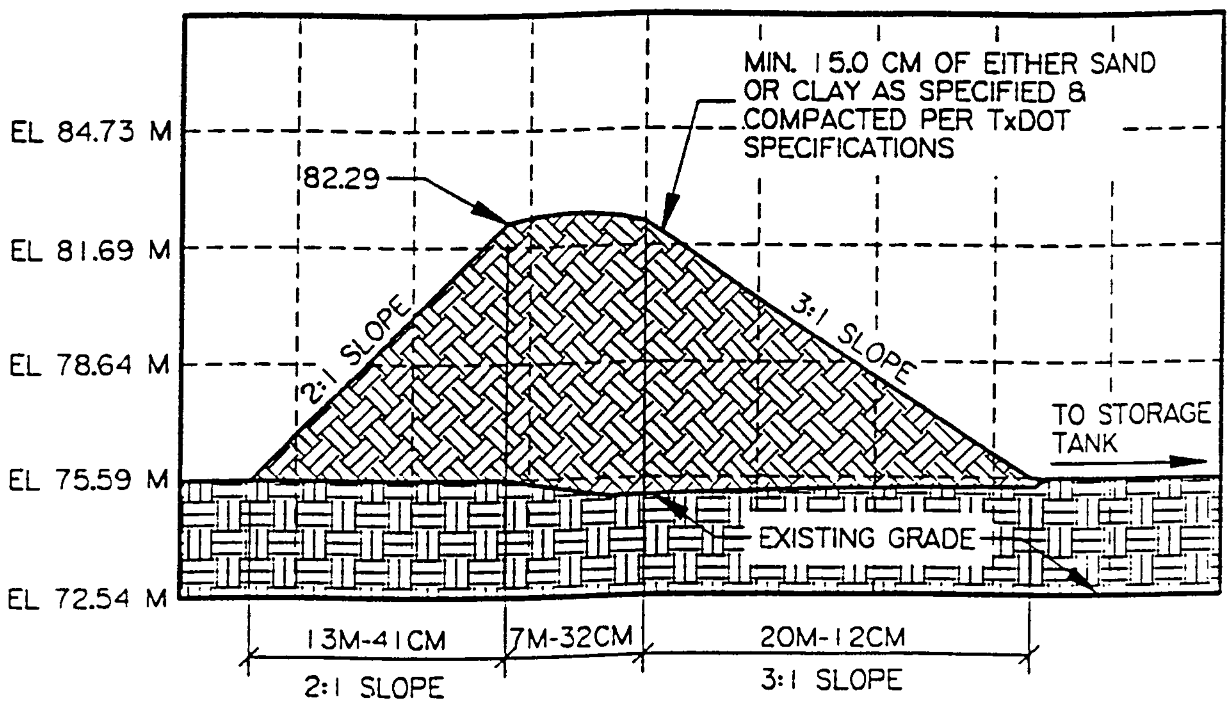

Figure 2. "L-Shaped" Embankment Cross-Section

Slope Study Plots

The embankment was constructed of both sand and clay to repeat the product evaluations on two diverse soil types. The embankment provided a total of 76 subplots, each being 6.2 m (20 ft) wide. A concrete sediment collection box was installed at the base of each plot. Figure 3 shows a typical cross-section of the sediment collection box.

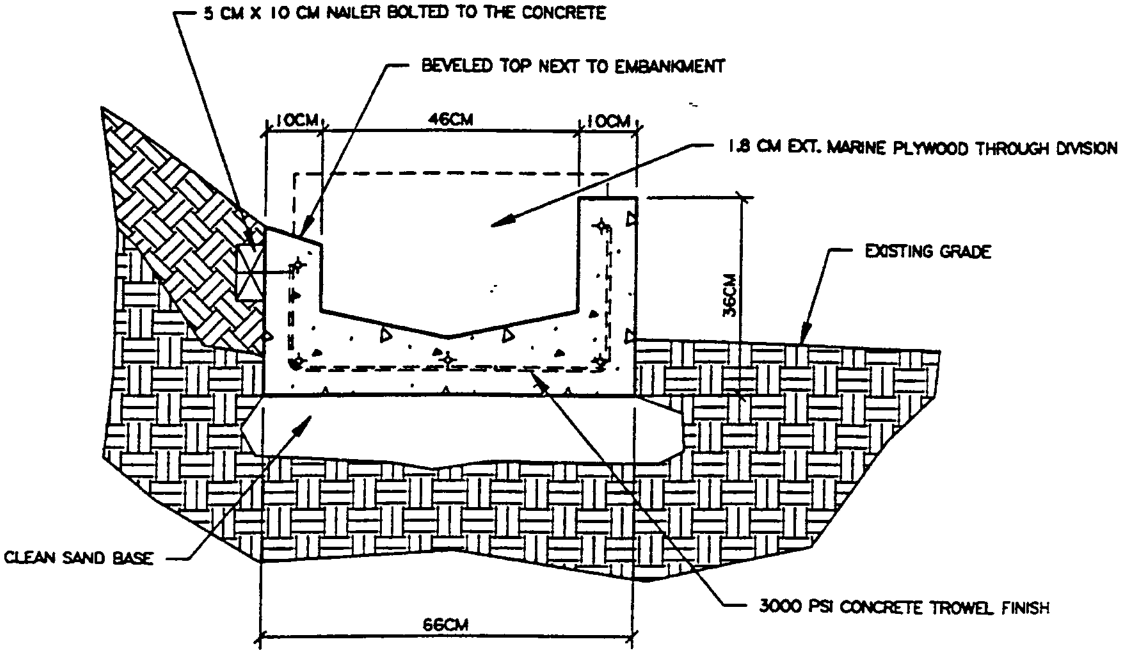

Figure 3. Typical Cross-Section of the Sediment Collection Box

Rainfall Simulators

Rainfall simulators generated the primary data in the sediment-retention performance evaluations. Natural rainfall was recorded, but no sediment was collected. The rainfall simulator units were 6.2 m (20 ft) wide and capable of covering the entire plot.

Each simulator unit consisted of a series of arms spaced 1.5 m (5 ft) apart and mounted on a steel frame. The frame sat approximately 0.60 m (2 ft) above the ground plane. Each arm had pressure gauges at each end to control water flow through the coarse-spray, adjustable irrigation nozzles. The nozzles sprayed upwards away from the slope face approximately 1 to 1-1/2 m (3-5 ft) to provide a greater drop velocity. Each unit can be calibrated to provide 25 to 300 mm (1-11.8 in) of precipitation per hour. Drop size was generally representative of natural rainfall.

RESERVOIRS AND PUMP STATION

Because of the embankment construction, two reservoirs were created with a natural vertical elevation difference of approximately 1.5 m (5 ft). The upper reservoir has a surface area of 2.63 ha (6.5 ac) and has a holding capacity of approximately 43,000 m (56,000 yd). This reservoir was the primary water supply source for all the experimental work. A ten-horsepower centrifugal pump supplied the rain simulators on the embankment.

WEATHER INSTRUMENTATION

The field laboratory had an on-site suite of recording weather instruments. These included a tipping-bucket rain gauge, hygrothermograph, barograph, recording anemometer, and pyronometer. These instruments provided a detailed record of the climatic influences over the study period and recorded the results.

METHODOLOGY

The experiment was established under a completely randomized design consisting of 12 treatments of two replicates for each soil type (sand or clay) by slope. Treatments consisted of erosion-control blankets (soil retention blankets) overlaying seeded embankments on clay and sand loam soil on a 2:1 and/or 3:1 slope. Control for the experiment consisted of four plots receiving the same vegetative treatment for each soil type with no erosion-control blanket in place. Test plots were evaluated for sediment retention and vegetative density with respect to soil type and slope.

RAINFALL SIMULATION

To maintain uniformity throughout a multiple-year testing program, all results for the erosion-control blanket evaluations were based on artificially generated rainfall. It was recognized that there is no way of controlling natural rainfall, so all reporting included a profile of the on-site weather conditions. Any unusual or mitigating events were noted and considered in the study results.

RAINFALL INTENSITY

Rainfall intensity determination was based upon rainfall intensities of 30.23 mm per hour (1.19 in/hr), 145.5 mm per hour (5.73 in/hr), and 183.6 mm per hour (7.23 in/hr). These were calculated as the anticipated intensities from storms of a ten-minute duration and a 1-year, 2-year, and 5-year return frequency (99%, 50%, and 20% probability of occurrence in a given year, respectively). The method used to derive the 2-year and 5-year values was the modified "Steel Formula" recommended in the Texas State Department of Highways and Public Transportation (now TxDOT), Bridge Division (D-5), *Hydraulics Manual*, Third Edition, 1985, for estimating intensity values "i" for use in the Rational Formula (8).

$$i = \frac{b}{(t_c + d)^e}$$ where: b, d, and e are constants.

The values of the constants b, d, and e were from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) Technical Paper No. 40, *Rainfall Frequency Atlas of the United States (6)*. Recommended constants used in each county of Texas were from Table 6 of the TxDOT *Hydraulics Manual.* The values used in the evaluation procedures were derived by computing the values of "i" for all counties in the state based upon the assumption that (t_c) was equal to a short storm duration and most of slopes (cut and fill) that require protection represent the upper limit of the micro-watershed. The median values selected were from the triangle of counties encompassing Houston, Dallas, and Austin. Since these counties contain the highest percentage of state-maintained rights-of-way, higher intensities were calculated for the counties located in the coastal zones of the state. However, including these values could have biased the test results. Figure 4 shows the representation of the counties throughout the State according to the computed "i" values.

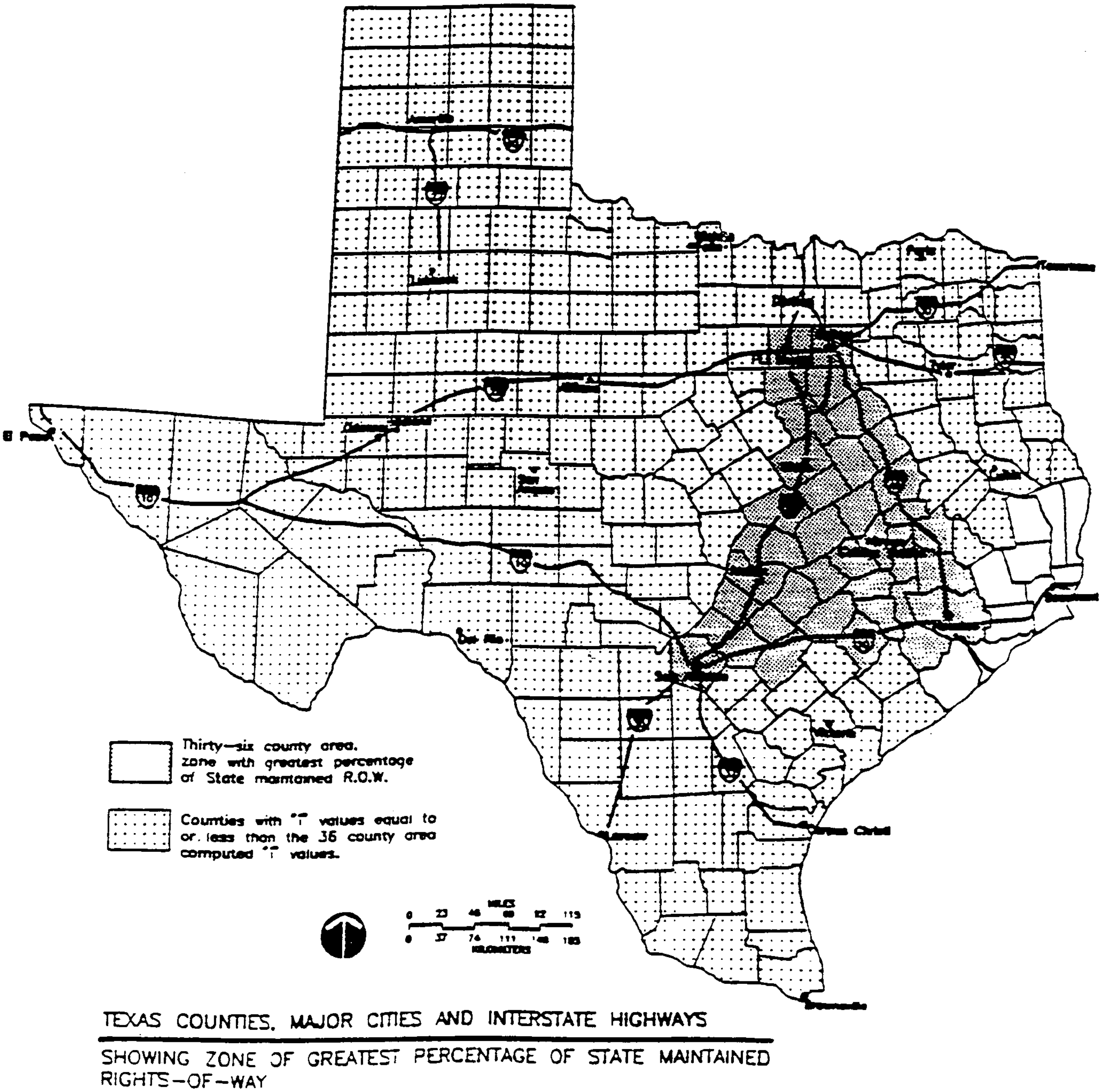

Figure 4. Texas County Map (Showing Zone of Greatest Concentration of State-Maintained Rights-of-Way)

RAINFALL EVENTS

Each erosion-control blanket treatment plot was subjected to three different rainfall events replicated several times. The first simulated rainfall events were 1-year return frequency, 30.226 mm per hour (1.19 in/hr). The second rainfall events were 2-year return frequency, 145.54 mm per hour (5.73 in/hr). Final rainfall events were 5-year return frequency, 183.64 mm per hour (7.23 in/hr). All rainfall simulations were conducted for ten-minute durations. Tables H and I show the dates of material installation and simulated rainfall events.

VEGETATION MEASUREMENT

The research team needed data that would accurately depict the vegetative density or apparent vegetative cover for the first growing season. After experimenting with several data collecting methods, the team chose to use a computer-based process to analyze the samples. The process was chosen since it was reproducible and a cost-efficient method to collect and analyze the samples. *VeCAP* or Vegetation Coverage Analysis Program, was developed to calculate the percentage of pixels in a sample image by color. Sample images were recorded in the field, as shown in Figure 5. The samples were converted to single digital images using a Targa 16 board and TIPS software and imported into the *VeCAP* Program. The images were analyzed, and a percentage of vegetation was determined, as shown in Figure 6.

Figure 5. Sample Images Being Recorded in the Field

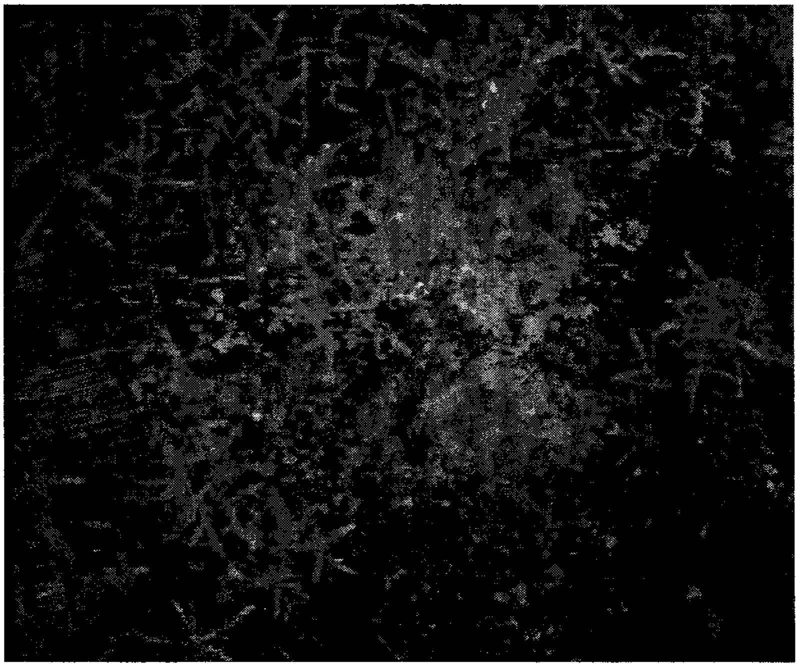

Figure 6. Sample of VeCAP Image

The sediment, retention and vegetative density data was statistically analyzed by the Statistical Analysis System (SAS) variance test, and significant means were separated by Duncan's Multiple Range test ($P<0.05$). Material performance was documented, but no data was included in the statistical analysis.

DESCRIPTION OF MATERIALS FOR 1992 CYCLE

The erosion control products were categorized into three varying degrees of definition. All of the materials classified by generic material type, primary material classification, and trade or brand names are shown in the first three columns of Tables A and B. The last column documents steepness of slope conditions as requested by the manufacturer for the 1992 cycle.

Table A. Description of Erosion-Control Blankets for the 1992 Cycle

Generic Classification	Material Classification	Brand Name of Material Evaluated	Slope
Organic	Excelsior	American Excelsior Curlex®	2:1 & 3:1
	Gypsum	AIRTROL® Plaster	2:1 & 3:1
	Jute	DEKOWE® 700	2:1

Table B. Description of Hydraulic Mulches for the 1992 Cycle

Generic Classification	Material Classification	Brand Name of Material Evaluated	Slope
Organic	Recycled Paper	American Fiber Mulch®	3:1
	Virgin Wood-Fiber	Conwed® Fiber Hydro Mulch®	3:1
	Recycled Wood-Fiber	Second Nature® Regenerated Wood Fiber	3:1

Besides erosion control material plots, there were bare ground (control) plots replicated on the 2:1 and 3:1 slopes, clay and sand soils. The control plots were prepared in the same manner as the product plots. All erosion-control blanket control plots were subjected to the identical rainfall simulations and vegetative density measurements as were the material plots. The hydraulic mulch control plots had vegetative density measurements taken throughout the growing season.

Erosion-Control Blanket Material Descriptions

The manufacturers submitted the following erosion-control blankets for evaluation in the 1992 cycle. General material specifications and roll dimensions for each material are presented on the following pages as supplied by the manufacturer.

AIRTROL® Plaster

AIRTROL® Plaster is made by U.S. Gypsum Company, a subsidiary of USG Corporation, based in Chicago, Illinois. AIRTROL® Plaster is a cementitious binder which, when mixed with water and mulch, sets in a controlled way to form a crust. It is produced from high-purity gypsum deposits. AIRTROL® Plaster is nontoxic, noncombustible, and harmless to fish, birds, plants, and animals. AIRTROL® Plaster is applied in a single application using conventional hydroseeding equipment.

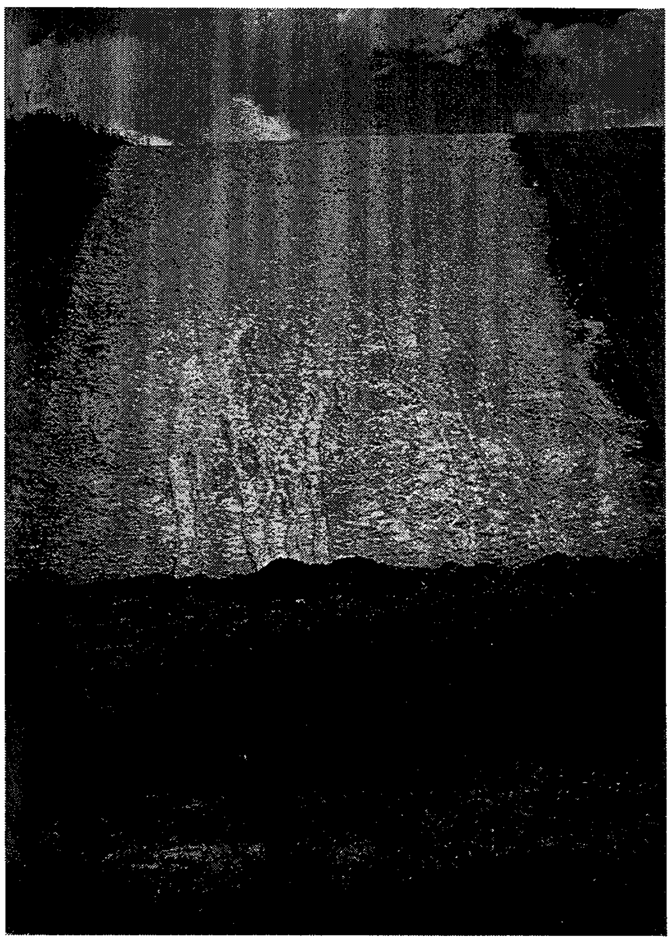

Figure 7. AIRTROL® Plaster

American Excelsior Curlex®

American Excelsior Curlex® is manufactured by American Excelsior Company based in Arlington, Texas. American Excelsior Curlex® is made from curled and seasoned Aspen wood excelsior reinforced with polypropylene netting. The top side is covered with a photodegradable extruded plastic mesh that adheres to the wood excelsior. The blanket is smolder-resistant without the use of chemical additives.

Table C. American Excelsior Curlex® Product Specifications

American Excelsior Curlex®	
MATERIAL SPECIFICATIONS	
Wood excelsior	80% 1.83 m (6") or longer
Weight	0.44 kg/0.83 sq/, (0.98 lbs/sy)
Mesh	black plastic
ROLL SPECIFICATIONS	
Width	1.22 m (4 ft)
Length	54.86 m (180 ft)
Weight	35.38 lg (78 lbs)
Area	66.89 sq m (80 sy)

Source: *American Excelsior Curlex ® Product Installation Guidelines*, 1992 (1). Metric conversions are shown to comply with metrication reporting procedures.

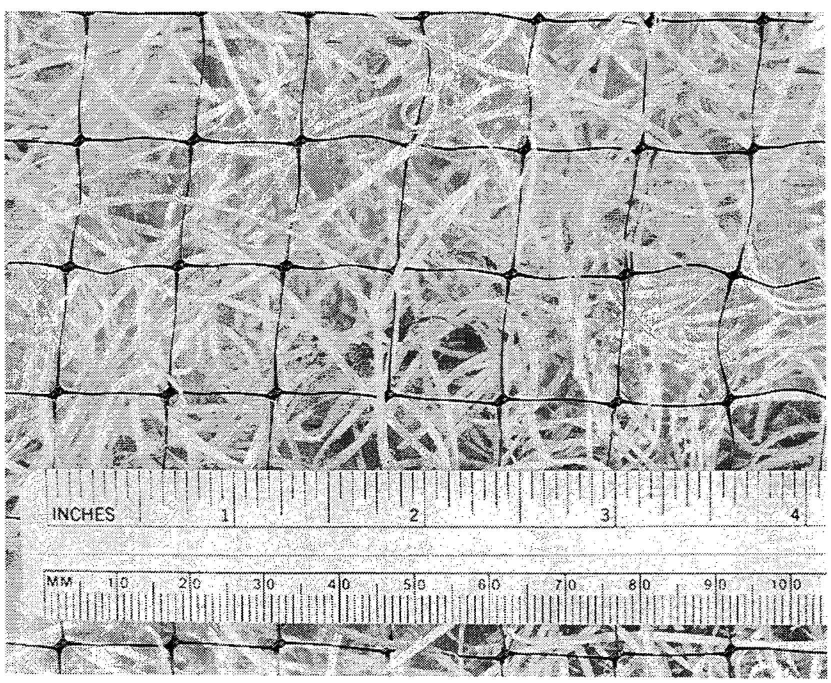

Figure 8. American Excelsoir Curlex®

Belton DEKOWE® 700

Belton DEKOWE® 700 is manufactured by Belton Industries, Inc. based in Atlanta, Georgia. Belton DEKOWE® 700 is made from Coir fibers which come from the husk of the coconut. The composition of coir fibers is about 45% lignin which gives it a high tensile strength and resistance to rotting. The fabric is woven from spun yarns of 100% biodegradable coir fibers. At least 64 weft yarns per linear yard and a correspondingly greater density of yarns in the warp direction comprise the fabric. Belton DEKOWE® 700 will completely decompose usually in 5-10 years, depending upon the application.

Table D. Belton Industries DEKOWE® 700 Product Specifications

DEKOWE® 700	
MATERIAL SPECIFICATIONS	
100% Coir fibers	
Weight	584 g/0.836m (20.6 oz/yd)
Yarn count	0 Warp-88, Weft-64
Tensile strength, per yarn	dry-24.97 kg (55lbs), wet-18.16 kg (40 lbs)
Elongation, per yarn	dry-29%, wet 35%
ROLL SPECIFICATIONS	
Standard widths	1m, 1.5m, 2m
Length	50.27 m (55 yd)
Weight varies with roll width	34.96 kg, 52.21 kg, 69.92 kg
Area varies with roll width	50.16 m , 75.24 m2, 100.32 m

Source: *Belton Industries, Inc., DEKOWE ®700 Product Installation Guidelines*, 1992 (2). Metric conversions are shown to comply with metrication procedures.

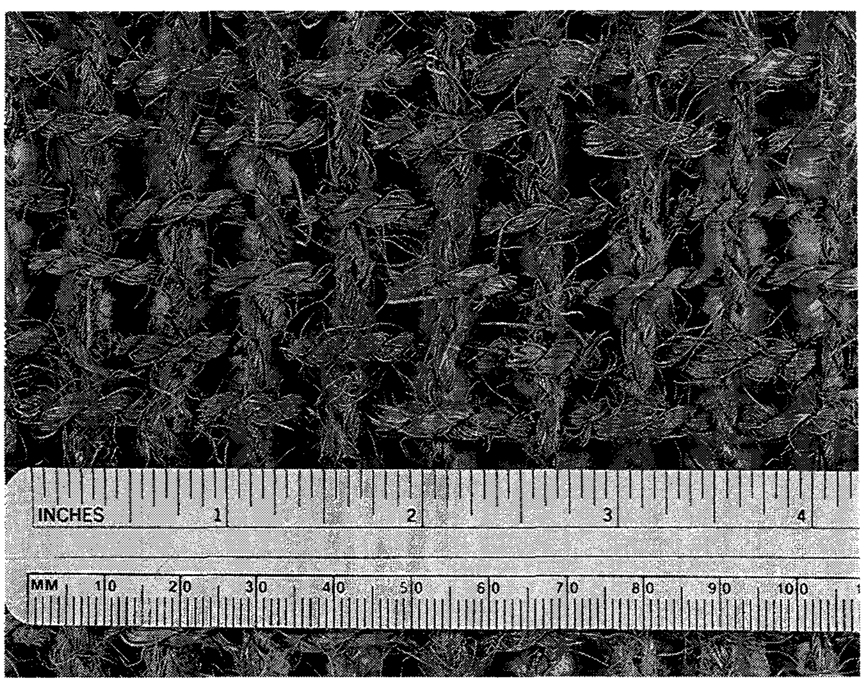

Figure 9. Belton DEKOWE® 700

Hydraulic Mulch Material Descriptions

The following hydraulic mulch materials were evaluated during the 1992 cycle as requested by the manufacturer. The general material specifications are shown for each material according to the manufacturer's published literature and are presented on the following pages.

American Fiber Mulch®

American Fiber Mulch® is made by American Fiber Manufacturing, Inc. based in Austin, Texas. The product is produced from recycled paper. There is no published literature available for this product for further product information.

Second Nature® Regenerated Wood Fiber

Second Nature® Regenerated Wood Fiber mulch is made by Central Fiber Corporation based in Wellsville, Kansas. The product is a recycled, natural fiber material used as a hydroseeding mulch. It can be used in all hydroseeding machines. The following criteria is met or exceeded by Second Nature® Regenerated Wood Fiber mulch:

Table E. Second Nature® Regenerated Wood Fiber Product Specifications

Second Nature® Regenerated Wood Fiber	
MATERIAL SPECIFICATIONS	
Applied color	Intense Green
Organic Matter	99%
Moisture Content	12% +/- 3%
Water Holding Capacity	1500 grams of per 100 g of fiber
pH Range	6.5 +/- 1
Net Weight	22.7 kg (50 lbs)

Source: *Central Fiber Corporation Product Installation Guidelines*, 1992 (3). Metric conversions are shown to comply with metrication reporting procedures.

Conwed® Fibers Hydro Mulch®

Conwed® Fibers Hydro Mulch® is made by Conwed® Fibers based in Riverside, New Jersey. The product is a reprocessed wood fiber material produced from pure uncontaminated raw lumber chips. The chips are processed in such a manner as to contain no lead paint, varnish, printing ink, petroleum-based compounds, or seed germination inhibitors. Fibers are not produced from unknown-origin recycled material such as sawdust, paper, cardboard, or residue from chlorine-bleached pulp and paper mills. The wood fiber mulch is dyed green to aid visual metering during application. The dye specifications state that it is biodegradable, does not inhibit plant growth, and remains green for 30 days.

Table F. Conwed® Fibers Hydro Mulch® Product Specifications

Conwed® Fibers Hydro Mulch®	
MATERIAL SPECIFICATIONS	
Applied Color	Green
Organic Matter	99.2% +/- 0.8% O.D. Basis
Moisture Content	(maximum) 10% +/- 3%
Water Holding Capacity	(minimum) 1000 grams of h20 per 100 g of fiber
Ash content	0.8% +/- 0.2 % O.D. Basis

Source: *Conwed® Fibers Hydro Mulch® Product Installation Guidelines,* 1992 (4). Metric conversions are shown to comply with metrication reporting procedures.

PROCEDURES

SOIL PREPARATION

All treatment plots were cleared of vegetation, repaired, and brought back to a uniform grade. The soil was graded with a chain link drag and left in a loose condition. Fine grading was accomplished by hand-raking the surface.

SEEDING

The seeding mixtures used were those from the specification enacted in the *TxDOT Standard Specifications for Construction of Highways, Streets and Bridges,* 1993, Item 164: Seeding for Erosion Control (Appendix B) (10). The seeding mixtures used were for District 17-Bryan as recommended by TxDOT, Construction and Maintenance Division. Fertilizer was applied integrally with the seed mixtures at the rate of 102.15 kg per 0.405 ha (225 lb/ac). For the erosion-control blanket study, the seed and fertilizer mixture was applied with a hydroseeder prior to installing the products. For the hydraulic mulch study, the seed and fertilizer mixture was applied according to a one-step or two-step process.

MATERIAL INSTALLATION

Installation of the selected erosion-control blankets was done according to the manufacturer's *published* technical specifications and recommendations. Accomplished work was under the supervision of the Hydraulics and Erosion Control Laboratory manager. Each manufacturer had a technical representative present for the installation of their product. The researchers gained the manufacturers' approval that all published recommendations and installation requirements were completed before initiating formal evaluation procedures. The following pages describe the product installations replicated on the sand and clay soils.

Erosion-Control Blanket Installation Descriptions

AIRTROL® Plaster - 2:1 Sand Slope

The AIRTROL® Plaster was installed according to the manufacturer's published literature on June 11, 1992. The fertilizer and seed were applied before the application of the American Fiber Mulch® and AIRTROL® Plaster mixture. The AIRTROL® Plaster and mulch were mixed and uniformly applied within 30 minutes of spraying the seed and fertilizer mixture. The AIRTROL® Plaster and mulch mixture was applied a minimum of 0.46 m (18 in) beyond the crest of the slope. The application rate for the AIRTROL® Plaster and mulch mixture included:

American Fiber Mulch® - 998.8 kg per 0.405 ha (2200 lb/ac)
AIRTROL® Plaster - 3.97 mg per 0.405 ha (8750 lb/ac)

Figure 10 graphically depicts the installation of the AIRTROL® Plaster on the 2:1 slope.

AIRTROL® Plaster - 2:1 Clay Slope

The AIRTROL® Plaster was installed according to the manufacturer's published literature on June 10, 1992. The fertilizer and seed were applied prior to the application of the American Fiber Mulch® and AIRTROL® Plaster mixture. The AIRTROL® Plaster and mulch were mixed together and uniformly applied within 30 minutes of spraying the seed and fertilizer mixture. The AIRTROL® Plaster and mulch mixture was applied a minimum of 0.46 m (18 in) beyond the crest of the slope. The application rate for the AIRTROL® Plaster and mulch mixture included:

American Fiber Mulch®- - 998.8 kg per 0.405 ha (2200 lb/ac)
AIRTROL® Plaster - 3.97 mg per 0.405 ha (8750 lb/ac)

Figure 10 graphically depicts the installation of the AIRTROL® Plaster on the 2:1 slope.

AIRTROL®Plaster - 3:1 Sand Slope

The AIRTROL® Plaster was installed according to the manufacturer's published literature on June 5, 1992. The fertilizer and seed were applied prior to the application of the American Fiber Mulch® and AIRTROL® Plaster mixture. The AIRTROL® Plaster and mulch were mixed together and uniformly applied within 30 minutes of spraying the seed and fertilizer mixture. The AIRTROL® Plaster and mulch mixture was applied a minimum of 0.46 m (18 in) beyond the crest of the slope. The application rate for the AIRTROL® Plaster and mulch mixture included:

American Fiber Mulch® - 851.3 kg per 0.405 ha (1875 lb/ac)
AIRTROL® Plaster - 3.71 mg per 0.405 ha (8175 lb/ac)

Figure10 graphically depicts the installation of the AIRTROL® Plaster on the 3:1 slope.

AIRTROL® Plaster - 3:1 Clay Slope

The AIRTROL® Plaster was installed according to the manufacturer's published literature on June 4, 1992. The fertilizer and seed were applied prior to the application of the American Fiber Mulch® and AIRTROL® Plaster mixture. The AIRTROL® Plaster and mulch were mixed together and uniformly applied within 30 minutes of spraying the seed and fertilizer mixture. The AIRTROL® Plaster and mulch mixture was applied a minimum of 0.46 m (18 in) beyond the crest of the slope. The application rate for the AIRTROL® Plaster and mulch mixture included:

American Fiber Mulch® - 851.3 kg per 0.405 ha (1875 lb/ac)
AIRTROL® Plaster - 3.71 mg per 0.405 ha (8175 lb/ac)

Figure10 graphically depicts the installation of the AIRTROL® Plaster on the 3:1 slope.

Figure 10. Installation of AIRTROL® Plaster on 2:1 and 3:1 Sand and Clay Slopes

American Excelsior Curlex® - 2:1 Sand Slope

The American Excelsior Curlex® blanket was installed according to the manufacturer's published literature on June 11, 1992. The material was extended 0.915 m (3 ft) beyond the top of the slope, and staples were placed every 304.8 mm (12 in) on the center. The blanket was rolled downhill in the direction of the water flow. The edges of parallel blankets were butted together and stapled with a common row of staples. The ends of blankets were butted snugly together and stapled with a common row of staples. The staple pattern was a 1.83 m x 0.915 m (6 ft x 3 ft) pattern, and the staple size was 203.2 mm x 50.8 mm x 203.2 mm (8 in x 2 in x 8 in). During the installation of the American Excelsior Curlex® material, there were no visible signs of punctures, tears, or other physical damage. Figure 11 graphically depicts the installation of the American Excelsior Curlex® blanket on the 2:1 sand slope.

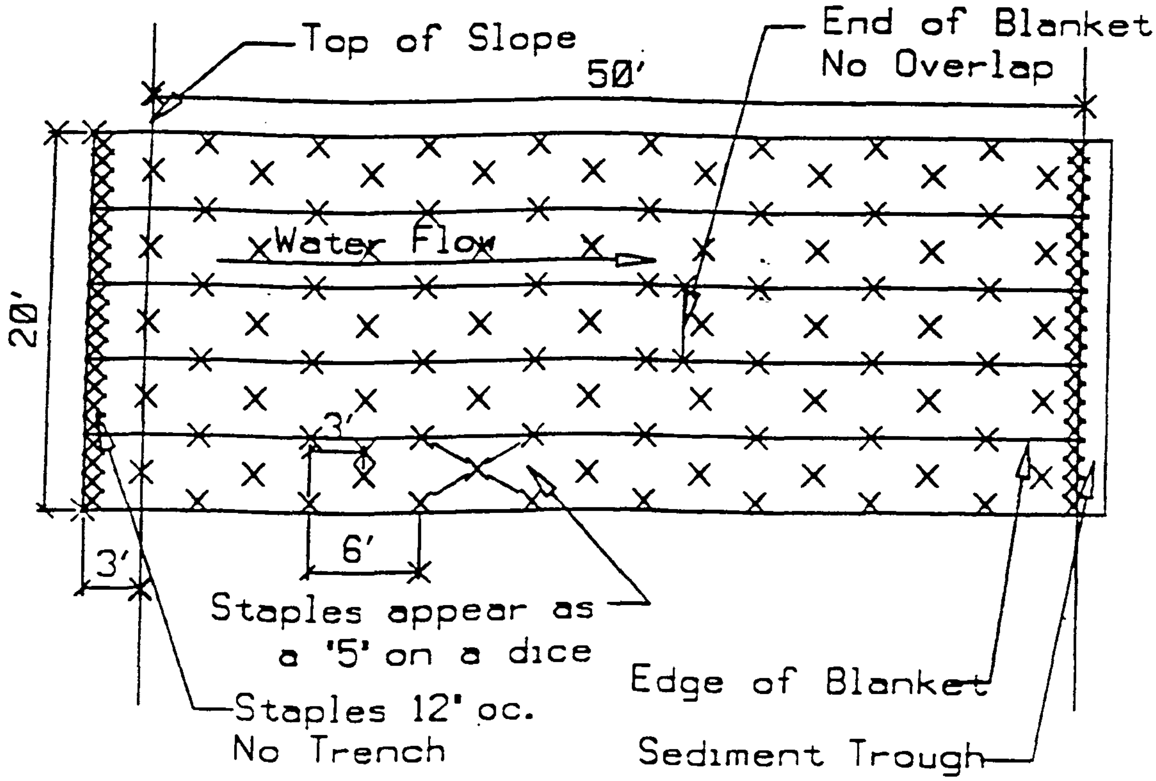

Figure 11. American Excelsior Curlex® 2:1 Sand Installation Plan

American Excelsior Curlex® - 3:1 Sand Slope

The American Excelsior Curlex® blanket was installed according to the manufacturer's published literature on May 13, 1992. The material was extended 0.915 m (3 ft) beyond the top of the slope, and staples were placed every 304.8 mm (12 in) on the center. The blanket was rolled downhill in the direction of the water flow. The edges of parallel blankets were butted together and stapled with a common row of staples. The ends of blankets were butted snugly together and stapled with a common row of staples. The staple pattern was a 1.83 m x 0.915 m (6 ft x 3 ft) pattern, and the staple size was 203.2 mm x 50.8 mm x 203.2 mm (8 in x 2 in x 8 in). During the installation of the American Excelsior Curlex® material, no visible signs of punctures, tears, or other physical damage existed. Figure 12 graphically depicts the installation of the American Excelsior Curlex® blanket on the 3:1 sand slope.

American Excelsior Curlex® - 3:1 Clay Slope

The American Excelsior Curlex® blanket was installed according to the manufacturer's published literature on May 13, 1992. The material was extended 0.915 m (3 ft) beyond the top of the slope, and staples were placed every 304.8 mm (12 in) on the center. The blanket was rolled downhill in the direction of the water flow. The edges of parallel blankets were butted together and stapled with a common row of staples. The ends of blankets were butted snugly together and stapled with a common row of staples. The staple pattern was a 1.83 m x 0.915 m (6 ft x 3 ft) pattern, and the staple size was 152.4 mm x 25.4 mm x 152.4 mm (6 in x 1 in x 6 in). During the installation of the American Excelsior Curlex® material, there were no visible signs of punctures, tears, or other physical damage. Figure 12 graphically depicts the installation of the American Excelsior Curlex® blanket on the 3:1 clay slope.

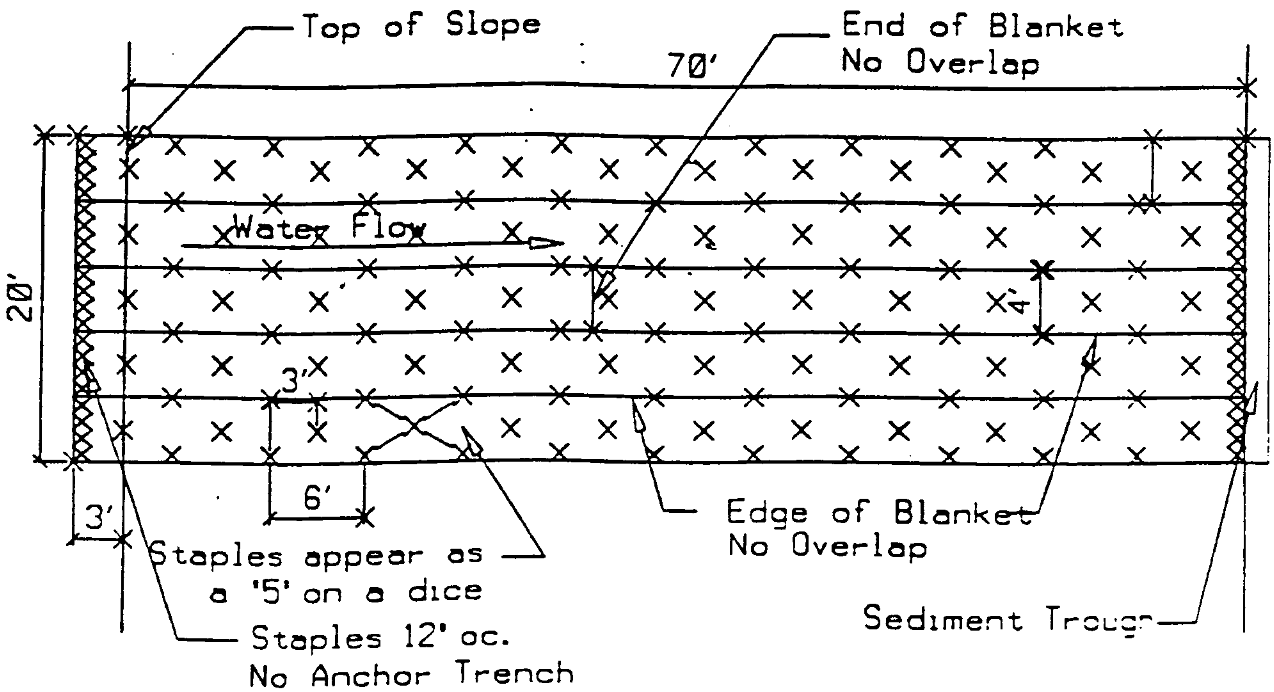

Figure 12. American Excelsior Curlex® 3:1 Sand and Clay Installation Plan

Belton DEKOWE® 700 - 2:1 Sand Slope
The Belton DEKOWE® 700 blanket was installed according to the manufacturer's published literature on June 11, 1992. The material was buried in an anchor trench that was 254 mm (10 in) deep at the crest of the slope, and the bottom of the slope had staples placed every 304.8 mm (12 in) on the center. The blanket was rolled downhill in the direction of the water flow. The edges of parallel blankets were overlapped a minimum of 127 mm (5 in) and stapled with a common row of staples placed 304.8 mm (12 in) on the center. The ends of the blankets, when one roll stopped and another began, were overlapped a minimum of 0.51 m (20 in). The staple pattern was a 0.915 m x 0.915 m (3 ft x 3 ft) pattern, and the staple size was 254 mm x 50.8 mm x 254 mm (10 in x 2 in x 10 in). During the installation of the Belton DEKOWE® 700 material, there were no visible signs of punctures, tears, or other physical damage. Figure 13 graphically depicts the installation of the Belton DEKOWE® 700 blanket on the 2:1 sand slope.

Belton DEKOWE® 700 - 2:1 Clay Slope
The Belton DEKOWE® 700 blanket was installed according to the manufacturer's published literature on May 29, 1992. The material was buried in an anchor trench that was 254 mm (10 in) deep at the crest of the slope, and the bottom of the slope had staples placed every 304.8 mm (12 in) on the center. The blanket was rolled downhill in the direction of the water flow. The edges of parallel blankets were overlapped a minimum of 127 mm (5 in) and stapled with a common row of staples placed 304.8 mm (12 in) on the center. The ends of the blankets, when one roll stopped and another began, were overlapped a minimum of 0.51 m (20 in). The staple pattern was a 0.915 m x 0.915 m (3 ft x 3 ft) pattern, and the staple size was 254 mm x 50.8 mm x 254 mm (10 in x 2 in x 10 in). During the installation of the Belton DEKOWE® 700 material, there were no visible signs of punctures, tears, or other physical damage. Figure 13 graphically depicts the installation of the Belton DEKOWE® 700 blanket on the 2:1 clay slope.

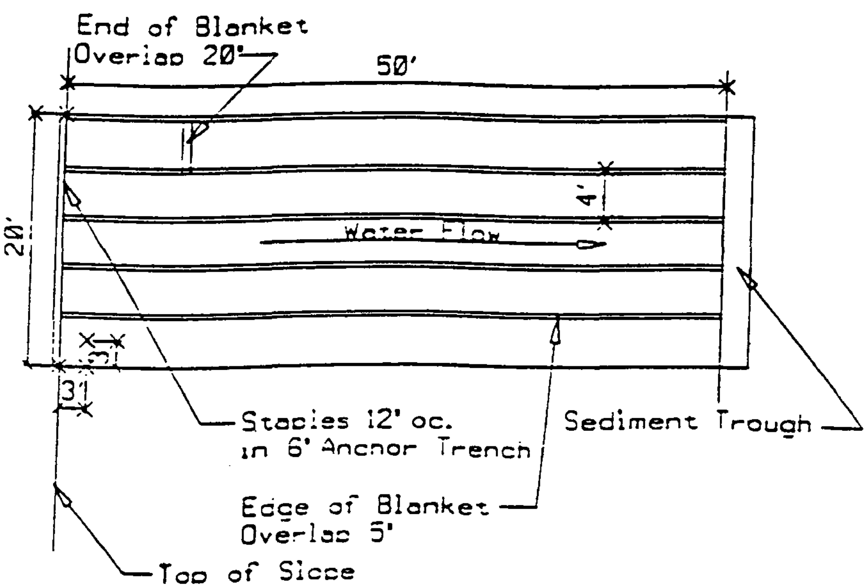

Figure 13. Belton DEKOWE® 700 2:1 Sand and Clay Installation Plan

Hydraulic Mulch Installation Descriptions

The hydraulic mulches installed were replicated for two different application methods. The mulch product was integrally mixed and applied with the seed mixture as a one-step process or was applied after the seed and fertilizer mixture was in place as a two-step process. The two-step process is the standard application procedure used by TxDOT. However, depending upon sufficient performance data generated over time, this extra step may not remain a standard procedure. The plot size for the mulch evaluations was 3.05 m x 21.35 m (10 ft x 70 ft) to fit the replication of application processes on two different soil types. To compensate for transition areas at the edges and crest of the slope, an additional 8.56 m^2 (92 ft^2) was calculated in the mixture proportions. The following application rates were used for the mulch study plots:

3:1 Sand Plots - 1.04 mg per 0.405 ha (2300 lb/ac) = 19.07 kg (42 lb) of mulch
3:1 Clay Plots - 1.36 mg per 0.405 ha (3000 lb/ac) = 24.97 kg (55 lb) of mulch

Table G. Installation Dates for Hydraulic Mulch Products

Mulch Material	Installation Date	Plot
American Fiber Mulch®	4 June 1992	Clay
American Fiber Mulch®	5 June 1992	Sand
Conwed® Fiber Hydro Mulch®	9 June 1992	Clay
Conwed® Fiber Hydro Mulch®	9 June 1992	Sand
Second Nature® Regenerated Wood Fiber	3 June 1992	Clay
Second Nature® Regenerated Wood Fiber	3 June 1992	Sand

DATA COLLECTION

The following procedures were followed in collecting and recording data.

WEATHER DATA

Weather data was collected and recorded daily. The data was collected on-site from the weather station or from Easterwood Airport located 10.5 km (6.5 ml) southeast of the laboratory site.

SEDIMENT DATA

After each simulated rainfall event (Tables H and I), the sediment and water were suctioned with a wet-dry vacuum into buckets, labeled, covered, and temporarily stored. The sediment was allowed to settle for at least 24 hours before the top layer of water was siphoned off and discarded. Soil samples of uniform size were collected from each bucket, capped, labeled, and stored. The remaining soil in the buckets was weighed, recorded, and discarded then. The soil samples were used to find the moisture-to-sediment ratio for the total dry weight calculations.

Each soil sample went through a drying process to find out the moisture-to-sediment ratio. Each sample's weight was recorded and then emptied onto a microwave cooking dish. Any material left in the sample bottle was rinsed with water and added to the cooking dish. The soil was dried in a microwave oven for several minutes and weighed. This process continued until three consecutive weights became constant. Dry weights were recorded and averaged with the other replication samples to find an average wet/dry ratio. This ratio was divided into the total weight of sediment to calculate the total dry weight of the collected sediment from each plot. The dry sample weights were then divided by the number 10 m^2 (107.64 ft^2) for each plot to determine the total sediment loss per 10 m^2 (107.64 ft^2). Figure 14 shows an example of the soil weighing process.

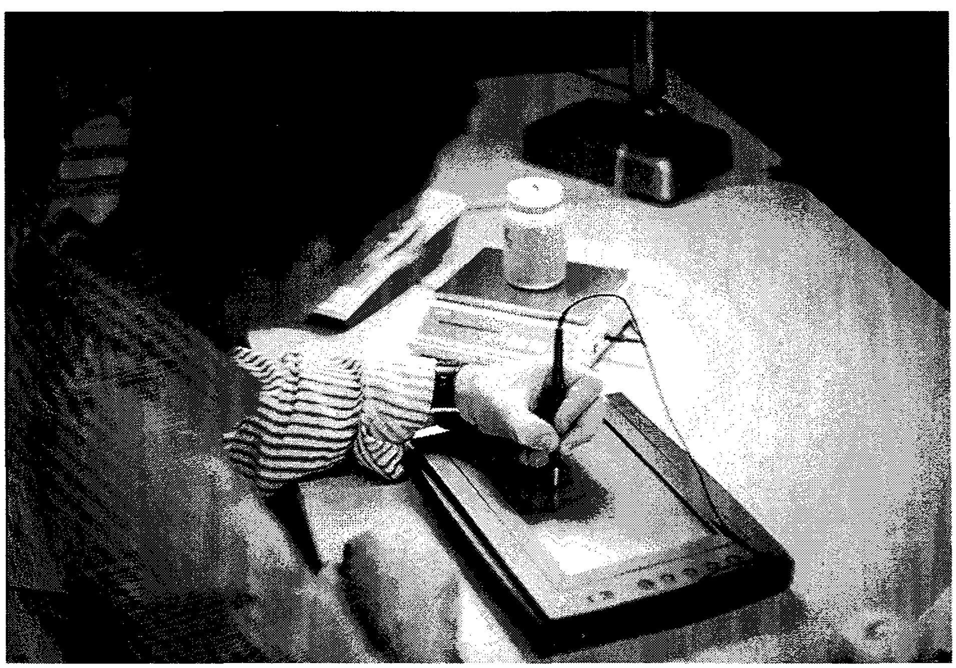

Figure 14. Shows Example of Soil-Weighing Process

Table H. 1992 Cycle Rainfall Simulations, 2:1 Slope.

Product Brand Name	Install	1-Year #1	1-Year #2	2-Year #1	2-Year #2	2-Year #3	5-Year #1	5-Year #2
2:1 SAND STUDY PLOTS								
CONTROL	05/28/92	07/13/92	07/20/92	08/14/92	08/25/92	09/03/92	09/18/92	11/14/92
Belton DEKOWE® 700	05/29/92	07/13/92	07/23/92	08/14/92	08/25/92	09/03/92	09/18/92	11/16/92
AIRTROL® Plaster	06/10/92	07/13/92	07/23/92	08/17/92	08/25/92	09/03/92	09/18/92	11/16/94
2:1 CLAY STUDY PLOTS								
American Excelsior Curlex®	06/11/92	07/14/92	08/05/92	08/17/92	08/26/92	09/07/92	09/24/92	11/15/92
Belton DEKOWE® 700	06/11/92	07/14/92	08/05/92	08/18/92	08/25/92	09/07/92	09/24/92	12/01/92
AIRTROL® Plaster	06/11/92	07/14/92	08/06/92	08/18/92	08/26/92	09/08/92	09/24/92	11/17/92
CONTROL	06/11/92	07/14/92	08/05/92	08/18/92	08/26/92	09/09/92	09/23/92	12/01/92

Table I. 1992 Cycle Rainfall Simulations, 3:1 Slope.

Product Brand Name	Install	1-Year #1	1-Year #2	2-Year #1	2-Year #2	2-Year #3	5-Year #1	5-Year #2
3:1 SAND STUDY PLOTS								
Fabric CONTROL	05/28/92	07/10/92	07/16/92	08/13/92	08/24/92	09/02/92	09/17/92	11/14/92
American Excelsior Curlex®	05/13/92	07/09/92	07/16/92	08/10/92	08/21/92	09/02/92	09/17/92	11/15/92
AIRTROL® Plaster	06/04/92	07/09/92	07/16/92	08/11/92	08/21/92	08/31/92	09/16/92	11/19/92
3:1 CLAY STUDY PLOTS								
Fabric CONTROL	05/28/92	07/15/92	08/06/92	08/20/92	08/28/92	09/11/92	11/03/92	11/23/92
American Excelsior Curlex®	05/13/92	06/17/92	07/15/92	08/20/92	08/28/92	08/31/92	09/16/92	11/06/92
AIRTROL® Plaster	06/05/92	06/17/92	07/15/92	08/20/92	08/28/92	08/31/92	09/15/92	11/06/92

The following criteria were followed for the rainfall simulation process: (1) Rainfall simulations did not occur within 24 hours of a natural rainfall or during any natural precipitation. (2) Simulations were not done when the wind conditions were such that most of the water was blown onto the adjacent plots. If the wind was calm, the plots adjacent to the treatment plot were covered with a plastic film immediately before the rain simulation was started. (3) Once the material was "rained" upon, the plastic film was removed, and the sediment and water were collected in the trough(s).

VEGETATIVE DENSITY DATA

The research team began collecting vegetative density data four weeks after installation and continued at approximately six-week intervals until the end of the growing season (November 15). In order to determine the apparent vegetative density of each plot, the research team modified an existing software package. This computer-based method was used to calculate the vegetation coverage versus other sampling methods. ***VeCAP,*** or Vegetation Coverage Analysis Program became the program's vegetation analysis method after several modifications. The following process was done for each round of vegetation data collection.

Each plot was subdivided on a graph into a grid of 0.50 m^2 (5.38 ft^2) sections. Next, a random sampling pattern was established using a table of random numbers. Observations from 20 random sections were recorded on the 3:1 slope plots and 16 random sections on the 2:1 slope plots. All observations were recorded using a Hi-8mm video camera positioned perpendicular to the slope face. The video analog images were converted to digital images using a Targa 16 board and TIPS software. Single sample images were imported and analyzed with the **VeCAP** program to calculate the percent of vegetation coverage.

Prior to analyzing each data set, the program required a training session to establish the portion of the image that was vegetation. The percentage of apparent coverage for each image was averaged to arrive at the total percent coverage for the study plot. Tables J and K show the videotaping schedule for the 1992 cycle.

Table J. 1992 Cycle Videotaping Schedule for Erosion-Control Blankets

ROUND	DATE	LENGTH OF VIDEOTAPING ROUND	INTERVAL BETWEEN VIDEOTAPING
1	6/11/92-7/9/92	29 Days (4.1 Weeks)	Start
2	7/23/92-8/21/92	32 Days (4.5 Weeks)	6 Weeks Average
3	9/18/92-10/2/92	15 Days (2.1 Weeks)	6 Weeks Average
4	10/28/92-11/13/92	15 Days (2.1 Weeks)	6 Weeks Average

1 Erosion-control blanket control plot was videotaped on July 23

2 Erosion-control blanket control plot was videotaped on September 2

3 Erosion-control blanket control plot was videotaped on October 15

4 Erosion-control blanket control plot was videotaped on November 25

Table K. 1992 Cycle Videotaping Schedule for Hydraulic Mulches

ROUND	DATE	LENGTH OF VIDEOTAPING ROUND	INTERVAL BETWEEN VIDEOTAPING
1	7/1/94-7/8/94	8 Days (1.1 Weeks)	Start
2	8/13/94-8/21/94	8 Days (1.1 Weeks)	6 Weeks Average
3	9/23/92-10/2/92	10 Days (1.4 Weeks)	6 Weeks Average
4	11/5/94-11/13/94	8 Days (1.1 Weeks)	6 Weeks Average

1 Mulch control plot was videotaped on July 23

2 Mulch control plot was videotaped on September 2

3 Mulch control plot was videotaped on October 15

4 Mulch control plot was videotaped on November 25

MATERIAL PERFORMANCE DATA

Throughout the growing season, the study plots were visually inspected for any damage or undermining of the material. Failures were recorded on a plot diagram and photographed. No repairs were made to the materials.

LABORATORY INDEX TESTS

TxDOT conducted laboratory index tests at Division 9, Materials and Tests, Austin, Texas, that described and documented basic material properties of the erosion-control blankets. The Industry Advisory Council, TxDOT, and the TTI research team selected these tests. Table L shows the index tests for organic erosion-control blanket materials.

Table L. TxDOT Laboratory Index Tests

MATERIAL PROPERTY		TEST METHOD
ORGANIC MATS		
Weight		ASTM D 3776 (Total roll only)
Netting:	Composition	ASTM E 1252
	Aperture Size	Direct measure
	Placement	Visual
	Weight	ASTM D 3776
	Color	Tex-839-B
	Number of Nets	Visual
	Net/Matrix Binding Method	Visual/Direct measure

EVALUATION CRITERIA

The following evaluation criteria were established before the 1991 cycle to provide the framework for the data analysis. The Statistical Analysis System (SAS) was used to process the test data, and significant means were separated by Duncan's Multiple Range test ($P<0.05$). Evaluation criteria included erosion control and apparent vegetative density. Material performance was documented, but no data was included in the statistical analysis.

The researcher's evaluation criteria are presented first. The erosion-control blankets and hydraulic mulches analysis levels are presented second followed by the analysis results that are the basis for TxDOT's approved materials list. The remaining analysis results are shown in Appendices F and G.

EROSION-CONTROL BLANKET CRITERIA

Erosion Control Criteria

Acceptable erosion-control blankets should sustain little damage from normally anticipated rainfall events during the vegetation establishment phase of a project. The blankets should effectively protect the seed bed from a short duration storm, 2-year return frequency (50% probability of occurrence within a given year), within two weeks of installation.

Acceptable erosion-control blankets with emerging vegetation can resist erosive forces from a 5-year return frequency storm (20% probability of occurrence within a given year), within six weeks of installation.

Acceptable erosion-control blankets should significantly reduce the soil loss from the protected area as compared to an unprotected area (dry weight) of the same soil.

Vegetation Establishment Criteria

Acceptable erosion-control blankets should promote vegetative growth by sufficiently protecting the seed bed. The least acceptable coverage should be established by statistical comparison of similar erosion-control materials and in an unprotected area of the same soil.

Acceptable erosion-control blankets should have sufficient vegetative cover to aid in long-term soil protection within one growing season.

Material Performance Criteria

Acceptable erosion-control blankets installed according to the manufacturer's published recommendations should not develop major ripples, sags, tears, or become undermined before the vegetation becomes established.

HYDRAULIC MULCH CRITERIA

Vegetation Establishment Criteria

Acceptable hydraulically applied mulch products should promote vegetative growth of seeded grasses by protecting the surface from the erosive forces of rain splash and by acting as a moisture barrier from the drying forces of sunlight and wind. Mulches should promote vegetative growth significantly greater than when compared to an unprotected treatment plot (control plot) within the first growing season.

ANALYSIS LEVELS AND RESULTS

ANALYSIS LEVEL DESCRIPTION FOR EROSION-CONTROL BLANKETS

There were eight logical analysis levels identified by the research team that provided answers to how a particular product performed. Generally, this analysis approach starts "broad-brush" and then isolates different variables in an increasingly specific manner.

Level 1

Analyzed the product's *overall performance*, without separating performance with respect to steepness of slope, type of soil, or design storm level. (This level used the final vegetative density measurements only.)

Level 2

Analyzed the product's performance with respect to *steepness of slope only*, without separating performance into clay or sand soils, or design storm level. (This level used the final vegetative density measurements only.)

Level 3

Analyzed the product's performance with respect to *soil conditions only*, without separating performance into 2:1 or 3:1 slopes or design storm level. (This level used the final vegetative density measurements only.)

Level 4

Analyzed the average sediment loss for each product within *each of the three simulated design storms.* The vegetative density achieved by each product at each round of measurement was determined.

Level 5

Analyzed the product's performance with respect to *both steepness of slope and soil condition*. This level averaged the sediment loss determined within each of the three simulated design storms and final vegetative density measurements.

Level 6

Analyzed the average sediment loss for each product within *each of the simulated design storms and by the 2:1 and 3:1 slopes.* The data collected from the vegetative densities achieved by each product at each measurement stage within the 2:1 and 3:1 slopes were used for this analysis level.

Level 7

Analyzed the average sediment loss for each product within *each of the simulated design storms and by the clay and sand soils.* The data collected from the vegetative densities achieved by each product at each measurement stage within the clay and sand soils were used for this analysis level.

Level 8

Analyzed the sediment loss by each product within *each of the simulated design storms, within the clay and sand soils,and within the 2:1 and 3:1 slopes.* The data collected from the vegetative densities produced by each product at each measurement stage within the clay and sand soils and within the 2:1 and 3:1 slopes was used for this analysis level.

ANALYSIS LEVEL DESCRIPTION FOR HYDRAULIC MULCHES

The research team indentified four logical analysis levels that provided answers to how a particular product performed. Generally, this analysis approach starts "broad-brush" and then isolates different variables in an increasingly specific manner.

Level 1

Analyzed the product's *overall performance* without separating performance with respect to type of soil or application method.

Level 2

Analyzed the product's performance with respect to *soil type only*, without separating performance by application method.

Level 3

Analyzed the product's performance with respect to *application methods only*, without separating performance by soil type.

Level 4

Analyzed the product's performance with respect to *soil type and application method.*

MINIMUM PERFORMANCE STANDARDS FOR BLANKETS AND MULCHES

Level-5 results are the basis for TxDOT's Approved Materials List for erosion-control blankets (soil retention blankets) which was and will be updated with the annual data generated from the research program. For the 1992 cycle, Level-1 results provided the basis for TxDOT's Approved Materials List for hydraulic mulches. All erosion-control blankets (soil retention blankets) and hydraulic mulches used within TxDOT's maintenance or construction activities must meet the minimum performance standards. TxDOT has reserved the right to refine the minimum acceptable performance standards based upon additional data collected through the research program. Tables M and N show the minimum performance standards for erosion-control blankets. Table O shows the minimum performance standards for hydraulic mulches.

Table M. Minimum Acceptable Vegetation Density for Erosion-Control Blankets

	Clay Soils	Sandy Soils
3:1 or Flatter	80%	70%
Steeper than 3:1	80%	70%

Table N. Maximum Acceptable Sediment Loss for Erosion-Control Blankets

	Clay Soils	Sandy Soils
3:1 or Flatter	0.34 kg/10 m^2 (.75 lbs/107.64 sq ft)	12.21 kg/10 m^2 (26.91 lbs/107.64 sq ft)
Steeper than 3:1	0.34 kg/10 m^2 (.75 lbs/107.64 sq ft)	26.85 kg/10 m^2 (59.20 lbs/107.64 sq ft)

Table O. Minimum Acceptable Vegetation Density for Hydraulic Mulches

	Combined Soil Type
3:1 or Flatter	50%

Note: TxDOT has reserved the right not to recommend hydraulic mulches for steep sandy slopes based upon the poor performance results achieved through the research program.

RESULTS AND DISCUSSION

1992 EROSION-CONTROL BLANKET RESULTS

Vegetation Density

The material performance, Level 5, of each product is shown in Table P and Figures 15 through 20. In the vegetation study, Belton DEKOWE® 700 supported less vegetation than the AIRTROL® Plaster or control treatments on 2:1 slope and clay soil, although not significantly less. All of the treatments of the 2:1 slope and sand soil performed within the same statistical ranking that was ***below*** the minimum performance requirements set by TxDOT. Interestingly, the vegetation density performance on 2:1 the slope and sand soil of American Excelsior Curlex® in 1991 and 1992 was within the same statistical ranking in comparison of the total two-year results, 52.674% (b) and 47.335% (b) respectively. Table T shows that American Excelsior Curlex® and AIRTROL® Plaster supported more vegetation than the control treatments on 3:1 slope and clay soil. American Excelsior Curlex® supported significantly less vegetation than the control treatment on 3:1 slope and sand soil. Both treatments performed significantly less than the AIRTROL® Plaster on 3:1 slope and sand soil. However, the AIRTROL® Plaster (68.749%) performance did not meet the minimum requirements for vegetation density.

Table P. Performance Assessment of Erosion-Control Blankets on Vegetative Density for the 1992 Cycle

Treatment	Vegetative Density	Vegetative Density
2:1 Slope	Clay Soil Mean/Grouping	Sand Loam Soil Mean/Grouping
Belton DEKOWE® 700	73.713 a	not available
AIRTROL® Plaster	86.094 a	41.882 a
American Excelsior Curlex® (92)	not available	47.335 a
CONTROL	97.081 a	35.834 a
Treatment	Vegetative Density	Vegetative Density
3:1 Slope	Clay Soil Mean/Grouping	Sand Loam Soil Mean/Grouping
AIRTROL® Plaster	86.444 a	68.749 a
American Excelsior Curlex® (92)	98.125 a	33.232 c
CONTROL	75.562 a	41.298 b

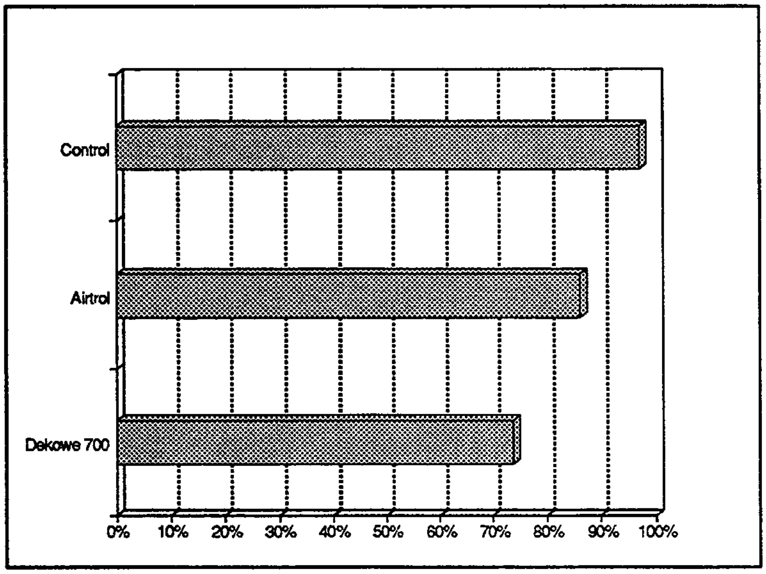

Figure 15. 2:1 Clay Vegetative Density

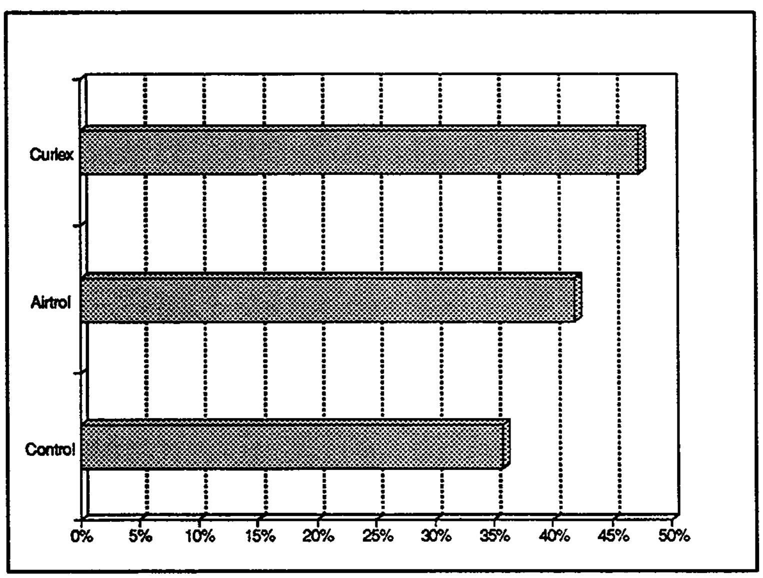

Figure 16. 2:1 Sand Vegetative Density

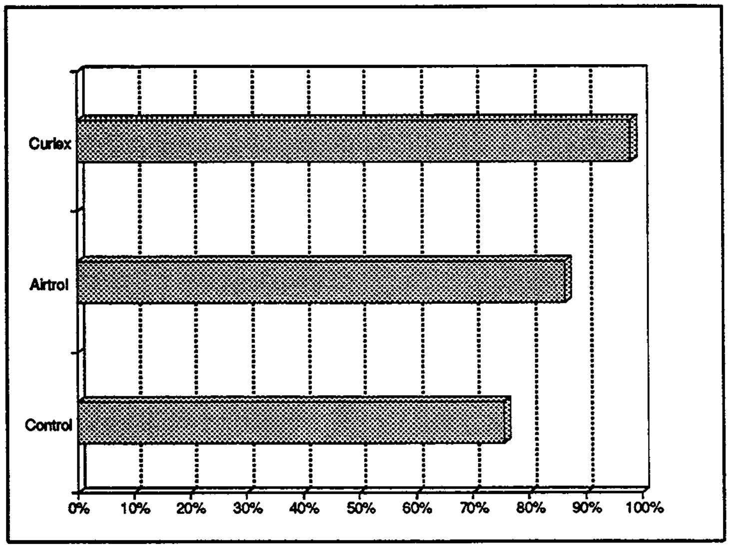

Figure 17. 3:1 Clay Vegetative Density

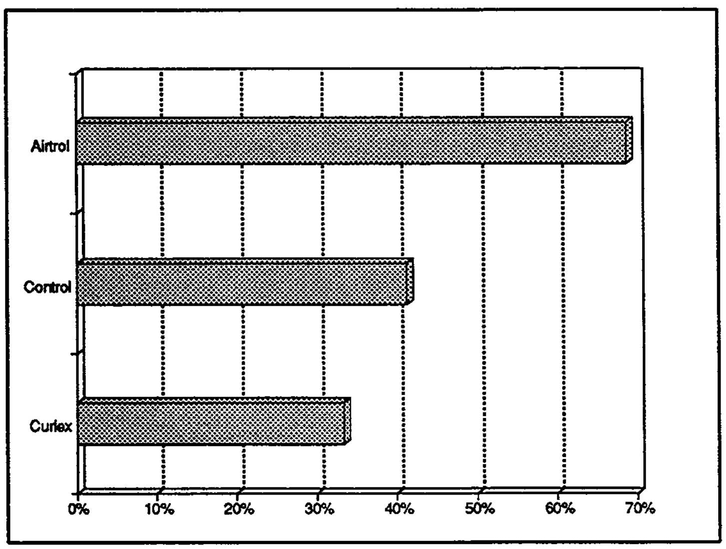

Figure 18. 3:1 Sand Vegetative Density

Data indicated that the erosion-control blankets evaluated support vegetation at a relatively similar level under clay soils. This level is generally greater than that of the control plots, although not always significantly so. An erosion-control blanket's importance in establishing vegetation on sandy loam soils was unclear. The results showed general failure with an average vegetative density of 62.256% (2:1 slope) and 71.6375% (3:1 slope). Overall apparent vegetative cover on the erosion-resistant (K=0.20) soil was more abundant than on the erodible soil (K=0.38), no matter the slope condition. This finding may exist due to the higher percentage of clay, silt, and organic content found in this cohesive soil type that could have promoted better germination and growth.

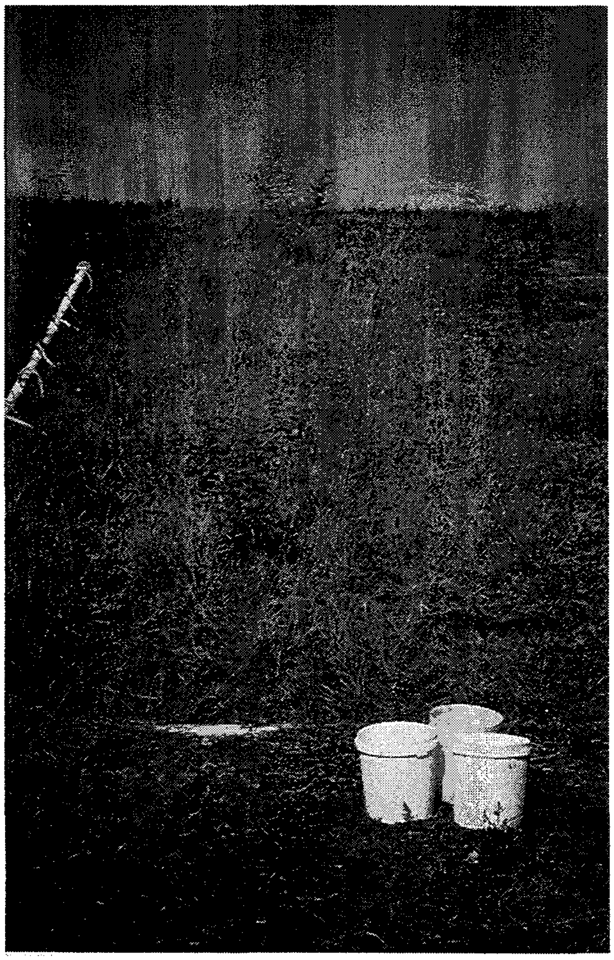

Figure 19. American Excelsior Curlex® 3:1 Clay Treatment Plot Four Months After Installation

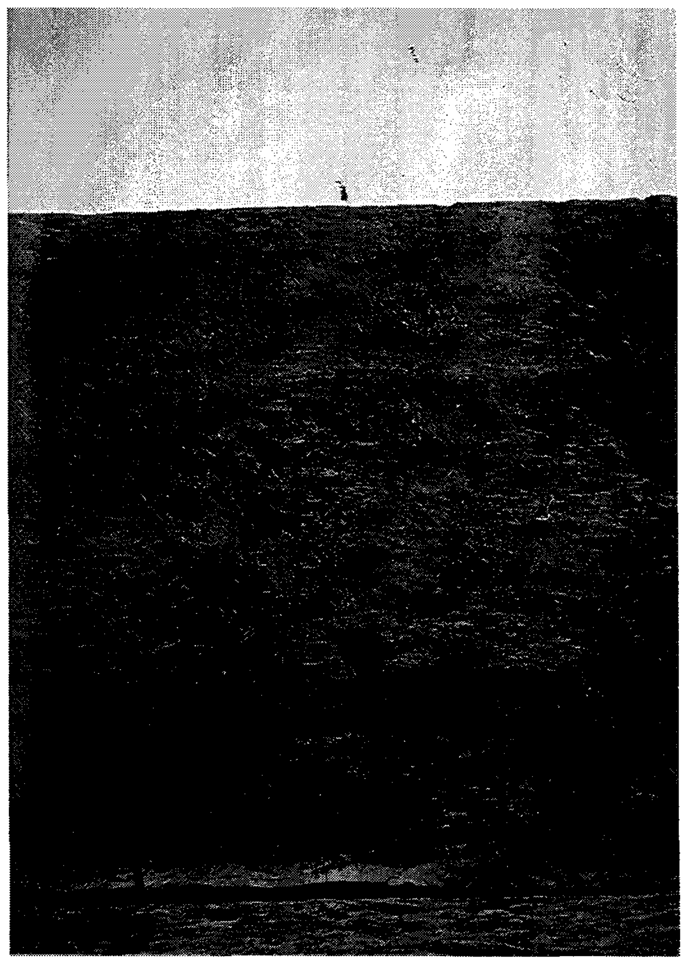

Figure 20. AIRTROL® Plaster 2:1 Sand Treatment Plot Four Months After Installation

Sediment Loss

The material performance, Level 5, of each product is shown in Table Q and Figures 21 through 26. In the sediment loss study, AIRTROL® Plaster and Belton DEKOWE® 700 performed within the same statistical ranking. This ranking was significantly better than the performance of the control treatment on 2:1 slope and clay soil. AIRTROL® Plaster and the control treatments yielded greater sediment loss than American Excelsior Curlex® on 2:1 slope and sand soil, although not significantly more. American Excelsior Curlex® and AIRTROL® Plaster performed the same and were significantly better than the control treatment on 3:1 slope and clay soil. AIRTROL® Plaster performed better than the control treatment on 3:1 slope and sand soil, but both treatments yielded significantly more sediment than American Excelsior Curlex®.

Results from the sediment loss study suggested that control plots yielded significantly greater sediment loss than all other treatments within each of the four soil and slope conditions. There were no significant differences between the effectiveness of the erosion-control blankets on sediment loss under clay soils regardless of slope. Means were spread under sandy loam soils, suggesting that an erosion-control blanket's effectiveness on sediment loss is more variable under this soil type. Results from the sediment loss test suggest that the selection of erosion-control blankets is more critical for more erodible soils, such as sandy loam soils (K=0.38), regardless of slope. As expected, sediment loss was significantly greater on the erodible soil (K=0.38) than the erosion-resistant soil (K=0.20) regardless of slope.

Table Q. Performance Assessment of Erosion-Control Blankets on Sediment Loss for the 1992 Cycle.

Treatment	Sediment Loss (kg/10 sm)	Sediment Loss (kg/10 sm)
2:1 Slope	**Clay Soil Mean/Grouping**	**Sand Loam Soil Mean/Grouping**
Belton DEKOWE® 700	-0.09 a	not available
AIRTROL® Plaster	-0.09 a	-15.93 a
American Excelsior Curlex® (91)	not available	-9.17 a
CONTROL	-0.64 b	-23.70 a
Treatment	**Sediment Loss (kg/10 sm)**	**Sediment Loss (kg/10 sm)**
3:1 Slope	**Clay Soil Mean/Grouping**	**Sand Loam Soil Mean/Grouping**
AIRTROL® Plaster	-0.09 ab	-0.69 ab
American Excelsior Curlex® (91)	-0.04 a	-1.73 a
CONTROL	-0.61 b	-13.34 b

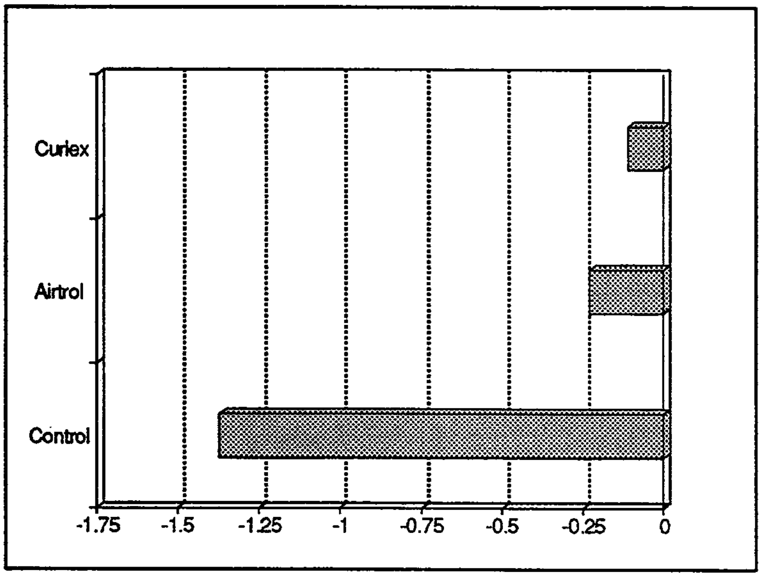

Figure 21. 2:1 Clay Sediment Loss (kg/10 sq m)

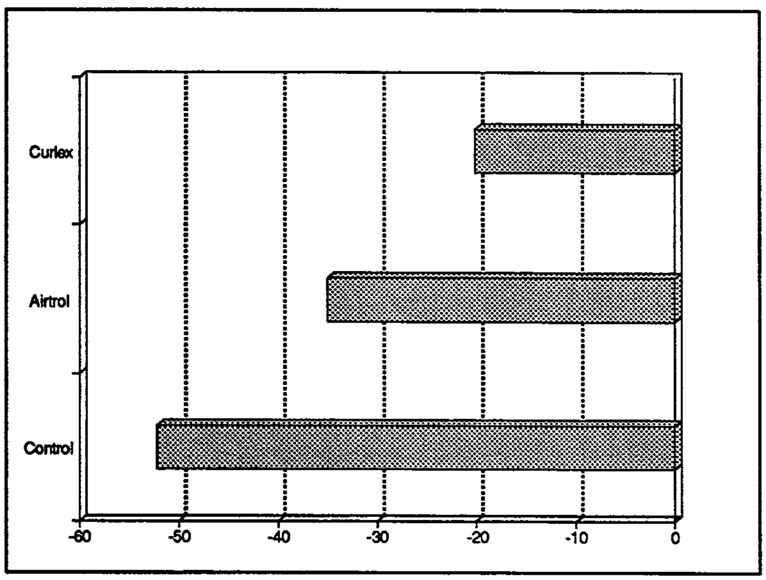

Figure 22. 2:1 Sand Sediment Loss (kg/10 sq m)

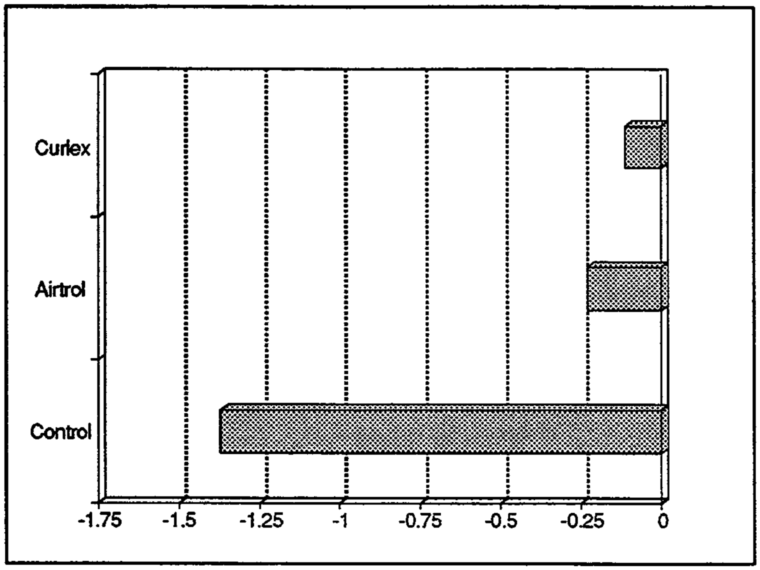

Figure 23. 3:1 Clay Sediment Loss (kg/10 sq m)

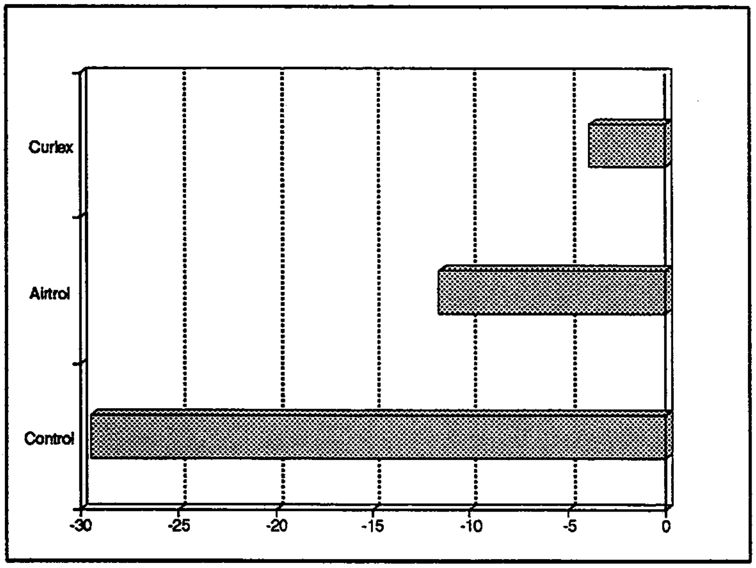

Figure 24. 3:1 Sand Sediment Loss (kg/10 sq m)

Damaged Treatment Plot

The Belton DEKOWE® 700 treatment plot suffered significant damage due to a broken water line at the crest of the 2:1 sand treatment plot. The research team decided the appropriate course of action and scheduled Belton DEKOWE® 700 for the 1993 cycle to collect performance data. Figures 25 and 26 show this damage.

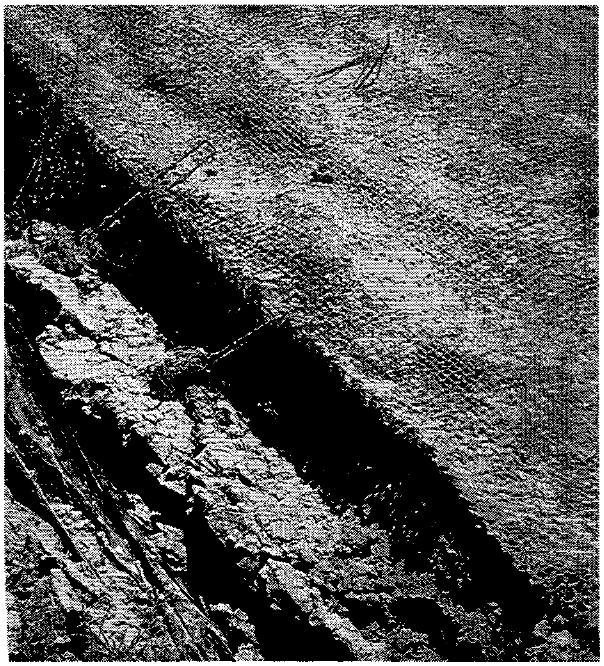

Figure 25. Washout at the Edge of the Belton Dekowe® 700 Plot

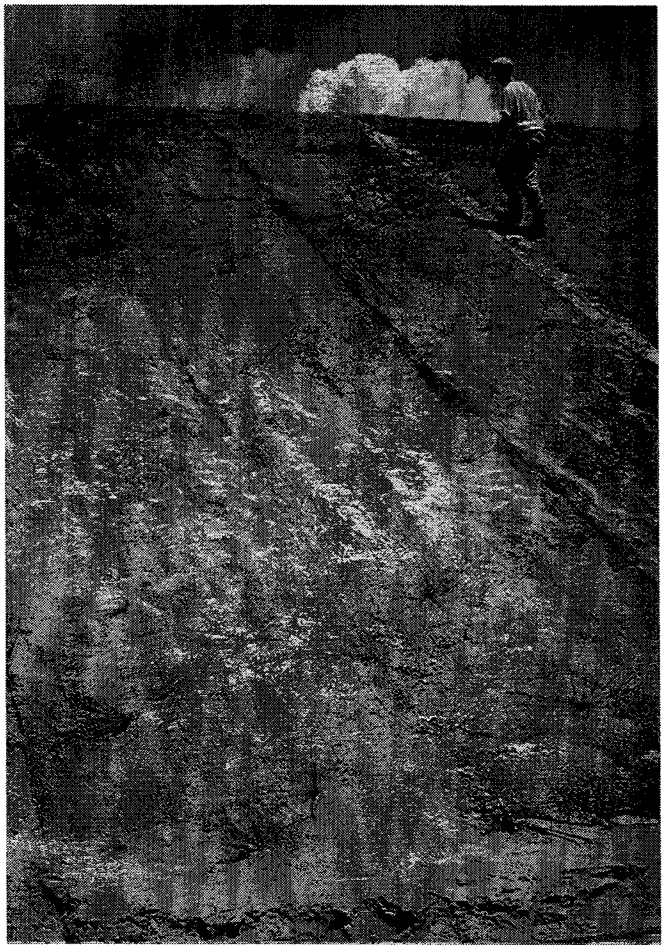

Figure 26. Damaged Belton Dekowe® 700 Plot

1992 HYDRAULIC MULCH RESULTS

The hydraulic mulch performance, Level 1, of each product is shown in Table R and Figure 27. With this analysis level, there was no significant difference in performance among the treatments or controls. This is the level used by TxDOT to support their approved materials list. However, in contrast, Level 2 provides a better indication of material performance based on soil type.

Table R. Level 1 - Overall Analysis

Product Evaluated	Test Cycle	Measurement	Slope	Soil	Veg Density	Veg Rank
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	All	59.120	1/4
CONWED® Fiber Hydro Mulch®	92	Round 4	3:1	All	56.860	2/4
MULCH CONTROL	92	Round 4	3:1	All	55.076	3/4
American Fiber Mulch®	92	Round 4	3:1	All	53.471	4/4

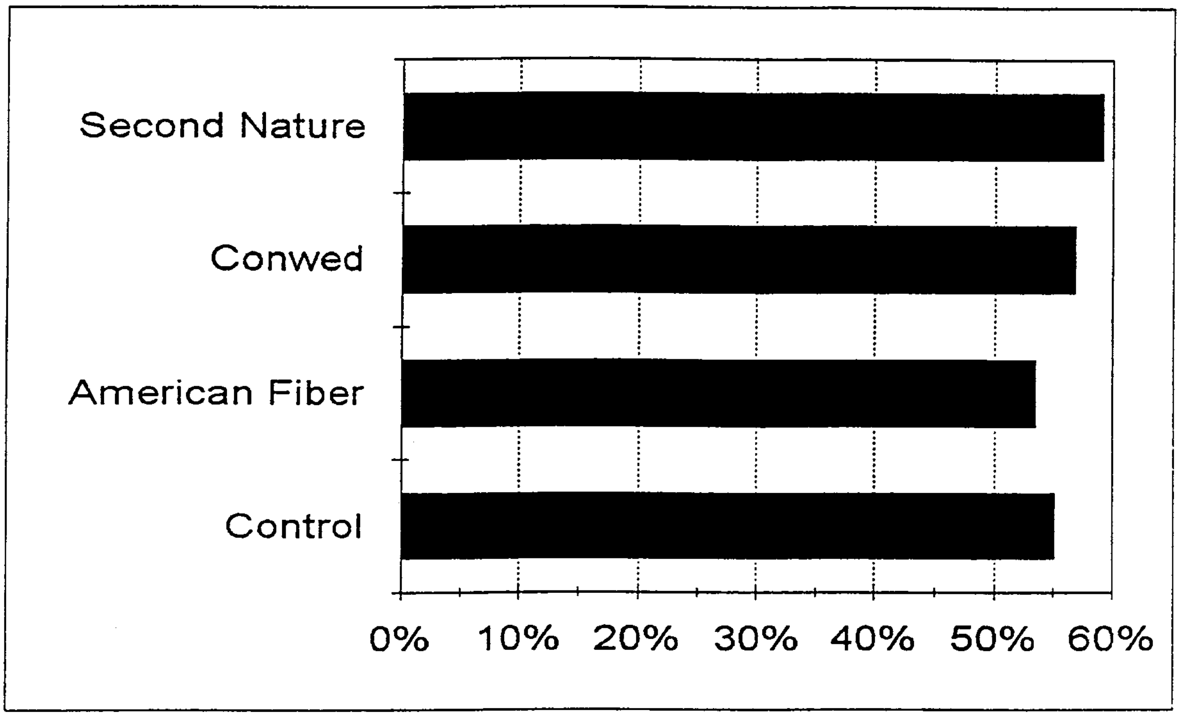

Figure 27. Vegetative Density

The material performance, Level 2, of each product is shown in Table S and Figures 28 and 29. American Fiber Mulch® supported significantly less vegetation than all other treatments of 3:1 slope and clay soil. Second Nature® Regenerated Wood Fiber and American Fiber Mulch® produced significantly more vegetation than Conwed® Fiber Hydro Mulch® and the control treatment. Based upon soil type, there was significantly more vegetation produced on the erosion-resistant soil (K=0.20) than on the erodible soil (K=0.038). Within a sample grouping, the results show similar performance for each of treatments.

Table S. Performance Assessment of Hydraulic Mulches on Vegetative Density Production for the 1992 Cycle

Treatment	Vegetative Density (%)	Vegetative Density (%)
3:1 Slope	Clay Soil Mean/Grouping	Sand Loam Soil Mean/Grouping
MULCH CONTROL	82.708 a	25.988 b
Conwed® Fiber Hydro Mulch®	82.169 a	31.551 ab
Second Nature® Regenerated Wood Fiber®	77.968 a	40.272 a
American Fiber Mulch®	66.611 b	40.987 a

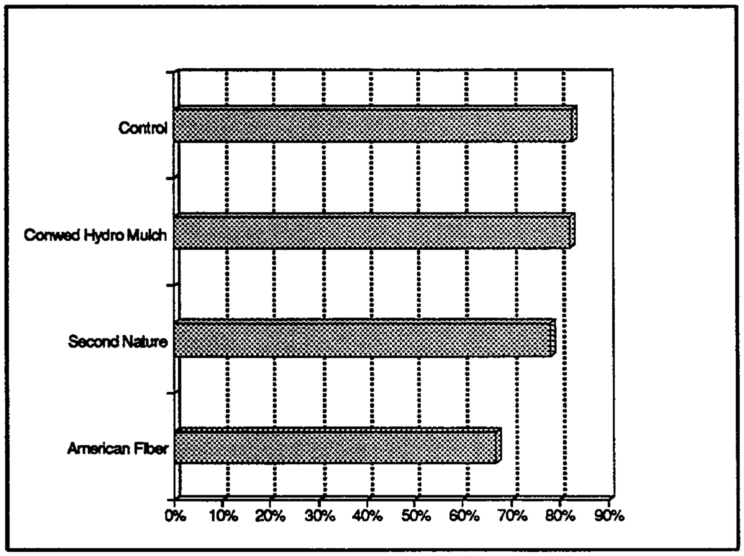

Figure 28. 3:1 Clay Vegetative Density

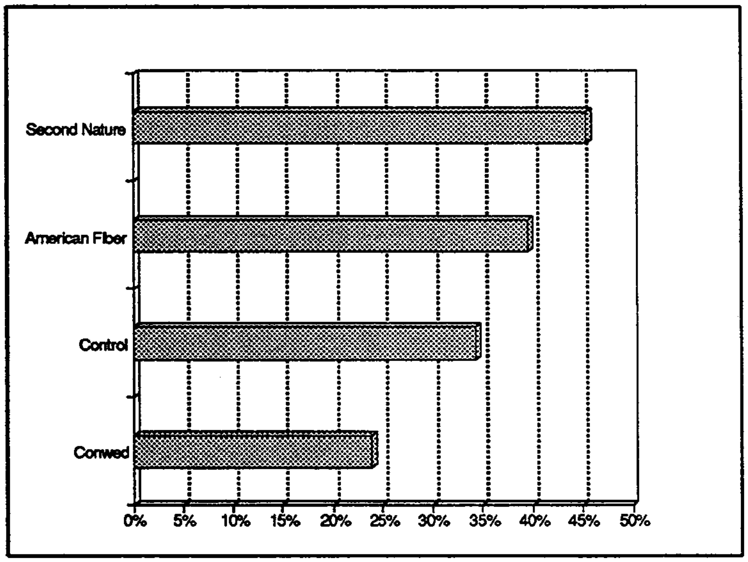

Figure 29. 3:1 Sand Vegetative Density

Currently, TxDOT standard specifications require hydraulic mulch applications in a 2-step process. Scientific information suggesting that there are significant differences in application method or product type in relationship to the highway environment is limited. Therefore, data concerning application method (1-step or 2-step) was collected as well. This type of data will be collected until sufficient information is known to find out which, if any, is the better application method for TxDOT. First-year data suggested there was no significant difference between the 1-step and the 2-step method despite soil condition. Table T shows the results of the 1-step and 2-step performance analysis, Level 4. Figures 30 through 33 show the results in a graphical and photographic condition.

Results from the first year's study show significant differences in the performance of mulches on an erosion-resistant soil (K=0.20) and an erosive soil (K=0.38) on a 3:1 slope. The erosion-resistant soil is more cohesive than the erodible soil, and this would explain the soil's enhanced capability to resist the forces of rain splash. Overall performances of the 1-step and 2-step process results suggest there were no significant differences in the performance of hydraulic mulches on 3:1 slopes. The average overall performance of the treatments was 56.593% vegetative density and was lower than expected on the 3:1 slope condition. This trend may indicate a significant breakdown point based upon the steepness of the slope condition for which mulches should be applied as a vegetation establishment facilitator.

Table T. Performance Assessment of Hydraulic Mulch Applications on Vegetative Density Production for the 1992 Cycle

Treatment	Vegetative Density (%)	Vegetative Density(%)
3:1 Slope	1 - Step Process Mean/Grouping	2 - Step Process Mean/Grouping
American Fiber Mulch®	55.178 a	51.849 a
Conwed® Fiber Hydro Mulch®	64.178 a	49.542 a
Second Nature® Regenerated Wood Fiber	56.883 a	61.356 a
MULCH CONTROL	51.744 a	58.582 a

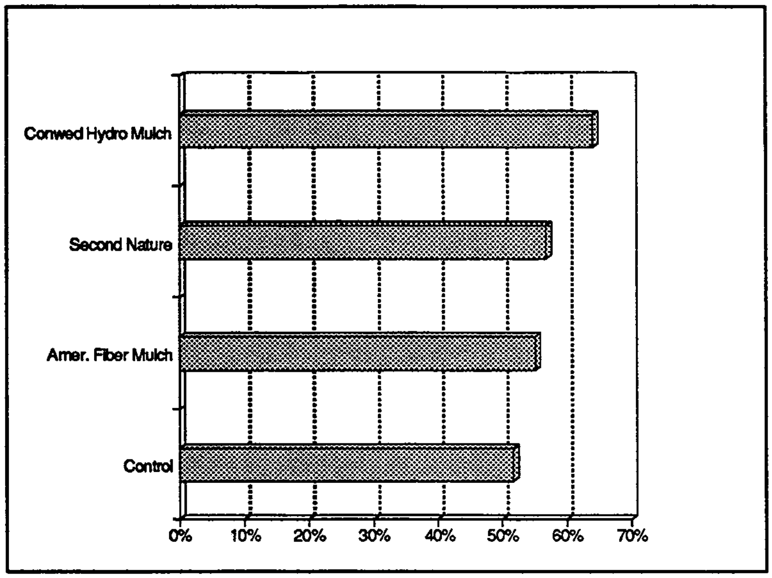

Figure 30. 3:1, 1-Step Process Clay Vegetative Density

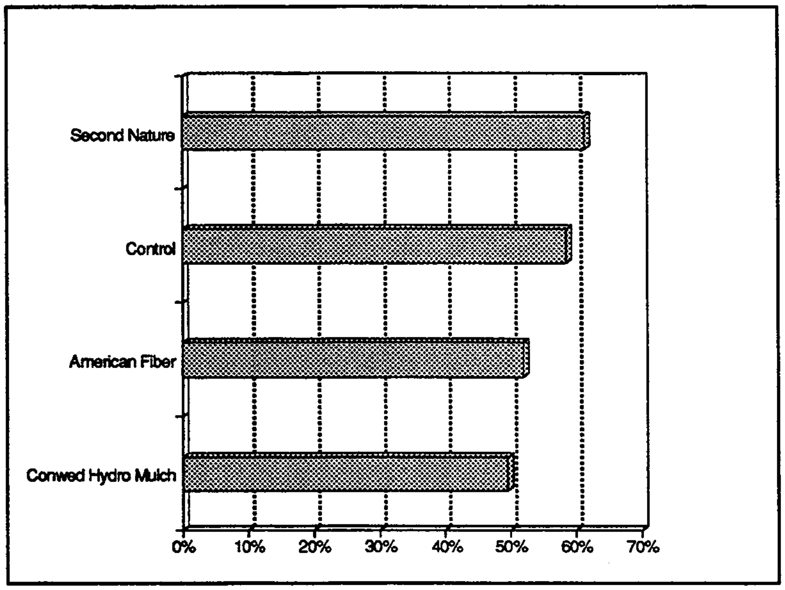

Figure 31. 3:1, 1-Step Process Sand Vegetative Density

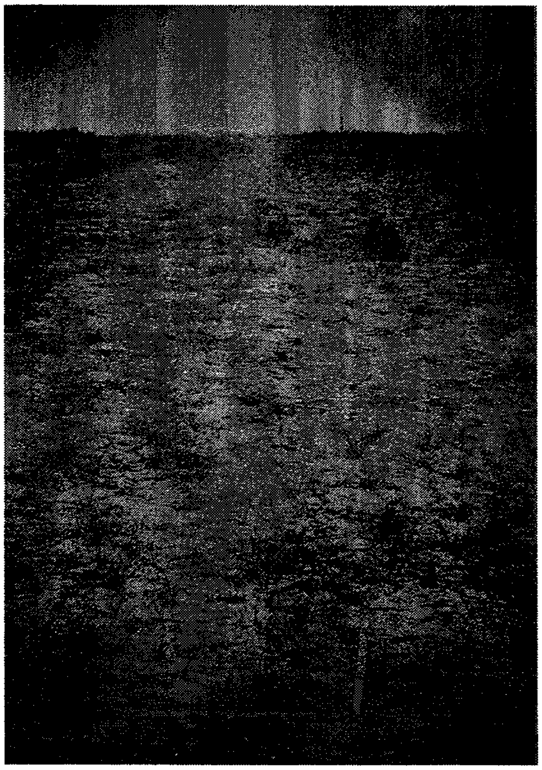

Figure 32. Second Nature® Regenerated Wood Fiber
3:1 Sand Treatment Plot Four Months After Installation

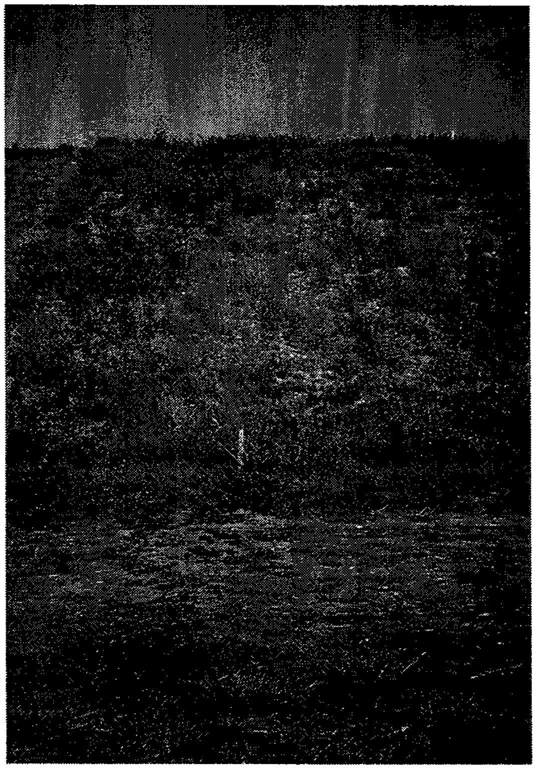

Figure 33. Second Nature® Regenerated Wood Fiber
3:1 Clay Treatment Plot Four Months After Installation

CONCLUSIONS FROM THE 1991 AND 1992 EROSION-CONTROL BLANKET RESULTS COMBINED

The combined material performance, Level 5, of each product is shown in Tables U and V. In the vegetation study, Polyfelt® TS22 supported significantly less vegetation than all other treatments of 2:1 slope and clay soil. Xcel Superior®, POLYJUTE™ 407GT, North American Green® S150, and North American Green® SC150 supported significantly more vegetation than American Excelsior Curlex® 91, ANTI-WASH®/GEOJUTE®, GREENSTREAK® PEC-MAT™, Belton DEKOWE® 700, and Polyfelt® TS22 under conditions of 2:1 slope regardless of soil type. Under the condition of 3:1 slope and clay soil, the control and American Excelsior Curlex® 91 yielded significantly less vegetation than all other treatments. Interestingly, American Excelsior Curlex® 92 supported the greatest vegetative density under 3:1 slope and clay soil, while it yielded significantly less vegetation than all other materials under sandy loam soils. Data indicated that the erosion-control blankets tested support vegetation at a similar level under clay soils. This level is generally greater than that of the control plots, although not always significantly so.

Furthermore, erosion-control blankets were more important in the establishment of vegetation in plots with sandy loam soils regardless of slope. Overall apparent vegetative cover on the erosion-resistant soils (K=0.20) was more abundant than on the erodible soil (K=0.38), whatever the slope condition. This finding might be attributed to a higher percentage of clay, silt, and organic content found in cohesive soils which could have contributed to better germination and growth. Figures 34 through 37 show the results in a graph form. The following trends were also observed in the vegetation study:

- Products containing straw, excelsior, or PVC as the primary component were the top vegetation producers on the 3:1 slope despite soil condition.

- Products composed of excelsior, straw, straw/coconut, or polypropylene were the top producers on the 2:1 slope regardless of soil condition.

Table U. Comparative Assessment of the Effects of Erosion-Control Blankets on Vegetative Density Production for the Two-Year Cycle, 1991 and 92

Treatment	Vegetative Density (%)	Vegetative Density (%)
2:1 Slope	Clay Soil Mean/Grouping	Sand Loam Soil Mean/Grouping
Xcel Superior®	98.814 a	85.805 a
American Excelsior Curlex® (91)	97.834 a	52.674 b
POLYJUTE™ 407GT	96.151 a	74.302 a
North American Green® S150	92.014 a	84.746 a
ANTI-WASH®/GEOJUTE®	90.058 a	51.372 b
North American Green® SC150	89.979 a	76.409 a
GREENSTREAK® PEC-MAT™	87.580 a	38.863 b
CONTROL	86.400 ab	40.123 b
AIRTROL® Plaster	86.094 ab	41.882 b
Belton DEKOWE® 700	73.717 b	38.716 b
Polyfelt® TS22	35.909 c	46.051 b
American Excelsior Curlex® (92)	not available	47.335 b
Treatment	**Vegetative Density (%)**	**Vegetative Density (%)**
3:1 Slope	**Clay Soil Mean/Grouping**	**Sand Loam Soil Mean/Grouping**
American Excelsior Curlex® (92)	98.125 a	33.232 d
North American Green® S75	96.187 a	77.904 a
GREENSTREAK® PEC-MAT™	90.524 a	63.385 b
Xcel Regular®	90.166 a	72.263 ab
verdyol® ERO-MAT®	87.808 a	73.202 ab
AIRTROL® Plaster	86.444 a	68.749 ab
CONTROL	67.286 b	47.553 c
American Excelsior Curlex® (91)	63.230 b	60.937 bc

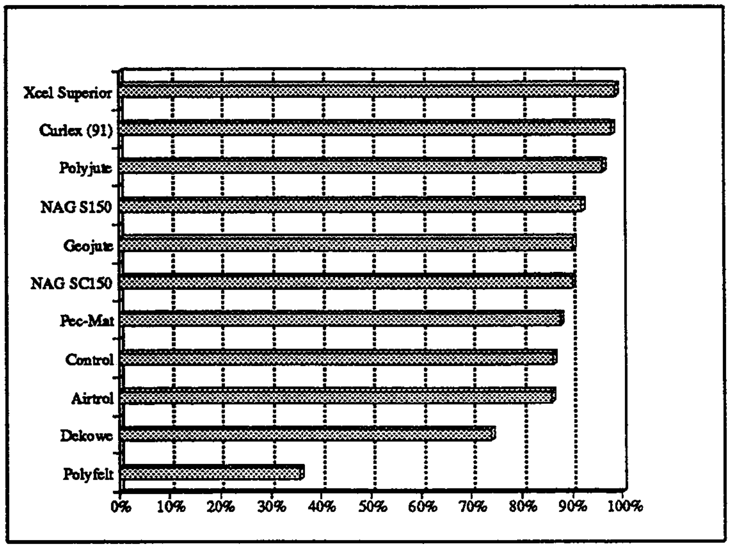

Figure 34. 2:1 Clay Vegetative Density

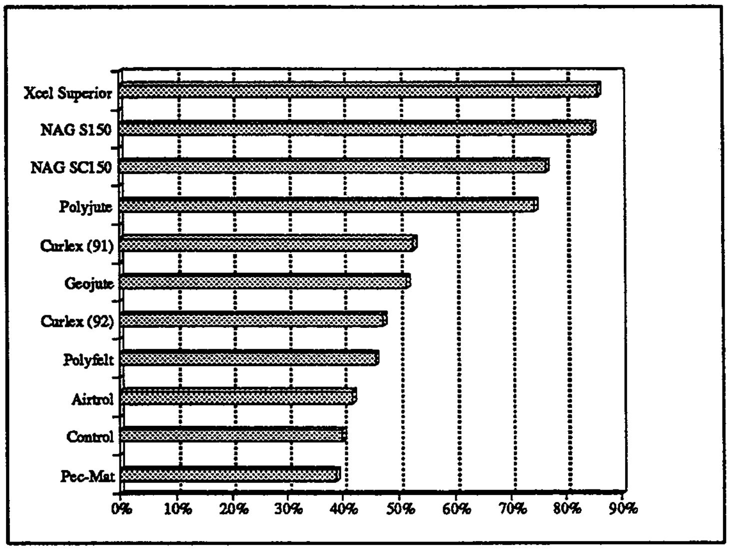

Figure 35. 2:1 Sand Vegetative Density

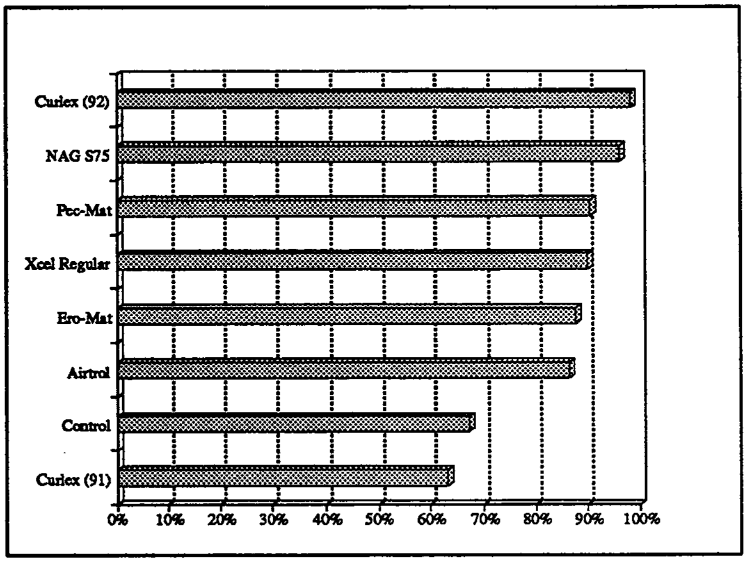

Figure 36. 3:1 Clay Vegetative Density

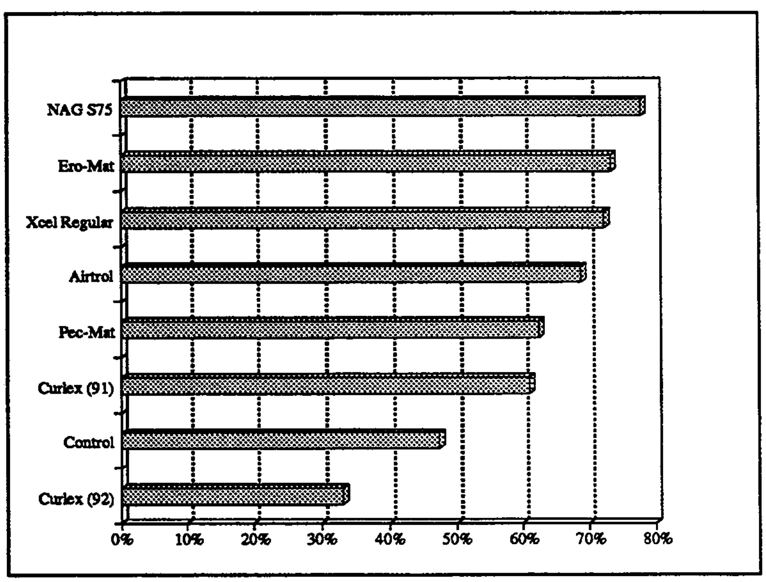

Figure 37. 3:1 Sand Vegetative Density

Results from the sediment loss study suggested that the control plots yielded significantly greater sediment loss than all other treatments within each of the four soil and slope conditions. As expected, sediment loss was significantly greater on the erodible soils (K=0.38) than the erosion-resistant soil (K=0.20) regardless of the slope condition. Generally, the organic products reduced the amount of sediment loss significantly more than the synthetic products. This finding may be a result of the organic products, tendency to burrow down into the soil to form a soil/material bond that was not apparent with the synthetic products. In contrast, the synthetic products tended to span the surface of any rill formations that developed, instead of conforming to the shape of the slope.

On the 2:1 slope of clay soils, the products performed within the same statistical grouping, whereas on the sandy soils the results varied. This indicates the importance of material selection for more erosive soil types. Excel Superior® performed significantly better than all other treatments. POLYJUTE™ 407GT, North American Green® SC150, American Excelsior Curlex®, and North American Green® S150 performed within the same grouping and significantly better than the remaining treatments.

Again, on the 3:1 slope treatments, the same groupings occurred with no treatments performing significantly better than one another for the clay soil. On the sandy soil, there were significant performance differences. American Excelsior Curlex® (91 and 92) performed significantly better than all other treatments. Excel Regular®, North American Green® S75, and verdyol® ERO-MAT® performed better than AIRTROL® Plaster, GREENSTREAK® PEC-MAT™, and the control treatments.

Table V. Comparative Performance Assessment of Soil-Retention Blankets on Sediment Loss for the Two-Year Cycle, 1991 and 92

Treatment	Sediment Loss (kg/10 sm)	Sediment Loss (kg/10 sm)
2:1 Slope	Clay Soil Mean/Grouping	Sand Loam Soil Mean/Grouping
American Excelsior Curlex® (92)	not available	-29.375
American Excelsior Curlex® (91)	-0.191	-40.142
North American Green® SC150	-0.212	-28.048
Polyfelt® TS22	-0.217	-33.844
Belton DEKOWE® 700	-0.219	-10.389
North American Green® S150	-0.225	-32.220
POLYJUTE™ 407GT	-0.237	-25.282
AIRTROL® Plaster	-0.242	-51.040
GREENSTREAK® PEC-MAT™	-0.249	-41.957
ANTI-WASH®/GEOJUTE®	-0.272	-40.815
Xcel Superior®	-0.320	-
CONTROL	-1.499	-63.569
Treatment	**Sediment Loss (kg/10 sm)**	**Sediment Loss (kg/10 sm)**
3:1 Slope	**Clay Soil Mean/Grouping**	**Sand Loam Soil Mean/Grouping**
American Excelsior Curlex® (92)	-0.116	-4.127
American Excelsior Curlex® (91)	-0.147	-4.415
verdyol® ERO-MAT®	-0.153	-9.097
GREENSTREAK® PEC-MAT™	-0.201	-16.436
AIRTROL® Plaster	-0.245	-12.415
North American Green® S75	-0.273	-8.116
Xcel Regular®	-0.320	-4.722
CONTROL	-1.299	-2.936

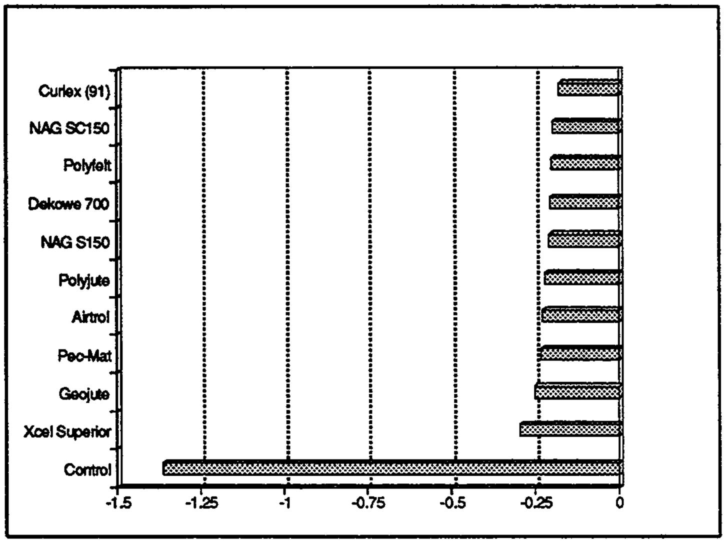

Figure 38. 2:1 Clay Sediment Loss (kg/10 sm)

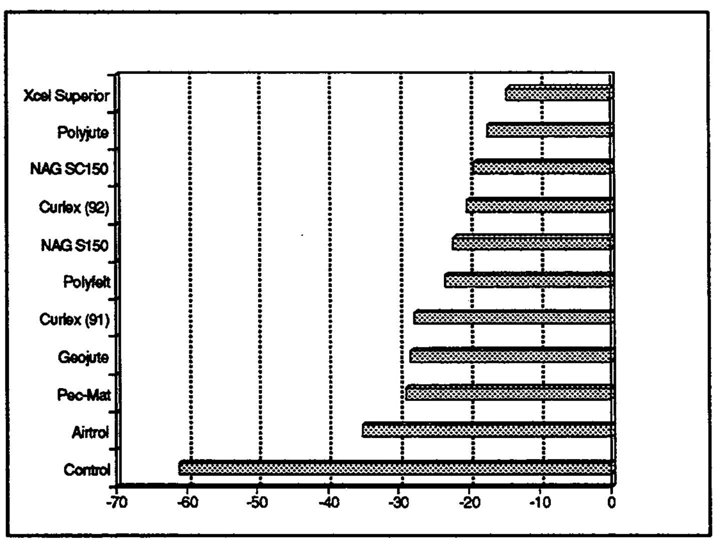

Figure 39. 2:1 Sand Sediment Loss (kg/10 sm)

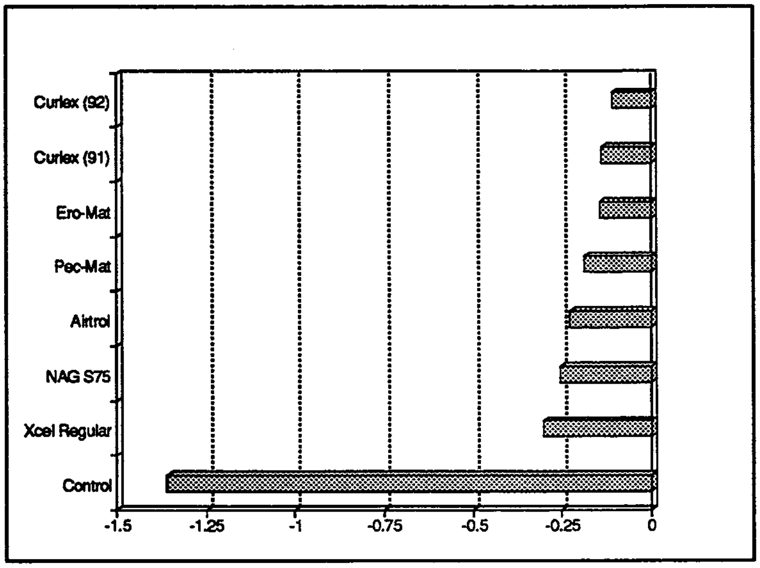

Figure 40. 3:1 Clay Sediment Loss (kg/10 sm)

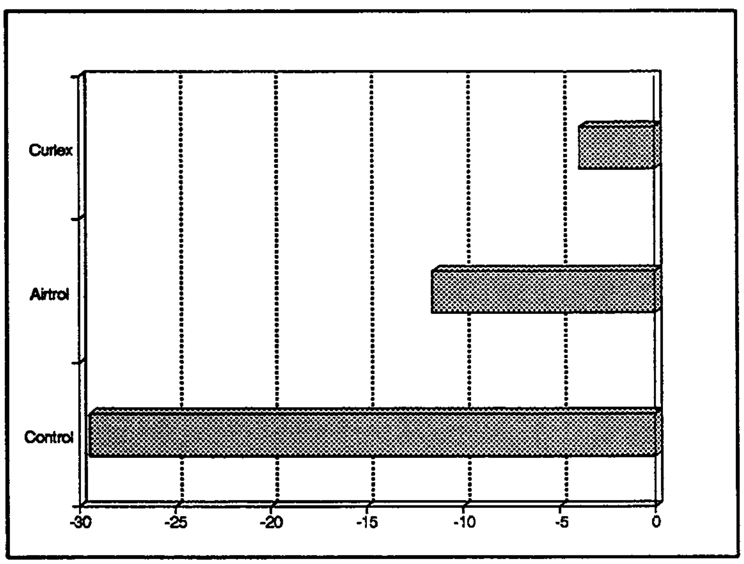

Figure 41. 3:1 Sand Sediment Loss (kg/10 sm)

Because of this study, TxDOT updated the *Approved Materials List* for erosion-control blankets (soil-retention blankets) and established a list for hydraulic mulches. Standard installation detail sheets of approved erosion-control blankets have been developed and incorporated into TxDOT's specifications. These documents provide minimum performance standards through which the designer may speed up the decision-making process for selecting erosion control materials and writing specifications. Standard specifications and details allow the contractor choices and flexibility in product selection while maintaining a standard quality. Additionally, standardized details ensure that the inspector and contractor have the essential details and requirements for proper product installation. Figure 42 shows a view of the treatment plots less than 18 months after installation. This is the ultimate goal.

Figure 42. Stabilized Slope 18 Months After Treatment Installation

Figure 43 shown below illustrates the problem too often encountered in slope management: no erosion-control protection upon project completion followed by standard maintenance procedures. This slope is approximately three years old and has virtually no vegetation on the lower third of the slope.

Figure 43. Slope with No Initial Erosion Control Protection

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5. Dimaggio, J.. 1984 (Revised 1985). *Geotextile Engineering Course Manual*. Federal Highway Administration Contract No. DTFH61-83-C-00150.917.

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APPENDIX A

GLOSSARY

Definitions of terms as approved by the International Standards Organization (ISO) as related to geotextiles and erosion control.

Drainage: The collecting and carrying of precipitation, groundwater, and/or other fluids in the plane of a geotextile.

Filtration: The restraining of soil or other particles subjected to hydrodynamic forces while allowing the passage of fluids.

Geocomposite: An assembled material using at least one geotextile or geotextile-related product among the components.

Geogrid: A polymeric, planar structure consisting of a regular open network of integrally connected tensile elements used in geotechnical and civil engineering applications.

Geonet: A polymeric, planar structure used in geotechnical applications, whose openings are much larger than the constituents and in which the mesh is linked by knots.

Geotextile: A permeable, polymeric, woven, nonwoven, or knitted material used in geotechnical and civil engineering applications.

Geotextile-related products: Permeable, polymeric, sheet, or strip-like construction materials used in geotechnical and civil engineering applications.

Knitted geotextile (Geoknitted): A geotextile produced by interlooping one or more yarns, fibers, filaments, or other elements.

Nonwoven geotextile (Geononwoven): A geotextile in the form of a manufactured sheet, web, or batt of directionally or randomly orientated fibers, bonded by friction and/or cohesion and/or adhesion (see ISO 9092:1988).

Protection: The limiting or preventing with a geotextile of local damage to a geotechnical system.

Reinforcement: The use of the tensile properties of a geotextile to improve the mechanical properties of a soil layer.

Separation: The preventing from intermixing of dissimilar soils and/or fill materials.

Woven geotextile (Geowoven): A geotextile produced by interlacing, usually at right angles, two or more sets of yarns, fibers, filaments, tapes, or other elements. (Knitted fabrics are excluded).

APPENDIX B

ITEM 164:
SEEDING FOR EROSION CONTROL
(PARTIAL SPECIFICATIONS)

This specification is reproduced as published in TxDOT's standard specification manual.

ITEM 164
SEEDING FOR EROSION CONTROL
(PARTIAL SPECIFICATIONS)

164.1. Description. This item shall govern for preparing ground, providing for sowing of seeds, mulching with straw, hay, or cellulose fiber and other management practices on areas shown on the plans and in accordance with this Item.

It includes seeding for permanent erosion control and seeding for temporary erosion control during the initial winter season.

164.2. Materials.

(1) Seed. All seed must meet the requirements of the Texas Seed Law including the labeling requirements for showing pure live seed (PLS - purity x germination), name and type of seed. Seed furnished shall be of the previous season's crop, and the date of analysis shown on each bag shall be within nine months of the time of use on the project. Each variety of seed shall be furnished and delivered in separate bags or containers. A sample of each variety of seed shall be furnished for analysis and testing when directed by the engineer. Buffalograss shall be treated with a dormancy method approved by the engineer. The species and varieties of seed shall be from among the types specified in Table 1A.

Table 1A. List of Selected Grass Species with Their Scientific and Common Names

Scientific Name	Common Name (Acceptable Varieties)	Season Warm/Cool	Native/ Introduced
Agropyron smithii	Western Wheatgrass	C	N
Andropogon hallii	Sand Bluestem	W	N
Avena sativa	Oats	C	I
Bothriochloa ischaemum	K-R Bluestem	W	I
Bouteloua curtipendula	Sideoats Grama (see seed mix table for appropriate varieties)	W	N
Bouteloua eriopoda	Black Grama	W	N
Boutloua gracilis	Blue Grama (see seed mix table for appropriate varieties)	W	N

Buchloe dactyloides	Buffalograss	W	N
Cenchrus ciliaris	Buffelgrass	W	I
Chloris guyana	Rhodesgrass	W	I
Cynodon dactylon	Bermudagrass	W	I
Eragrostis trichodes	Sand Lovegrass (see seed mix table for appropriate varieties)	W	N
Festuca arundinaceae	Tall Fescue	C	N
Hordeum vulgare	Barley	C	I
Leptochloa dubia	Green Sprangletop	W	N
Panicum virgatum	Switchgrass (see seed mix table for appropriate varieties)	W	N
Paspalum notatum	Bahiagrass (Pensacola variety)	W	I
Schizachyrium scoparium	Little Bluestem (Texas origin only)	W	N
Setaria italica	Foxtail Millet	W	I
Setaria macrostachya	Plains Bristlegrass	W	N
Sorghastrum avenaceum	Indiangrass (see seed mix table for appropriate varieties)	W	N
Sporobolus cryptandrus	Sand Dropseed	W	N
Triticum aestivum	Wheat (Red, Winter)	C	I

(2) Fertilizer. Fertilizer shall conform to the requirements of Item 166, "Fertilizer." The fertilizer used shall have the analysis as shown on the plans.

(3) Water. Water shall conform to the requirements of Item 168, "Vegetative Watering."

(4) Mulch.

(a) Straw Mulch or Hay Mulch. Straw mulch shall be oat, wheat or rice straw. Hay mulch shall be prairie grass, bermudagrass or other hay as approved by the engineer. The straw mulch or hay mulch shall be free of Johnson grass or other noxius weeds and foreign materials. It shall be kept in a dry condition and shall not be molded or rotted.

(b) **Cellulose Fiber Mulch.** It shall meet the requirements of and be approved by the Director of Maintenance and Operations. A list of pretested and approved materials will be maintained and can be obtained by writing the Director of Maintenance and Operations, 125 East 11th Street, Austin, Texas 78701-2483.

The mulch shall be designed for use in conventional mechanical planting, hydraulic planting of seed, or hydraulic mulching of grass seed, either alone or with fertilizers and other additives. The mulch shall be such that, when applied, the material shall form a strong, moisture-retaining mat without the need of an asphalt binder. It shall be kept in a dry condition until applied and shall not be molded or rotted.

(5) Soil Retention Blanket. Soil retention blanket shall meet the requirements of Item 169, "Soil Retention Blanket."

(6) Tacking Agents. Tacking agents for straw or hay mulch shall be SS-1, unless otherwise shown on the plans. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent when approved by the engineer. Asphaltic material shall conform to the requirements of Item 300, "Asphalt, Oils and Emulsions."

164.3. Construction Methods. After designated areas have been completed to the lines, grades and cross sections shown on the plans and as provided for in other items of this contract, seeding shall be performed in accordance with the requirements hereinafter described. Unless otherwise approved by the engineer, all areas to be seeded shall be cultivated to a depth of at least four (4) inches, except where seeding is to be done using a seed drill suitable for seeding into untilled soil. The seedbeds shall be cultivated sufficiently to reduce the soil to a state of good tilth when the soil particles on the surface are small enough and lie closely enough together to prevent the seed from being covered too deeply for optimum germination. Cultivation of the seedbed will not be required in loose sand where depth of sand is four inches or more.

The cross section previously established shall be maintained throughout the process of cultivation. Any necessary reshaping shall be done prior to any planting of seed.

(1) Planting Season and Seed Mixes. All planting shall be done between the dates specified for each highway district except as specifically authorized in writing by the engineer.

The pure live seed planted per acre shall be of the type specified in Table 2 for rural areas (warm season).

Table 2.
Rural Area Species-Specific Warm-Season Seeding Mixtures in Pounds of Pure Live Seed Per Acre, By District.

District and Planting Dates*		Mixture for Use in Clay or Tight Soils	Mixture for Use in Sand or Sandy Soils
17 (All Sections)			(All Sections)
(Bryan)			
Feb 1	Green Sprangletop	0.6	Green Sprangletop 1.1

May 15	Bermudagrass	0.8	Bermudagrass	1.5
	Little Bluestem	1.1	Bahiagrass	6.7
	Indiangrass (Lometa)	1.5	(Pensacola)	
	K-R Bluestem	0.7		
	Switchgrass (Alamo)	1.2		

(2) Broadcast Seeding. The seed or seed mixture, in the quantity specified, shall be uniformly distributed over the areas shown on the plans or where directed by the engineer. If the sowing of seed is by hand, rather than by mechanical methods, the seed shall be sown in two directions at right angles to each other. If mechanical equipment is used, all varieties of seed as well as fertilizer, may be distributed simultaneously provided that each component is uniformly applied at the specified rate. When seed and fertilizer are to be distributed as a water slurry, the mixture shall be applied to the area to be seeded within 30 minutes after components are placed in the equipment. After planting, the planted area shall be rolled with a light corrugated drum roller or another type of roller approved by the engineer. All rolling of the sloped areas shall be along the contour of the slopes.

(3) Cellulose Fiber Mulch Seeding. The seed or seed mixture, in the quantity specified, shall be uniformly distributed over the areas shown on the plans or where directed by the engineer. If the sowing of seed is by hand, rather than by mechanical methods, the seed shall be sown in two directions at right angles to each other. If mechanical equipment is used, all varieties of seed, as well as fertilizer, may be distributed simultaneously, provided that each component is uniformly applied at the specified rate. When seed and fertilizer are to be distributed as a water slurry, the mixture shall be applied to that area to be seeded within 30 minutes after all components are placed in the equipment.

Immediately upon completion of planting of the seed, cellulose fiber mulch shall be spread uniformly over the seeded area at the following rates:

Sandy soils with 3:1 slope or less - min. 908 kg/0405 ha
Sandy soils with greater than 3:1 skioe - min. 1044 kg/0405 ha
Clay soils with 3:1 slope or less - min. 1135 kg/0405 ha
Clay soils with greater than 3:1 slope - min. 1362 kg/0405 ha

Cellulose fiber mulch rates are based on dry weight of mulch per acre. When used, a mulching machine, approved by the engineer, shall be equipped to eject the thoroughly wet mulch material at a uniform rate to provide the mulch coverage specified.

APPENDIX C

ITEM 169:
SOIL-RETENTION BLANKET

This specification is reproduced as published
in TxDOT's standard specification manual.

ITEM 169
SOIL RETENTION BLANKET

169.1. Description. This item shall govern for providing and placing wood, straw or coconut fiber mat, synthetic mat, paper mat, jute mesh or other material as a soil retention blanket for erosion control on slopes or ditches or for short-term or long-term protection of seeded or sodded areas as shown on the plans or as specified by the engineer.

169.2. Materials.

(1) Soil Retention Blankets. All soil retention blankets must be prequalified by the Director of Maintenance and Operations prior to use.

Prequalification procedures and a current list of prequalified materials may be obtained by writing to the Director of Maintenance and Operations, 125 East 11th Street, Austin, Texas 78701-2483. A 12" x 12" sample of the material may be required by the Engineer in order to verify prequalification. Samples taken, accompanied by the manufacturer's literature, will be sent, properly wrapped and identified, to the Division of Maintenance and Operations for verification.

The soil retention blanket shall be one of the following classes and types as shown on plans:

(a) **Class 1.** "Slope Protection"

(i) **Type A.** Slopes 3:1 or flatter - Clay soils
(ii) **Type B.** Slopes 3:1 or flatter - Sandy soils

(iii) **Type C.** Slopes steeper than 3:1 - Clay soils

(iv) **Type D.** Slopes steeper than 3:1 - Sandy soils

(b) **Class 2.** "Flexible Channel Liner"

(i) **Type E.** Short-term duration (Up to 2 years)
Shear Stress (td) < 454 kg/0.093 sq. meters

(ii) **Type F.** Short-term duration (Up to 2 years)
Shear Stress (td) 454 to 0.908/0.093 sq. meters

(iii) **Type G.** Long-term duration (Longer than 2 years)
Shear Stress (td) > 0.908 to < 2.27 kg

(iv) **Type H.** Long-term duration (Longer than 2 years)
Shear Stress (td) > 2.27 kg

(2) Fasteners. Fasteners shall conform to the requirements shown on Standard Detail sheet "Soil Retention blanket (SRB)."

169.3. Construction Methods.

(1) General. The soil retention blanket shall conform to the class and type shown on the plans. The contractor has the option of selecting an approved soil retention blanket conforming to the class and type shown on the plans and according to the current approved material list.

(2) Installation. The soil retention blanket, whether installed as slope protection or as flexible channel liner in accordance with the approved materials list, shall be placed within 24 hours after seeding or sodding operations have been completed, or as approved by the engineer. Prior to placing the blanket, the area to be covered shall be relatively free of all rocks or clods over 1-1/2 inches in maximum dimension and all sticks or other foreign material which will prevent the close contact of the blanket with the soil. The area shall be smooth and free of ruts and other depressions. If as a result of rain, the prepared bed becomes crusted or eroded, or if any eroded places, ruts, or depressions exist for any reason, the contractor shall be required to rework the soil until it is smooth and to reseed or resod the area at the contractor's expense.

Installation and anchorage of the soil retention blanket shall be in accordance with the Manufacturer's recommendations and the Standard Detail Sheet "Soil Retention Blanket (SRB)".

(3) Literature. The contractor shall submit one (1) full set of manufacturer's literature and manufacturer's installation recommendations for the soil retention blanket selected in accordance with the approved material list.

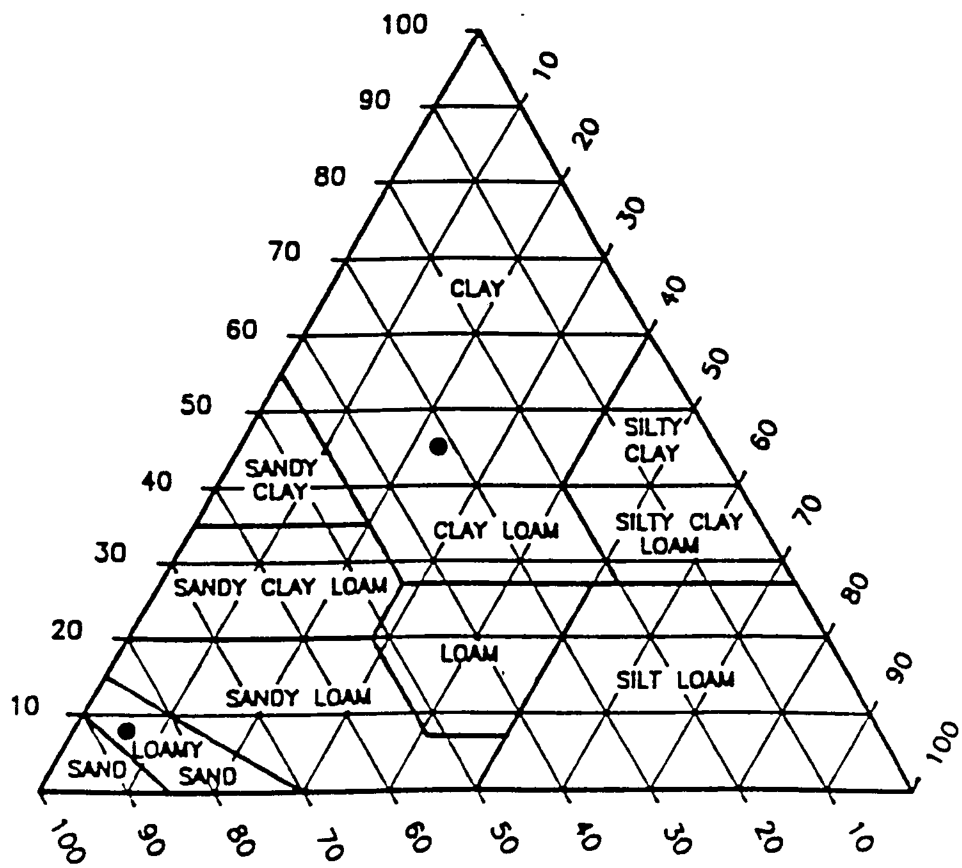
169.4. Measurement. This item will be measured by the square yard of surface area covered.

169.5. Payment. The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Soil Retention Blanket" of the class and type shown on the plans. This price shall be full compensation for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work. Anchors, checks, terminals or junction slots, and wire staples or wood stakes will not be paid for directly but will be considered subsidiary to this item.

APPENDIX D

SOIL TEXTURE TRIANGLE

The soil texture triangle is from the *National Soils Handbook,* (7) Figure 603-1, which shows the two soil types used in the 1992 evaluations of erosion-control materials at the Hydraulics and Erosion-Control Field Laboratory in Bryan, Texas.



APPENDIX E

WEATHER-RAINFALL DATA

Table E1. 1992 Weather-Rainfall Data

DATE	TEMPERATURE		PRECIPITATION
	MAXIMUM	MINIMUM	
01-01-92	19 °C (67 °F)	6 °C (44 °F)	---
01-02-92	16 °C (62 °F)	6 °C (44 °F)	11 mm (0.45 in)
01-03-92	20 °C (68 °F)	2 °C (36 °F)	---
01-04-92	17 °C (64 °F)	4 °C (40 °F)	5 mm (0.21 in)
01-05-92	12 °C (55 °F)	9 °C (49 °F)	7 mm (0.31 in)
01-06-92	13 °C (56 °F)	9 °C (49 °F)	0 mm (0.01 in)
01-07-92	18 °C (65 °F)	12 °C (54 °F)	5 mm (0.22 in)
01-08-92	16 °C (61 °F)	9 °C (49 °F)	T
01-09-92	15 °C (60 °F)	6 °C (44 °F)	---
01-10-92	15 °C (60 °F)	6 °C (43 °F)	---
01-11-92	11 °C (53 °F)	6 °C (44 °F)	17 mm (0.68 in)
01-12-92	13 °C (57 °F)	6 °C (44 °F)	0 mm (0.03 in)
01-13-92	13 °C (57 °F)	2 °C (37 °F)	T
01-14-92	11 °C (52 °F)	0 °C (32 °F)	---
01-15-92	13 °C (57 °F)	-1 °C (29 °F)	---
01-16-92	3 °C (38 °F)	-4 °C (24 °F)	---
01-17-92	5 °C (42 °F)	2 °C (36 °F)	21 mm (0.84 in)
01-18-92	6 °C (44 °F)	2 °C (36 °F)	22 mm (0.87 in)
01-19-92	10 °C (51 °F)	-0 °C (31 °F)	0 mm (0.01 in)
01-20-92	13 °C (56 °F)	-2 °C (27 °F)	---
01-21-92	21 °C (71 °F)	10 °C (50 °F)	T
01-22-92	11 °C (53 °F)	3 °C (38 °F)	14 mm (0.58 in)
01-23-92	14 °C (58 °F)	2 °C (36 °F)	---
01-24-92	20 °C (68 °F)	-0 °C (31 °F)	---
01-25-92	20 °C (69 °F)	3 °C (39 °F)	T
01-26-92	13 °C (57 °F)	10 °C (51 °F)	11 mm (0.45 in)
01-27-92	12 °C (55 °F)	10 °C (51 °F)	6 mm (0.24 in)
01-28-92	11 °C (52 °F)	10 °C (50 °F)	0 mm (0.02 in)
01-29-92	11 °C (53 °F)	10 °C (50 °F)	T
01-30-92	18 °C (66 °F)	10 °C (50 °F)	---
01-31-92	22 °C (73 °F)	6 °C (44 °F)	---

Table E2. 1992 Weather-Rainfall Data

02-01-92	22 °C (73 °F)	5 °C (42 °F)	---
02-02-92	17 °C (64 °F)	11 °C (52 °F)	0 mm (0.2 in)
02-03-92	14 °C (58 °F)	12 °C (54 °F)	55 mm (2.20 in)
02-04-92	13 °C (57 °F)	8 °C (48 °F)	38 mm (1.51 in)
02-05-92	9 °C (49 °F)	4 °C (40 °F)	3 mm (0.13 in)
02-06-92	15 °C (60 °F)	1 °C (35 °F)	---
02-07-92	15 °C (59 °F)	3 °C (38 °F)	---
02-08-92	16 °C (61 °F)	2 °C (36 °F)	---
02-09-92	13 °C (56 °F)	3 °C (39 °F)	T
02-10-92	21 °C (70 °F)	7 °C (45 °F)	T
02-11-92	16 °C (61 °F)	14 °C (52 °F)	23 mm (0.94 in)
02-12-92	22 °C (72 °F)	14 °C (58 °F)	2 mm (0.08 in)
02-13-92	23 °C (75 °F)	17 °C (63 °F)	0 mm (0.01 in)
02-14-92	23 °C (75 °F)	18 °C (65 °F)	0 mm (0.02 in)
02-15-92	24 °C (76 °F)	13 °C (57 °F)	---
02-16-92	25 °C (77 °F)	10 °C (50 °F)	3 mm (0.13 in)
02-17-92	24 °C (76 °F)	11 °C (52 °F)	---
02-18-92	22 °C (73 °F)	6 °C (43 °F)	---
02-19-92	22 °C (72 °F)	5 °C (42 °F)	---
02-20-92	22 °C (72 °F)	4 °C (40 °F)	---
02-21-92	20 °C (69 °F)	7 °C (46 °F)	T
02-22-92	22 °C (72 °F)	14 °C (58 °F)	51 mm (2.02 in)
02-23-92	23 °C (75 °F)	9 °C (49 °F)	---
02-24-92	17 °C (64 °F)	13 °C (56 °F)	66 mm (2.62 in)
02-25-92	14 °C (57 °F)	4 °C (40 °F)	3 mm (0.14 in)
02-26-92	14 °C (58 °F)	2 °C (36 °F)	---
02-27-92	21 °C (70 °F)	4 °C (40 °F)	---
02-28-92	25 °C (77 °F)	4 °C (40 °F)	---
02-29-92	28 °C (83 °F)	8 °C (47 °F)	---

Table E3. 1992 Weather-Rainfall Data

03-01-92	25 °C (77 °F)	10 °C (50 °F)	---
03-02-92	22 °C (72 °F)	14 °C (58 °F)	T
03-03-92	21 °C (70 °F)	16 °C (62 °F)	6 mm (0.26 in)
03-04-92	18 °C (66 °F)	15 °C (59 °F)	57 mm (2.27 in)
03-05-92	25 °C (78 °F)	16 °C (62 °F)	T
03-06-92	28 °C (84 °F)	15 °C (60 °F)	---
03-07-92	27 °C (82 °F)	12 °C (55 °F)	---
03-08-92	24 °C (76 °F)	16 °C (62 °F)	T
03-09-92	23 °C (75 °F)	13 °C (57 °F)	1 mm (0.05 in)
03-10-92	13 °C (57 °F)	4 °C (40 °F)	---
03-11-92	10 °C (51 °F)	2 °C (37 °F)	---
03-12-92	21 °C (70 °F)	3 °C (38 °F)	---
03-13-92	21 °C (71 °F)	7 °C (46 °F)	---
03-14-92	27 °C (81 °F)	9 °C (49 °F)	---
03-15-92	26 °C (80 °F)	12 °C (54 °F)	---
03-16-92	25 °C (77 °F)	13 °C (57 °F)	---
03-17-92	23 °C (75 °F)	16 °C (62 °F)	T
03-18-92	28 °C (84 °F)	16 °C (61 °F)	0 mm (0.03 in)
03-19-92	19 °C (67 °F)	10 °C (50 °F)	---
03-20-92	20 °C (69 °F)	4 °C (40 °F)	---
03-21-92	19 °C (67 °F)	12 °C (55 °F)	0 mm (0.02 in)
03-22-92	24 °C (76 °F)	7 °C (46 °F)	T
03-23-92	17 °C (64 °F)	3 °C (38 °F)	---
03-24-92	22 °C (72 °F)	7 °C (46 °F)	---
03-25-92	27 °C (81 °F)	14 °C (58 °F)	---
03-26-92	26 °C (80 °F)	10 °C (51 °F)	---
03-27-92	25 °C (78 °F)	13 °C (56 °F)	T
03-28-92	18 °C (65 °F)	15 °C (59 °F)	25 mm (0.99 in)
03-29-92	25 °C (77 °F)	16 °C (61 °F)	T
03-30-92	21 °C (70 °F)	10 °C (50 °F)	---
03-31-92	22 °C (73 °F)	8 °C (47 °F)	---

Table E4. 1992 Weather-Rainfall Data

04-01-92	20 °C (68 °F)	10 °C (51 °F)	---
04-02-92	11 °C (52 °F)	7 °C (45 °F)	2 mm (0.11 in)
04-03-92	19 °C (67 °F)	4 °C (40 °F)	---
04-04-92	24 °C (76 °F)	7 °C (45 °F)	---
04-05-92	15 °C (60 °F)	11 °C (52 °F)	16 mm (0.65 in)
04-06-92	23 °C (74 °F)	12 °C (54 °F)	0 mm (0.01 in)
04-07-92	27 °C (81 °F)	10 °C (50 °F)	---
04-08-92	26 °C (80 °F)	15 °C (60 °F)	---
04-09-92	26 °C (79 °F)	15 °C (60 °F)	---
04-10-92	26 °C (80 °F)	16 °C (62 °F)	---
04-11-92	28 °C (83 °F)	17 °C (64 °F)	---
04-12-92	30 °C (86 °F)	20 °C (68 °F)	---
04-13-92	29 °C (85 °F)	17 °C (63 °F)	---
04-14-92	28 °C (84 °F)	16 °C (62 °F)	---
04-15-92	27 °C (81 °F)	19 °C (67 °F)	---
04-16-92	28 °C (83 °F)	17 °C (63 °F)	---
04-17-92	22 °C (72 °F)	16 °C (61 °F)	23 mm (0.93 in)
04-18-92	26 °C (79 °F)	15 °C (60 °F)	T
04-19-92	27 °C (81 °F)	15 °C (59 °F)	3 mm (0.12 in)
04-20-92	23 °C (74 °F)	12 °C (55 °F)	0 mm (0.01 in)
04-21-92	26 °C (80 °F)	8 °C (48 °F)	---
04-22-92	27 °C (82 °F)	13 °C (56 °F)	---
04-23-92	30 °C (86 °F)	16 °C (61 °F)	---
04-24-92	30 °C (86 °F)	18 °C (66 °F)	T
04-25-92	24 °C (76 °F)	16 °C (61 °F)	51 mm (2.01 in)
04-26-92	25 °C (78 °F)	13 °C (57 °F)	---
04-27-92	25 °C (78 °F)	13 °C (57 °F)	---
04-28-92	27 °C (82 °F)	13 °C (57 °F)	0 mm (0.01 in)
04-29-92	27 °C (82 °F)	16 °C (62 °F)	T
04-30-92	22 °C (73 °F)	15 °C (59 °F)	---

Table E5. 1992 Weather-Rainfall Data

05-01-92	29 °C (85 °F)	14 °C (58 °F)	---
05-02-92	29 °C (85 °F)	17 °C (64 °F)	---
05-03-92	29 °C (85 °F)	17 °C (64 °F)	---
05-04-92	26 °C (80 °F)	17 °C (63 °F)	T
05-05-92	30 °C (87 °F)	14 °C (58 °F)	---
05-06-92	23 °C (75 °F)	12 °C (55 °F)	---
05-07-92	24 °C (76 °F)	8 °C (48 °F)	---
05-08-92	25 °C (77 °F)	8 °C (48 °F)	---
05-09-92	26 °C (80 °F)	11 °C (52 °F)	---
05-10-92	25 °C (78 °F)	15 °C (60 °F)	---
05-11-92	29 °C (85 °F)	21 °C (70 °F)	0 mm (0.01 in)
05-12-92	32 °C (90 °F)	18 °C (66 °F)	T
05-13-92	31 °C (88 °F)	16 °C (62 °F)	3 mm (0.15 in)
05-14-92	31 °C (88 °F)	20 °C (69 °F)	T
05-15-92	23 °C (75 °F)	20 °C (68 °F)	---
05-16-92	24 °C (76 °F)	20 °C (68 °F)	19 mm (0.76 in)
05-17-92	26 °C (79 °F)	19 °C (67 °F)	10 mm (0.42 in)
05-18-92	26 °C (79 °F)	18 °C (66 °F)	20 mm (0.79 in)
05-19-92	29 °C (85 °F)	20 °C (68 °F)	10 mm (0.40 in)
05-20-92	30 °C (86 °F)	20 °C (68 °F)	11 mm (0.47 in)
05-21-92	29 °C (85 °F)	18 °C (65 °F)	40 mm (1.60 in)
05-22-92	30 °C (86 °F)	17 °C (63 °F)	---
05-23-92	30 °C (87 °F)	18 °C (65 °F)	---
05-24-92	31 °C (89 °F)	18 °C (65 °F)	---
05-25-92	30 °C (87 °F)	20 °C (68 °F)	---
05-26-92	28 °C (83 °F)	20 °C (68 °F)	---
05-27-92	28 °C (84 °F)	19 °C (67 °F)	0 mm (0.01 in)
05-28-92	29 °C (85 °F)	19 °C (67 °F)	13 mm (0.55 in)
05-29-92	20 °C (68 °F)	14 °C (58 °F)	---
05-30-92	23 °C (75 °F)	13 °C (56 °F)	T
05-31-92	22 °C (72 °F)	18 °C (65 °F)	22 mm (0.88 in)

Table E6. 1992 Weather-Rainfall Data

06-01-92	29 °C (85 °F)	20 °C (69 °F)	43 mm (1.73 in)
06-02-92	27 °C (82 °F)	18 °C (66 °F)	47 mm (1.88 in)
06-03-92	31 °C (89 °F)	17 °C (63 °F)	---
06-04-92	32 °C (90 °F)	19 °C (67 °F)	---
06-05-92	32 °C (91 °F)	18 °C (66 °F)	---
06-06-92	26 °C (80 °F)	20 °C (68 °F)	17 mm (0.68 in)
06-07-92	28 °C (84 °F)	20 °C (68 °F)	---
06-08-92	32 °C (91 °F)	20 °C (69 °F)	---
06-09-92	31 °C (88 °F)	22 °C (72 °F)	---
06-10-92	33 °C (92 °F)	20 °C (69 °F)	---
06-11-92	33 °C (93 °F)	22 °C (72 °F)	---
06-12-92	33 °C (92 °F)	22 °C (72 °F)	---
06-13-92	33 °C (93 °F)	22 °C (73 °F)	1 mm (0.05 in)
06-14-92	33 °C (93 °F)	24 °C (76 °F)	---
06-15-92	34 °C (94 °F)	24 °C (76 °F)	---
06-16-92	33 °C (93 °F)	24 °C (76 °F)	---
06-17-92	33 °C (93 °F)	24 °C (76 °F)	---
06-18-92	34 °C (94 °F)	23 °C (74 °F)	---
06-19-92	34 °C (94 °F)	23 °C (75 °F)	---
06-20-92	34 °C (94 °F)	23 °C (75 °F)	---
06-21-92	35 °C (95 °F)	23 °C (75 °F)	T
06-22-92	30 °C (86 °F)	23 °C (75 °F)	T
06-23-92	33 °C (93 °F)	22 °C (72 °F)	T
06-24-92	34 °C (94 °F)	22 °C (72 °F)	---
06-25-92	34 °C (94 °F)	23 °C (74 °F)	---
06-26-92	34 °C (94 °F)	24 °C (76 °F)	3 mm (0.14 in)
06-27-92	32 °C (91 °F)	22 °C (72 °F)	0 mm (0.11 in)
06-28-92	33 °C (93 °F)	23 °C (74 °F)	T
06-29-92	34 °C (94 °F)	20 °C (69 °F)	T
06-30-92	31 °C (89 °F)	20 °C (69 °F)	15 mm (0.62 in)

Table E7. 1992 Weather-Rainfall Data

07-01-92	34 °C (94 °F)	23 °C (74 °F)	---
07-02-92	35 °C (95 °F)	26 °C (79 °F)	---
07-03-92	33 °C (93 °F)	22 °C (72 °F)	0 mm (0.02 in)
07-04-92	33 °C (93 °F)	21 °C (70 °F)	---
07-05-92	33 °C (93 °F)	23 °C (75 °F)	---
07-06-92	35 °C (95 °F)	22 °C (73 °F)	---
07-07-92	34 °C (94 °F)	23 °C (74 °F)	---
07-08-92	34 °C (94 °F)	23 °C (75 °F)	---
07-09-92	35 °C (95 °F)	23 °C (75 °F)	---
07-10-92	35 °C (95 °F)	24 °C (76 °F)	---
07-11-92	35 °C (96 °F)	23 °C (75 °F)	---
07-12-92	35 °C (96 °F)	24 °C (76 °F)	---
07-13-92	35 °C (95 °F)	22 °C (73 °F)	---
07-14-92	35 °C (96 °F)	24 °C (76 °F)	---
07-15-92	36 °C (97 °F)	25 °C (77 °F)	---
07-16-92	35 °C (96 °F)	25 °C (78 °F)	---
07-17-92	35 °C (96 °F)	22 °C (72 °F)	T
07-18-92	33 °C (93 °F)	21 °C (70 °F)	11 mm (0.46 in)
07-19-92	31 °C (89 °F)	22 °C (73 °F)	---
07-20-92	27 °C (82 °F)	22 °C (72 °F)	7 mm (0.29 in)
07-21-92	32 °C (91 °F)	22 °C (73 °F)	0 mm (0.01 in)
07-22-92	32 °C (90 °F)	23 °C (74 °F)	T
07-23-92	33 °C (93 °F)	23 °C (75 °F)	---
07-24-92	35 °C (95 °F)	23 °C (75 °F)	---
07-25-92	35 °C (95 °F)	23 °C (75 °F)	---
07-26-92	35 °C (95 °F)	23 °C (75 °F)	---
07-27-92	35 °C (95 °F)	23 °C (74 °F)	---
07-28-92	34 °C (94 °F)	23 °C (74 °F)	---
07-29-92	35 °C (95 °F)	22 °C (73 °F)	---
07-30-92	35 °C (96 °F)	23 °C (74 °F)	---
07-31-92	35 °C (96 °F)	24 °C (76 °F)	---

Table E8. 1992 Weather-Rainfall Data

08-01-92	36 °C (97 °F)	22 °C (73 °F)	---
08-02-92	35 °C (95 °F)	21 °C (71 °F)	7 mm (0.30 in)
08-03-92	32 °C (90 °F)	21 °C (71 °F)	T
08-04-92	34 °C (94 °F)	22 °C (73 °F)	---
08-05-92	35 °C (95 °F)	23 °C (74 °F)	---
08-06-92	35 °C (95 °F)	22 °C (72 °F)	---
08-07-92	36 °C (97 °F)	22 °C (73 °F)	---
08-08-92	36 °C (97 °F)	23 °C (75 °F)	---
08-09-92	36 °C (97 °F)	23 °C (75 °F)	---
08-10-92	36 °C (97 °F)	23 °C (75 °F)	---
08-11-92	34 °C (94 °F)	23 °C (74 °F)	0 mm (0.01 in)
08-12-92	32 °C (90 °F)	23 °C (74 °F)	---
08-13-92	33 °C (93 °F)	23 °C (75 °F)	---
08-14-92	34 °C (94 °F)	22 °C (72 °F)	---
08-15-92	30 °C (86 °F)	22 °C (72 °F)	---
08-16-92	31 °C (88 °F)	17 °C (64 °F)	---
08-17-92	31 °C (89 °F)	16 °C (62 °F)	---
08-18-92	32 °C (90 °F)	16 °C (61 °F)	---
08-19-92	28 °C (83 °F)	21 °C (70 °F)	T
08-20-92	32 °C (91 °F)	19 °C (67 °F)	---
08-21-92	33 °C (93 °F)	19 °C (67 °F)	---
08-22-92	34 °C (94 °F)	19 °C (67 °F)	---
08-23-92	35 °C (96 °F)	20 °C (68 °F)	---
08-24-92	35 °C (96 °F)	21 °C (70 °F)	---
08-25-92	35 °C (96 °F)	22 °C (72 °F)	---
08-26-92	38 °C (101 °F)	22 °C (72 °F)	---
08-27-92	31 ° C (89 °F)	20 °C (69 °F)	---
08-28-92	33 ° C (92 °F)	16 °C (61 °F)	---
08-29-92	33 °C (93 °F)	15 °C (60 °F)	---
08-30-92	33 °C (92 °F)	18 °C (65 °F)	---
08-31-92	31 °C (89 °F)	20 °C (69 °F)	4 mm (0.18 in)

Table E9. 1992 Weather-Rainfall Data

09-01-92	35 °C (96 °F)	23 °C (74 °F)	2 mm (0.08 in)
09-02-92	35 °C (96 °F)	23 °C (74 °F)	---
09-03-92	35 °C (95 °F)	22 °C (72 °F)	2 mm (0.08 in)
09-04-92	32 °C (91 °F)	21 °C (71 °F)	4 mm (0.17 in)
09-05-92	35 °C (95 °F)	21 °C (71 °F)	---
09-06-92	34 °C (94 °F)	23 °C (74 °F)	2 mm (0.11 in)
09-07-92	35 °C (96 °F)	22 °C (72 °F)	---
09-08-92	36 °C (97 °F)	23 °C (74 °F)	---
09-09-92	35 °C (95 °F)	23 °C (74 °F)	---
09-10-92	36 °C (98 °F)	22 °C (72 °F)	---
09-11-92	33 °C (93 °F)	21 °C (70 °F)	---
09-12-92	34 °C (94 °F)	22 °C (73 °F)	---
09-13-92	33 °C (93 °F)	22 °C (73 °F)	3 mm (0.15 in)
09-14-92	33 °C (92 °F)	22 °C (72 °F)	T
09-15-92	33 °C (92 °F)	21°C (71 °F)	---
09-16-92	33 °C (93 °F)	21°C (70 °F)	---
09-17-92	33 °C (93 °F)	21°C (71 °F)	---
09-18-92	35 °C (95 °F)	22 °C (73 °F)	---
09-19-92	35 °C (96 °F)	22 °C (73 °F)	---
09-20-92	36 °C (98 °F)	23 °C (74 °F)	---
09-21-92	35 °C (96 °F)	20 °C (69 °F)	6 mm (0.24 in)
09-22-92	32 °C (90 °F)	21 °C (70 °F)	---
09-23-92	30 °C (86 °F)	19 °C (67 °F)	---
09-24-92	28 °C (83 °F)	16 °C (61 °F)	---
09-25-92	31 °C (89 °F)	16 °C (62 °F)	---
09-26-92	32 °C (90 °F)	21 °C (70 °F)	---
09-27-92	31 °C (88 °F)	21 °C (70 °F)	---
09-28-92	30 °C (86 °F)	17 °C (64 °F)	---
09-29-92	30 °C (87 °F)	15 °C (59 °F)	---
09-30-92	28 °C (84 °F)	11 °C (53 °F)	---

Table E10. 1992 Weather-Rainfall Data

10-01-92	30 °C (86 °F)	12 °C (54 °F)	---
10-02-92	30 °C (86 °F)	12 °C (55 °F)	---
10-03-92	31 °C (88 °F)	11 °C (53 °F)	---
10-04-92	32 °C (91 °F)	11 °C (53 °F)	---
10-05-92	32 °C (90 °F)	13 °C (57 °F)	---
10-06-92	30 °C (86 °F)	15 °C (59 °F)	---
10-07-92	30 °C (86 °F)	15 °C (59 °F)	31 mm (1.23 in)
10-08-92	24 °C (76 °F)	9 ° C (49 °F)	---
10-09-92	27 °C (82 °F)	11 ° C (52 °F)	---
10-10-92	31 °C (89 °F)	20 ° C (69 °F)	---
10-11-92	29 °C (85 °F)	14 °C (58 °F)	---
10-12-92	30 °C (87 °F)	11 °C (52 °F)	---
10-13-92	31 °C (88 °F)	13 °C (56 °F)	---
10-14-92	31 °C (89 °F)	17 °C (63 °F)	---
10-15-92	31 °C (89 °F)	20 °C (69 °F)	---
10-16-92	25 °C (77 °F)	17 °C (64 °F)	14 mm (0.59 in)
10-17-92	22 °C (72 °F)	16 °C (61 °F)	---
10-18-92	24 °C (76 °F)	15 °C (60 °F)	---
10-19-92	25 °C (78 °F)	10 °C (51 °F)	---
10-20-92	28 °C (84 °F)	13 °C (57 °F)	---
10-21-92	28 °C (83 °F)	17 °C (63 °F)	---
10-22-92	28 °C (83 °F)	17 °C (64 °F)	---
10-23-92	30 °C (86 °F)	16 °C (62 °F)	---
10-24-92	30 °C (87 °F)	13 °C (56 °F)	---
10-25-92	32 °C (91 °F)	15 °C (59 °F)	---
10-26-92	31 °C (88 °F)	16 °C (61 °F)	---
10-27-92	28 °C (83 °F)	15 °C (60 °F)	T
10-28-92	29 °C (85 °F)	13 °C (57 °F)	---
10-29-92	31 °C (88 °F)	17 °C (64 °F)	29 mm (1.15 in)
10-30-92	28 °C (84 °F)	17 °C (63 °F)	15 mm (0.61 in)
10-31-92	31 °C (89 °F)	22 °C (72 °F)	T

Table E11. 1992 Weather-Rainfall Data

11-01-92	26 °C (79 °F)	11 °C (53 °F)	20 mm (0.79 in)
11-02-92	26 °C (79 °F)	8 °C (47 °F)	---
11-03-92	26 °C (79 °F)	11 °C (52 °F)	---
11-04-92	11 °C (52 °F)	5 °C (41 °F)	0 mm (0.03 in)
11-05-92	13 °C (56 °F)	0 °C (33 °F)	---
11-06-92	15 °C (60 °F)	4 °C (40 °F)	---
11-07-92	18 °C (66 °F)	2 °C (36 °F)	---
11-08-92	20 °C (69 °F)	11 °C (52 °F)	0 mm (0.01 in)
11-09-92	26 °C (79 °F)	17 °C (63 °F)	---
11-10-92	22 °C (72 °F)	18 °C (66 °F)	5 mm (0.21 in)
11-11-92	25 °C (77 °F)	19 °C (67 °F)	T
11-12-92	18 °C (66 °F)	8 °C (48 °F)	12 mm (0.51 in)
11-13-92	17 °C (64 °F)	6 °C (43 °F)	---
11-14-92	19 °C (67 °F)	3 °C (39 °F)	---
11-15-92	20 °C (68 °F)	4 °C (40 °F)	---
11-16-92	23 °C (74 °F)	8 °C (47 °F)	---
11-17-92	23 °C (74 °F)	10 °C (51 °F)	---
11-18-92	20 °C (68 °F)	17 °C (63 °F)	0 mm (0.01 in)
11-19-92	21 °C (71 °F)	16 °C (62 °F)	51 mm (2.04 in)
11-20-92	16 °C (62 °F)	10 °C (51 °F)	1 mm (0.04 in)
11-21-92	20 °C (68 °F)	8 °C (47 °F)	16 mm (0.64 in)
11-22-92	14 °C (58 °F)	6 °C (43 °F)	---
11-23-92	17 °C (63 °F)	6 °C (43 °F)	2 mm (0.11 in)
11-24-92	18 °C (66 °F)	8 °C (47 °F)	10 mm (0.41 in)
11-25-92	12 °C (55 °F)	3 °C (38 °F)	---
11-26-92	7 °C (45 °F)	0 °C (31 °F)	---
11-27-92	9 °C (49 °F)	-3 °C (26 °F)	---
11-28-92	14 °C (58 °F)	-2 °C (27 °F)	---
11-29-92	19 °C (67 °F)	2 °C (37 °F)	---
11-30-92	14 °C (58 °F)	5 °C (41 °F)	T

Table E12. 1992 Weather-Rainfall Data

12-01-92	20 °C (69 °F)	4 °C (40 °F)	---
12-02-92	16 °C (62 °F)	5 °C (42 °F)	---
12-03-92	18 °C (66 °F)	4 °C (40 °F)	T
12-04-92	17 °C (64 °F)	8 °C (47 °F)	T
12-05-92	8 °C (47 °F)	2 °C (37 °F)	0 mm (0.03 in)
12-06-92	8 °C (48 °F)	2 °C (37 °F)	0 mm (0.03 in)
12-07-92	17 °C (63 °F)	1 °C (35 °F)	---
12-08-92	12 °C (55 °F)	6 °C (43 °F)	0 mm (0.01 in)
12-09-92	20 °C (69 °F)	7 °C (45 °F)	21 mm (0.83 in)
12-10-92	21 °C (70 °F)	4 °C (40 °F)	---
12-11-92	18 °C (66 °F)	1 °C (35 °F)	---
12-12-92	21 °C (70 °F)	7 °C (46 °F)	---
12-13-92	21 °C (71 °F)	17 °C (64 °F)	T
12-14-92	20 °C (69 °F)	5 °C (42 °F)	43 mm (1.72 in)
12-15-92	13 °C (56 °F)	4 °C (40 °F)	25 mm (1.01 in)
12-16-92	15 °C (59 °F)	1 °C (35 °F)	---
12-17-92	13 °C (57 °F)	3 °C (39 °F)	---
12-18-92	17 °C (63 °F)	2 °C (37 °F)	---
12-19-92	22 °C (73 °F)	13 °C (56 °F)	---
12-20-92	16 °C (62 °F)	5 °C (42 °F)	3 mm (0.14 in)
12-21-92	12 °C (55 °F)	5 °C (42 °F)	1 mm (0.05 in)
12-22-92	19 °C (67 °F)	12 °C (54 °F)	0 mm (0.01 in)
12-23-92	20 °C (68 °F)	13 °C (57 °F)	6 mm (0.27 in)
12-24-92	16 °C (61 °F)	7 °C (46 °F)	---
12-25-92	12 °C (54 °F)	10 °C (50 °F)	3 mm (0.13 in)
12-26-92	10 °C (50 °F)	7 °C (45 °F)	T
12-27-92	15 °C (60 °F)	7 °C (46 °F)	---
12-28-92	21 °C (70 °F)	13 °C (57 °F)	3 mm (0.14 in)
12-29-92	24 °C (76 °F)	19 °C (67 °F)	T
12-30-92	24 °C (76 °F)	20 °C (68 °F)	1 mm (0.14 in)
12-31-92	22 °C (73 °F)	2 °C (36 °F)	T

APPENDIX F

ANALYSIS LEVEL RESULTS FOR EROSION-CONTROL BLANKETS

ANALYSIS LEVEL DESCRIPTION

The research team indentified eight logical analysis levels which demonstrated how a particular product performed. Generally, this analysis approach starts "broad-brush," and then isolates different variables in an increasingly specific manner.

Level 1: Analyzed the product's *overall performance* without separating performance steepness of slope, type of soil, or design storm level.

Level 2: Analyzed the product's performance with respect to *steepness of slope only,* without separating performance into clay or sand soils, or design storm level.

Level 3: Analyzed the product's performance with respect to *soil conditions only*, without separating performance into 2:1 or 3:1 slopes or design storm level.

Level 4: Analyzed the average sediment loss for each product within *each of the three simulated design storms.* The vegetation density achieved by each product at each round of measurement was determined.

Level 5: Analyzed the product's performance with respect to *both steepness of slope and soil condition.* This level averaged the sediment loss determined within each of the three simulated design storms and used final vegetative density measurements. (This is the primary analysis level used by TxDOT to determine the minimum acceptable performance standards and to produce the annual *Approved Materials List.*)

Level 6: Analyzed the average sediment loss for each product within *each of the simulated design storms within the 2:1 and 3:1 slopes.* The data collected from the vegetative densities achieved by each product at each measurement stage within the 2:1 and 3:1 slopes was used for this analysis level.

Level 7: Analyzed the average sediment loss for each product within *each of the simulated design storms within the clay and sand soils.* The data collected from the vegetative densities achieved by each product at each measurement stage within the clay and sand soils was used for this analysis level.

Level 8: Analyzed the sediment loss by each product within *each of the simulated design storms, within the clay and sand soils, and within the 2:1 and 3:1 slopes*. The data collected from the vegetative densities produced by each product at each measurement stage within the clay and sand soils and within the 2:1 and 3:1 slopes was used for this analysis level.

Table F1. Level 1 - Overall Analysis

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
AIRTROL® Plaster	92	All	All	All	12.41	2/2	71.588	1/2
American Excelsior Curlex®	92	All	All	All	8.45	1/2	61.184	2/2
Belton DEKOWE® 700	92	All	All	All	N/A	N/A	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES								
Xcel Regular®	91	All	All	All	0.29	1/14	81.215	6/14
North American Green® S75	91	All	All	All	0.54	2/14	87.046	3/14
verdyol®ERO-MAT®	91	All	All	All	5.86	3/14	80.505	7/14
American Excelsior Curlex®	92	All	All	All	8.45	4/14	61.184	12/14
Xcel Superior®	91	All	All	All	9.44	5/14	92.310	1/14
POLYJUTE™ 407GT	91	All	All	All	12.34	6/14	85.227	4/14
AIRTROL® Plaster	92	All	All	All	12.41	7/14	71.588	8/14
American Excelsior Curlex®	91	All	All	All	12.41	8/14	67.937	11/14
North American Green® SC150	91	All	All	All	13.13	9/14	83.413	5/14
North American Green® S150	91	All	All	All	15.70	10/14	88.380	2/14
GREENSTREAK® PEC-MAT™	91	All	All	All	16.35	11/14	71.020	10/14
Polyfelt® TS22	91	All	All	All	16.86	12/14	40.980	14/14
ANTI-WASH®/GEOJUTE®	91	All	All	All	20.55	13/14	71.339	9/14
CONTROL	91-92	All	All	All	26.08	14/14	59.537	13/14
Belton DEKOWE® 700	92	All	All	All	N/A	N/A	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

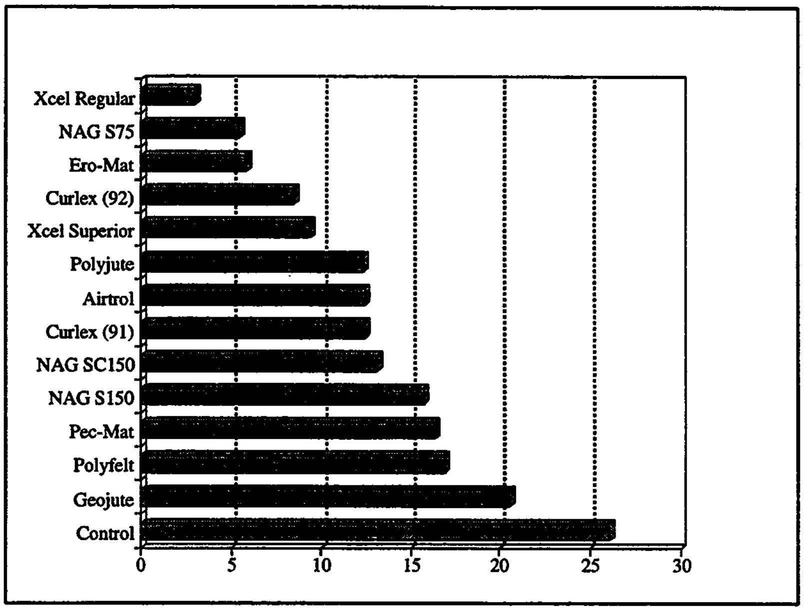


Figure 1F. Sediment Loss (kg/9.3 sq m)

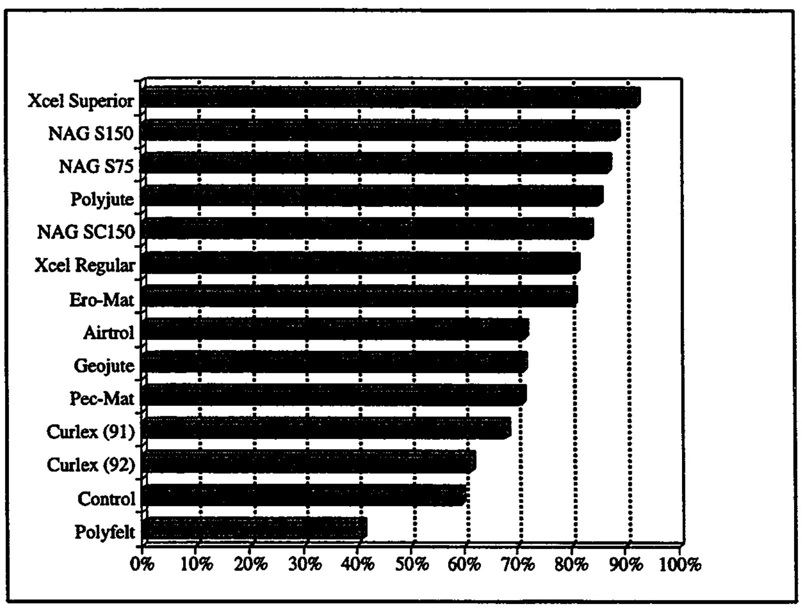


Figure 2F. Vegetative Density (%)

Table F2. Level 2 - Analysis Based Upon Steepness of Slope Only

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
AIRTROL® Plaster	92	2:1	All	All	18.69	1/3	71.588	1/3
American Excelsior Curlex®	92	2:1	All	All	20.20	2/3	61.184	2/3
CONTROL	92	2:1	All	All	26.14	3/3	60.996	3/3
Belton DEKOWE® 700	92	2:1	All	All	N/A	N/A	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES								
Xcel Superior®	91	2:1	All	All	9.44	1/11	92.310	1/11
POLYJUTE™ 407GT	91	2:1	All	All	12.33	2/11	85.227	3/11
North American Green® SC150	91	2:1	All	All	13.12	3/11	83.413	4/11
North American Green® S150	91	2:1	All	All	15.70	4/11	88.380	2/11
Polyfelt® TS22	91	2:1	All	All	16.86	5/11	40.980	11/11
AIRTROL® Plaster	92	2:1	All	All	18.69	6/11	63.988	8/11
American Excelsior Curlex®	91	2:1	All	All	19.98	7/11	75.254	5/11
American Excelsior Curlex®	92	2:1	All	All	20.20	8/11	47.335	10/11
ANTI-WASH®/GEOJUTE®	91	2:1	All	All	20.55	9/11	71.339	6/11
GREENSTREAK® PEC-MAT™	91	2:1	All	All	21.32	10/11	64.007	7/11
CONTROL	91-92	2:1	All	All	35.44	11/11	62.490	9/11
Belton DEKOWE® 700	92	2:1	All	All	N/A	N/A	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

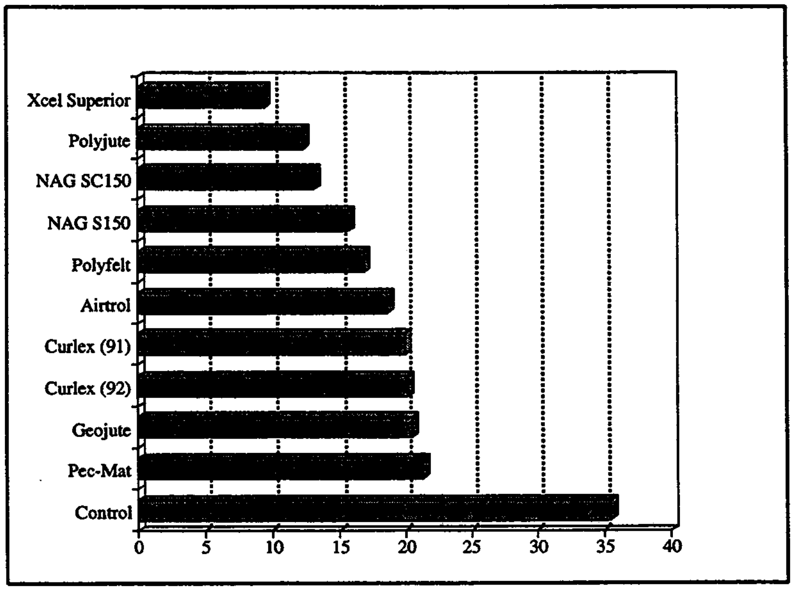


Figure 3F. Sediment Loss (kg/9.3 sq m)

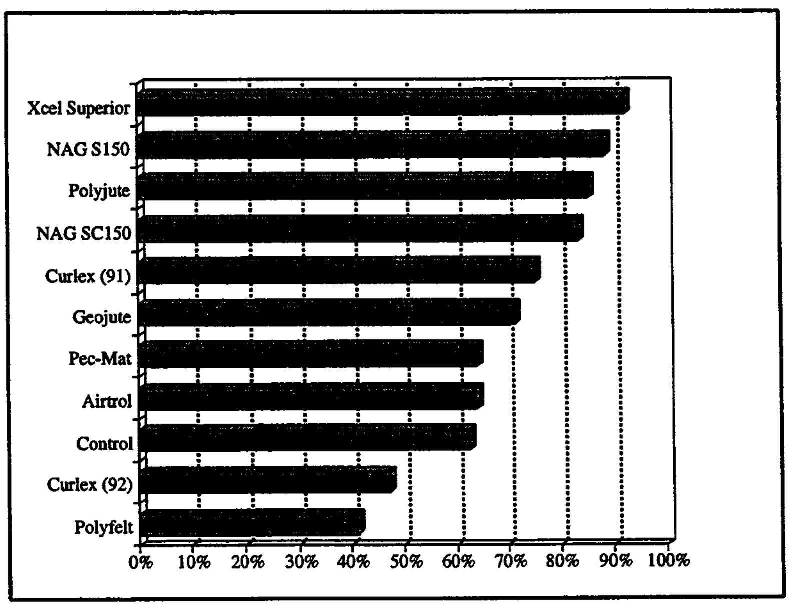


Figure 4F. Vegetative Density (%)

Table F3. Level 2 - Analysis Based Upon Steepness of Slope Only

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
Airtrol Plaster®	92	3:1	All	All	2.12	1/3	77.824	1/3
American Excelsior Curlex®	92	3:1	All	All	6.65	2/3	66.511	2/3
CONTROL	92	3:1	All	All	16.08	3/3	58.430	3/3
COMBINED 91-92 EVALUATION CYCLES								
American Excelsior Curlex®	92	3:1	All	All	2.12	1/8	66.511	6/8
American Excelsior Curlex®	91	3:1	All	All	2.68	2/8	62.083	7/8
Xcel Regular®	91	3:1	All	All	2.97	3/8	81.215	2/8
North American Green® S75	92	3:1	All	All	5.46	4/8	87.046	1/8
verdyol®ERO-MAT®	91	3:1	All	All	5.86	5/8	80.505	3/8
Airtrol Plaster®	92	3:1	All	All	6.65	6/8	77.824	4/8
GREENSTREAK® PEC-MAT™	91	3:1	All	All	10.97	7/8	76.455	5/8
CONTROL	91-92	3:1	All	All	17.19	8/8	57.295	8/8

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

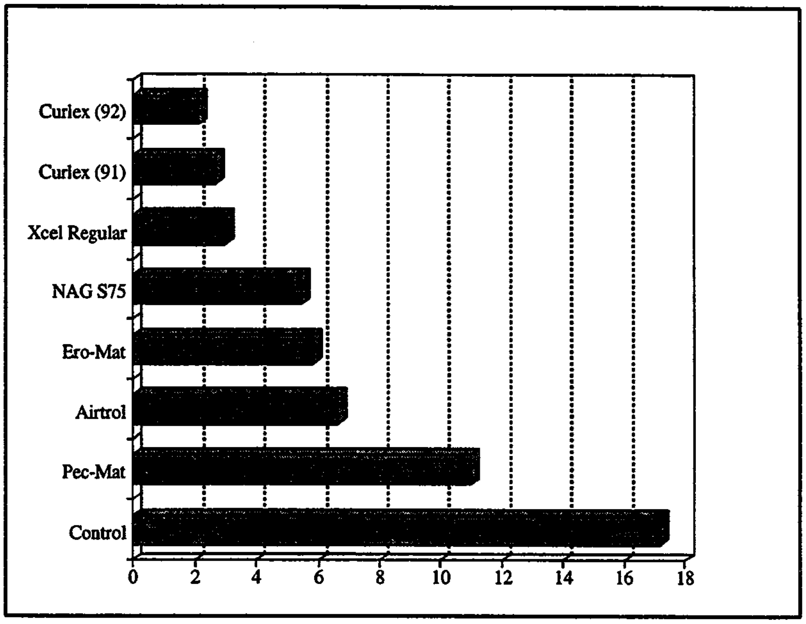


Figure 5F. Sediment Loss (kg/9.3 sq m)

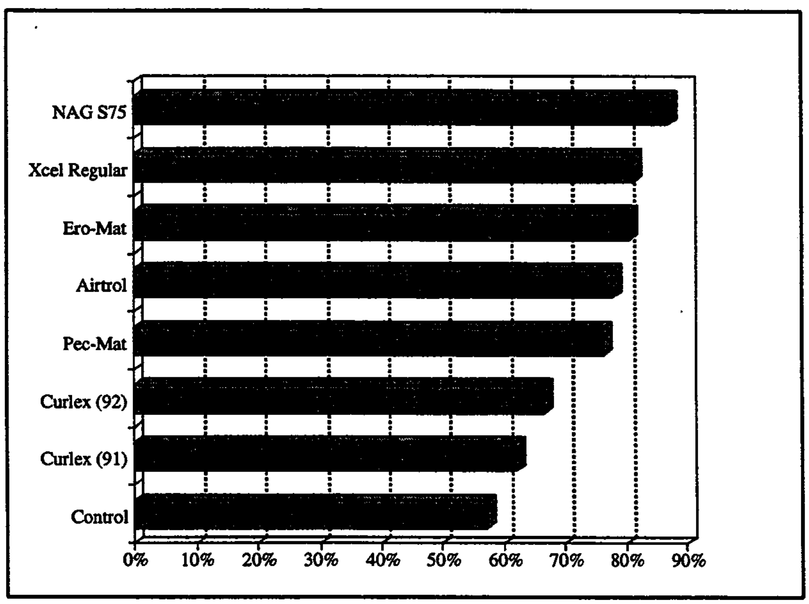


Figure 6F. Vegetative Density (%)

Table F4. Level 3 - Analysis Based Upon Type of Soil

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
American Excelsior Curlex®	92	All	Clay	All	0.10	1/4	98.125	1/4
Belton DEKOWE® 700	92	All	Clay	All	0.20	2/4	73.717	4/4
Airtrol Plaster®	92	All	Clay	All	0.22	3/4	86.289	2/4
CONTROL	92	All	Clay	All	1.40	4/4	84.423	3/4
COMBINED 91-92 EVALUATION CYCLES								
American Excelsior Curlex®	92	All	Clay	All	0.10	1/15	98.125	2/15
verdyol®ERO-MAT®	91	All	Clay	All	0.14	2/15	87.808	10/15
American Excelsior Curlex®	91	All	Clay	All	0.15	3/15	78.609	12/15
North American Green® SC150	91	All	Clay	All	0.19	4/15	89.979	8/15
Polyfelt® TS22	91	All	Clay	All	0.20	5/15	35.909	15/15
Belton DEKOWE® 700	92	All	Clay	All	0.20	6/15	73.717	14/15
GREENSTREAK® PEC-MAT™	91	All	Clay	All	0.20	7/15	89.216	9/15
North American Green® S150	91	All	Clay	All	0.20	8/15	92.014	5/15
POLYJUTE™ 407GT	91	All	Clay	All	0.22	9/15	96.151	4/15
Airtrol Plaster®	92	All	Clay	All	0.22	10/15	86.289	11/15
ANTI-WASH®/GEOJUTE®	91	All	Clay	All	0.25	11/15	90.058	7/15
North American Green® S75	91	All	Clay	All	0.25	12/15	96.187	3/15
Xcel Superior®	91	All	Clay	All	0.29	13/15	98.814	1/15
Xcel Regular®	91-92	All	Clay	All	0.29	14/15	90.166	6/15
CONTROL	92	All	Clay	All	1.36	15/15	75.438	13/15

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

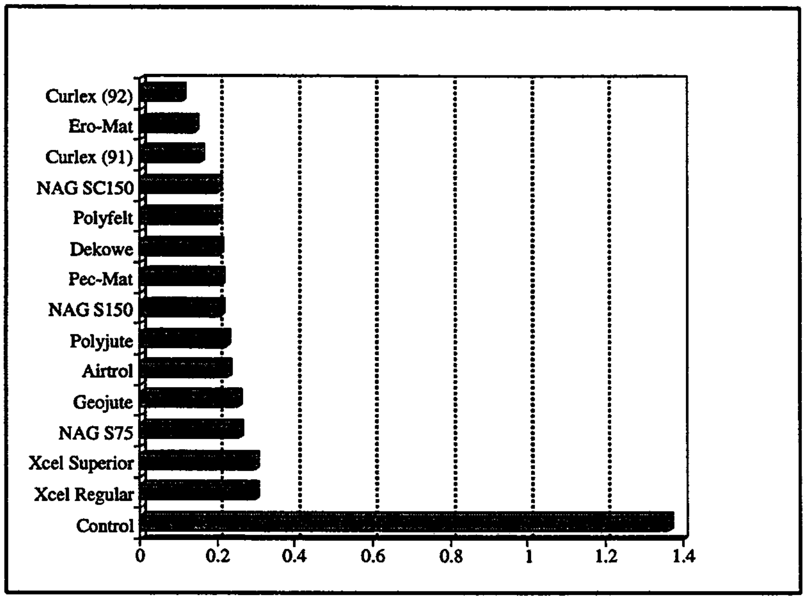


Figure 7F. Sediment Loss (kg/9.3 sq m)

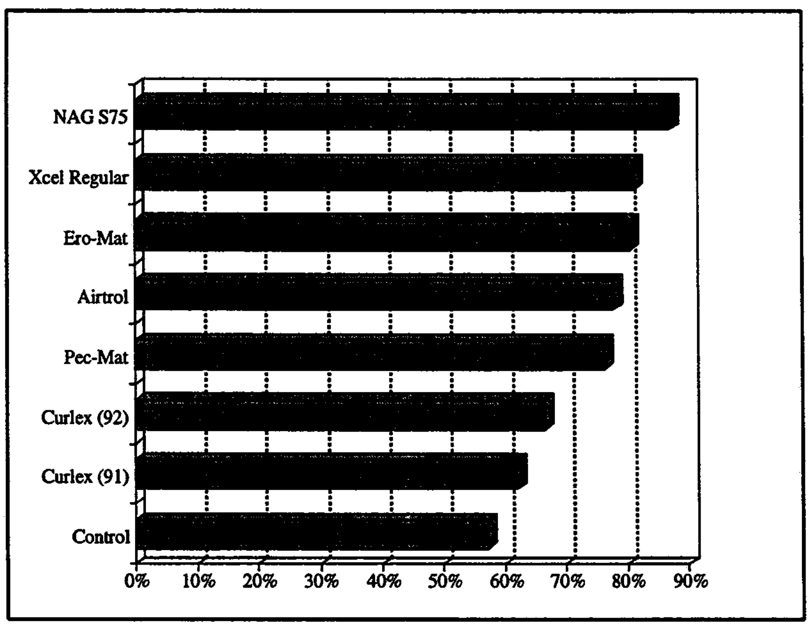


Figure 8F. Vegetative Density (%)

Table F5. Level 3 - Analysis Based Upon Type of Soil

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
American Excelsior Curlex®	92	All	Sand	All	12.02	1/3	39.454	2/3
Airtrol Plaster®	92	All	Sand	All	22.41	2/3	56.467	1/3
CONTROL	92	All	Sand	All	39.93	3/3	38.870	3/3
Belton DEKOWE® 700	92	All	Sand	All	N/A	N/A	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES								
Xcel Regular®	91	All	Sand	All	4.39	1/14	72.263	7/14
North American Green® S75	91	All	Sand	All	7.54	2/14	77.904	3/14
verdyol®ERO-MAT®	91	All	Sand	All	8.45	3/14	73.202	6/14
American Excelsior Curlex®	92	All	Sand	All	12.02	4/14	39.454	14/14
Xcel Superior®	91	All	Sand	All	14.52	5/14	85.805	1/14
POLYJUTE™ 407GT	91	All	Sand	All	17.38	6/14	74.302	5/14
American Excelsior Curlex®	91	All	Sand	All	17.99	7/14	57.265	8/14
North American Green® SC150	91	All	Sand	All	19.29	8/14	76.409	4/14
North American Green® S150	91	All	Sand	All	22.15	9/14	84.746	2/14
Airtrol Plaster®	92	All	Sand	All	22.41	10/14	56.467	9/14
GREENSTREAK® PEC-MAT™	91	All	Sand	All	22.45	11/14	52.304	10/14
Polyfelt® TS22	91	All	Sand	All	23.27	12/14	46.051	12/14
ANTI-WASH®/GEOJUTE®	91	All	Sand	All	28.07	13/14	51.372	11/14
CONTROL	91-92	All	Sand	All	44.43	14/14	44.309	13/14
Belton DEKOWE® 700	92	All	Sand	All	N/A	N/A	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

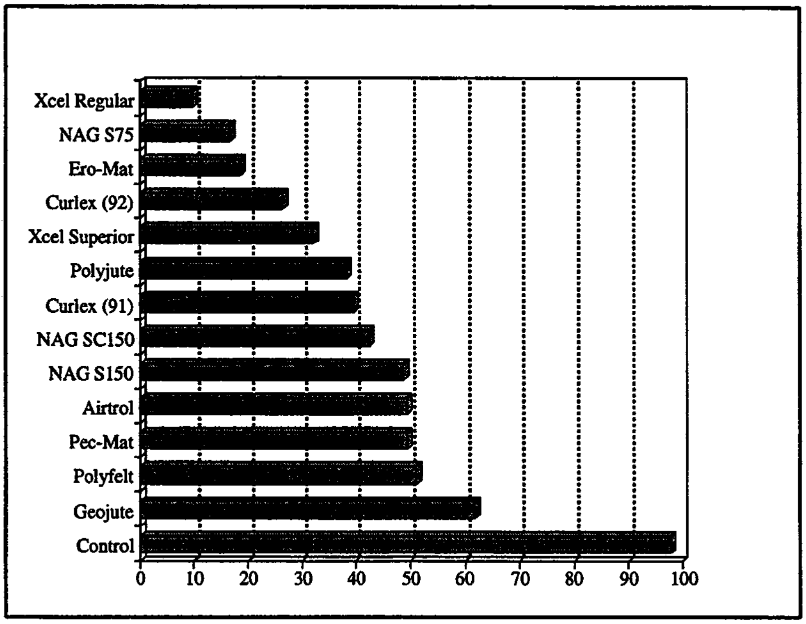


Figure 9F. Sediment Loss (kg/9.3 sq m)

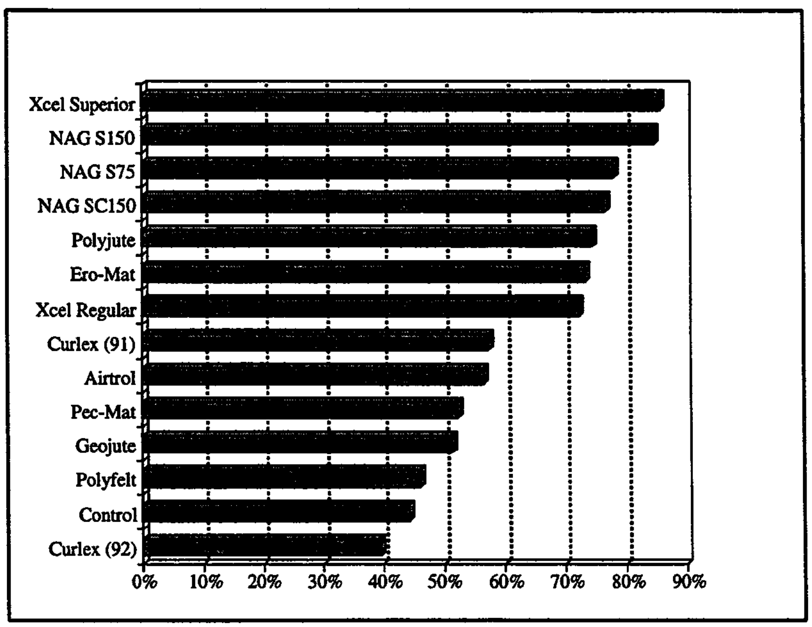


Figure 10F. Vegetative Density (%)

Table F6. Level 4 - Sediment Loss Based Upon Simulated Rainfall Event

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	All	All	1.03	1/3
AIRTROL® Plaster	92	1-Year	All	All	3.97	2/3
CONTROL	92	1-Year	All	All	10.65	3/3
Belton DEKOWE® 700	92	1-Year	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
verdyol®ERO-MAT®	91	1-Year	All	All	0.42	1/14
North American Green® S150	91	1-Year	All	All	0.50	2/14
North American Green® SC150	91	1-Year	All	All	0.53	3/14
Xcel Regular®	91	1-Year	All	All	0.67	4/14
North American Green® S75	91	1-Year	All	All	0.68	5/14
Polyfelt® TS22	91	1-Year	All	All	0.86	6/14
Xcel Superior®	91	1-Year	All	All	1.00	7/14
American Excelsior Curlex®	92	1-Year	All	All	1.03	8/14
American Excelsior Curlex®	91	1-Year	All	All	1.07	9/14
ANTI-WASH®/GEOJUTE®	91	1-Year	All	All	1.91	10/14
POLYJUTE™ 407GT	91	1-Year	All	All	3.56	11/14
AIRTROL® Plaster	92	1-Year	All	All	3.97	12/14
GREENSTREAK® PEC-MAT™	91	1-Year	All	All	4.29	13/14
CONTROL	91-92	1-Year	All	All	9.38	14/14
Belton DEKOWE® 700	92	1-Year	All	All	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

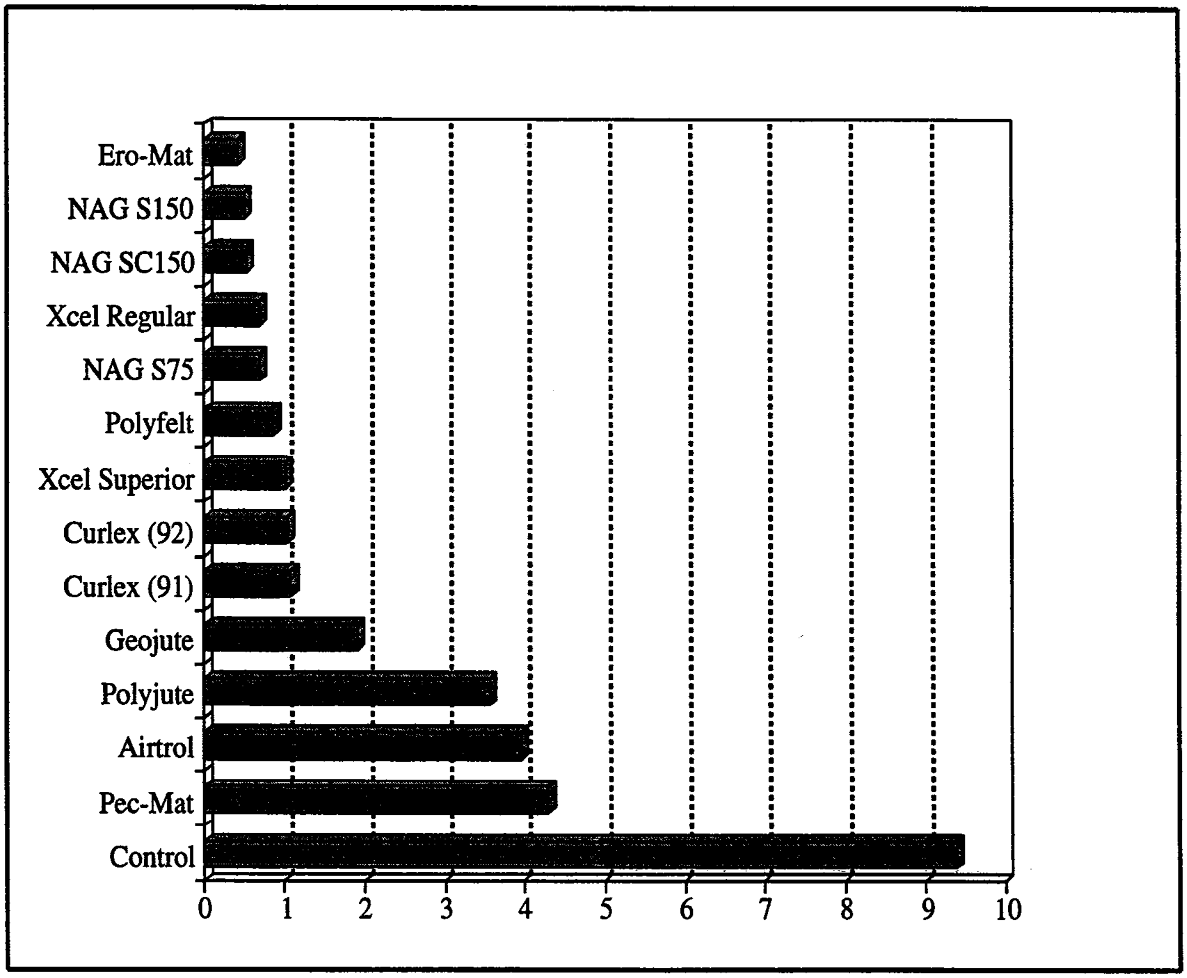


Figure 11F. Sediment Loss (kg/9.3 sq m)

Table F7. Level 4 - Sediment Loss Based Upon Simulated Rainfall Event

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	All	All	3.98	1/3
AIRTROL® Plaster	92	2-Year	All	All	8.54	2/3
CONTROL	92	2-Year	All	All	22.63	3/3
Belton DEKOWE® 700	92	2-Year	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	2-Year	All	All	1.52	1/14
Xcel Superior®	91	2-Year	All	All	3.15	2/14
American Excelsior Curlex®	92	2-Year	All	All	3.98	3/14
verdyol®ERO-MAT®	91	2-Year	All	All	5.04	4/14
North American Green® SC150	91	2-Year	All	All	5.69	5/14
North American Green® S75	91	2-Year	All	All	6.23	6/14
North American Green® S150	91	2-Year	All	All	7.95	7/14
POLYJUTE™ 407GT	91	2-Year	All	All	8.52	8/14
AIRTROL® Plaster	92	2-Year	All	All	8.54	9/14
American Excelsior Curlex®	91	2-Year	All	All	11.33	10/14
Polyfelt® TS22	91	2-Year	All	All	14.75	11/14
GREENSTREAK® PEC-MAT™	91	2-Year	All	All	14.80	12/14
ANTI-WASH®/GEOJUTE®	91	2-Year	All	All	18.99	13/14
CONTROL	91-92	2-Year	All	All	29.21	14/14
Belton DEKOWE® 700	92	2-Year	All	All	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

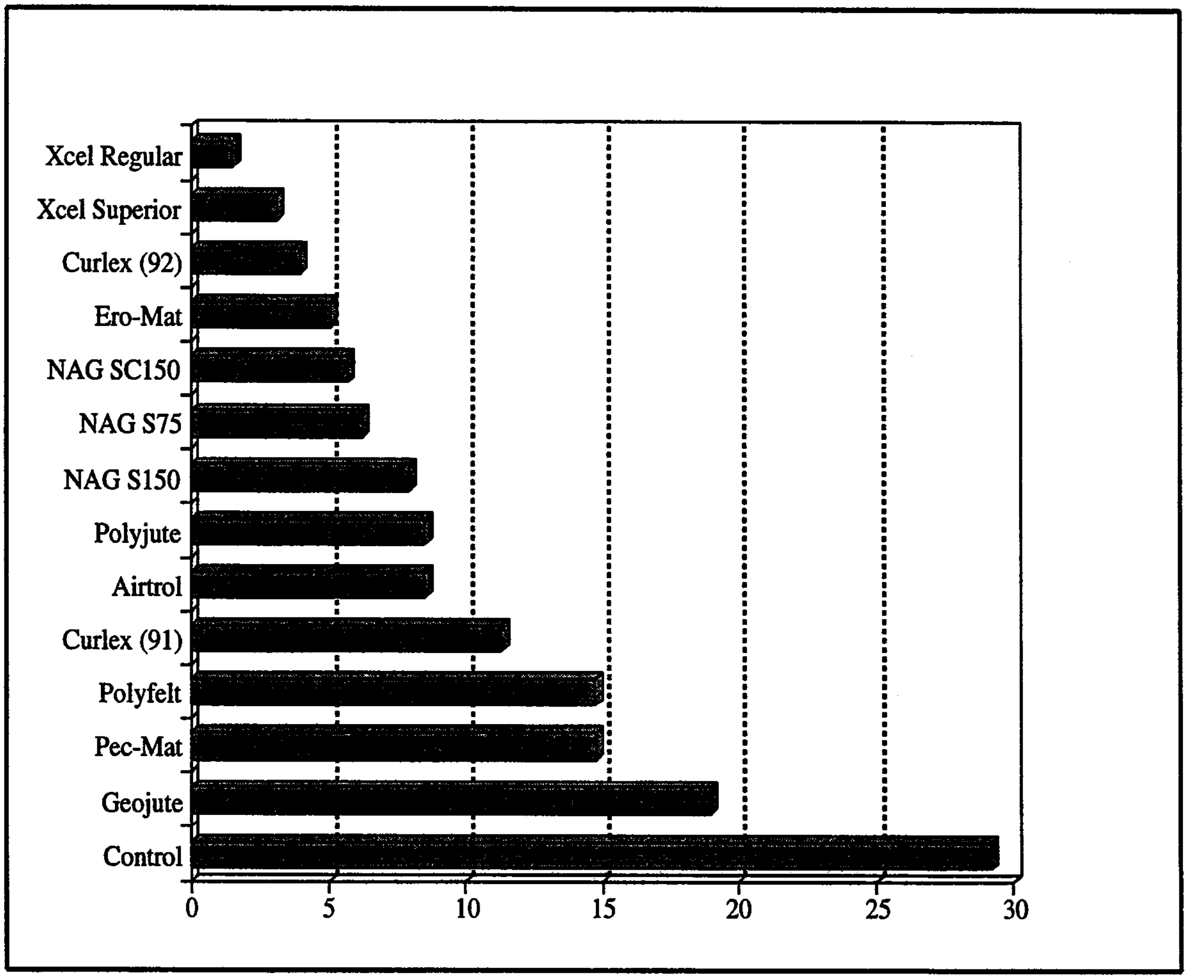


Figure 12F. Sediment Loss (kg/9.3 sq m)

Table F8. Level 4 - Sediment Loss Based Upon Simulated Rainfall Event

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	All	All	20.32	1/3
AIRTROL® Plaster	92	5-Year	All	All	25.33	2/3
CONTROL	92	5-Year	All	All	27.10	3/3
Belton DEKOWE® 700	92	5-Year	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	5-Year	All	All	4.42	1/14
North American Green® S75	91	5-Year	All	All	5.92	2/14
verdyol®ERO-MAT®	91	5-Year	All	All	7.83	3/14
Xcel Superior®	91	5-Year	All	All	15.46	4/14
American Excelsior Curlex®	91	5-Year	All	All	16.55	5/14
POLYJUTE™ 407GT	91	5-Year	All	All	18.18	6/14
American Excelsior Curlex®	92	5-Year	All	All	20.32	7/14
North American Green® SC150	91	5-Year	All	All	21.39	8/14
GREENSTREAK® PEC-MAT™	91	5-Year	All	All	21.95	9/14
Polyfelt® TS22	91	5-Year	All	All	22.98	10/14
AIRTROL® Plaster	92	5-Year	All	All	25.33	11/14
North American Green® S150	91	5-Year	All	All	26.28	12/14
ANTI-WASH®/GEOJUTE®	91	5-Year	All	All	27.92	13/14
CONTROL	91-92	5-Year	All	All	32.85	14/14
Belton DEKOWE® 700	92	5-Year	All	All	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

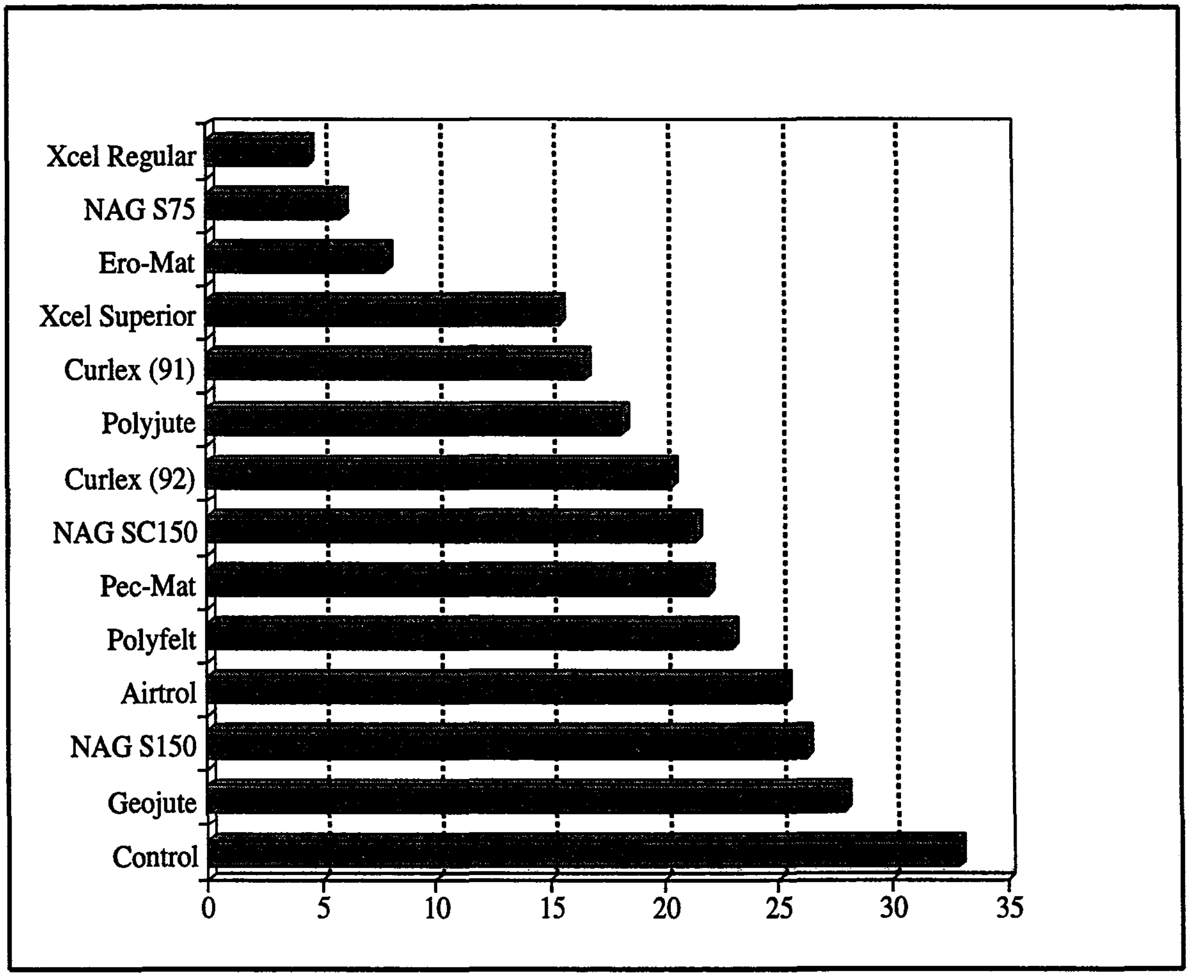


Figure 13F. Sediment Loss (kg/9.3 sq m)

Table F9. Level 4 - Vegetative Density Based Upon Measurement Round

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	All	All	20.411	1/3
AIRTROL® Plaster	92	Round 1	All	All	12.990	2/3
American Excelsior Curlex®	92	Round 1	All	All	7.471	3/3
Belton DEKOWE® 700	92	Round 1	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
CONTROL	91-92	Round 1	All	All	17.891	1/14
AIRTROL® Plaster	92	Round 1	All	All	12.990	2/14
North American Green® S75	91	Round 1	All	All	8.228	3/14
American Excelsior Curlex®	92	Round 1	All	All	7.471	4/14
Xcel Regular®	91	Round 1	All	All	7.296	5/14
POLYJUTE™ 407GT	91	Round 1	All	All	5.636	6/14
Xcel Superior®	91	Round 1	All	All	5.158	7/14
GREENSTREAK® PEC-MAT™	91	Round 1	All	All	3.436	8/14
American Excelsior Curlex®	91	Round 1	All	All	2.100	9/14
ANTI-WASH®/GEOJUTE®	91	Round 1	All	All	1.596	10/14
North American Green® S150	91	Round 1	All	All	1.581	11/14
verdyol®ERO-MAT®	91	Round 1	All	All	1.414	12/14
Polyfelt® TS22	91	Round 1	All	All	0.540	13/14
North American Green® SC150	91	Round 1	All	All	0.482	14/14
Belton DEKOWE® 700	92	Round 1	All	All	N/A	N/A

**Vegetative Density is in percent

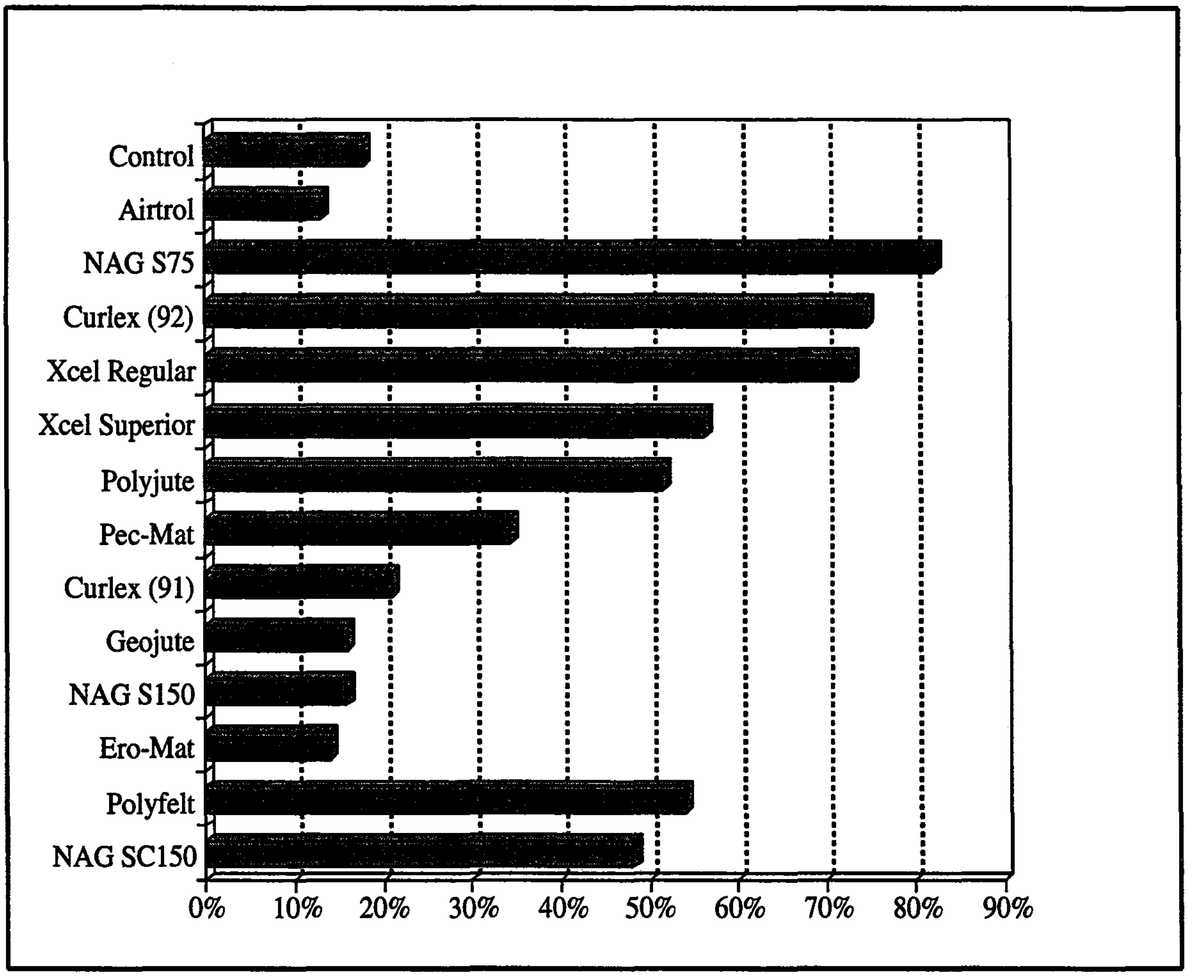


Figure 14F. Vegetative Density (%)

Table F10. Level 4 - Vegetative Density Based Upon Measurement Round

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 2	All	All	65.545	1/3
AIRTROL® Plaster	92	Round 2	All	All	53.541	2/3
American Excelsior Curlex®	92	Round 2	All	All	38.884	3/3
Belton DEKOWE® 700	92	Round 2	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 2	All	All	59.565	1/14
Xcel Regular®	91	Round 2	All	All	56.240	2/14
AIRTROL® Plaster	92	Round 2	All	All	53.541	3/14
North American Green® S75	91	Round 2	All	All	53.151	4/14
POLYJUTE™ 407GT	91	Round 2	All	All	46.952	5/14
CONTROL	91-92	Round 2	All	All	41.561	6/14
American Excelsior Curlex®	91	Round 2	All	All	39.558	7/14
American Excelsior Curlex®	92	Round 2	All	All	38.884	8/14
verdyol®ERO-MAT®	91	Round 2	All	All	35.889	9/14
North American Green® SC150	91	Round 2	All	All	31.402	10/14
North American Green® S150	91	Round 2	All	All	30.235	11/14
GREENSTREAK® PEC-MAT™	91	Round 2	All	All	26.929	12/14
ANTI-WASH®/GEOJUTE®	91	Round 2	All	All	24.267	13/14
Polyfelt® TS22	91	Round 2	All	All	6.659	14/14
Belton DEKOWE® 700	92	Round 2	All	All	N/A	N/A

**Vegetative Density is in percent

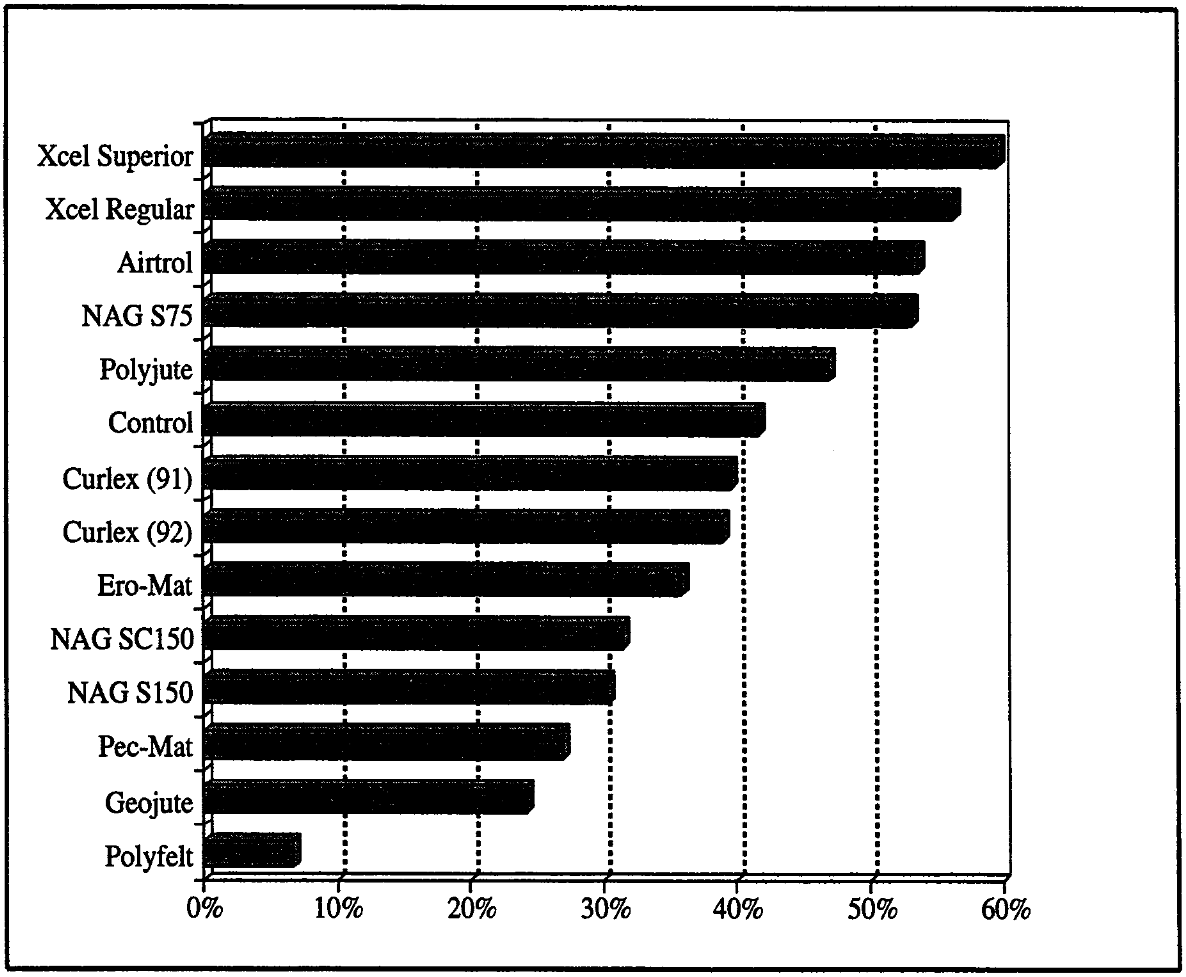


Figure 15F. Vegetative Density (%)

Table F11. Level 4 - Vegetative Density Based Upon Measurement Round

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 3	All	All	68.402	1/3
American Excelsior Curlex®	92	Round 3	All	All	60.630	2/3
AIRTROL® Plaster	92	Round 3	All	All	57.991	3/3
Belton DEKOWE® 700	92	Round 3	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 3	All	All	91.127	1/14
POLYJUTE™ 407GT	91	Round 3	All	All	90.487	2/14
North American Green® S75	91	Round 3	All	All	89.849	3/14
North American Green® SC150	91	Round 3	All	All	84.453	4/14
North American Green® S150	91	Round 3	All	All	82.846	5/14
Xcel Regular®	91	Round 3	All	All	76.490	6/14
American Excelsior Curlex®	91	Round 3	All	All	67.032	7/14
ANTI-WASH®/GEOJUTE®	91	Round 3	All	All	66.630	8/14
verdyol®ERO-MAT®	91	Round 3	All	All	64.790	9/14
CONTROL	91-92	Round 3	All	All	63.665	10/14
GREENSTREAK® PEC-MAT™	91	Round 3	All	All	61.730	11/14
American Excelsior Curlex®	92	Round 3	All	All	60.630	12/14
AIRTROL® Plaster	92	Round 3	All	All	57.991	13/14
Polyfelt® TS22	91	Round 3	All	All	36.894	14/14
Belton DEKOWE® 700	92	Round 3	All	All	N/A	N/A

**Vegetative Density is in percent

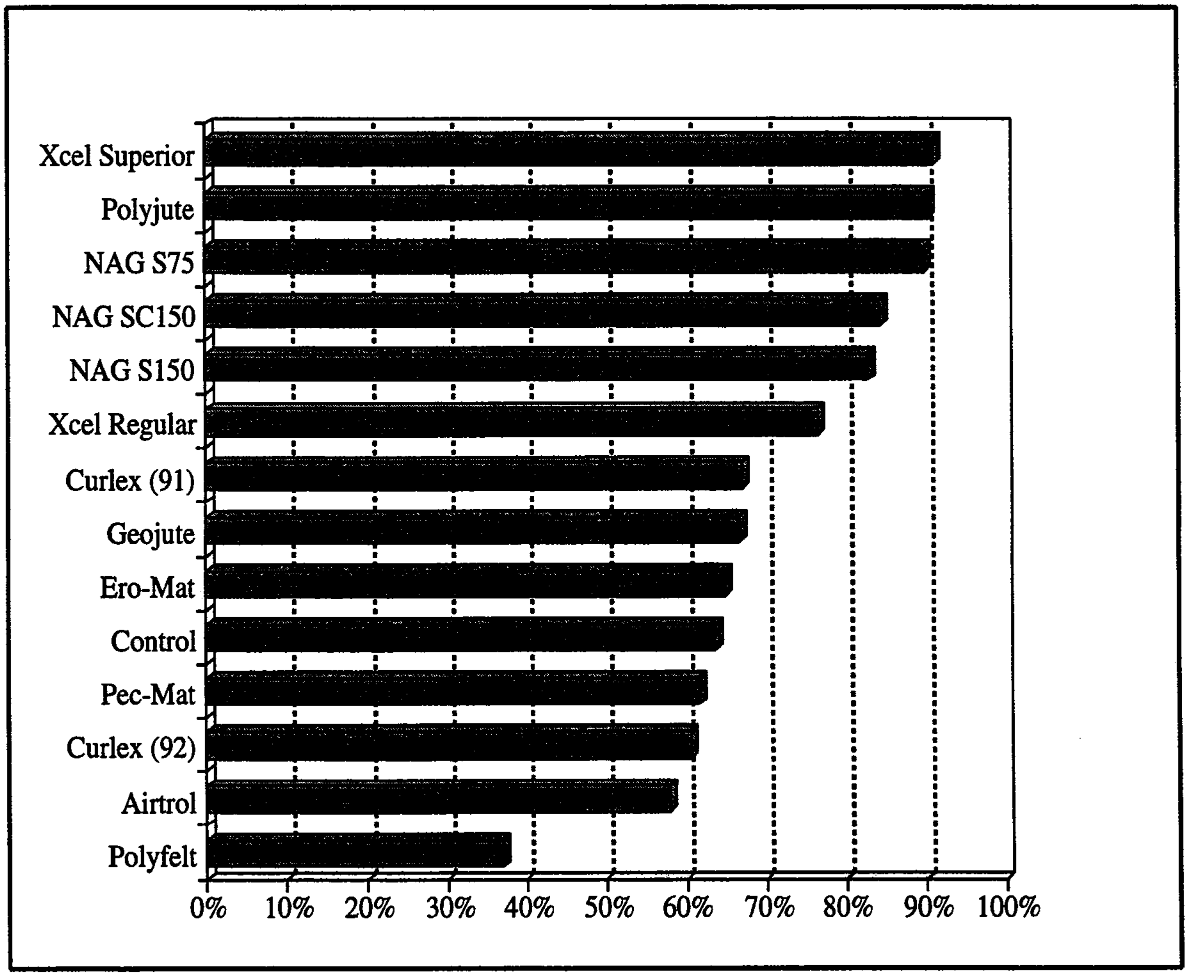


Figure 16F. Vegetative Density (%)

Table F12. Level 4 - Vegetative Density Based Upon Measurement Round

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
AIRTROL® Plaster	92	Round 4	All	All	71.588	1/3
American Excelsior Curlex®	92	Round 4	All	All	61.184	2/3
CONTROL	92	Round 4	All	All	60.996	3/3
Belton DEKOWE® 700	92	Round 4	All	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 4	All	All	92.310	1/14
North American Green® S150	91	Round 4	All	All	88.380	2/14
North American Green® S75	91	Round 4	All	All	87.046	3/14
POLYJUTE™ 407GT	91	Round 4	All	All	85.227	4/14
North American Green® SC150	91	Round 4	All	All	83.413	5/14
Xcel Regular®	91	Round 4	All	All	81.215	6/14
verdyol®ERO-MAT®	91	Round 4	All	All	80.505	7/14
AIRTROL® Plaster	92	Round 4	All	All	71.588	8/14
ANTI-WASH®/GEOJUTE®	91	Round 4	All	All	71.339	9/14
GREENSTREAK® PEC-MAT™	91	Round 4	All	All	71.020	10/14
American Excelsior Curlex®	91	Round 4	All	All	67.937	11/14
American Excelsior Curlex®	92	Round 4	All	All	61.184	12/14
CONTROL	91-92	Round 4	All	All	59.537	13/14
Polyfelt® TS22	91	Round 4	All	All	40.980	14/14
Belton DEKOWE® 700	92	Round 4	All	All	N/A	N/A

**Vegetative Density is in percent

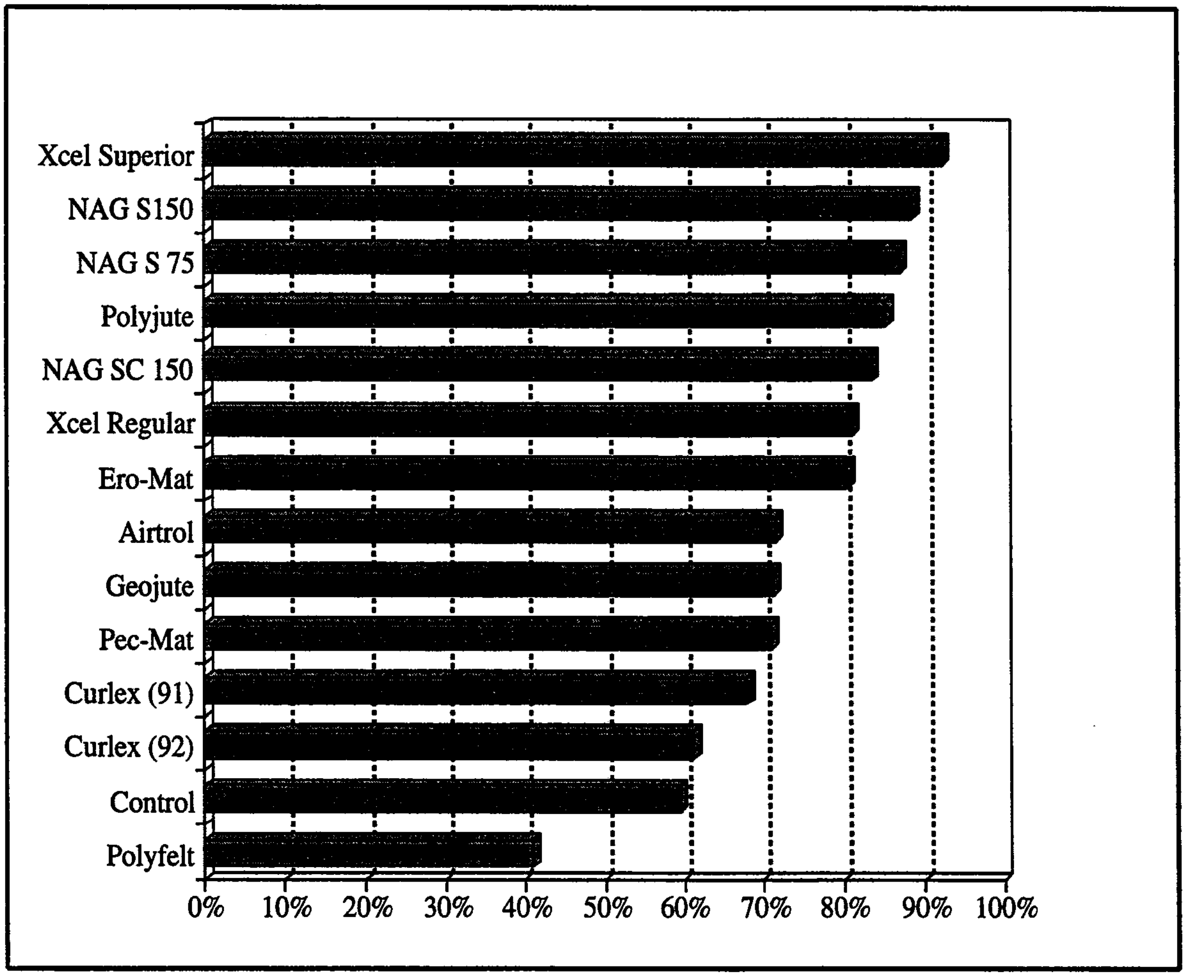


Figure 17F. Vegetative Density (%)

Table F13. Level 5 - Analysis Based Upon Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
Belton DEKOWE ® 700	92	2:1	Clay	All	0.20	1/3	73.713	3/3
Airtrol Plaster®	92	2:1	Clay	All	0.22	2/3	86.094	2/3
CONTROL	92	2:1	Clay	All	1.43	3/3	97.081	3/3
COMBINED 91-92 EVALUATION CYCLES								
American Excelsior Curlex®	91	2:1	Clay	All	0.17	1/11	97.834	2/11
North American Green® SC150	91	2:1	Clay	All	0.19	2/11	89.979	6/11
Polyfelt® TS22	91	2:1	Clay	All	0.20	3/11	35.909	11/11
Belton DEKOWE® 700	92	2:1	Clay	All	0.20	4/11	73.717	10/11
North American Green® S150	91	2:1	Clay	All	0.20	5/11	92.014	4/11
POLYJUTE™ 407GT	91	2:1	Clay	All	0.22	6/11	96.151	3/11
Airtrol Plaster®	92	2:1	Clay	All	0.22	7/11	86.094	9/11
GREENSTREAK® PEC-MAT™	91	2:1	Clay	All	0.23	8/11	87.580	7/11
ANTI-WASH®/GEOJUTE®	91	2:1	Clay	All	0.25	9/11	90.058	5/11
Xcel Superior®	91	2:1	Clay	All	0.29	10/11	98.814	1/11
CONTROL	91-92	2:1	Clay	All	1.36	11/11	86.400	8/11

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

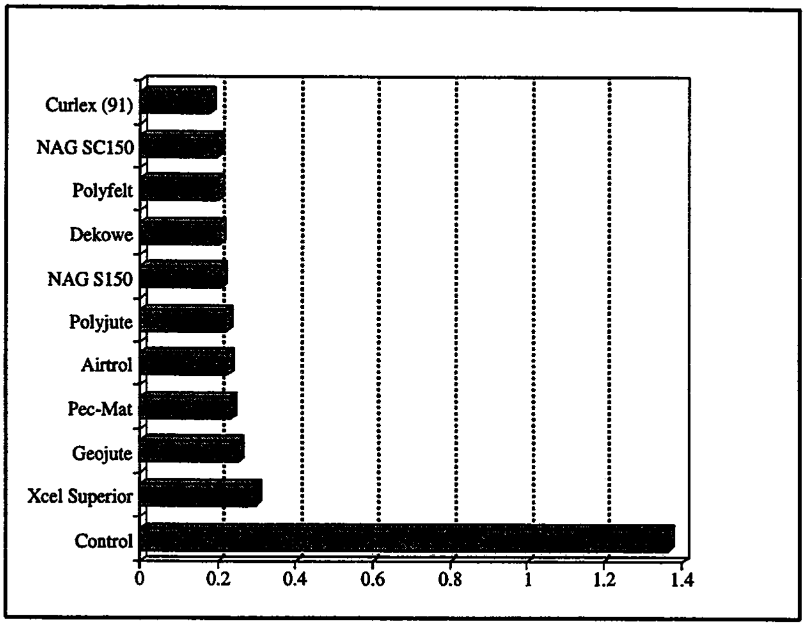


Figure 18F. Sediment Loss (kg/9.3 sq m)

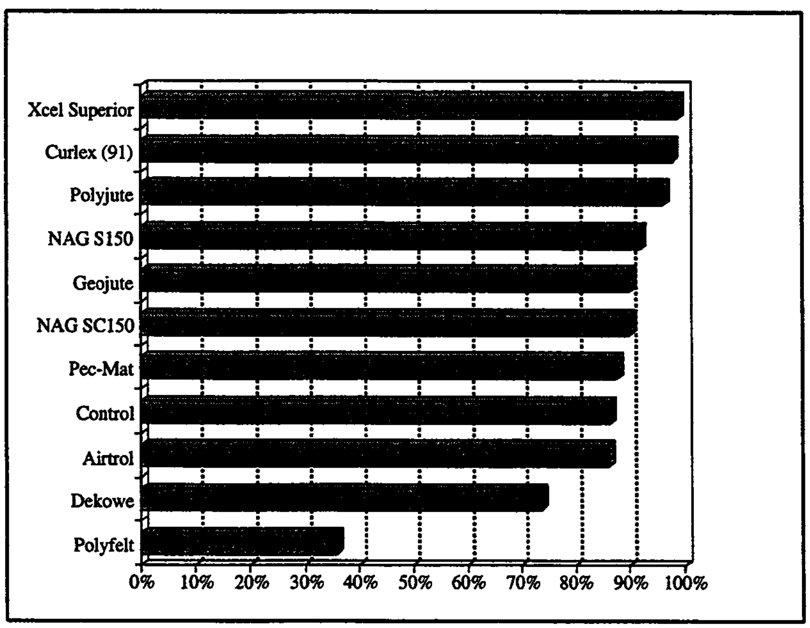


Figure 19F. Vegetative Density (%)

Table F14. Level 5 - Analysis Based Upon Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
American Excelsior Curlex®	92	2:1	Sand	All	20.20	1/3	47.335	1/3
AIRTROL® Plaster	92	2:1	Sand	All	35.10	2/3	41.882	2/3
CONTROL	92	2:1	Sand	All	52.22	3/3	35.834	3/3
Belton DEKOWE® 700	92	2:1	Sand	All	N/A	N/A	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES								
Xcel Superior®	91	2:1	Sand	All	14.52	1/11	85.805	1/11
POLYJUTE™ 407GT	91	2:1	Sand	All	17.38	2/11	74.302	4/11
North American Green® SC150	91	2:1	Sand	All	19.29	3/11	76.409	3/11
American Excelsior Curlex®	92	2:1	Sand	All	20.20	4/11	47.335	7/11
North American Green® S150	91	2:1	Sand	All	22.15	5/11	84.746	2/11
Polyfelt® TS22	91	2:1	Sand	All	23.27	6/11	46.051	8/11
American Excelsior Curlex®	91	2:1	Sand	All	27.60	7/11	52.674	5/11
ANTI-WASH®/GEOJUTE®	91	2:1	Sand	All	28.07	8/11	51.372	6/11
GREENSTREAK® PEC-MAT™	91	2:1	Sand	All	28.85	9/11	38.863	11/11
AIRTROL® Plaster	92	2:1	Sand	All	35.10	10/11	41.882	9/11
CONTROL	91-92	2:1	Sand	All	60.99	11/11	40.123	10/11
Belton DEKOWE® 700	92	2:1	Sand	All	N/A	N/A	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

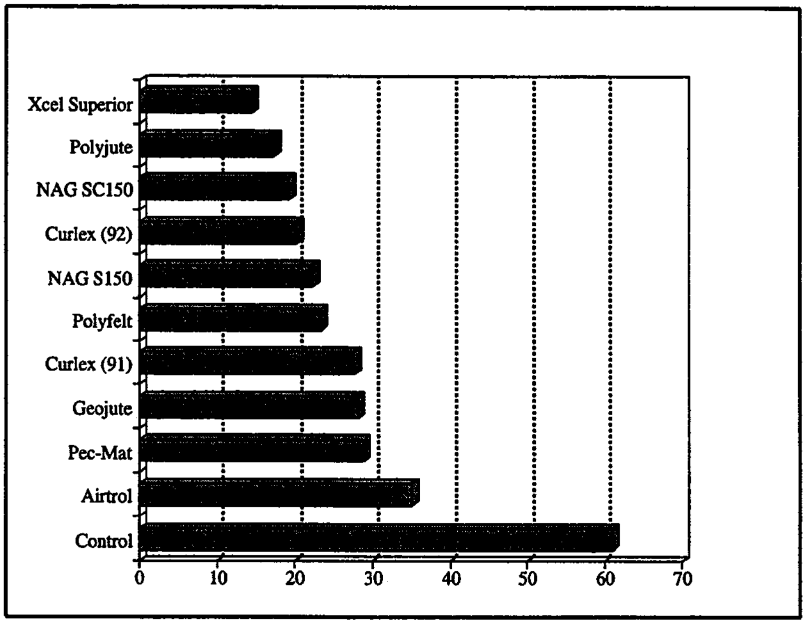


Figure 20F. Sediment Loss (kg/9.3 sq m)

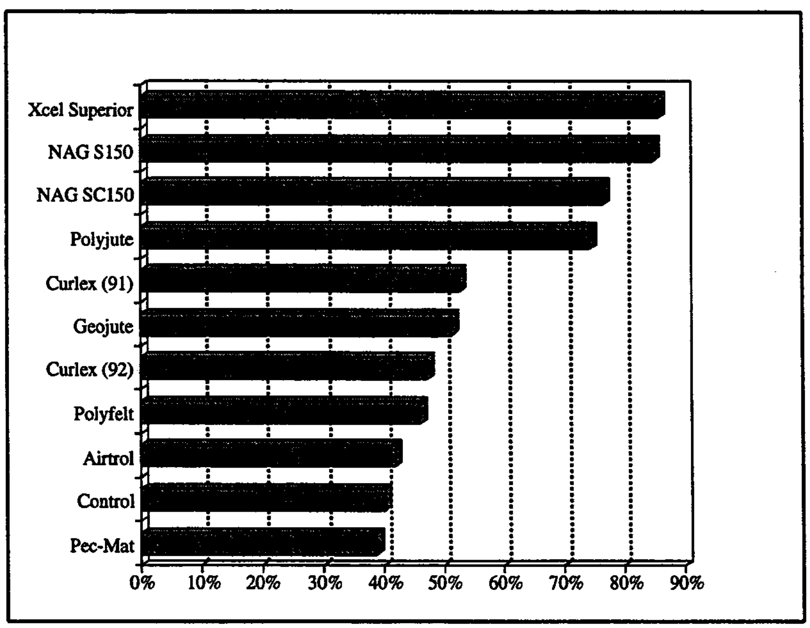


Figure 21F. Vegetative Density (%)

Table F15. Level 5 - Analysis Based Upon Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
American Excelsior Curlex®	92	3:1	Clay	All	0.10	1/3	98.125	1/3
Airtrol Plaster®	92	3:1	Clay	All	0.22	2/3	86.444	2/3
CONTROL	92	3:1	Clay	All	1.36	3/3	75.562	3/3
COMBINED 91-92 EVALUATION CYCLES								
American Excelsior Curlex®	92	3:1	Clay	All	0.10	1/8	98.125	1/8
American Excelsior Curlex®	91	3:1	Clay	All	0.13	2/8	63.230	8/8
verdyol®ERO-MAT®	91	3:1	Clay	All	0.14	3/8	87.808	5/8
GREENSTREAK® PEC-MAT™	91	3:1	Clay	All	0.18	4/8	90.524	3/8
Airtrol Plaster®	92	3:1	Clay	All	0.22	5/8	86.444	6/8
North American Green® S75	91	3:1	Clay	All	0.25	6/8	96.187	2/8
Xcel Regular®	91	3:1	Clay	All	0.29	7/8	90.166	4/8
CONTROL	91-92	3:1	Clay	All	1.35	8/8	67.286	7/8

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

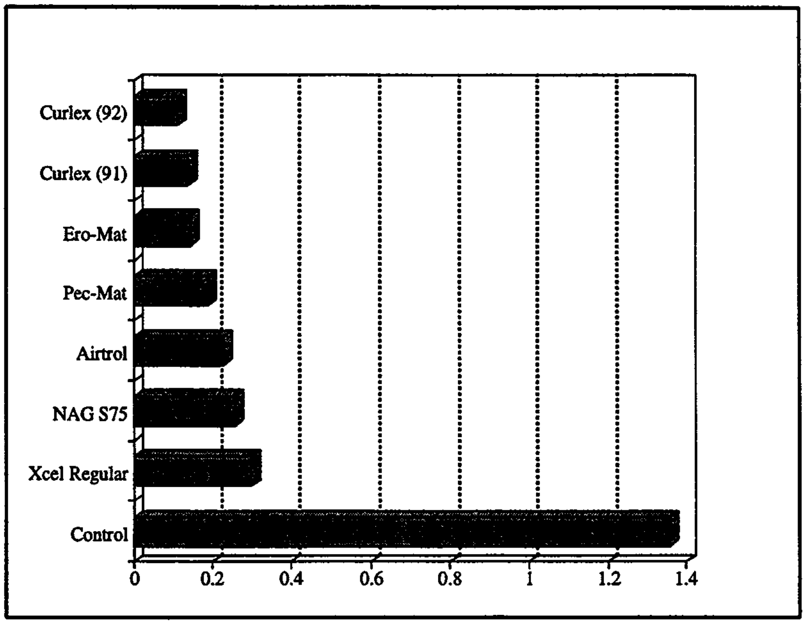


Figure 22F. Sediment Loss (kg/9.3 sq m)

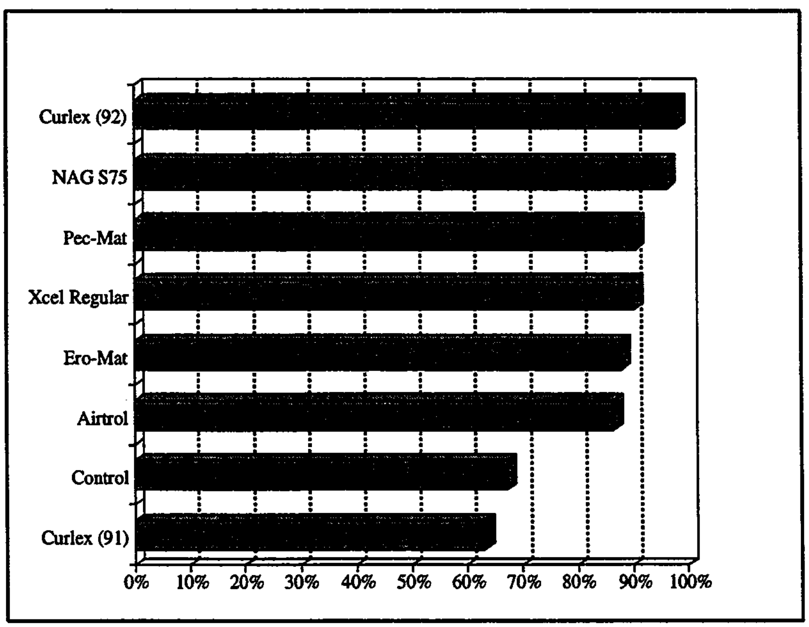


Figure 23F. Vegetative Density (%)

Table F16. Level 5 - Analysis Based Upon Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Slope	Soil	Design Storm	Sdmt Loss*	Sdmt Rank	Veg** Density	Veg Rank
American Excelsior Curlex®	92	3:1	Sand	All	3.83	1/3	33.232	3/3
Airtrol Plaster®	92	3:1	Sand	All	11.54	2/3	68.749	1/3
CONTROL	92	3:1	Sand	All	29.39	3/3	41.298	2/3
COMBINED 91-92 EVALUATION CYCLES								
American Excelsior Curlex®	92	3:1	Sand	All	3.83	1/8	33.232	8/8
American Excelsior Curlex®	91	3:1	Sand	All	4.10	2/8	60.937	6/8
Xcel Regular®	91	3:1	Sand	All	4.39	3/8	72.263	3/8
North American Green® S75	91	3:1	Sand	All	7.54	4/8	77.904	1/8
verdyol®ERO-MAT®	91	3:1	Sand	All	8.45	5/8	73.202	2/8
Airtrol Plaster®	92	3:1	Sand	All	11.54	6/8	68.749	4/8
GREENSTREAK® PEC-MAT™	91	3:1	Sand	All	15.28	7/8	62.385	5/8
CONTROL	91-92	3:1	Sand	All	28.84	8/8	47.553	7/8

*Sediment Loss is in (kg/9.3 sq m)
**Vegetative Density is in percent

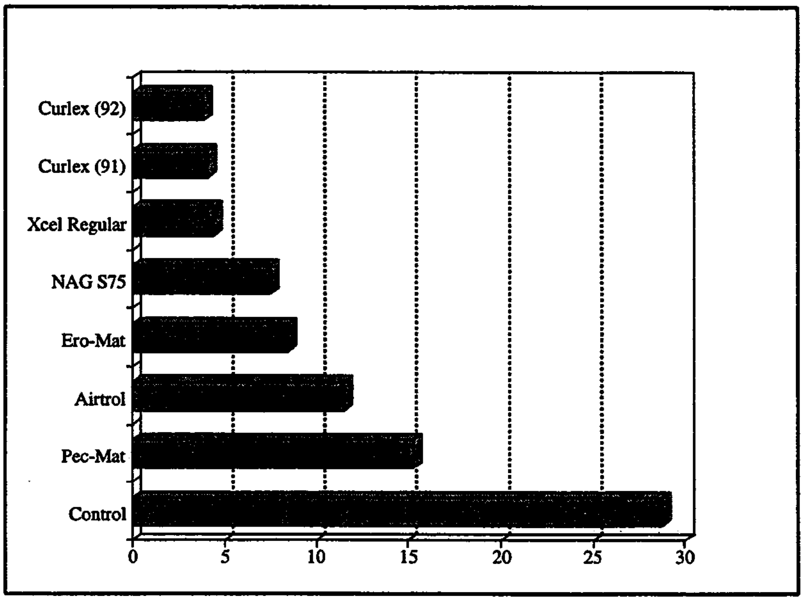


Figure 24F. Sediment Loss (kg/9.3 sq m)

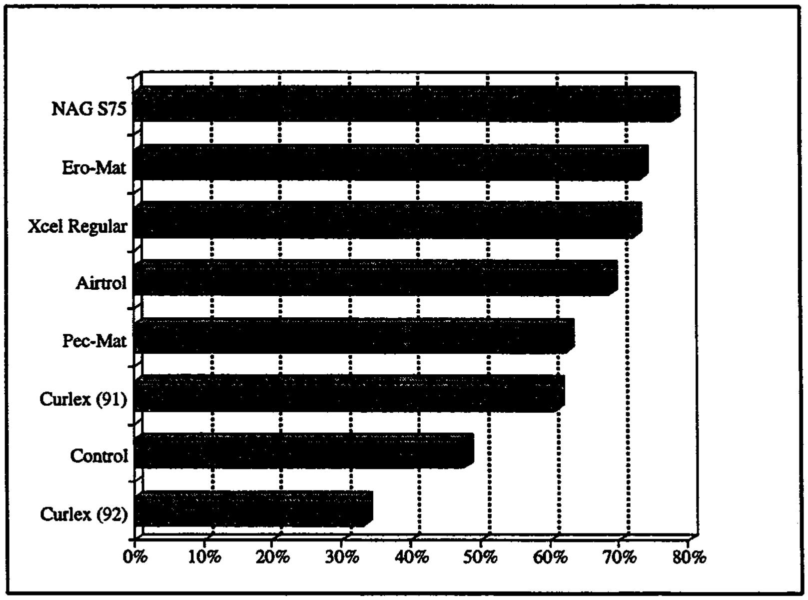


Figure 25F. Vegetative Density (%)

Table F17. Level 6 - Sediment Loss Based Upon Simulated Rainfall Event and Steepness of Slope

Product Evaluated	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	2:1	All	1.74	1/3
Airtrol Plaster®	92	1-Year	2:1	All	7.02	2/3
CONTROL	92	1-Year	2:1	All	15.54	3/3
Belton DEKOWE® 700	92	1-Year	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S150	91	1-Year	2:1	All	0.50	1/11
North American Green® SC150	91	1-Year	2:1	All	0.53	2/11
American Excelsior Curlex®	91	1-Year	2:1	All	0.75	3/11
Polyfelt® TS22	91	1-Year	2:1	All	0.86	4/11
Xcel Superior®	91	1-Year	2:1	All	0.86	5/11
American Excelsior Curlex®	92	1-Year	2:1	All	1.74	6/11
ANTI-WASH®/GEOJUTE®	91	1-Year	2:1	All	1.91	7/11
POLYJUTE™ 407GT	91	1-Year	2:1	All	3.56	8/11
GREENSTREAK® PEC-MAT™	91	1-Year	2:1	All	5.96	9/11
Airtrol Plaster®	92	1-Year	2:1	All	7.02	10/11
CONTROL	91-92	1-Year	2:1	All	13.39	11/11
Belton DEKOWE® 700	92	1-Year	2:1	All	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

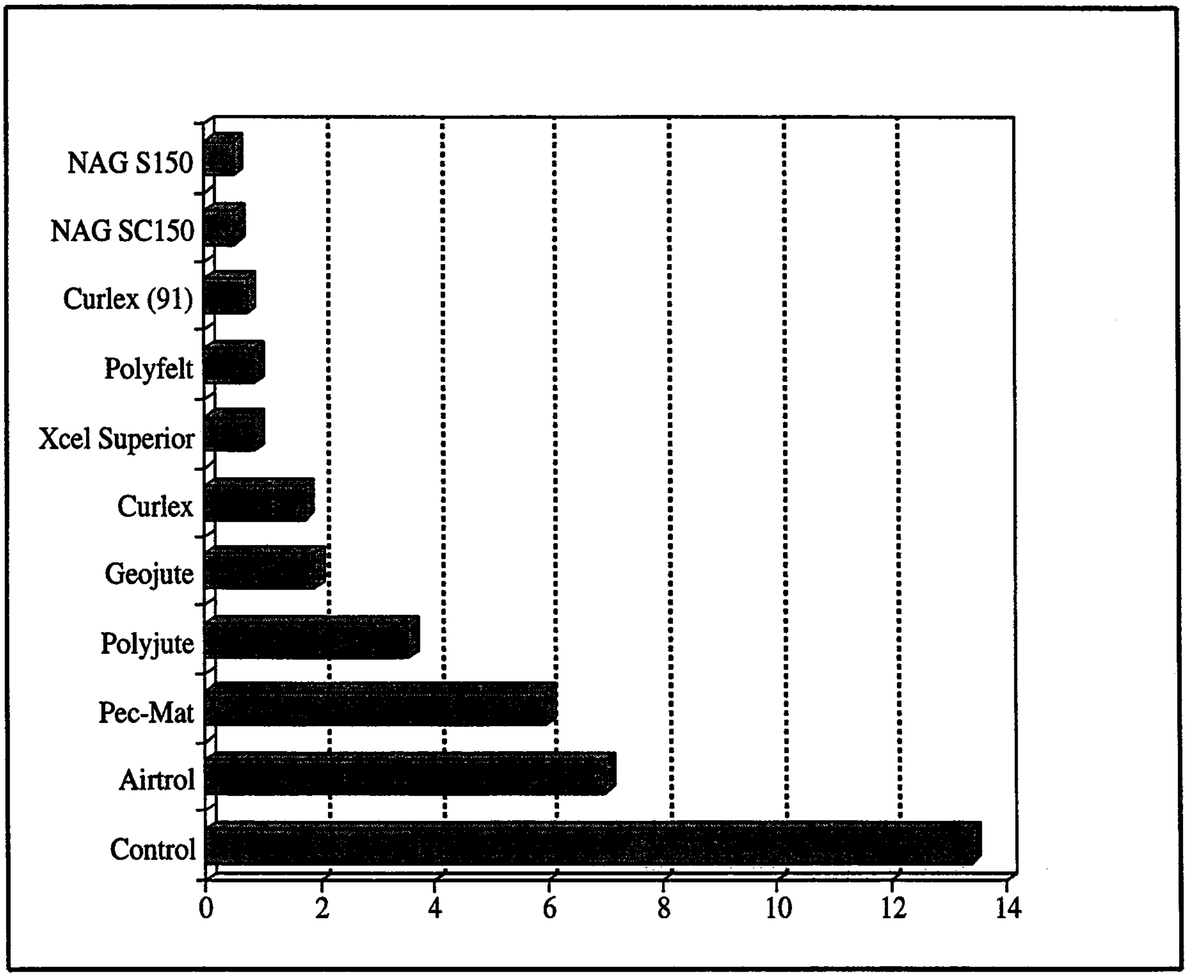


Figure 26F. Sediment Loss (kg/9.3 sq m)

Table F18. Level 6 - Sediment Loss Based Upon Simulated Rainfall Event and Steepness of Slope

Product Evaluated	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	2:1	All	11.32	1/3
Airtrol Plaster®	92	2-Year	2:1	All	11.98	2/3
CONTROL	92	2-Year	2:1	All	25.54	3/3
Belton DEKOWE® 700	92	2-Year	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	2-Year	2:1	All	0.42	1/11
North American Green® SC150	91	2-Year	2:1	All	5.69	2/11
North American Green® S150	91	2-Year	2:1	All	7.95	3/11
POLYJUTE™ 407GT	91	2-Year	2:1	All	8.52	4/11
American Excelsior Curlex®	92	2-Year	2:1	All	11.32	5/11
Airtrol Plaster®	92	2-Year	2:1	All	11.98	6/11
Polyfelt® TS22	91	2-Year	2:1	All	14.75	7/11
American Excelsior Curlex®	91	2-Year	2:1	All	16.15	8/11
GREENSTREAK® PEC-MAT™	91	2-Year	2:1	All	16.74	9/11
ANTI-WASH®/GEOJUTE®	91	2-Year	2:1	All	18.99	10/11
CONTROL	91-92	2-Year	2:1	All	38.52	11/11
Belton DEKOWE® 700	92	2-Year	2:1	All	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

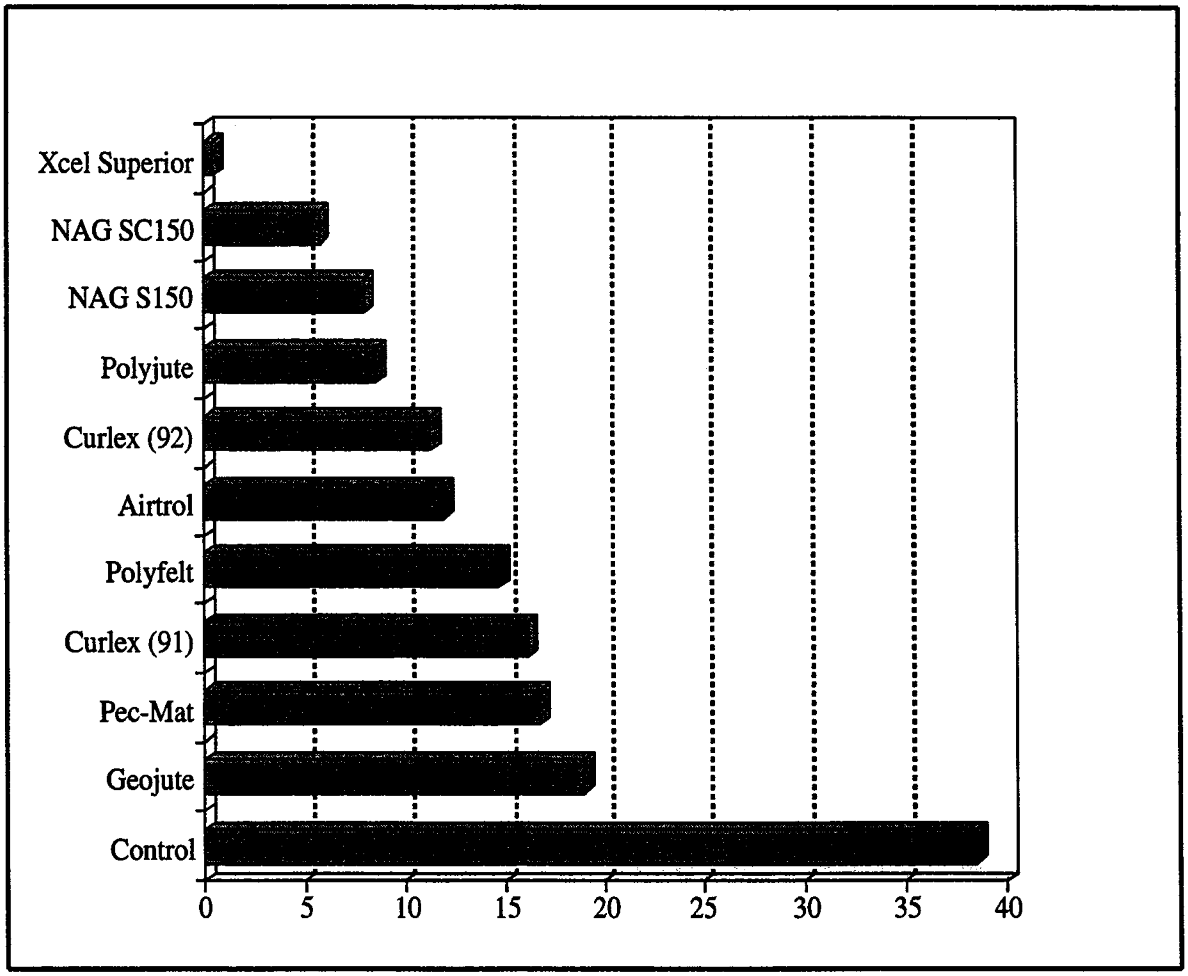


Figure 27F. Sediment Loss (kg/9.3 sq m)

Table F19. Level 6 - Sediment Loss Based Upon Simulated Rainfall Event and Steepness of Slope

Product Evaluated	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
CONTROL	92	5-Year	2:1	All	35.73	1/3
Airtrol Plaster®	92	5-Year	2:1	All	37.71	2/3
American Excelsior Curlex®	92	5-Year	2:1	All	44.46	3/3
Belton DEKOWE® 700	92	5-Year	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	5-Year	2:1	All	15.46	1/11
POLYJUTE™ 407GT	91	5-Year	2:1	All	18.18	2/11
North American Green® SC150	91	5-Year	2:1	All	21.39	3/11
Polyfelt® TS22	91	5-Year	2:1	All	22.98	4/11
North American Green® S150	91	5-Year	2:1	All	26.28	5/11
ANTI-WASH®/GEOJUTE®	91	5-Year	2:1	All	27.92	6/11
American Excelsior Curlex®	91	5-Year	2:1	All	28.62	7/11
GREENSTREAK® PEC-MAT™	91	5-Year	2:1	All	31.65	8/11
Airtrol Plaster®	92	5-Year	2:1	All	37.71	9/11
American Excelsior Curlex®	92	5-Year	2:1	All	44.46	10/11
CONTROL	91-92	5-Year	2:1	All	46.22	11/11
Belton DEKOWE® 700	92	5-Year	2:1	All	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

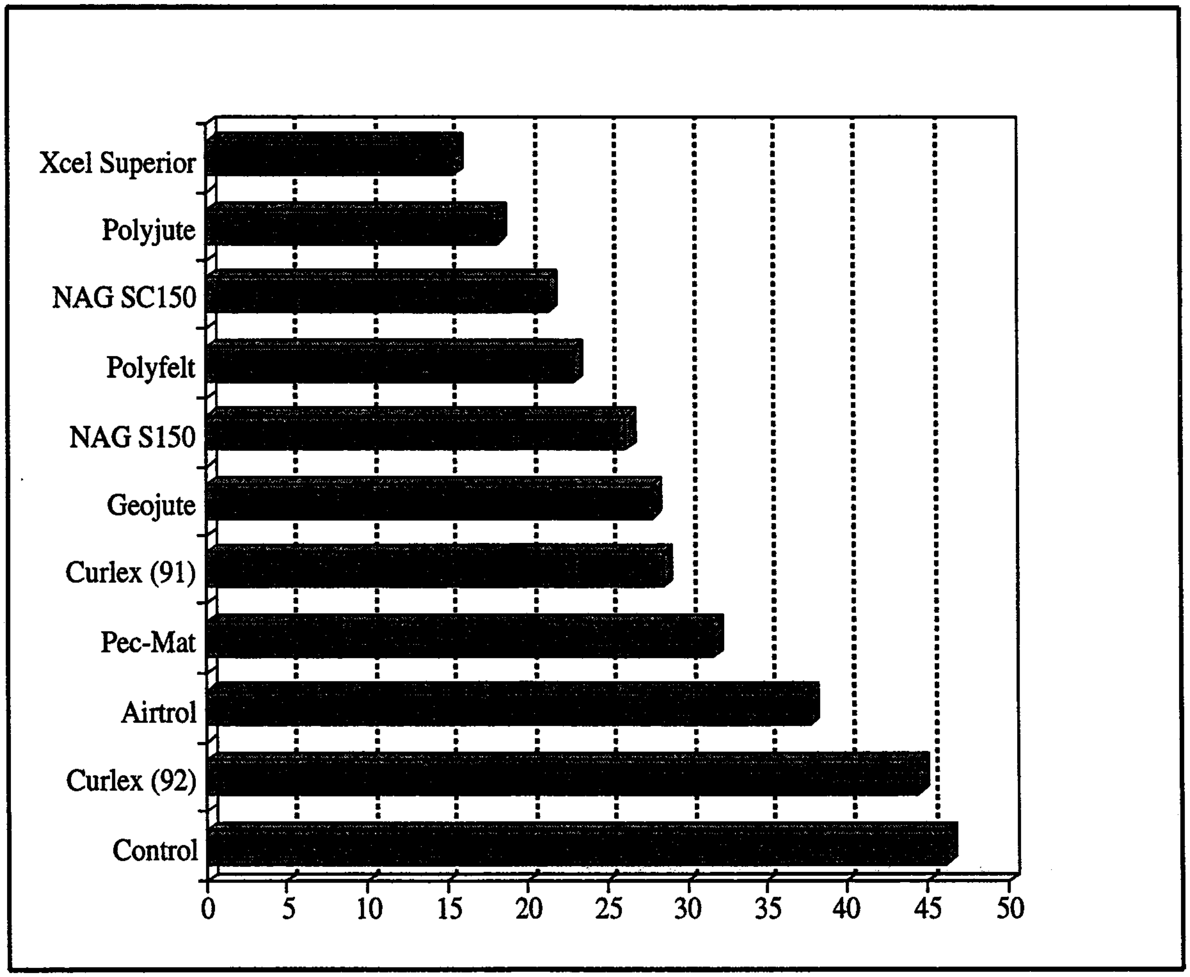


Figure 28F. Sediment Loss (kg/9.3 sq m)

Table F20. Level 6 - Sediment Loss Based Upon Simulated Rainfall Event and Steepness of Slope

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	3:1	All	0.24	1/3
Airtrol Plaster®	92	1-Year	3:1	All	0.91	2/3
CONTROL	92	1-Year	3:1	All	5.76	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	92	1-Year	3:1	All	0.24	1/8
verdyol®ERO-MAT®	91	1-Year	3:1	All	0.42	2/8
Xcel Regular®	91	1-Year	3:1	All	0.67	3/8
North American Green® S75	91	1-Year	3:1	All	0.68	4/8
Airtrol Plaster®	92	1-Year	3:1	All	0.91	5/8
American Excelsior Curlex®	91	1-Year	3:1	All	1.33	6/8
GREENSTREAK® PEC-MAT™	91	1-Year	3:1	All	2.28	7/8
CONTROL	91-92	1-Year	3:1	All	5.21	8/8

*Sediment Loss is in (kg/9.3 sq m)

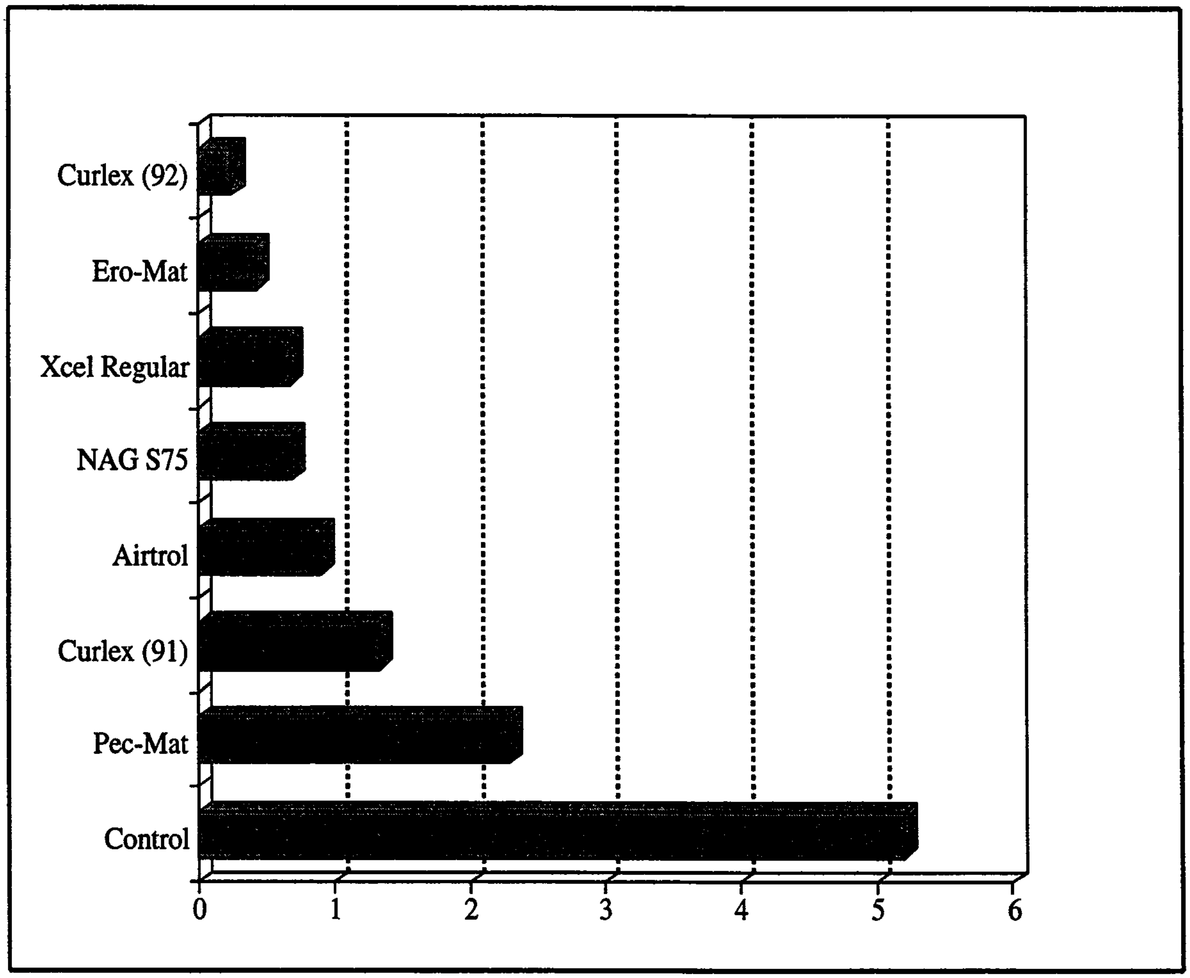


Figure 29F. Sediment Loss (kg/9.3 sq m)

Table F21. Level 6 - Sediment Loss Based Upon Simulated Rainfall Event and Steepness of Slope

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	3:1	All	1.53	1/3
Airtrol Plaster®	92	2-Year	3:1	All	5.68	2/3
CONTROL	92	2-Year	3:1	All	20.21	3/3
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	2-Year	3:1	All	1.52	1/8
American Excelsior Curlex®	92	2-Year	3:1	All	1.53	2/8
American Excelsior Curlex®	91	2-Year	3:1	All	1.68	3/8
verdyol®ERO-MAT®	91	2-Year	3:1	All	5.04	4/8
Airtrol Plaster®	92	2-Year	3:1	All	5.68	5/8
North American Green® S75	91	2-Year	3:1	All	6.23	6/8
GREENSTREAK® PEC-MAT™	91	2-Year	3:1	All	12.59	7/8
CONTROL	91-92	2-Year	3:1	All	21.12	8/8

*Sediment Loss is in (kg/9.3 sq m)

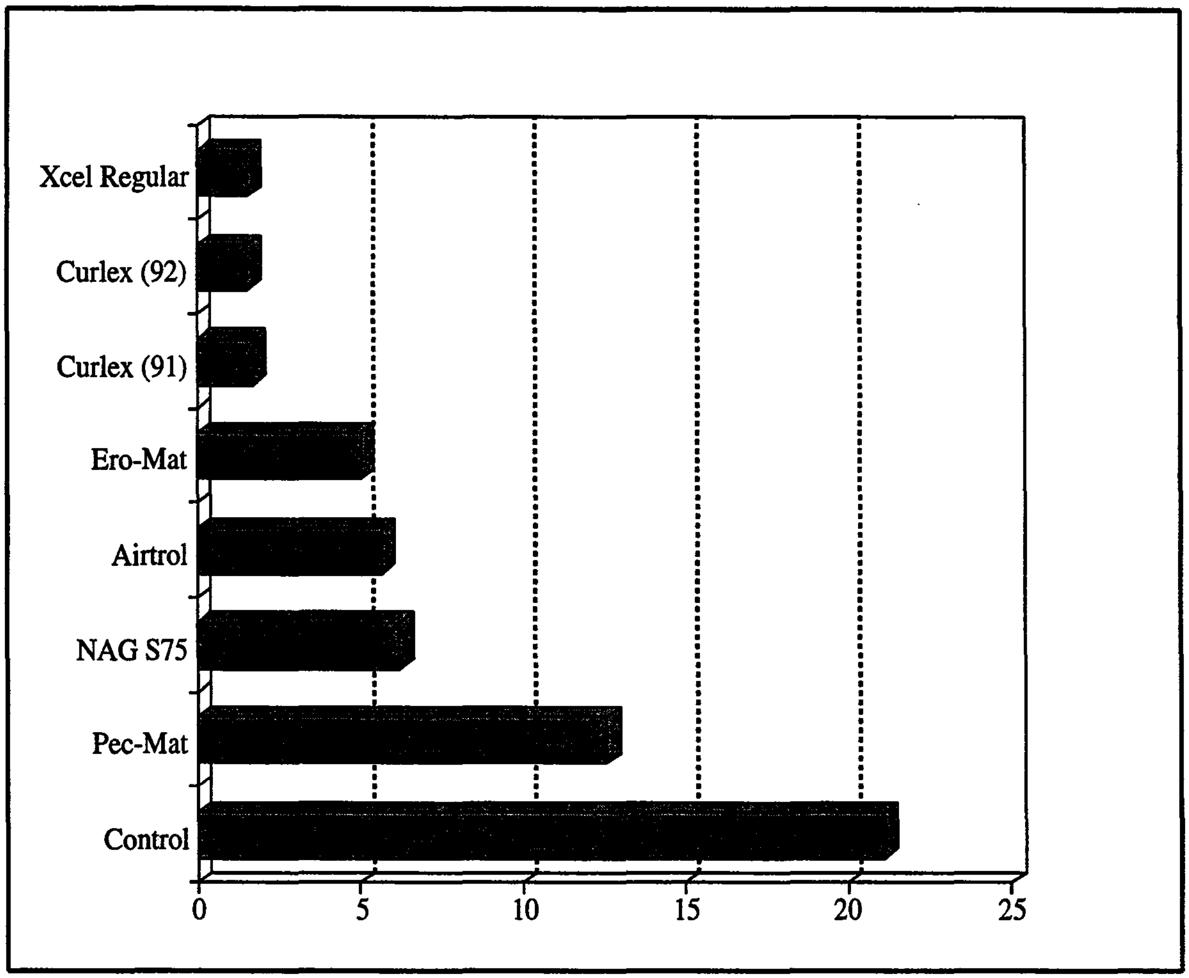


Figure 30F. Sediment Loss (kg/9.3 sq m)

Table F22. Level 6 - Sediment Loss Based Upon Simulated Rainfall Event and Steepness of Slope

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	3:1	All	4.22	1/3
Airtrol Plaster®	92	5-Year	3:1	All	12.95	2/3
CONTROL	92	5-Year	3:1	All	18.47	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	91	5-Year	3:1	All	3.67	1/8
American Excelsior Curlex®	92	5-Year	3:1	All	4.22	2/8
Xcel Regular®	91	5-Year	3:1	All	4.42	3/8
North American Green® S75	91	5-Year	3:1	All	5.93	4/8
verdyol®ERO-MAT	91	5-Year	3:1	All	7.83	5/8
GREENSTREAK® PEC-MAT™	91	5-Year	3:1	All	12.26	6/8
Airtrol Plaster®	92	5-Year	3:1	All	12.95	7/8
CONTROL	91-92	5-Year	3:1	All	19.11	8/8

*Sediment Loss is in (kg/9.3 sq m)

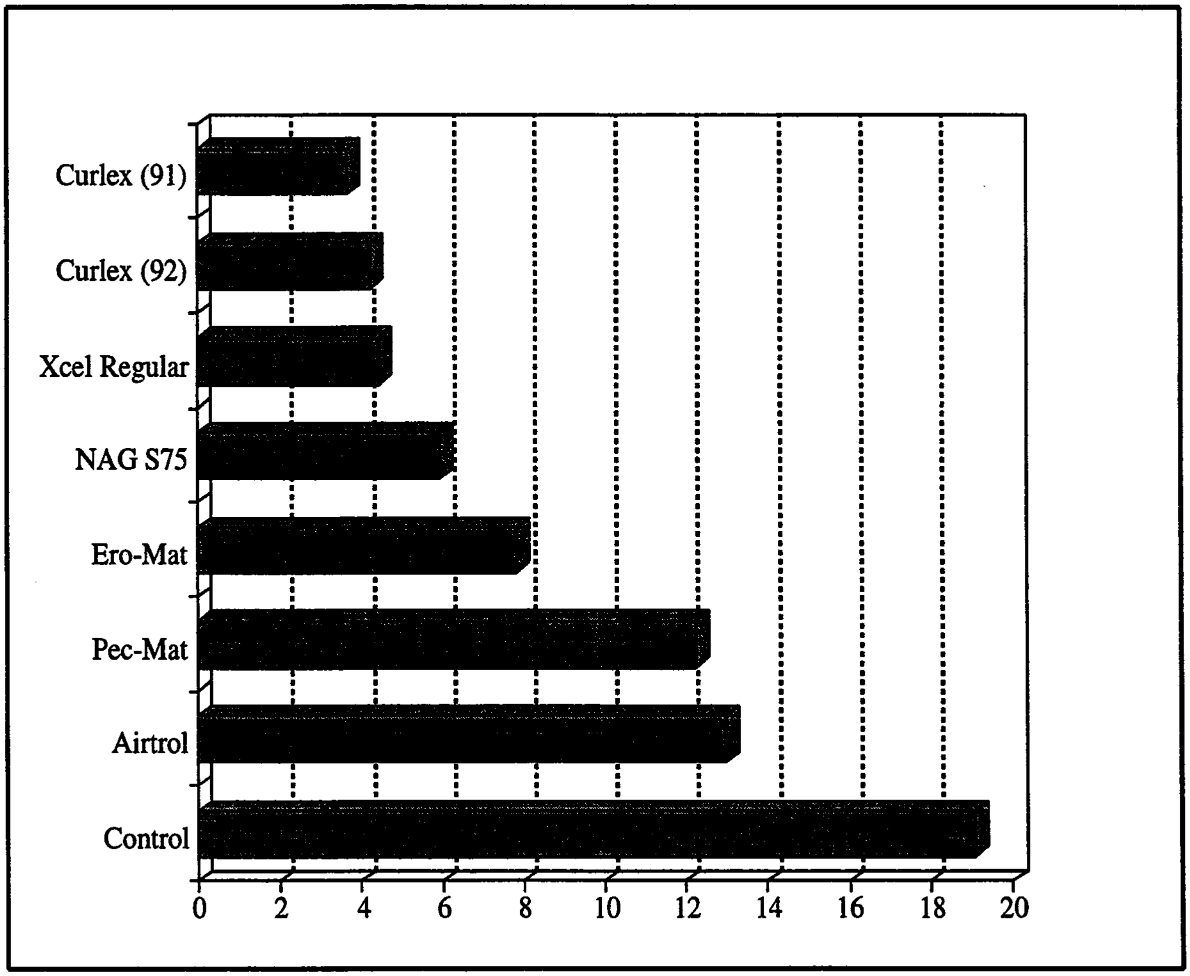


Figure 31F. Sediment Loss (kg/9.3 sq m)

Table F23. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	2:1	All	18.737	1/3
Airtrol Plaster®	92	Round 1	2:1	All	12.569	2/3
American Excelsior Curlex®	92	Round 1	2:1	All	9.081	3/3
Belton DEKOWE® 700	92	Round 1	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
CONTROL	91-92	Round 1	2:1	All	16.213	1/11
Airtrol Plaster®	92	Round 1	2:1	All	12.569	2/11
American Excelsior Curlex®	92	Round 1	2:1	All	9.081	3/11
Xcel Superior®	91	Round 1	2:1	All	5.636	4/11
POLYJUTE™ 407GT	91	Round 1	2:1	All	5.158	5/11
American Excelsior Curlex®	91	Round 1	2:1	All	2.222	6/11
ANTI-WASH®/GEOJUTE®	91	Round 1	2:1	All	1.596	7/11
North American Green® S150	91	Round 1	2:1	All	1.581	8/11
GREENSTREAK® PEC-MAT™	91	Round 1	2:1	All	1.473	9/11
Polyfelt® TS22	91	Round 1	2:1	All	0.540	10/11
North American Green® SC150	91	Round 1	2:1	All	0.482	11/11
Belton DEKOWE® 700	92	Round 1	2:1	All	N/A	N/A

**Vegetative Density is in percent

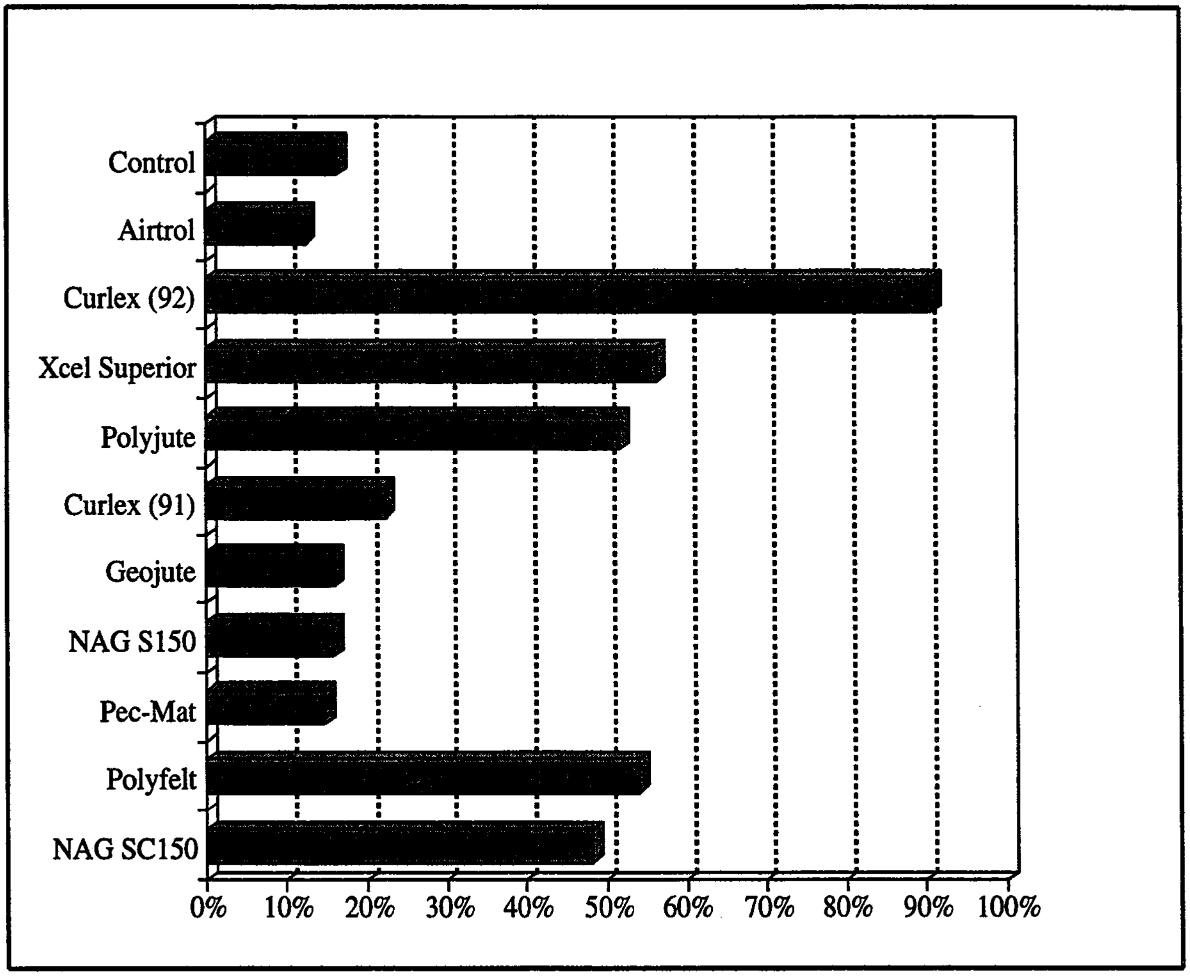


Figure 32F. Vegetative Density (%)

Table F24. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 2	2:1	All	96.398	1/3
Airtrol Plaster®	92	Round 2	2:1	All	75.272	2/3
American Excelsior Curlex®	92	Round 2	2:1	All	21.697	3/3
Belton DEKOWE® 700	92	Round 2	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 2	2:1	All	59.565	1/11
American Excelsior Curlex®	91	Round 2	2:1	All	47.918	2/11
CONTROL	91-92	Round 2	2:1	All	47.767	3/11
POLYJUTE™ 407GT	91	Round 2	2:1	All	46.952	4/11
Airtrol Plaster®	92	Round 2	2:1	All	46.550	5/11
North American Green® SC150	91	Round 2	2:1	All	31.402	6/11
North American Green® S150	91	Round 2	2:1	All	30.235	7/11
ANTI-WASH®/GEOJUTE®	91	Round 2	2:1	All	24.267	8/11
American Excelsior Curlex®	92	Round 2	2:1	All	21.697	9/11
GREENSTREAK® PEC-MAT™	91	Round 2	2:1	All	15.063	10/11
Polyfelt® TS22	91	Round 2	2:1	All	6.659	11/11
Belton DEKOWE® 700	92	Round 2	2:1	All	N/A	N/A

**Vegetative Density is in percent

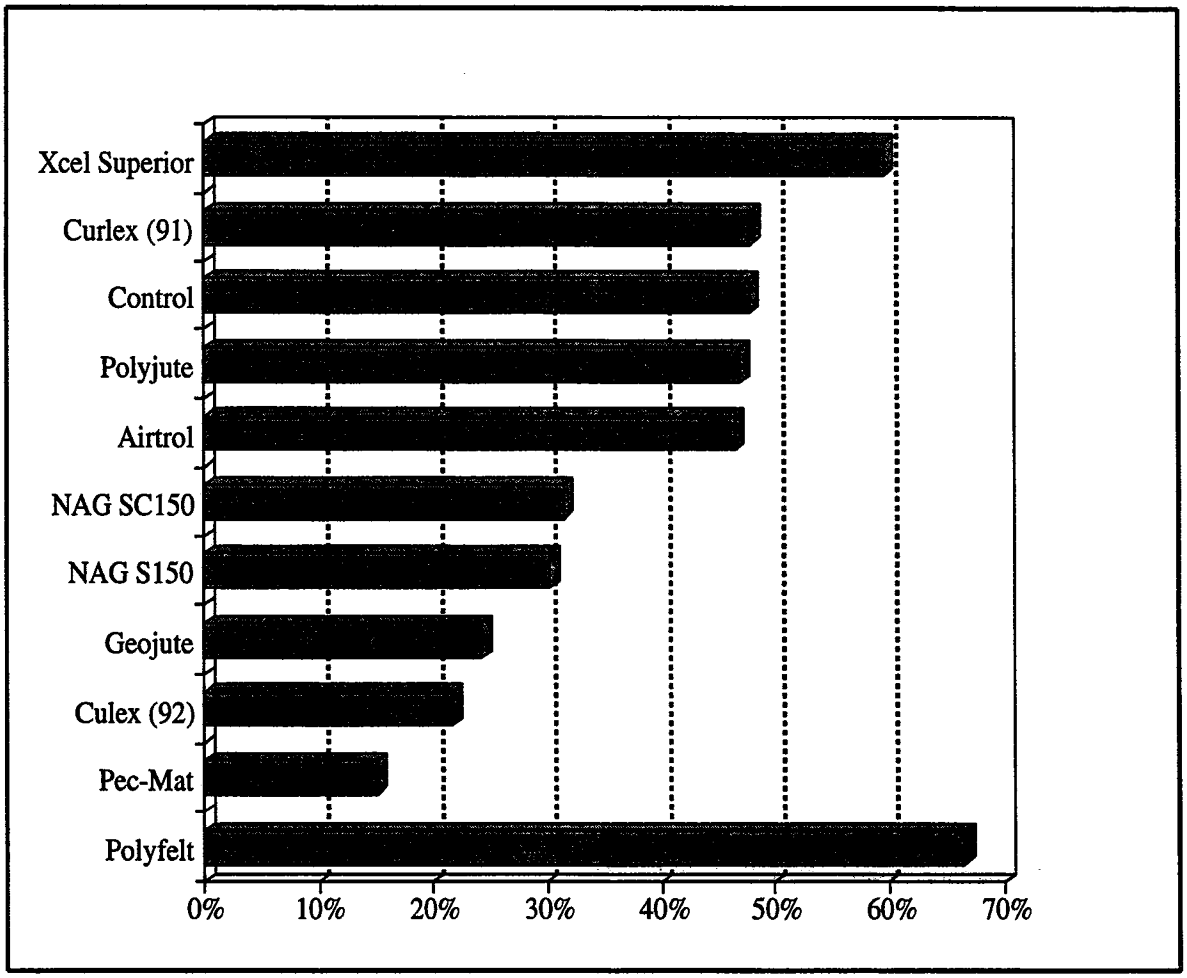


Figure 33F. Vegetative Density (%)

Table F25. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 3	2:1	All	96.615	1/3
Airtrol Plaster®	92	Round 3	2:1	All	50.912	2/3
American Excelsior Curlex®	92	Round 3	2:1	All	39.611	3/3
Belton DEKOWE® 700	92	Round 3	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 3	2:1	All	91.127	1/11
POLYJUTE™ 407GT	91	Round 3	2:1	All	90.487	2/11
North American Green® SC150	91	Round 3	2:1	All	84.453	3/11
North American Green® S150	92	Round 3	2:1	All	82.846	4/11
American Excelsior Curlex®	91	Round 3	2:1	All	76.749	5/11
CONTROL	91-92	Round 3	2:1	All	70.234	6/11
ANTI-WASH®/GEOJUTE®	91	Round 3	2:1	All	66.630	7/11
Airtrol Plaster®	92	Round 3	2:1	All	50.912	8/11
GREENSTREAK® PEC-MAT™	91	Round 3	2:1	All	46.226	9/11
American Excelsior Curlex®	92	Round 3	2:1	All	39.611	10/11
Polyfelt® TS22	91	Round 3	2:1	All	36.894	11/11
Belton DEKOWE® 700	92	Round 3	2:1	All	N/A	N/A

**Vegetative Density is in percent

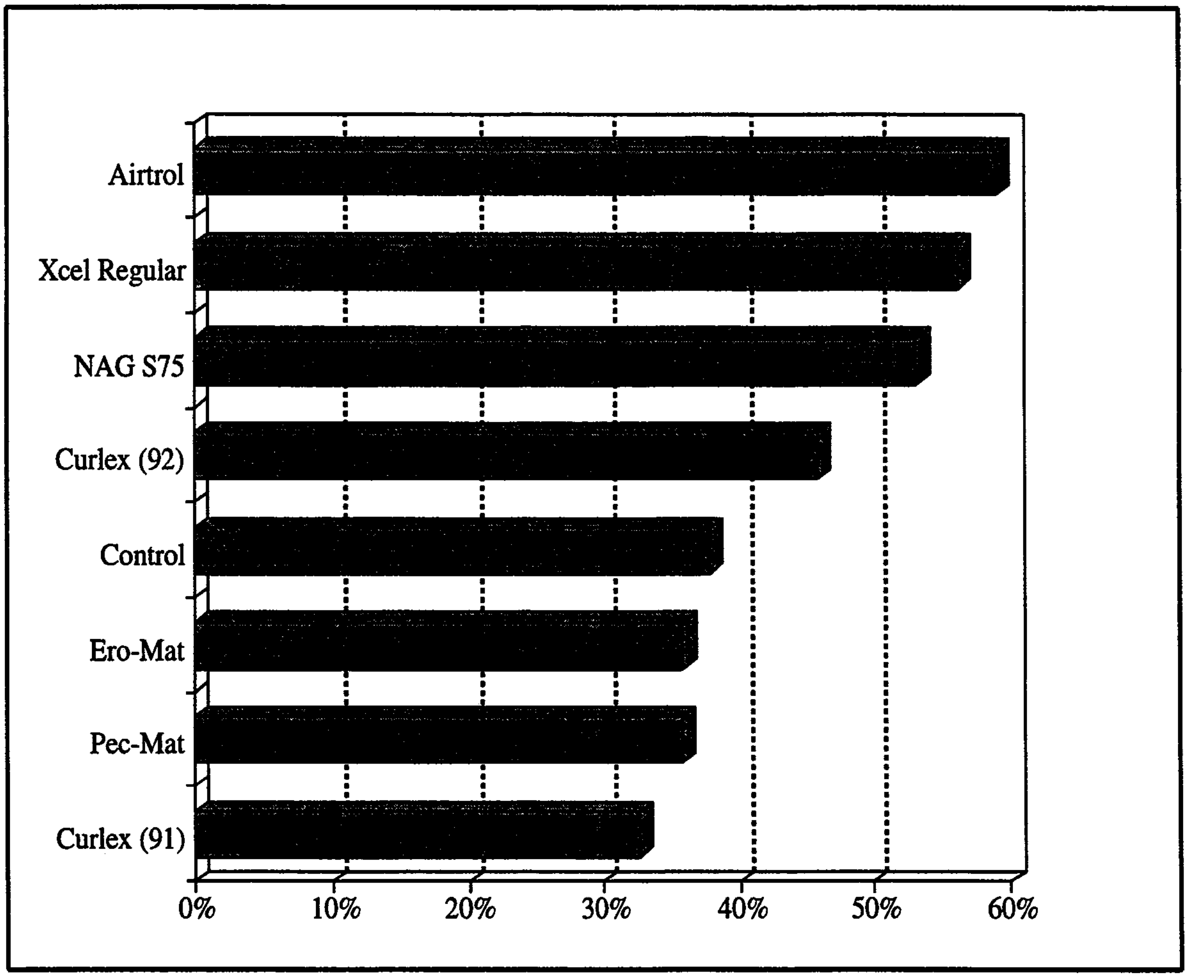


Figure 34F. Vegetative Density (%)

Table F26. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 4	2:1	All	64.416	1/3
Airtrol Plaster®	92	Round 4	2:1	All	63.988	2/3
American Excelsior Curlex®	92	Round 4	2:1	All	47.335	3/3
Belton DEKOWE® 700	92	Round 4	2:1	All	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 4	2:1	All	92.310	1/11
North American Green® S150	91	Round 4	2:1	All	88.380	2/11
POLYJUTE™ 407GT	91	Round 4	2:1	All	85.227	3/11
North American Green® SC150	91	Round 4	2:1	All	83.413	4/11
American Excelsior Curlex®	91	Round 4	2:1	All	75.254	5/11
ANTI-WASH®/GEOJUTE®	91	Round 4	2:1	All	75.254	6/11
GREENSTREAK® PEC-MAT™	91	Round 4	2:1	All	64.007	7/11
Airtrol Plaster®	92	Round 4	2:1	All	63.988	8/11
CONTROL	91-92	Round 4	2:1	All	62.490	9/11
American Excelsior Curlex®	92	Round 4	2:1	All	47.335	10/11
Polyfelt® TS22	91	Round 4	2:1	All	40.980	11/11
Belton DEKOWE® 700	92	Round 4	2:1	All	N/A	N/A

**Vegetative Density is in percent

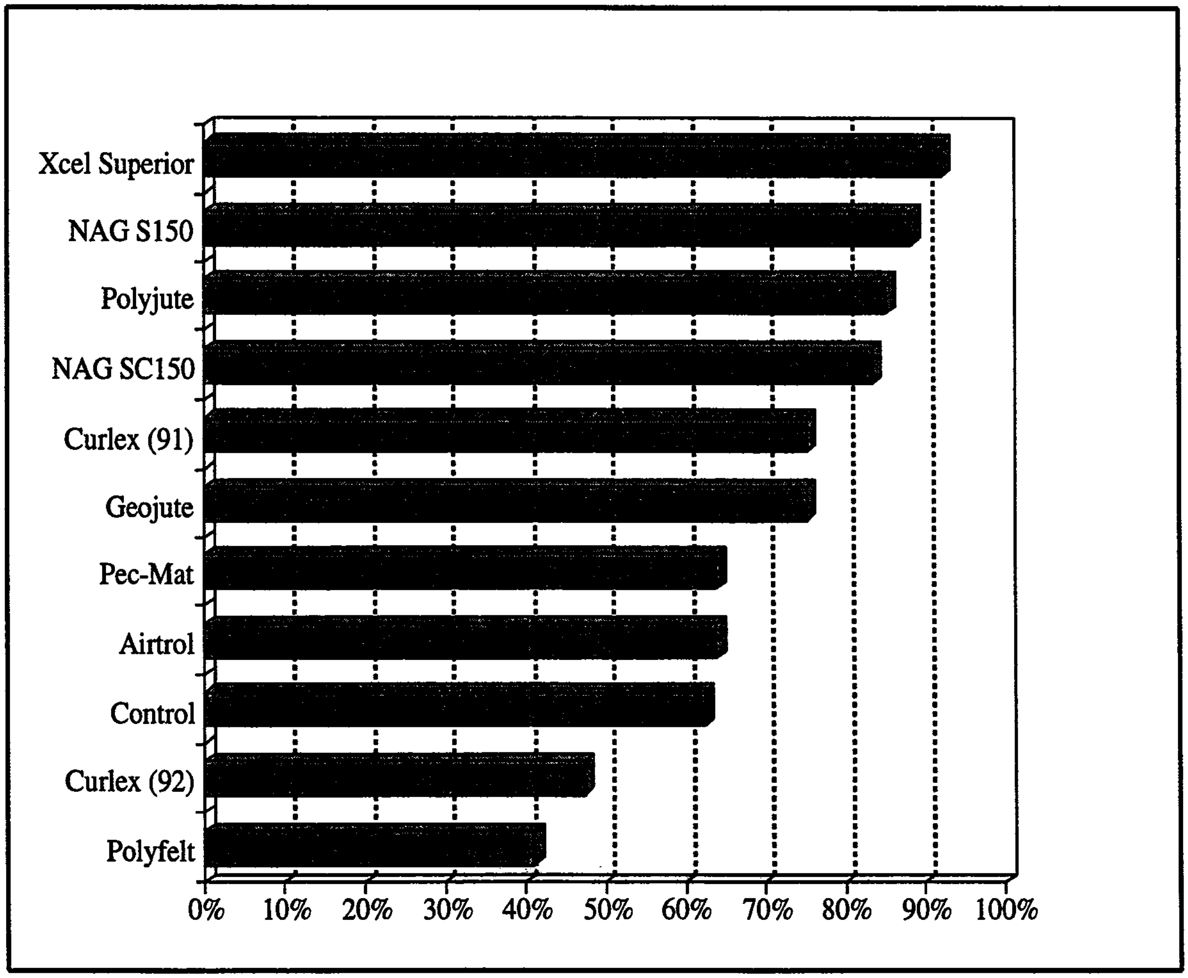


Figure 35F. Vegetative Density (%)

Table F27. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	3:1	All	21.821	1/3
Airtrol Plaster®	92	Round 1	3:1	All	13.327	2/3
American Excelsior Curlex®	92	Round 1	3:1	All	6.826	3/3
COMBINED 91-92 EVALUATION CYCLES						
CONTROL	91-92	Round 1	3:1	All	19.341	1/8
Airtrol Plaster®	92	Round 1	3:1	All	13.327	2/8
North American Green® S75	91	Round 1	3:1	All	8.228	3/8
Xcel Regular®	91	Round 1	3:1	All	7.296	4/8
American Excelsior Curlex®	92	Round 1	3:1	All	6.826	5/8
GREENSTREAK® PEC-MAT™	91	Round 1	3:1	All	4.909	6/8
American Excelsior Curlex®	91	Round 1	3:1	All	2.006	7/8
verdyol®ERO-MAT®	91	Round 1	3:1	All	1.414	8/8

**Vegetative Density is in percent

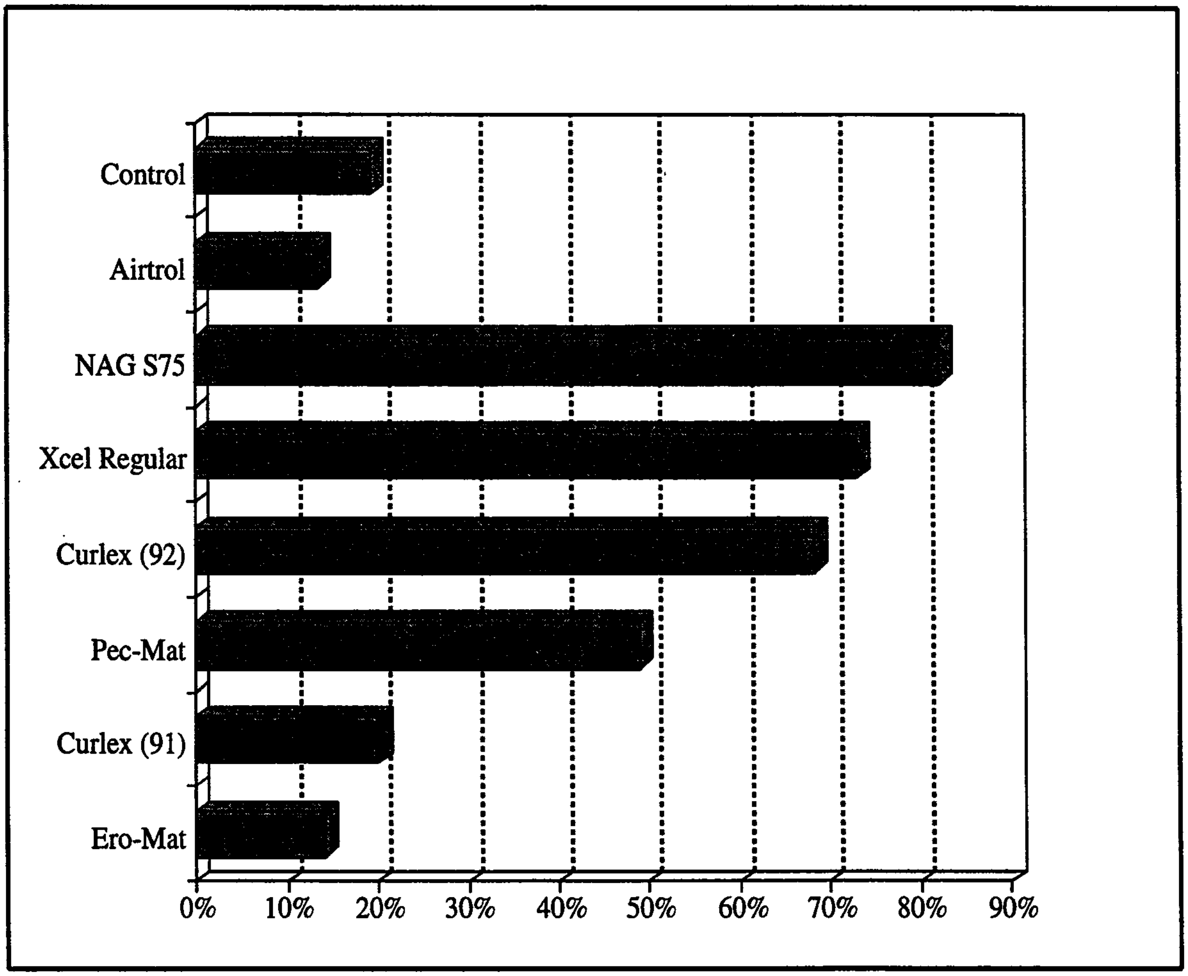


Figure 36F. Vegetative Density (%)

Table F28. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtrol Plaster®	92	Round 2	3:1	All	58.959	1/3
CONTROL	92	Round 2	3:1	All	53.204	2/3
American Excelsior Curlex®	92	Round 2	3:1	All	45.758	3/3
COMBINED 91-92 EVALUATION CYCLES						
Airtrol Plaster®	92	Round 2	3:1	All	58.959	1/8
Xcel Regular®	91	Round 2	3:1	All	56.240	2/8
North American Green® S75	91	Round 2	3:1	All	53.151	3/8
American Excelsior Curlex®	92	Round 2	3:1	All	45.758	4/8
CONTROL	91-92	Round 2	3:1	All	37.790	5/8
verdyol®ERO-MAT®	91	Round 2	3:1	All	35.889	6/8
GREENSTREAK® PEC-MAT™	91	Round 2	3:1	All	35.829	7/8
American Excelsior Curlex®	91	Round 2	3:1	All	32.698	8/8

**Vegetative Density is in percent

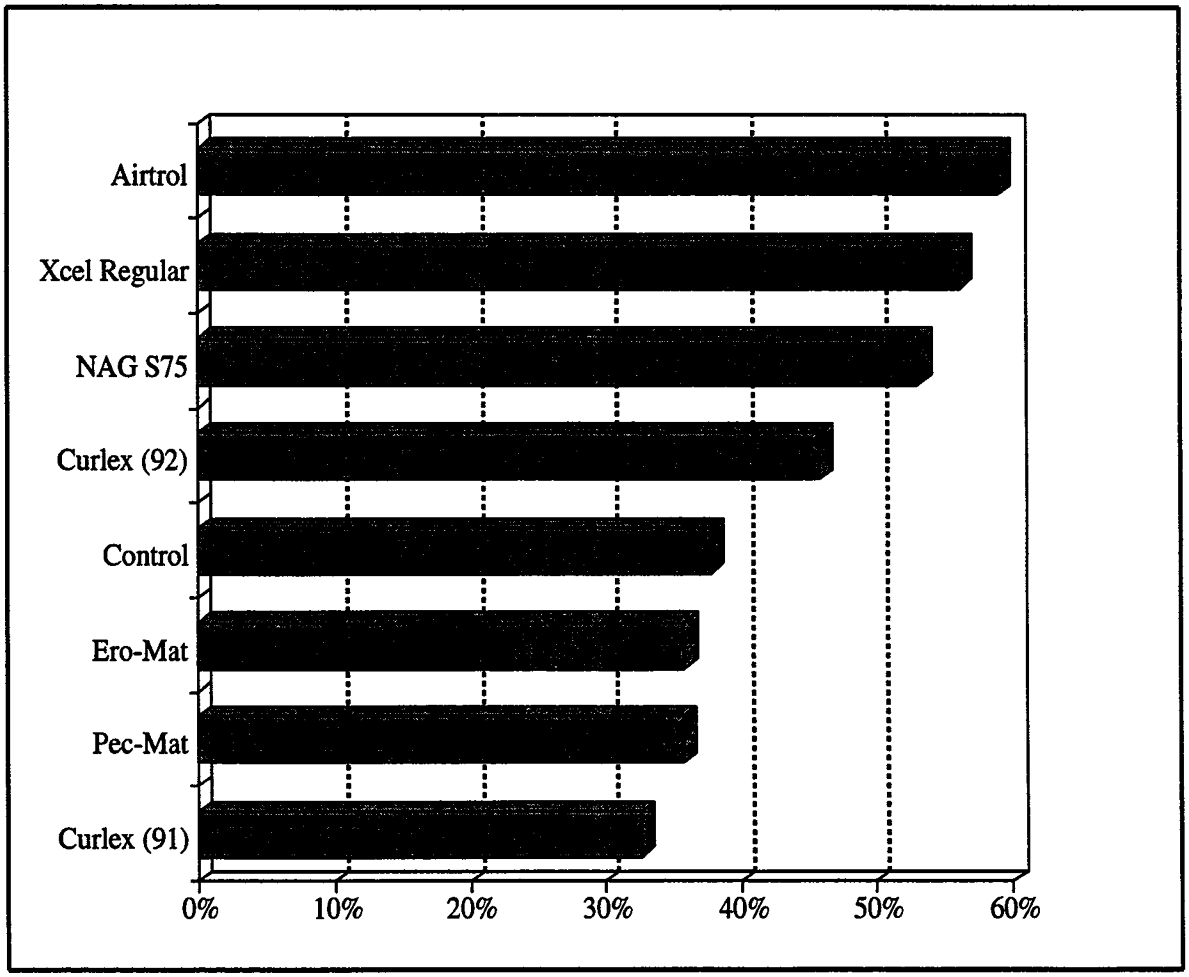


Figure 37F. Vegetative Density (%)

Table F29. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 3	3:1	All	69.037	1/3
Airtrol Plaster®	92	Round 3	3:1	All	63.618	2/3
CONTROL	92	Round 3	3:1	All	57.550	3/3
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S75	91	Round 3	3:1	All	89.849	1/8
Xcel Regular®	91	Round 3	3:1	All	76.490	2/8
GREENSTREAK® PEC-MAT™	91	Round 3	3:1	All	73.970	3/8
American Excelsior Curlex®	92	Round 3	3:1	All	69.037	4/8
verdyol®ERO-MAT®	91	Round 3	3:1	All	64.790	5/8
Airtrol Plaster®	92	Round 3	3:1	All	63.618	6/8
CONTROL	91-92	Round 3	3:1	All	59.740	7/8
American Excelsior Curlex®	91	Round 3	3:1	All	59.153	8/8

**Vegetative Density is in percent

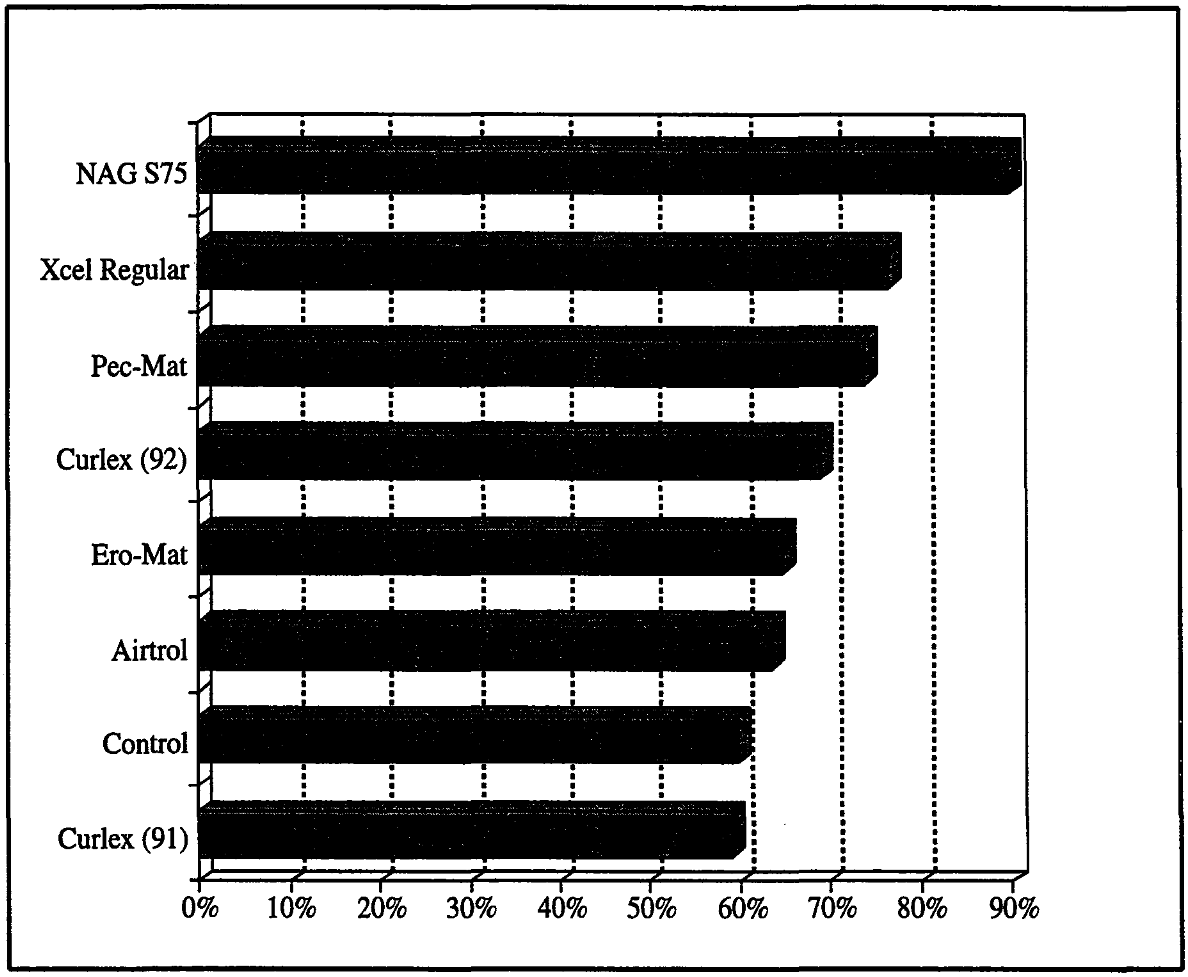


Figure 38F. Vegetative Density (%)

Table F30. Level 6 - Vegetative Density Based Upon Measurement Round and Steepness of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtrol Plaster®	92	Round 4	3:1	All	77.824	1/3
American Excelsior Curlex®	92	Round 4	3:1	All	66.511	2/3
CONTROL	92	Round 4	3:1	All	58.430	3/3
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S75	91	Round 4	3:1	All	87.046	1/8
Xcel Regular®	91	Round 4	3:1	All	81.215	2/8
verdyol®ERO-MAT®	91	Round 4	3:1	All	80.505	3/8
Airtrol Plaster®	92	Round 4	3:1	All	77.824	4/8
GREENSTREAK® PEC-MAT™	91	Round 4	3:1	All	76.455	5/8
American Excelsior Curlex®	92	Round 4	3:1	All	66.511	6/8
American Excelsior Curlex®	91	Round 4	3:1	All	62.083	7/8
CONTROL	91-92	Round 4	3:1	All	57.295	8/8

**Vegetative Density is in percent

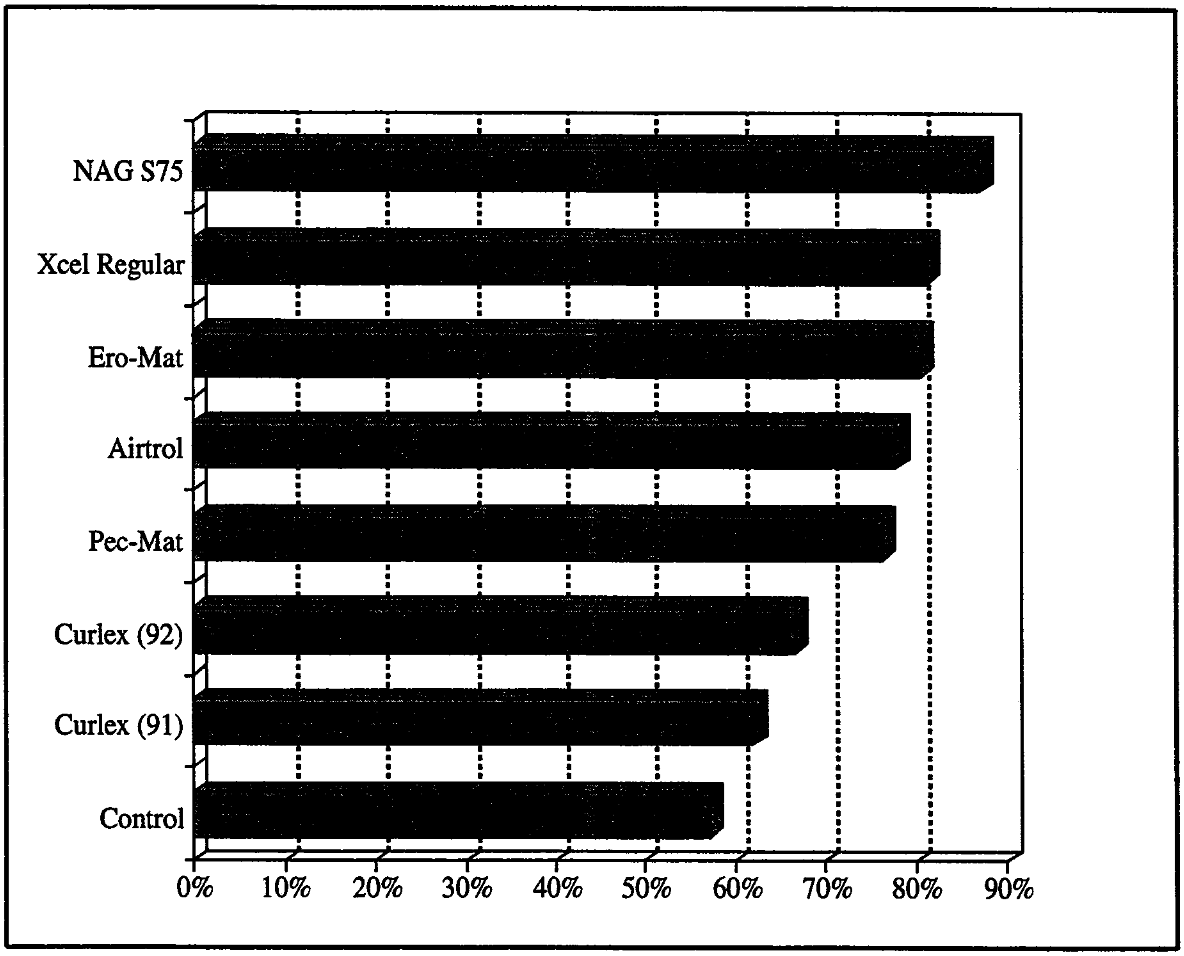


Figure 39F. Vegetative Density (%)

Table F31. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	All	Clay	0.05	1/4
Belton DEKOWE® 700	92	1-Year	All	Clay	0.09	2/4
Airtrol Plaster®	92	1-Year	All	Clay	0.15	3/4
CONTROL	92	1-Year	All	Clay	1.02	4/4
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	92	1-Year	All	Clay	0.05	1/15
Belton DEKOWE® 700	92	1-Year	All	Clay	0.09	2/15
Airtrol Plaster®	92	1-Year	All	Clay	0.15	3/15
ANTI-WASH®/GEOJUTE®	91	1-Year	All	Clay	0.33	4/15
verdyol®ERO-MAT®	91	1-Year	All	Clay	0.34	5/15
American Excelsior Curlex®	91	1-Year	All	Clay	0.36	6/15
North American Green® S150	91	1-Year	All	Clay	0.37	7/15
GREENSTREAK® PEC-MAT™	91	1-Year	All	Clay	0.41	8/15
North American Green® SC150	91	1-Year	All	Clay	0.45	9/15
Polyfelt® TS22	91	1-Year	All	Clay	0.46	10/15
POLYJUTE™ 407GT	91	1-Year	All	Clay	0.48	11/15
North American Green® S75	91	1-Year	All	Clay	0.59	12/15
Xcel Superior®	91	1-Year	All	Clay	0.72	13/15
Xcel Regular®	91	1-Year	All	Clay	0.72	14/15
CONTROL	91-92	1-Year	All	Clay	0.98	15/15

*Sediment Loss is in (kg/9.3 sq m)

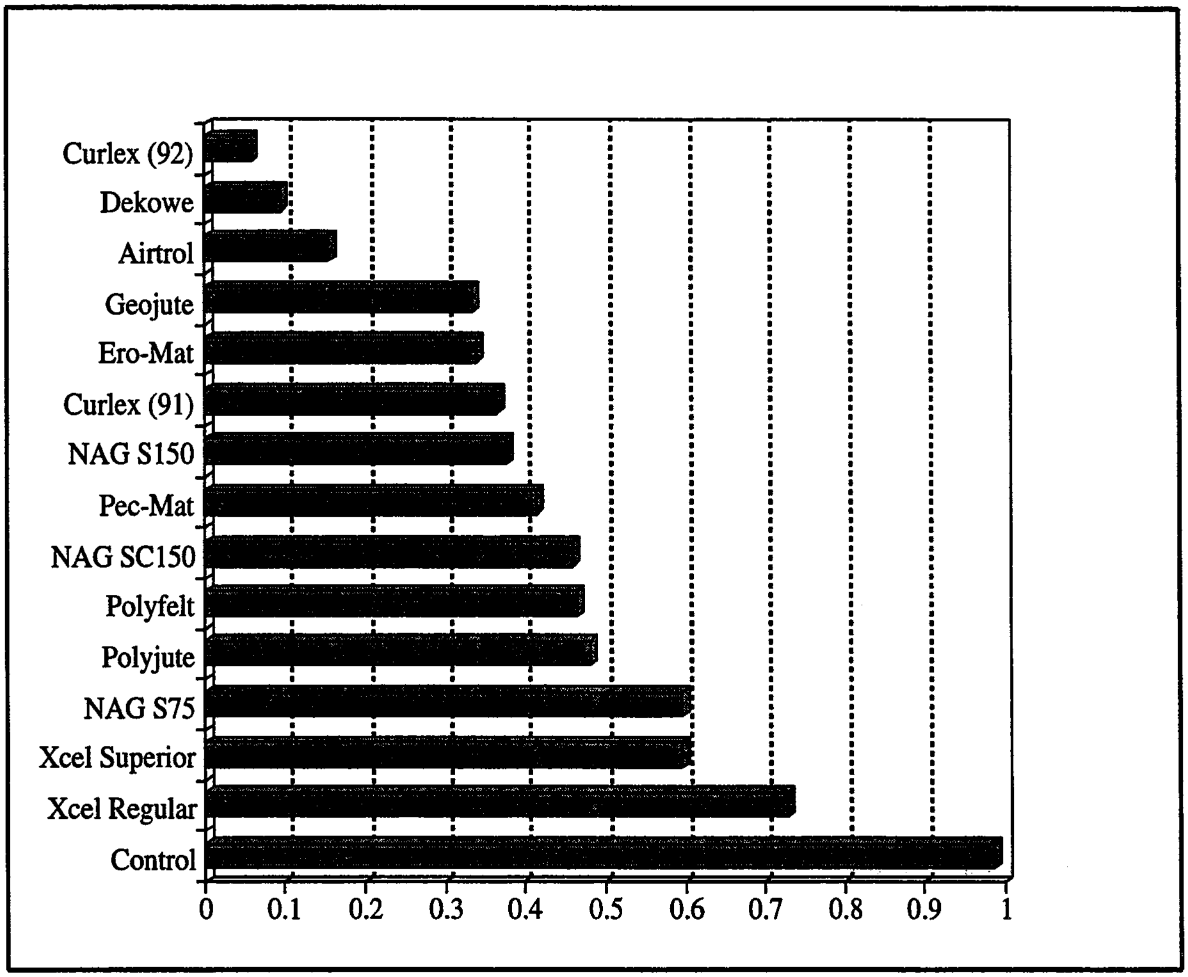


Figure 40F. Sediment Loss (kg/9.3 sq m)

Table F32. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	All	Clay	0.13	1/4
Airtrol Plaster®	92	2-Year	All	Clay	0.24	2/4
Belton DEKOWE® 700	92	2-Year	All	Clay	0.28	3/4
CONTROL	92	2-Year	All	Clay	1.69	4/4
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	91	2-Year	All	Clay	0.11	1/15
Polyfelt® TS22	91	2-Year	All	Clay	0.11	2/15
verdyol®ERO-MAT®	91	2-Year	All	Clay	0.13	3/15
American Excelsior Curlex®	92	2-Year	All	Clay	0.13	4/15
North American Green® SC150	91	2-Year	All	Clay	0.16	5/15
POLYJUTE™ 407GT	91	2-Year	All	Clay	0.19	6/15
GREENSTREAK® PEC-MAT™	91	2-Year	All	Clay	0.23	7/15
Airtrol Plaster®	92	2-Year	All	Clay	0.24	8/15
North American Green® S150	91	2-Year	All	Clay	0.25	9/15
Belton DEKOWE® 700	92	2-Year	All	Clay	0.28	10/15
North American Green® S75	91	2-Year	All	Clay	0.29	11/15
Xcel Superior®	91	2-Year	All	Clay	0.29	12/15
Xcel Regular®	91	2-Year	All	Clay	0.31	13/15
ANTI-WASH®/GEOJUTE®	91	2-Year	All	Clay	0.36	14/15
CONTROL	91-92	2-Year	All	Clay	1.78	15/15

*Sediment Loss is in (kg/9.3 sq m)

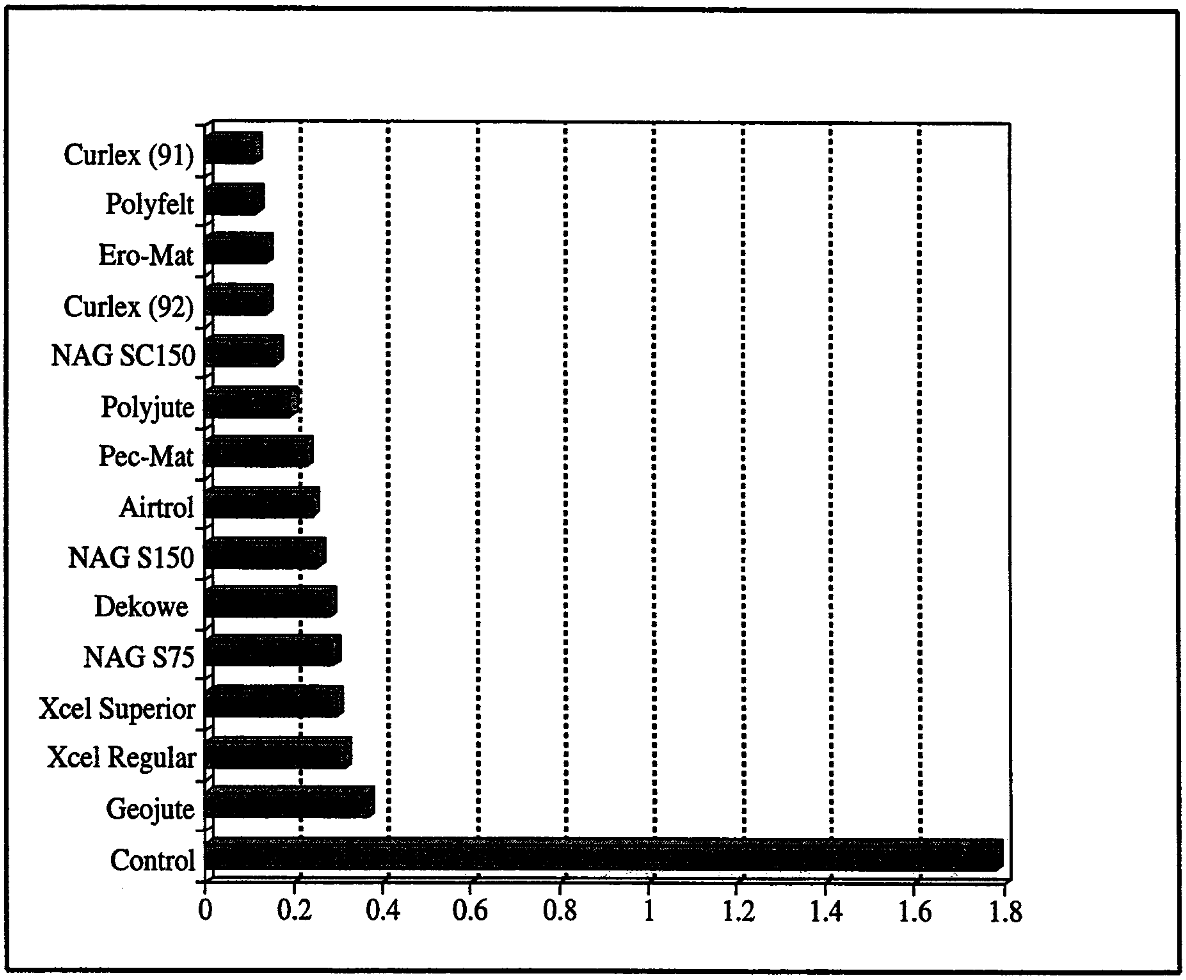


Figure 41F. Sediment Loss (kg/9.3 sq m)

Table F33. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	All	Clay	0.05	1/4
Belton DEKOWE® 700	92	5-Year	All	Clay	0.08	2/4
Airtrol Plaster®	92	5-Year	All	Clay	0.23	3/4
CONTROL	92	5-Year	All	Clay	1.22	4/4
COMBINED 91-92 EVALUATION CYCLES						
verdyol®ERO-MAT®	91	5-Year	All	Clay	0.04	1/15
North American Green® S75	91	5-Year	All	Clay	0.04	2/15
American Excelsior Curlex®	92	5-Year	All	Clay	0.05	3/15
Xcel Regular®	91	5-Year	All	Clay	0.06	4/15
North American Green® S150	91	5-Year	All	Clay	0.07	5/15
Belton DEKOWE® 700	92	5-Year	All	Clay	0.08	6/15
GREENSTREAK® PEC-MAT™	91	5-Year	All	Clay	0.08	7/15
Xcel Superior®	91	5-Year	All	Clay	0.08	8/15
American Excelsior Curlex®	91	5-Year	All	Clay	0.09	9/15
ANTI-WASH®/GEOJUTE®	91	5-Year	All	Clay	0.09	10/15
North American Green® SC150	91	5-Year	All	Clay	0.10	11/15
POLYJUTE™ 407GT	91	5-Year	All	Clay	0.11	12/15
Polyfelt® TS22	91	5-Year	All	Clay	0.15	13/15
Airtrol Plaster®	92	5-Year	All	Clay	0.23	14/15
CONTROL	91-92	5-Year	All	Clay	1.01	15/15

*Sediment Loss is in (kg/9.3 sq m)

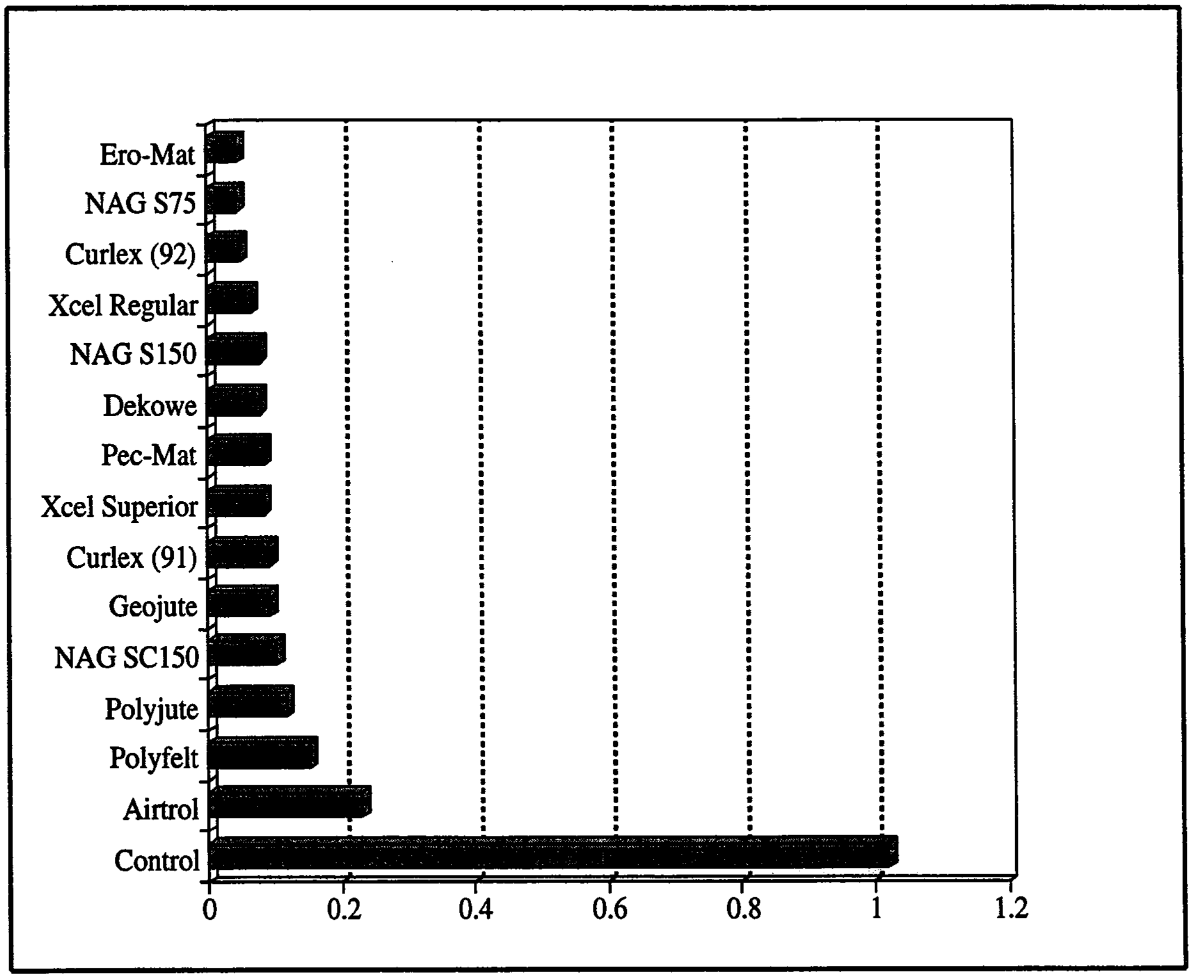


Figure 42F. Sediment Loss (kg/9.3 sq m)

Table F34. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	All	Sand	1.38	1/3
Airtrol Plaster®	92	1-Year	All	Sand	5.56	2/3
CONTROL	92	1-Year	All	Sand	17.07	3/3
Belton DEKOWE® 700	92	1-Year	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
verdyol®ERO-MAT®	91	1-Year	All	Sand	0.49	1/14
North American Green® SC150	91	1-Year	All	Sand	0.61	2/14
North American Green® S150	91	1-Year	All	Sand	0.64	3/14
Xcel Regular®	91	1-Year	All	Sand	0.64	4/14
North American Green® S75	91	1-Year	All	Sand	0.77	5/14
Polyfelt® TS22	91	1-Year	All	Sand	1.26	6/14
Xcel Superior®	91	1-Year	All	Sand	1.29	7/14
American Excelsior Curlex®	92	1-Year	All	Sand	1.38	8/14
American Excelsior Curlex®	91	1-Year	All	Sand	1.64	9/14
ANTI-WASH®/GEOJUTE®	91	1-Year	All	Sand	2.96	10/14
Airtrol Plaster®	92	1-Year	All	Sand	5.56	11/14
POLYJUTE™ 407GT	91	1-Year	All	Sand	5.61	12/14
GREENSTREAK® PEC-MAT™	91	1-Year	All	Sand	6.51	13/14
CONTROL	91-92	1-Year	All	Sand	15.26	14/14

*Sediment Loss is in (kg/9.3 sq m)

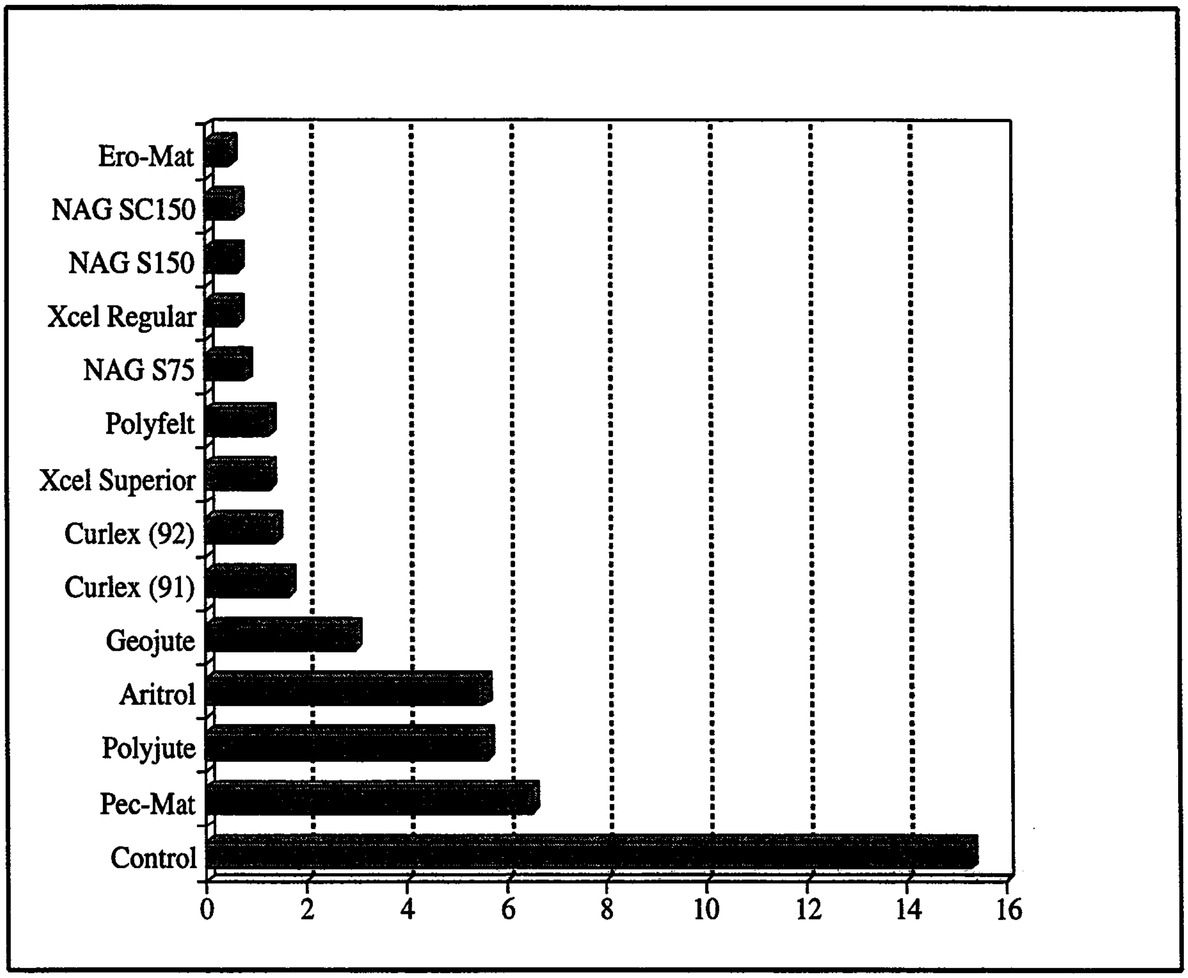


Figure 43F. Sediment Loss (kg/9.3 sq m)

Table F35. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	All	Sand	6.29	1/3
Airtrol Plaster®	92	2-Year	All	Sand	18.49	2/3
CONTROL	92	2-Year	All	Sand	47.77	3/3
Belton DEKOWE® 700	92	2-Year	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	2-Year	All	Sand	2.73	1/14
Xcel Superior®	91	2-Year	All	Sand	5.43	2/14
American Excelsior Curlex®	92	2-Year	All	Sand	6.29	3/14
verdyol®ERO-MAT®	91	2-Year	All	Sand	7.50	4/14
North American Green® S75	91	2-Year	All	Sand	8.40	5/14
North American Green® SC150	91	2-Year	All	Sand	8.85	6/14
North American Green® S150	91	2-Year	All	Sand	11.03	7/14
POLYJUTE™ 407GT	91	2-Year	All	Sand	12.23	8/14
American Excelsior Curlex®	91	2-Year	All	Sand	16.93	9/14
Airtrol Plaster®	92	2-Year	All	Sand	18.50	10/14
Polyfelt® TS22	91	2-Year	All	Sand	19.62	11/14
GREENSTREAK® PEC-MAT™	91	2-Year	All	Sand	20.11	12/14
ANTI-WASH®/GEOJUTE®	91	2-Year	All	Sand	25.21	13/14
CONTROL	91-92	2-Year	All	Sand	52.06	14/14
Belton DEKOWE® 700	92	2-Year	All	Sand	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

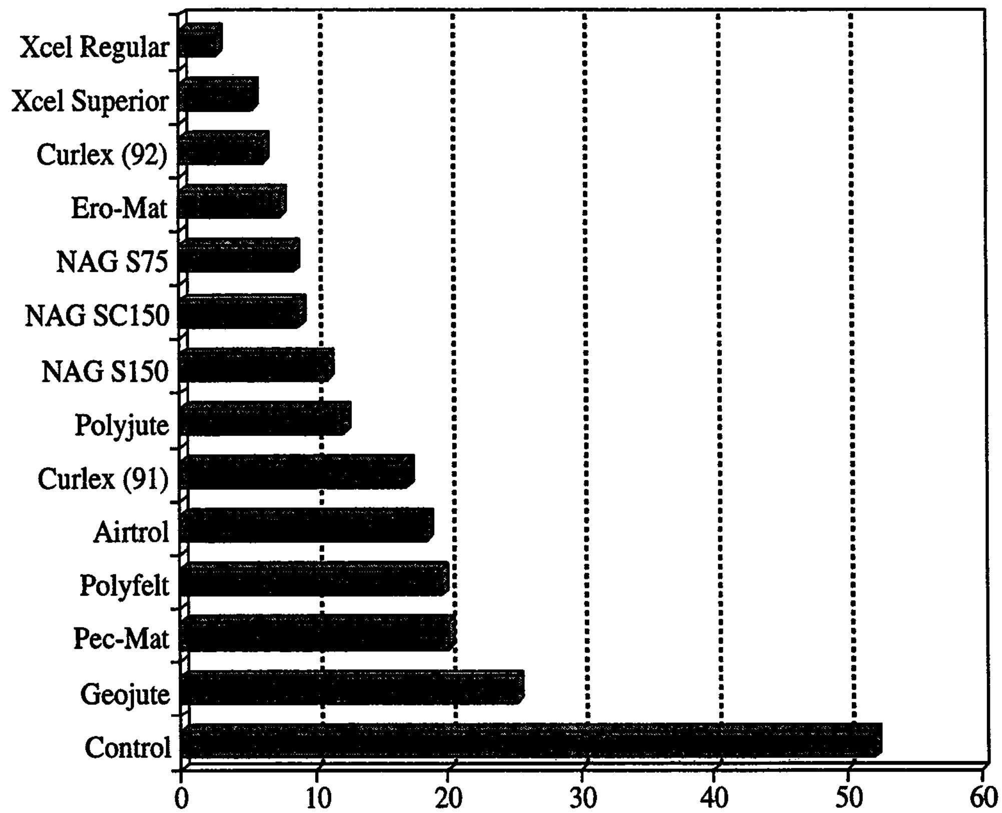


Figure 44F. Sediment Loss (kg/9.3 sq m)

Table F36. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	All	Sand	25.38	1/3
Airtrol Plaster®	92	5-Year	All	Sand	44.16	2/3
CONTROL	92	5-Year	All	Sand	52.99	3/3
Belton DEKOWE® 700	92	5-Year	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	5-Year	All	Sand	5.87	1/14
North American Green® S75	91	5-Year	All	Sand	7.89	2/14
verdyol®ERO-MAT®	91	5-Year	All	Sand	10.42	3/14
Xcel Superior®	91	5-Year	All	Sand	21.06	4/14
American Excelsior Curlex®	91	5-Year	All	Sand	22.27	5/14
POLYJUTE™ 407GT	91	5-Year	All	Sand	24.20	6/14
American Excelsior Curlex®	92	5-Year	All	Sand	25.38	7/14
North American Green® SC150	91	5-Year	All	Sand	28.48	8/14
GREENSTREAK® PEC-MAT™	91	5-Year	All	Sand	29.25	9/14
Polyfelt® TS22	91	5-Year	All	Sand	30.59	10/14
North American Green® S150	91	5-Year	All	Sand	35.01	11/14
ANTI-WASH®/GEOJUTE®	91	5-Year	All	Sand	37.20	12/14
Airtrol Plaster®	92	5-Year	All	Sand	44.16	13/14
CONTROL	91-92	5-Year	All	Sand	54.07	14/14
Belton DEKOWE® 700	92	5-Year	All	Sand	N/A	N/A

*Sediment Loss is in (kg/9.3 sq m)

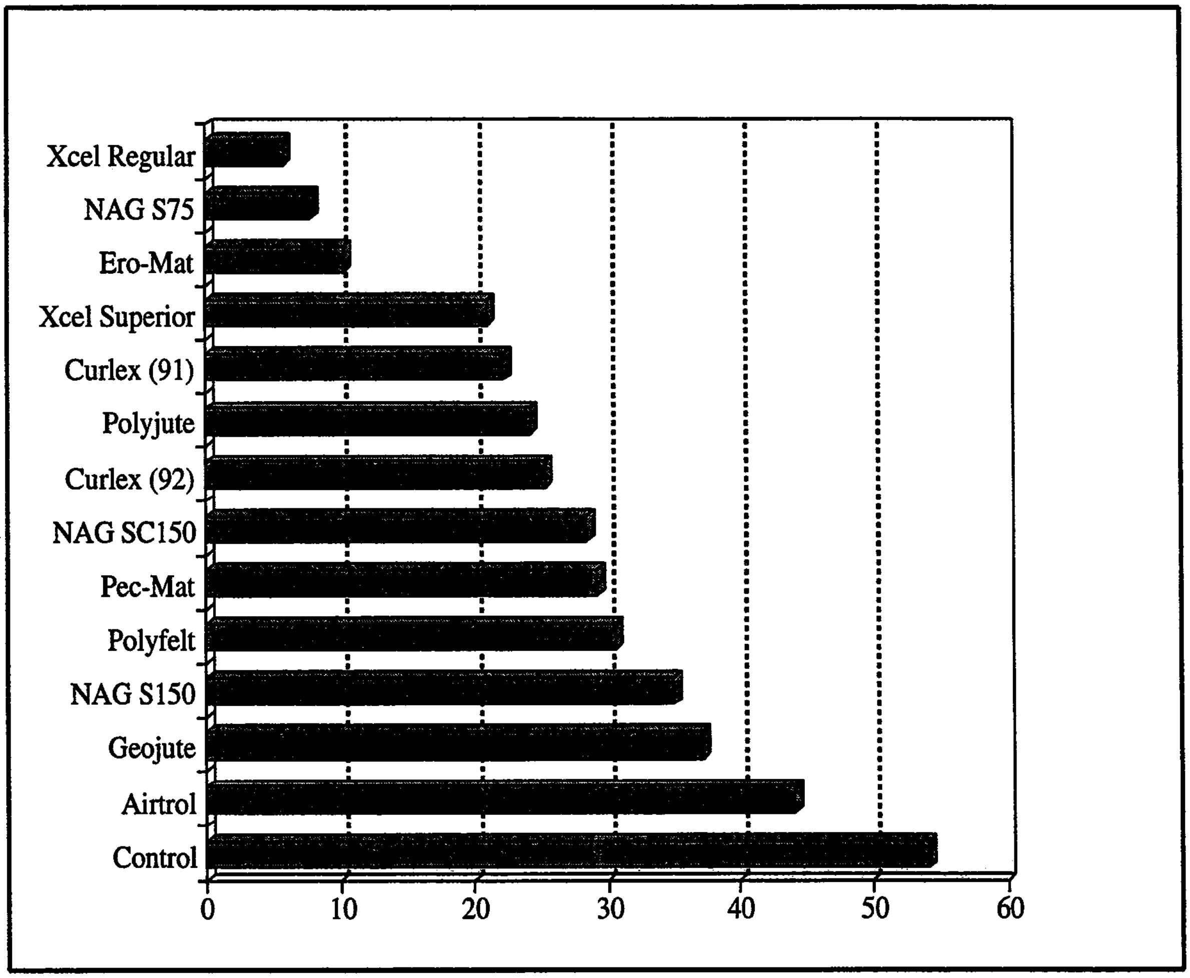


Figure 45F. Sediment Loss (kg/9.3 sq m)

Table F37. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Belton DEKOWE® 700	92	Round 1	All	Clay	30.658	1/4
CONTROL	92	Round 1	All	Clay	28.297	2/4
Airtrol Plaster®	92	Round 1	All	Clay	18.425	3/4
American Excelsior Curlex®	92	Round 1	All	Clay	8.532	4/4
COMBINED 91-92 EVALUATION CYCLES						
Belton DEKOWE® 700	92	Round 1	All	Clay	30.658	1/15
CONTROL	91-92	Round 1	All	Clay	24.711	2/15
Airtrol Plaster®	92	Round 1	All	Clay	18.425	3/15
American Excelsior Curlex®	92	Round 1	All	Clay	8.532	4/15
Xcel Regular®	91	Round 1	All	Clay	6.469	5/15
GREENSTREAK® PEC-MAT™	91	Round 1	All	Clay	5.941	6/15
North American Green® S75	91	Round 1	All	Clay	5.481	7/15
POLYJUTE™ 407GT	91	Round 1	All	Clay	4.394	8/15
American Excelsior Curlex®	91	Round 1	All	Clay	2.485	9/15
ANTI-WASH®/GEOJUTE®	91	Round 1	All	Clay	2.039	10/15
North American Green® S150	91	Round 1	All	Clay	1.581	11/15
Xcel Superior®	91	Round 1	All	Clay	1.327	12/15
North American Green® SC150	91	Round 1	All	Clay	0.482	13/15
Polyfelt® TS22	91	Round 1	All	Clay	0.466	14/15
verdyol®ERO-MAT®	91	Round 1	All	Clay	0.000	15/15

**Vegetative Density is in percent

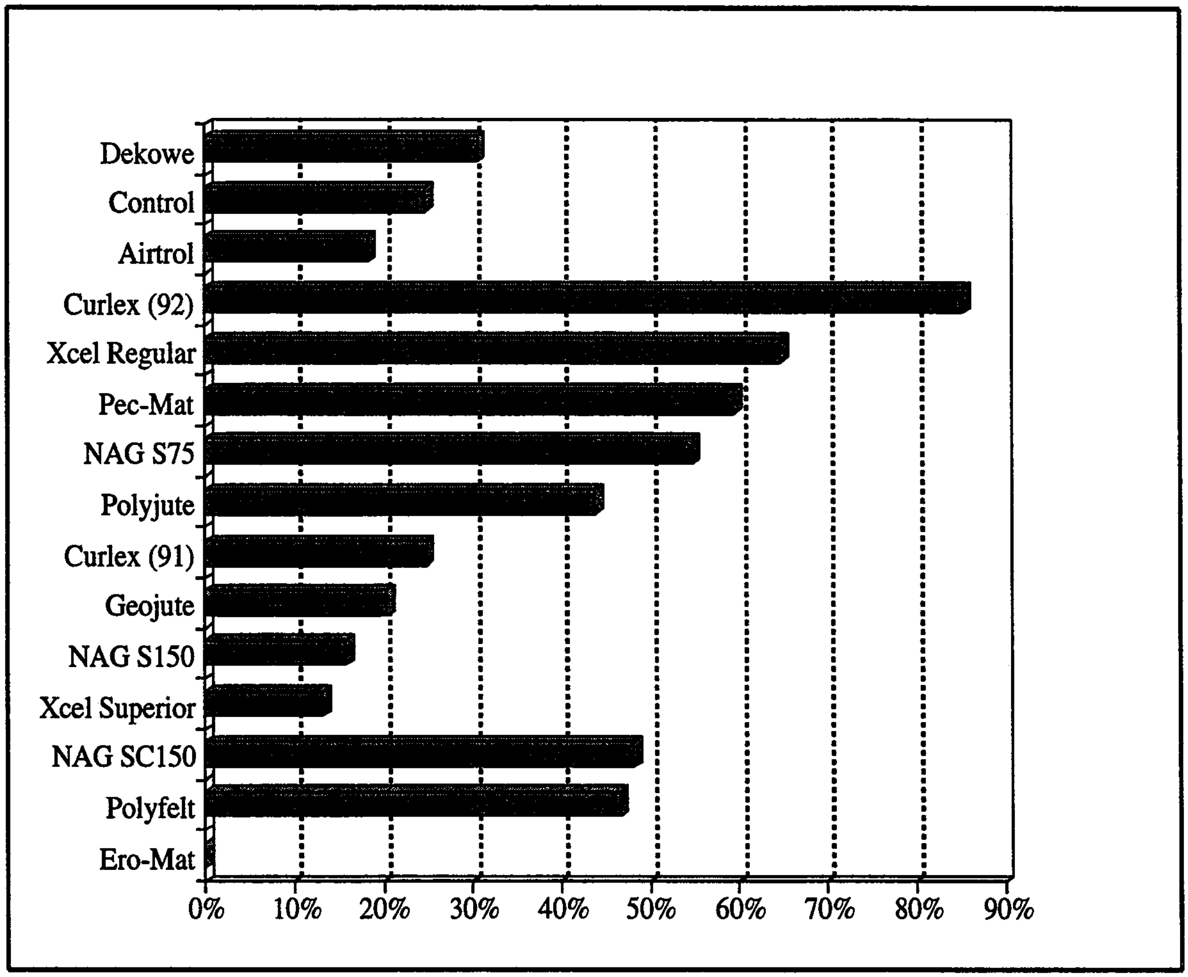


Figure 46F. Vegetation Density (%)

Table F38. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 2	All	Clay	80.980	1/4
Airtrol Plaster®	92	Round 2	All	Clay	76.943	2/4
Belton DEKOWE® 700	92	Round 2	All	Clay	75.272	3/4
American Excelsior Curlex®	92	Round 2	All	Clay	70.230	4/4
COMBINED 91-92 EVALUATION CYCLES						
Airtrol Plaster®	92	Round 2	All	Clay	76.943	1/15
Belton DEKOWE® 700	92	Round 2	All	Clay	75.273	2/15
American Excelsior Curlex®	92	Round 2	All	Clay	70.230	3/15
Xcel Regular®	91	Round 2	All	Clay	56.160	4/15
CONTROL	91-92	Round 2	All	Clay	55.996	5/15
North American Green® S75	91	Round 2	All	Clay	54.713	6/15
Xcel Superior®	91	Round 2	All	Clay	54.382	7/15
POLYJUTE™ 407GT	91	Round 2	All	Clay	46.749	8/15
American Excelsior Curlex®	91	Round 2	All	Clay	40.672	9/15
GREENSTREAK® PEC-MAT™	91	Round 2	All	Clay	37.456	10/15
North American Green® SC150	91	Round 2	All	Clay	31.442	11/15
verdyol®ERO-MAT®	91	Round 2	All	Clay	30.193	12/15
North American Green® S150	91	Round 2	All	Clay	29.503	13/15
ANTI-WASH®/GEOJUTE®	91	Round 2	All	Clay	26.075	14/15
Polyfelt® TS22	91	Round 2	All	Clay	4.436	15/15

**Vegetative Density is in percent

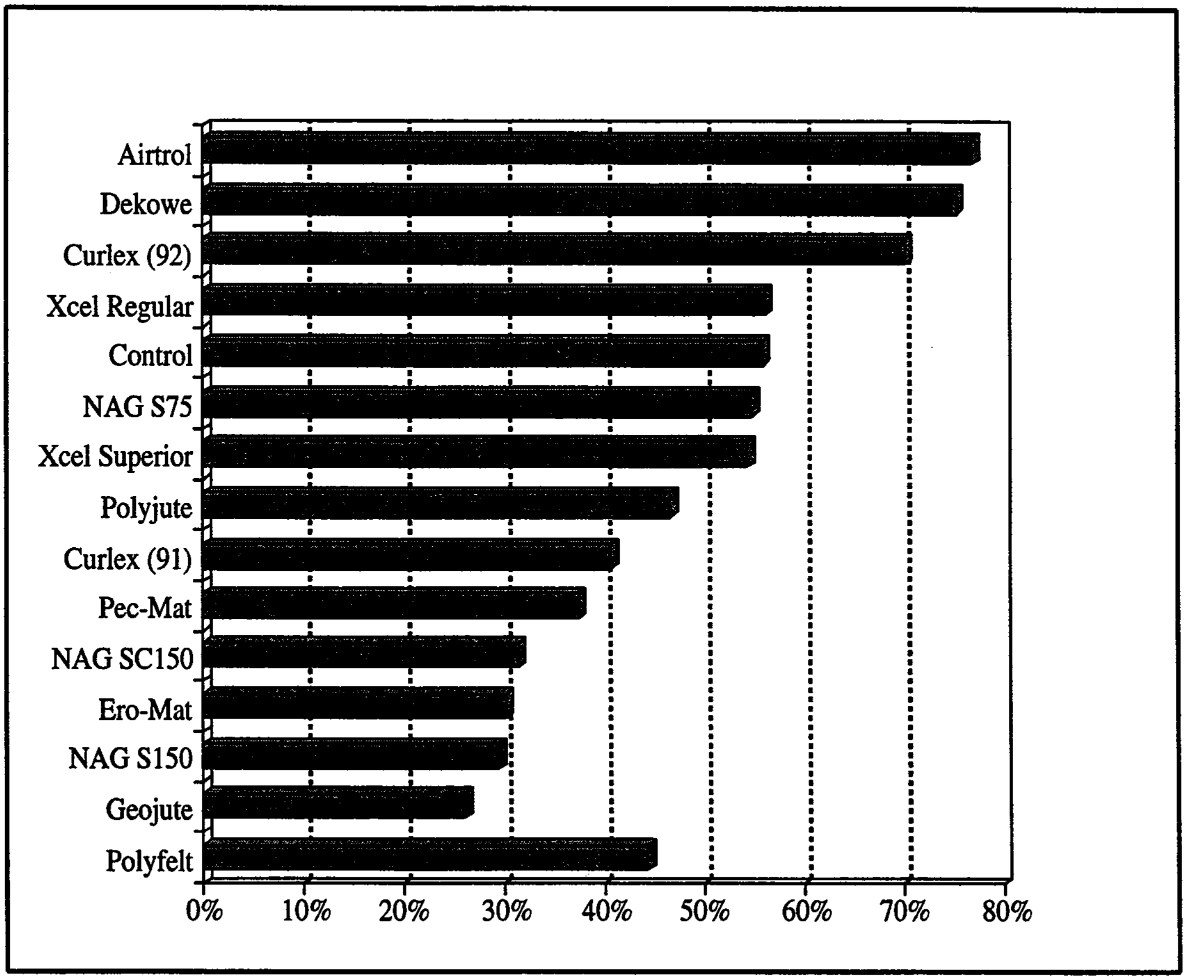


Figure 47F. Vegetation Density (%)

Table F39. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 3	All	Clay	96.995	1/4
CONTROL	92	Round 3	All	Clay	83.908	2/4
Airtrol Plaster®	92	Round 3	All	Clay	82.448	3/4
Belton DEKOWE® 700	92	Round 3	All	Clay	81.041	4/4
COMBINED 91-92 EVALUATION CYCLES						
POLYJUTE™ 407GT	91	Round 3	All	Clay	98.263	1/15
American Excelsior Curlex®	92	Round 3	All	Clay	96.995	2/15
North American Green® S75	91	Round 3	All	Clay	95.122	3/15
Xcel Superior®	91	Round 3	All	Clay	94.947	4/15
North American Green® S150	91	Round 3	All	Clay	93.921	5/15
ANTI-WASH®/GEOJUTE®	91	Round 3	All	Clay	93.840	6/15
North American Green® SC150	91	Round 3	All	Clay	90.680	7/15
GREENSTREAK® PEC-MAT™	91	Round 3	All	Clay	86.546	8/15
Xcel Regular®	91	Round 3	All	Clay	84.222	9/15
Airtrol Plaster®	92	Round 3	All	Clay	82.448	10/15
Belton DEKOWE® 700	92	Round 3	All	Clay	81.041	11/15
CONTROL	91-92	Round 3	All	Clay	81.038	12/15
American Excelsior Curlex®	91	Round 3	All	Clay	72.446	13/15
verdyol®ERO-MAT®	91	Round 3	All	Clay	69.620	14/15
Polyfelt® TS22	91	Round 3	All	Clay	32.107	15/15

**Vegetative Density is in percent

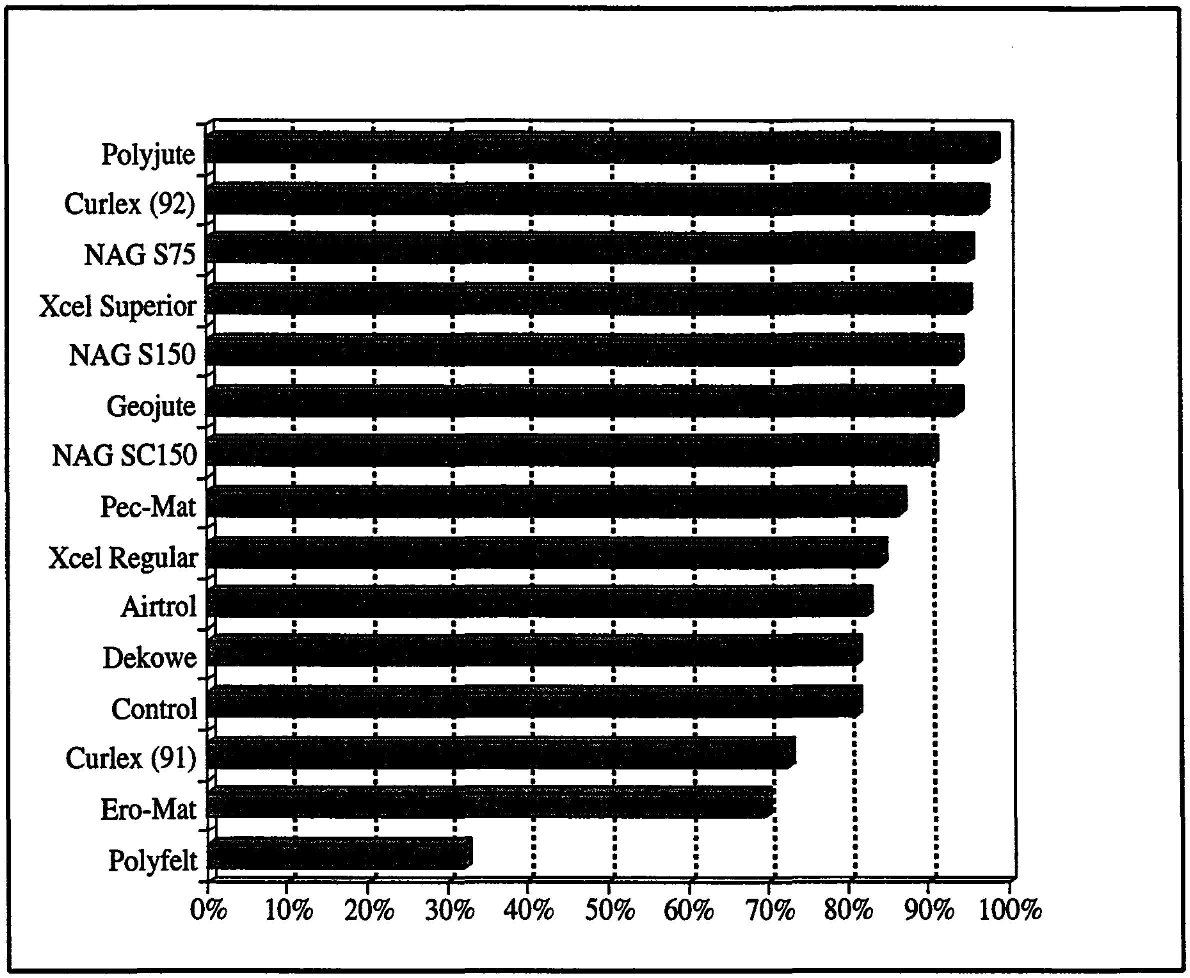


Figure 48F. Vegetation Density (%)

Table F40. Level 7 - Sediment Loss Based Upon Simulated Rainfall Event and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 4	All	Clay	98.125	1/4
Airtrol Plaster®	92	Round 4	All	Clay	86.289	2/4
CONTROL	92	Round 4	All	Clay	84.423	3/4
Belton DEKOWE® 700	92	Round 4	All	Clay	73.717	4/4
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 4	All	Clay	98.814	1/15
American Excelsior Curlex®	92	Round 4	All	Clay	98.125	2/15
North American Green® S75	91	Round 4	All	Clay	96.187	3/15
POLYJUTE™ 407GT	91	Round 4	All	Clay	96.151	4/15
North American Green® S150	91	Round 4	All	Clay	92.014	5/15
Xcel Regular®	91	Round 4	All	Clay	90.166	6/15
ANTI-WASH®/GEOJUTE®	91	Round 4	All	Clay	90.058	7/15
North American Green® SC150	91	Round 4	All	Clay	89.979	8/15
GREENSTREAK® PEC-MAT™	91	Round 4	All	Clay	89.216	9/15
verdyol®ERO-MAT®	91	Round 4	All	Clay	87.808	10/15
Airtrol Plaster®	92	Round 4	All	Clay	86.289	11/15
American Excelsior Curlex®	91	Round 4	All	Clay	78.609	12/15
CONTROL	91-92	Round 4	All	Clay	75.453	13/15
Belton DEKOWE® 700	92	Round 4	All	Clay	73.717	14/15
Polyfelt® TS22	91	Round 4	All	Clay	35.909	15/15

**Vegetative Density is in percent

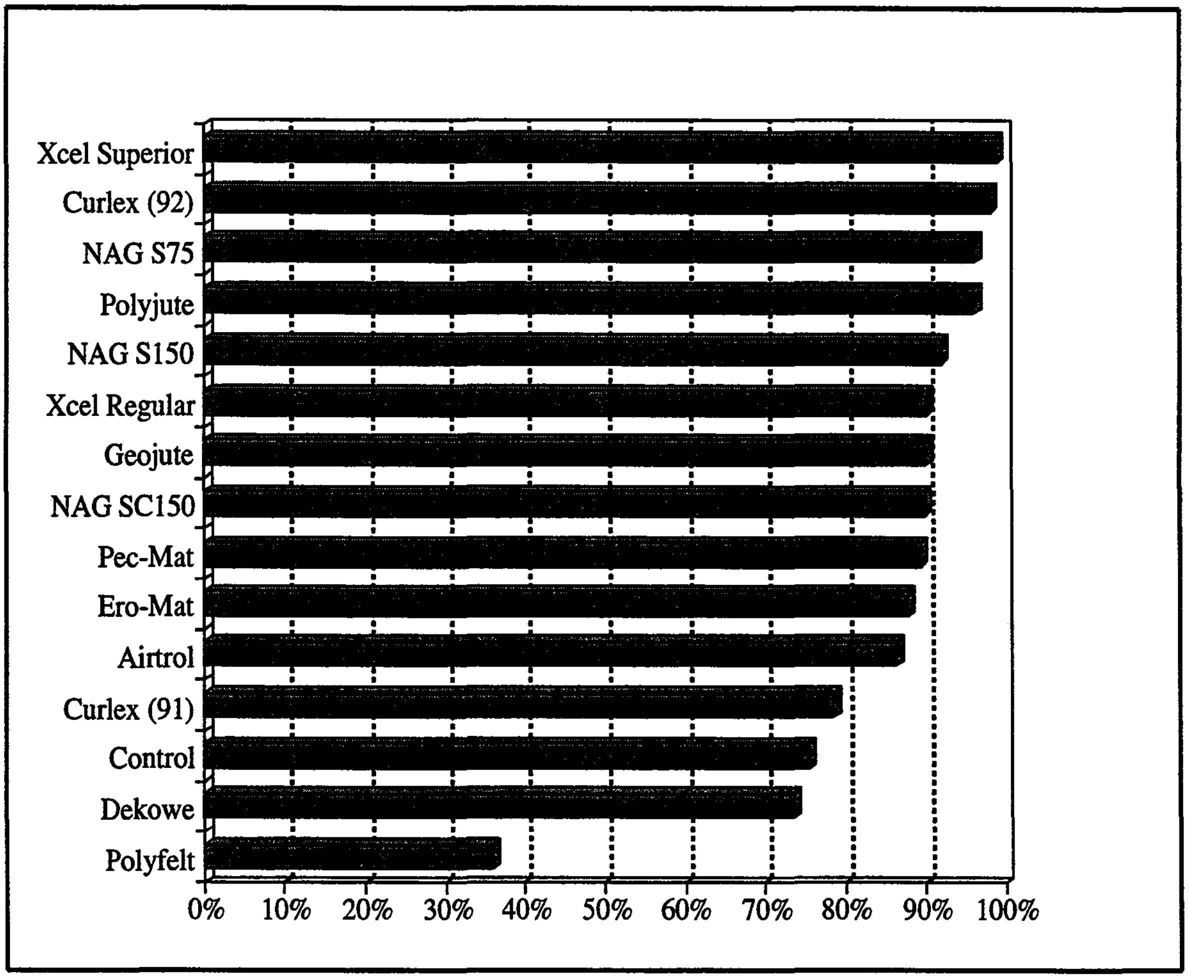


Figure 49F. Vegetation Density (%)

Table F41. Level 7 - Vegetative Density Based Upon Measurement Round and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	All	Sand	12.060	1/3
Airtrol Plaster®	92	Round 1	All	Sand	7.556	2/3
American Excelsior Curlex®	92	Round 1	All	Sand	6.881	3/3
Belton DEKOWE® 700	92	Round 1	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S75	91	Round 1	All	Sand	10.975	1/12
CONTROL	91-92	Round 1	All	Sand	10.730	2/12
Xcel Superior®	91	Round 1	All	Sand	9.676	3/12
Xcel Regular®	91	Round 1	All	Sand	8.123	4/12
Airtrol Plaster®	92	Round 1	All	Sand	7.556	5/12
American Excelsior Curlex®	92	Round 1	All	Sand	6.881	6/12
POLYJUTE™ 407GT	91	Round 1	All	Sand	5.973	7/12
verdyol®ERO-MAT®	91	Round 1	All	Sand	2.615	8/12
American Excelsior Curlex®	91	Round 1	All	Sand	1.726	9/12
ANTI-WASH®/GEOJUTE®	91	Round 1	All	Sand	1.152	10/12
GREENSTREAK® PEC-MAT™	91	Round 1	All	Sand	1.071	11/12
Polyfelt® TS22	91	Round 1	All	Sand	0.610	12/12
North American Green® S150	91	Round 1	All	Sand	N/A	N/A
North American Green® SC150	91	Round 1	All	Sand	N/A	N/A
Belton DEKOWE® 700	92	Round 1	All	Sand	N/A	N/A

**Vegetative Density is in percent

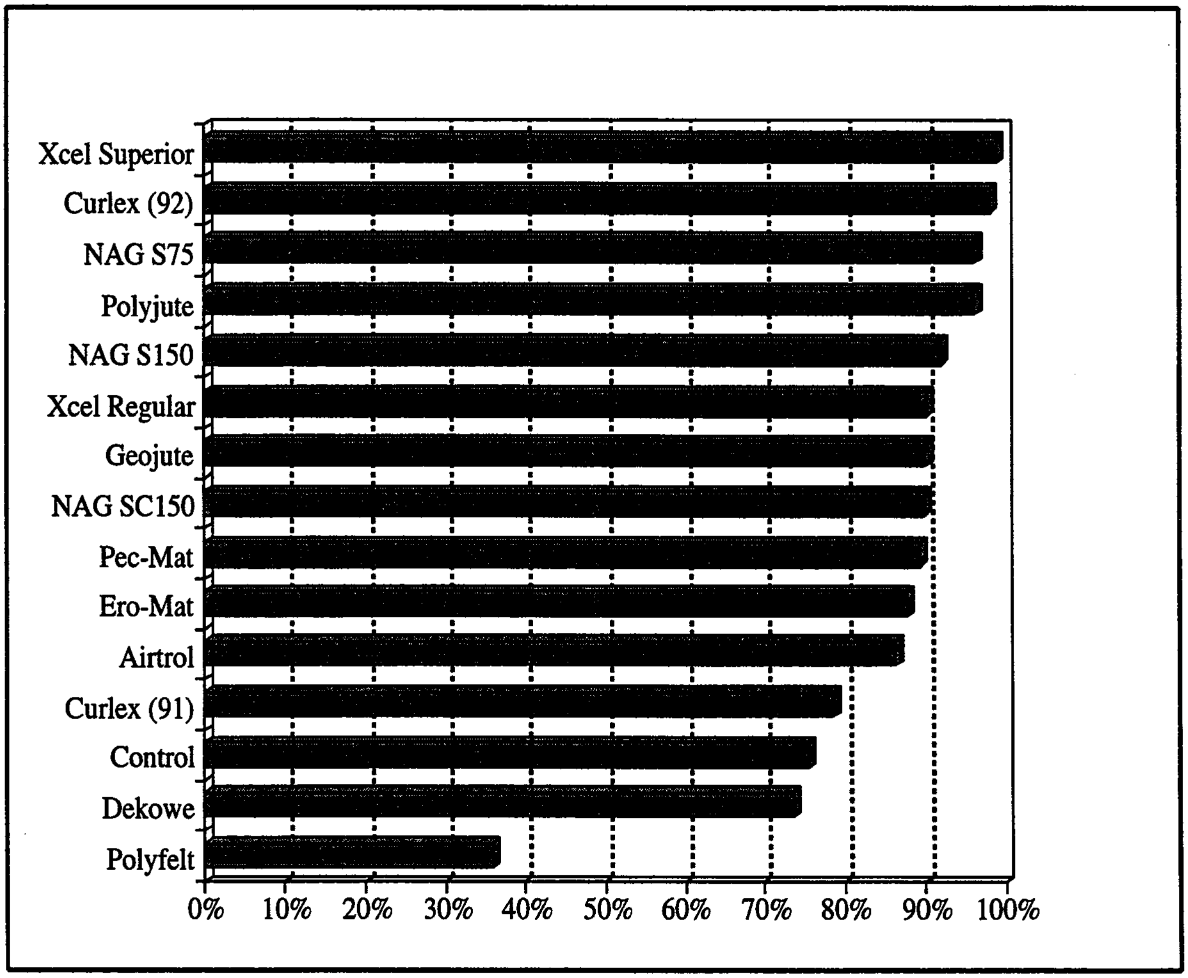


Figure 50F. Vegetation Density (%)

Table F42. Level 7 - Vegetative Density Based Upon Measurement Round and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 2	All	Sand	37.762	1/3
Airtrol Plaster®	92	Round 2	All	Sand	30.789	2/3
American Excelsior Curlex®	92	Round 2	All	Sand	21.469	3/3
Belton DEKOWE® 700	92	Round 2	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 2	All	Sand	64.747	1/14
Xcel Regular®	91	Round 2	All	Sand	56.320	2/14
North American Green® S75	91	Round 2	All	Sand	51.507	3/14
POLYJUTE™ 407GT	91	Round 2	All	Sand	47.156	4/14
verdyol®ERO-MAT®	91	Round 2	All	Sand	41.884	5/14
American Excelsior Curlex®	91	Round 2	All	Sand	38.474	6/14
North American Green® SC150	91	Round 2	All	Sand	31.362	7/14
North American Green® S150	91	Round 2	All	Sand	31.016	8/14
Airtrol Plaster®	92	Round 2	All	Sand	30.789	9/14
CONTROL	91-92	Round 2	All	Sand	23.260	10/14
ANTI-WASH®/GEOJUTE®	91	Round 2	All	Sand	22.458	11/14
American Excelsior Curlex®	92	Round 2	All	Sand	21.469	12/14
GREENSTREAK® PEC-MAT™	91	Round 2	All	Sand	16.988	13/14
Polyfelt® TS22	91	Round 2	All	Sand	8.881	14/14
Belton DEKOWE® 700	92	Round 2	All	Sand	N/A	N/A

**Vegetative Density is in percent

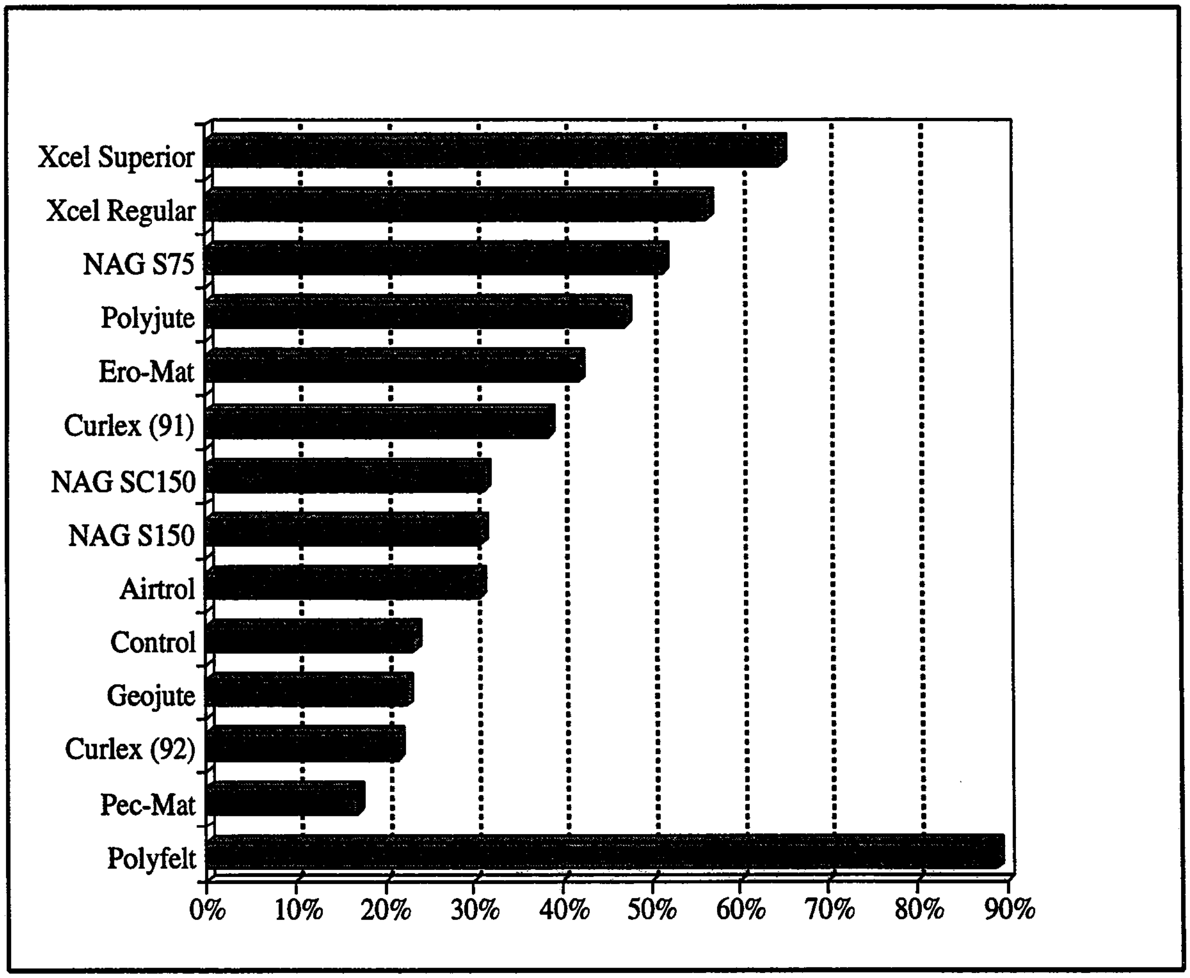


Figure 51F. Vegetation Density (%)

Table F43. Level 7 - Vegetative Density Based Upon Measurement Round and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 3	All	Sand	42.041	1/3
American Excelsior Curlex®	92	Round 3	All	Sand	40.427	2/3
Airtrol Plaster®	92	Round 3	All	Sand	33.534	3/3
Belton DEKOWE® 700	92	Round 3	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 3	All	Sand	87.307	1/14
North American Green® S75	91	Round 3	All	Sand	84.576	2/14
POLYJUTE™ 407GT	91	Round 3	All	Sand	82.710	3/14
North American Green® SC150	91	Round 3	All	Sand	78.226	4/14
Xcel Regular®	91	Round 3	All	Sand	68.758	5/14
North American Green® S150	91	Round 3	All	Sand	66.736	6/14
American Excelsior Curlex®	91	Round 3	All	Sand	61.776	7/14
verdyol®ERO-MAT®	91	Round 3	All	Sand	59.706	8/14
Polyfelt® TS22	91	Round 3	All	Sand	41.680	9/14
CONTROL	91-92	Round 3	All	Sand	41.466	10/14
ANTI-WASH®/GEOJUTE®	91	Round 3	All	Sand	41.121	11/14
American Excelsior Curlex®	92	Round 3	All	Sand	40.427	12/14
GREENSTREAK® PEC-MAT™	91	Round 3	All	Sand	38.332	13/14
Airtrol Plaster®	92	Round 3	All	Sand	33.534	14/14
Belton DEKOWE® 700	92	Round 3	All	Sand	N/A	N/A

**Vegetative Density is in percent

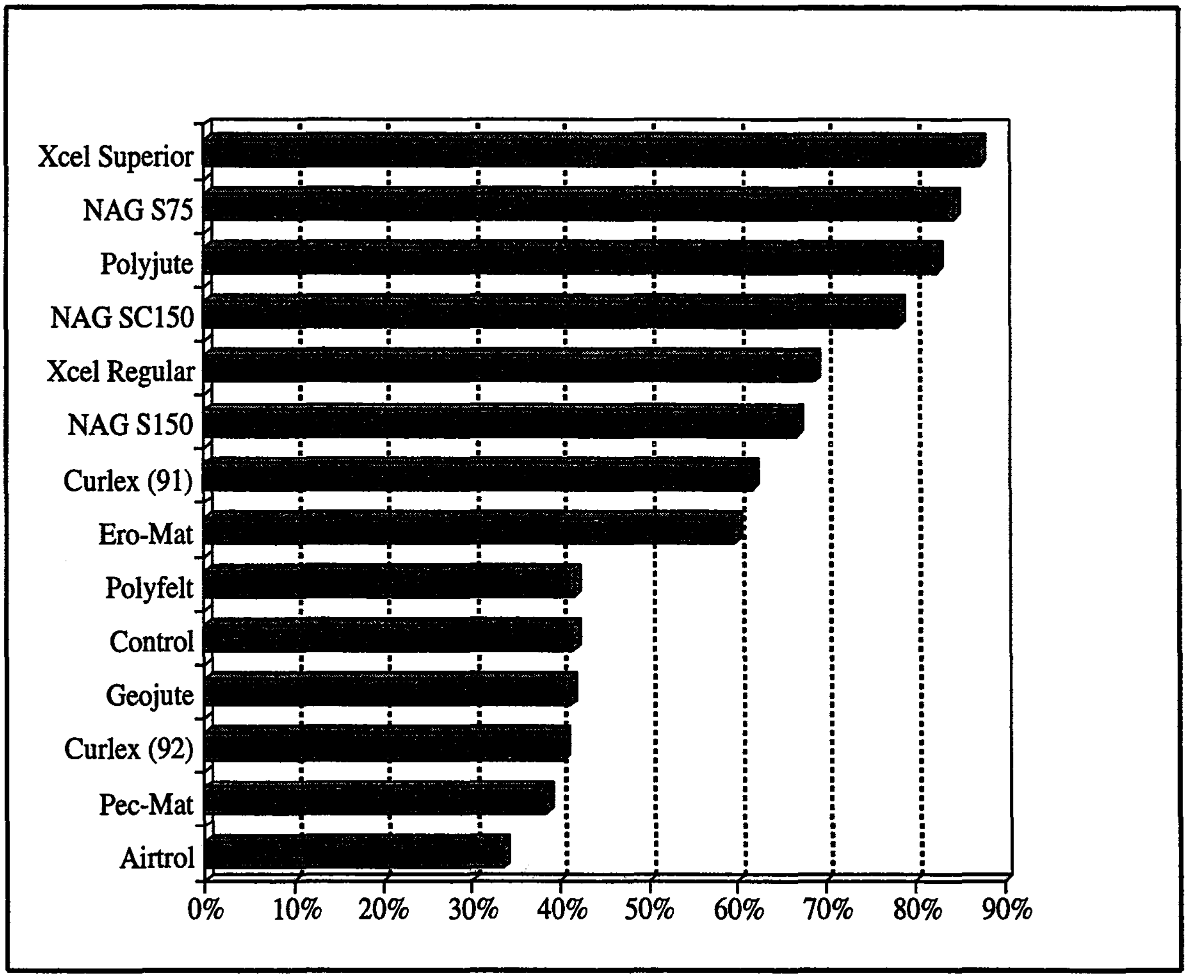


Figure 52F. Vegetative Density (%)

Table F44. Level 7 - Vegetative Density Based Upon Measurement Round and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtrol Plaster®	92	Round 4	All	Sand	56.467	1/3
American Excelsior Curlex®	92	Round 4	All	Sand	39.454	2/3
CONTROL	92	Round 4	All	Sand	38.870	3/3
Belton DEKOWE® 700	92	Round 4	All	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 4	All	Sand	85.805	1/14
North American Green® S150	91	Round 4	All	Sand	84.746	2/14
North American Green® S75	91	Round 4	All	Sand	77.904	3/14
North American Green® SC150	91	Round 4	All	Sand	76.409	4/14
POLYJUTE™ 407GT	91	Round 4	All	Sand	74.302	5/14
verdyol®ERO-MAT®	91	Round 4	All	Sand	73.202	6/14
Xcel Regular®	91	Round 4	All	Sand	72.263	7/14
American Excelsior Curlex®	91	Round 4	All	Sand	57.265	8/14
Airtrol Plaster®	92	Round 4	All	Sand	56.467	9/14
GREENSTREAK® PEC-MAT™	91	Round 4	All	Sand	52.304	10/14
ANTI-WASH®/GEOJUTE®	91	Round 4	All	Sand	51.372	11/14
Polyfelt® TS22	91	Round 4	All	Sand	46.051	12/14
CONTROL	91-92	Round 4	All	Sand	44.309	13/14
American Excelsior Curlex®	92	Round 4	All	Sand	39.454	14/14
Belton DEKOWE® 700	92	Round 4	All	Sand	N/A	N/A

**Vegetative Density is in percent

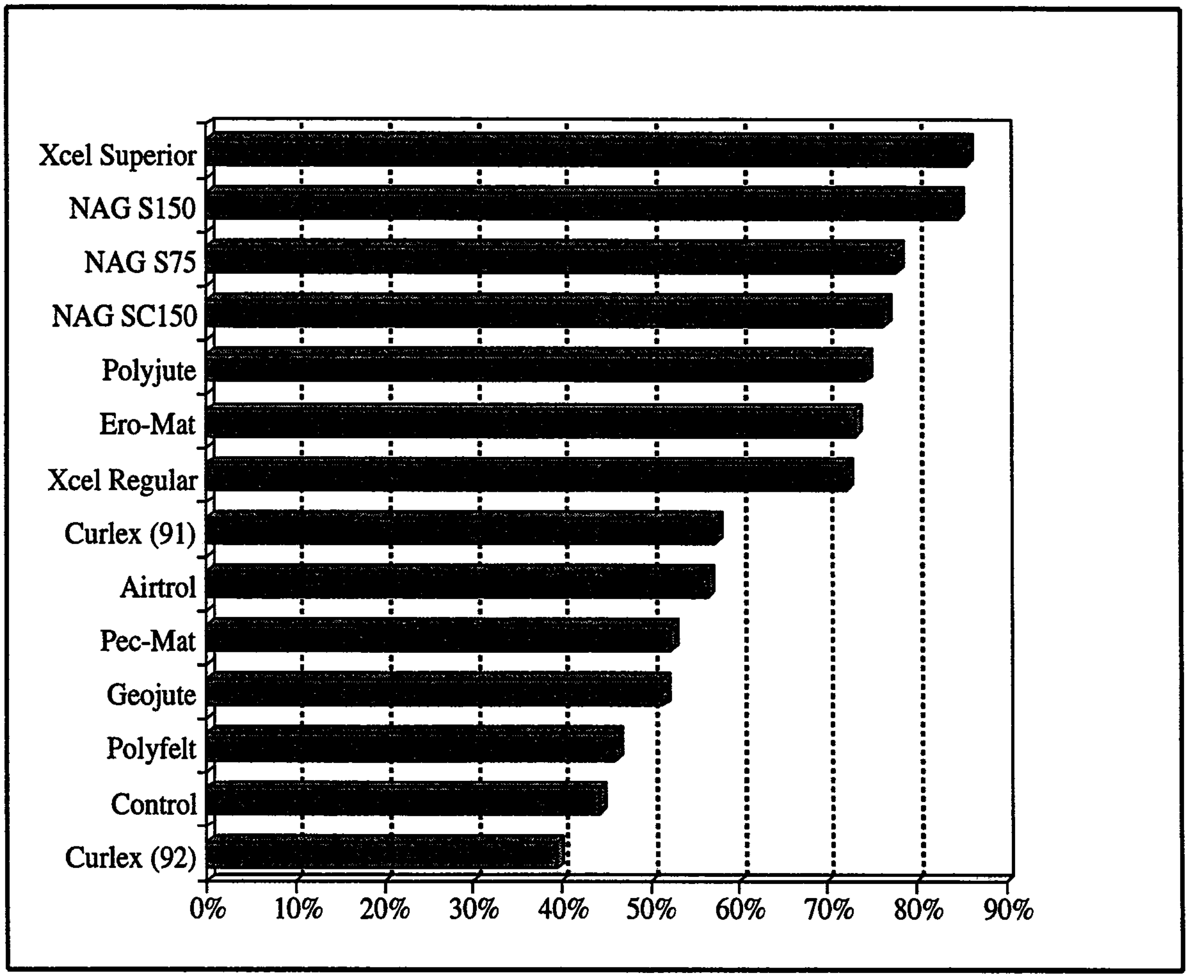


Figure 53F. Vegetative Density (%)

Table F45. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
Belton DEKOWE® 700	92	1-Year	2:1	Clay	0.09	1/3
Airtrol Plaster®	92	1-Year	2:1	Clay	0.20	2/3
CONTROL	92	1-Year	2:1	Clay	1.89	3/3
COMBINED 91-92 EVALUATION CYCLES						
Belton DEKOWE® 700	92	1-Year	2:1	Clay	0.09	1/11
Airtrol Plaster®	92	1-Year	2:1	Clay	0.20	2/11
ANTI-WASH®/GEOJUTE®	91	1-Year	2:1	Clay	0.33	3/11
North American Green® S150	91	1-Year	2:1	Clay	0.37	4/11
American Excelsior Curlex®	91	1-Year	2:1	Clay	0.42	5/11
North American Green® SC150	91	1-Year	2:1	Clay	0.45	6/11
Polyfelt® TS22	91	1-Year	2:1	Clay	0.46	7/11
POLYJUTE™ 407GT	91	1-Year	2:1	Clay	0.48	8/11
GREENSTREAK® PEC-MAT™	91	1-Year	2:1	Clay	0.50	9/11
Xcel Superior®	91	1-Year	2:1	Clay	0.72	10/11
CONTROL	91-92	1-Year	2:1	Clay	1.67	11/11

*Sediment Loss is in (kg/9.3 sq m)

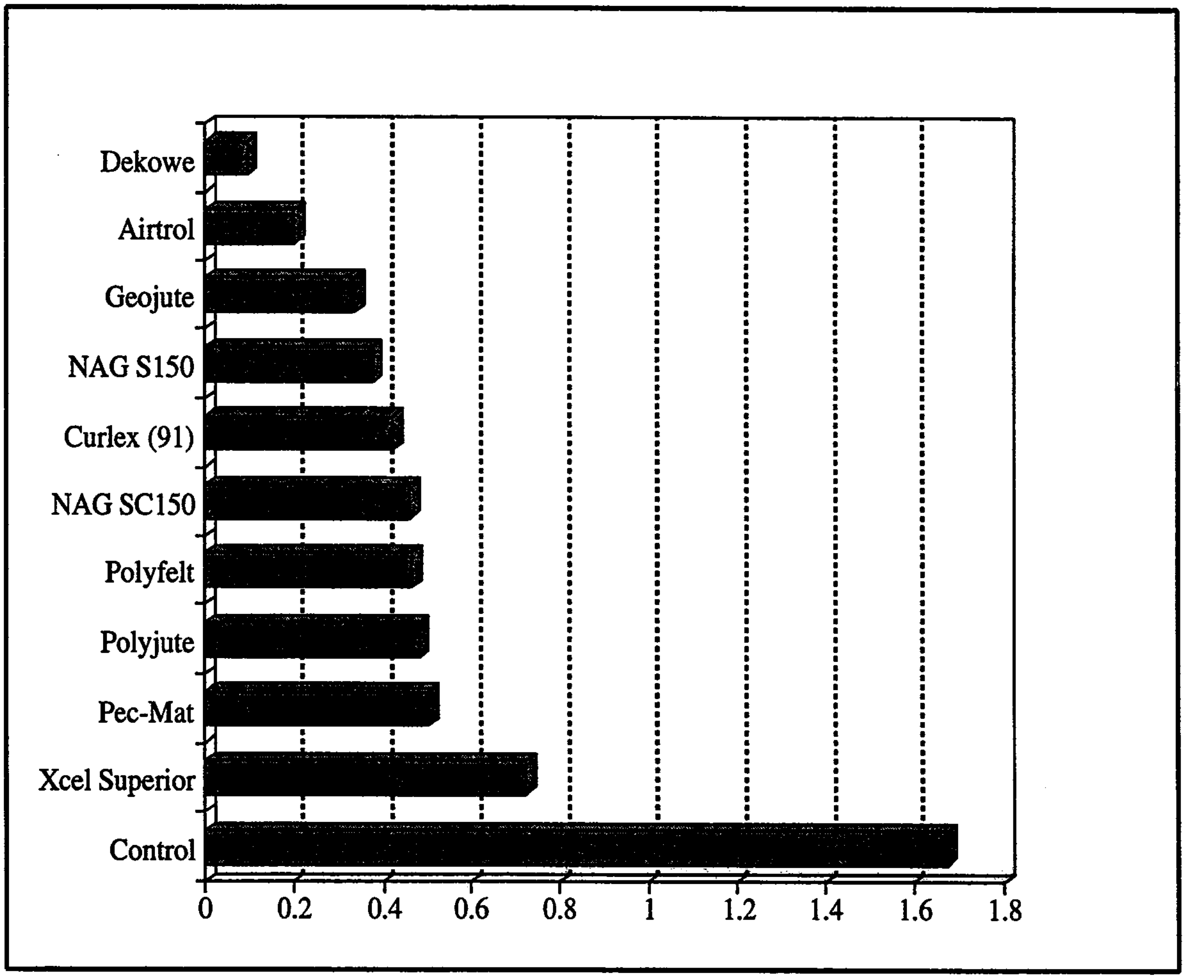


Figure 54F. Sediment Loss (kg/9.3 sq m)

Table F46. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
Airtrol Plaster®	92	2-Year	2:1	Clay	0.25	1/3
Belton DEKOWE® 700	92	2-Year	2:1	Clay	0.28	2/3
CONTROL	92	2-Year	2:1	Clay	1.81	3/3
COMBINED 91-92 EVALUATION CYCLES						
Polyfelt® TS22	91	2-Year	2:1	Clay	0.11	1/11
American Excelsior Curlex®	91	2-Year	2:1	Clay	0.12	2/11
North American Green® SC150	91	2-Year	2:1	Clay	0.16	3/11
POLYJUTE™ 407GT	91	2-Year	2:1	Clay	0.19	4/11
GREENSTREAK® PEC-MAT™	91	2-Year	2:1	Clay	0.21	5/11
North American Green® S150	91	2-Year	2:1	Clay	0.25	6/11
Airtrol Plaster®	91	2-Year	2:1	Clay	0.25	7/11
Belton DEKOWE® 700	92	2-Year	2:1	Clay	0.28	8/11
Xcel Superior®	91	2-Year	2:1	Clay	0.29	9/11
ANTI-WASH®/GEOJUTE®	91	2-Year	2:1	Clay	0.36	10/11
CONTROL	91-92	2-Year	2:1	Clay	1.86	11/11

*Sediment Loss is in (kg/9.3 sq m)

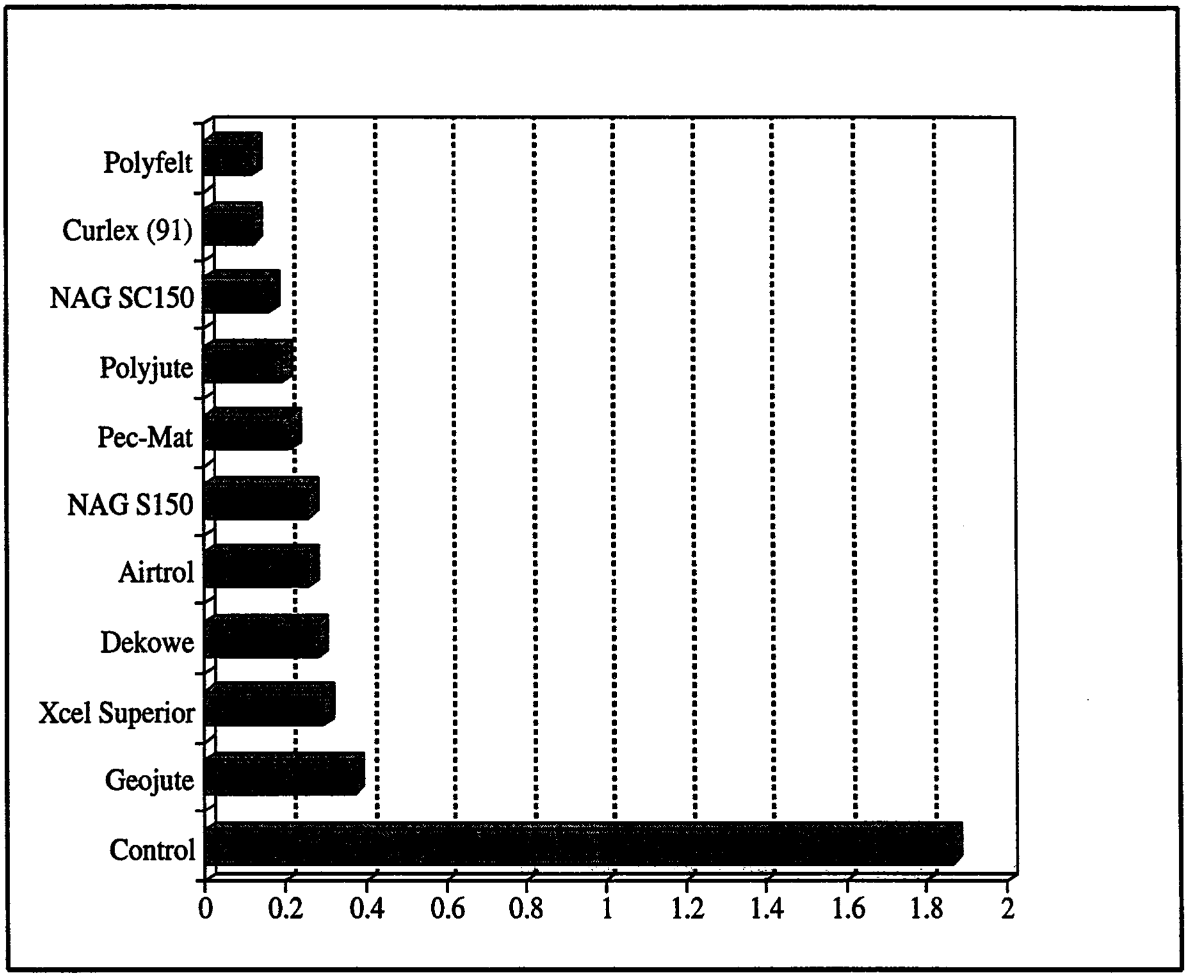


Figure 55F. Sediment Loss (kg/9.3 sq m)

Table F47. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
Belton DEKOWE® 700	92	5-Year	2:1	Clay	0.08	1/3
Airtrol Plaster®	92	5-Year	2:1	Clay	0.17	2/3
CONTROL	92	5-Year	2:1	Clay	0.57	3/3
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S150	91	5-Year	2:1	Clay	0.07	1/11
Belton DEKOWE® 700	92	5-Year	2:1	Clay	0.08	2/11
Xcel Superior®	91	5-Year	2:1	Clay	0.08	3/11
ANTI-WASH®/GEOJUTE®	91	5-Year	2:1	Clay	0.09	4/11
North American Green® SC150	91	5-Year	2:1	Clay	0.10	5/11
American Excelsior Curlex®	91	5-Year	2:1	Clay	0.11	6/11
GREENSTREAK® PEC-MAT™	91	5-Year	2:1	Clay	0.11	7/11
POLYJUTE™ 407GT	91	5-Year	2:1	Clay	0.11	8/11
Polyfelt® TS22	91	5-Year	2:1	Clay	0.15	9/11
Airtrol Plaster®	92	5-Year	2:1	Clay	0.17	10/11
CONTROL	91-92	5-Year	2:1	Clay	0.47	11/11

*Sediment Loss is in (kg/9.3 sq m)

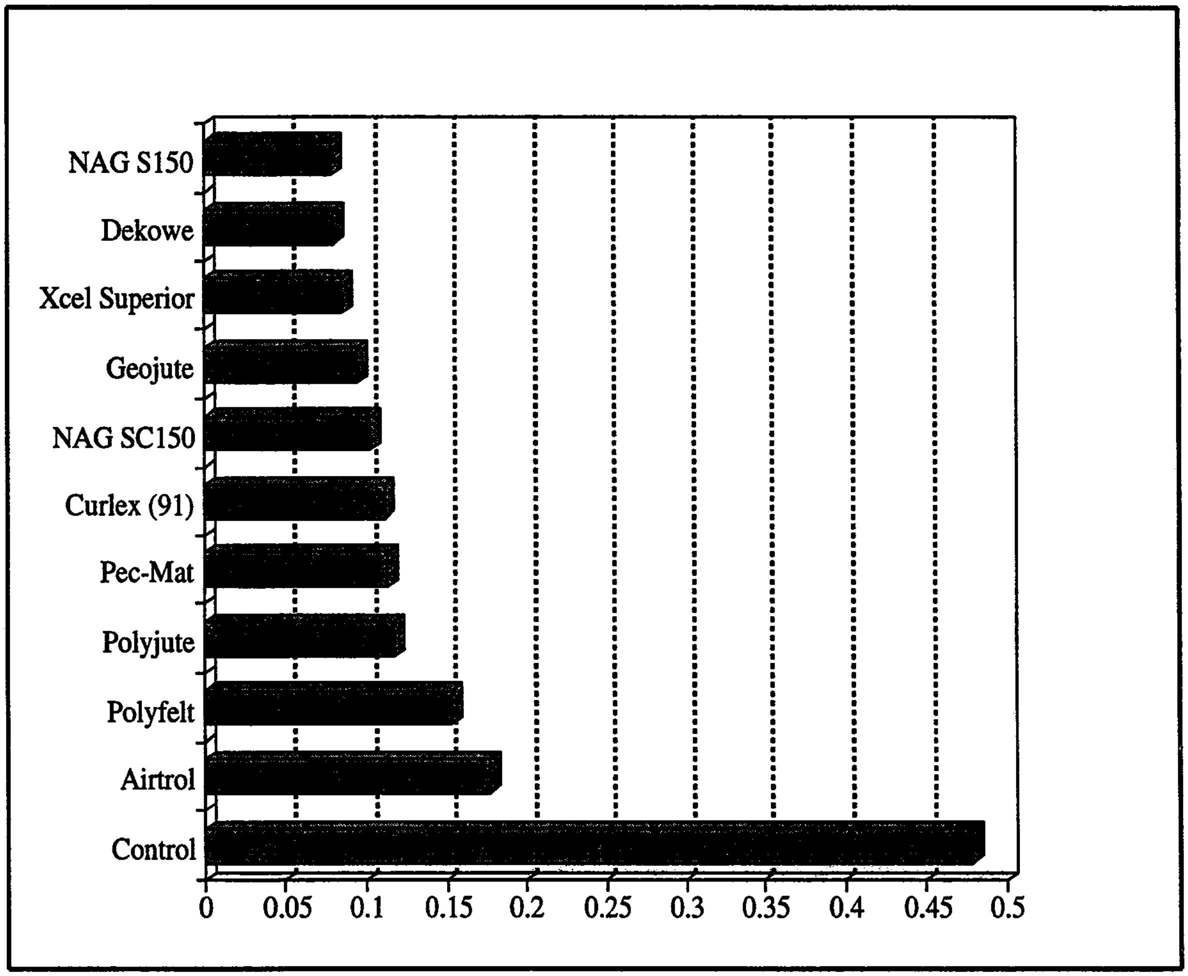


Figure 56F. Sediment Loss (kg/9.3 sq m)

Table F48. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	2:1	Sand	1.74	1/2
Airtrol Plaster®	92	1-Year	2:1	Sand	9.86	2/2
CONTROL	92	1-Year	2:1	Sand	24.64	3/3
Belton DEKOWE® 700	92	1-Year	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
North American Green® SC150	91	1-Year	2:1	Sand	0.61	1/11
North American Green® S150	91	1-Year	2:1	Sand	0.64	2/11
American Excelsior Curlex®	91	1-Year	2:1	Sand	1.08	3/11
Polyfelt® TS22	91	1-Year	2:1	Sand	1.26	4/11
Xcel Superior®	91	1-Year	2:1	Sand	1.29	5/11
American Excelsior Curlex®	92	1-Year	2:1	Sand	1.74	6/11
ANTI-WASH®/GEOJUTE®	91	1-Year	2:1	Sand	2.96	7/11
POLYJUTE™ 407GT	91	1-Year	2:1	Sand	5.61	8/11
GREENSTREAK® PEC-MAT™	91	1-Year	2:1	Sand	8.69	9/11
Airtrol Plaster®	92	1-Year	2:1	Sand	9.86	10/11
CONTROL	91-92	1-Year	2:1	Sand	20.72	11/11

*Sediment Loss is in (kg/9.3 sq m)

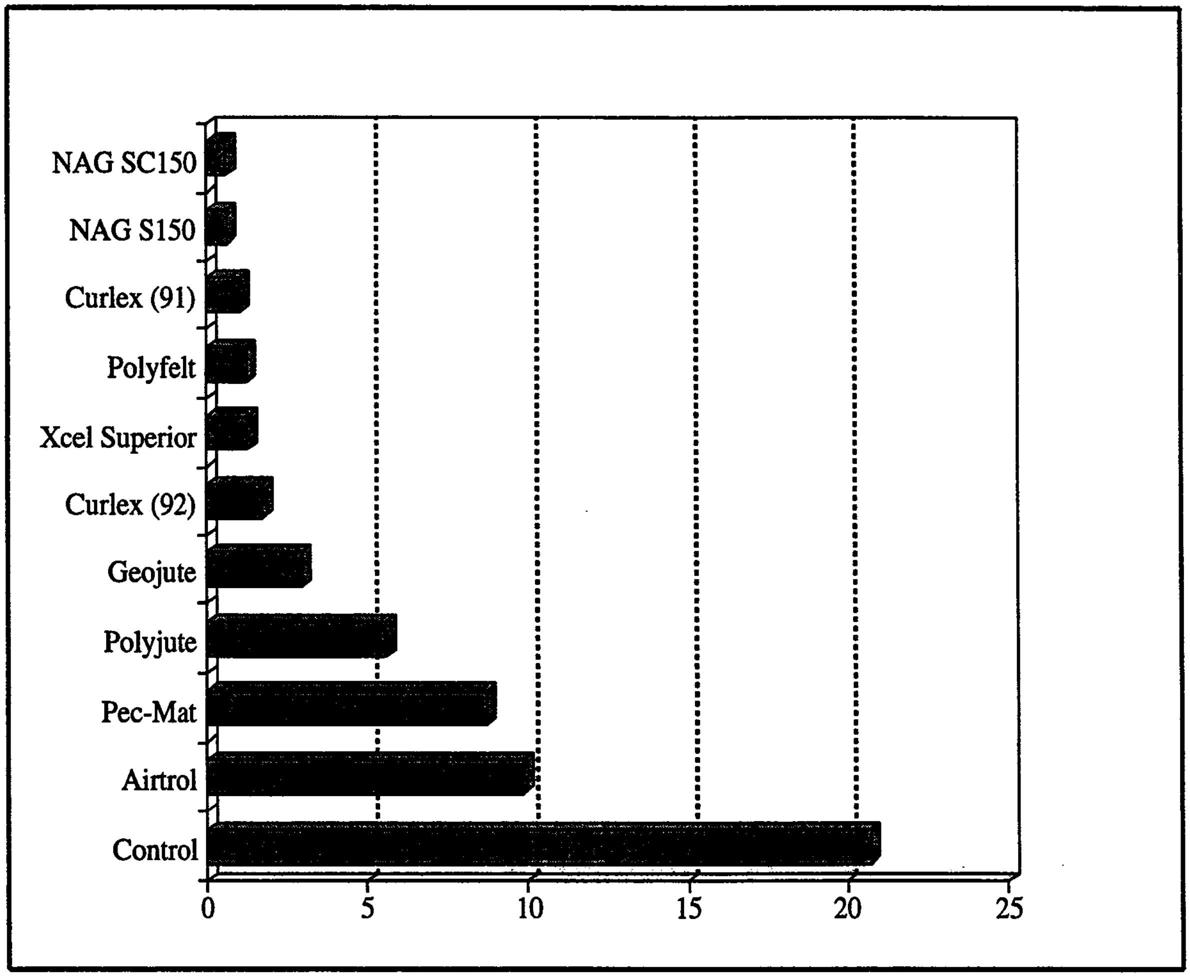


Figure 57F. Sediment Loss (kg/9.3 sq m)

Table F49. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	2:1	Sand	11.32	1/3
Airtrol Plaster®	92	2-Year	2:1	Sand	29.57	2/3
CONTROL	92	2-Year	2:1	Sand	61.14	3/3
Belton DEKOWE® 700	92	2-Year	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	2-Year	2:1	Sand	5.43	1/11
North American Green® SC150	91	2-Year	2:1	Sand	8.85	2/11
North American Green® S150	91	2-Year	2:1	Sand	11.03	3/11
American Excelsior Curlex®	92	2-Year	2:1	Sand	11.32	4/11
POLYJUTE™ 407GT	91	2-Year	2:1	Sand	12.23	5/11
Polyfelt® TS22	91	2-Year	2:1	Sand	19.62	6/11
American Excelsior Curlex®	91	2-Year	2:1	Sand	21.49	7/11
GREENSTREAK® PEC-MAT™	91	2-Year	2:1	Sand	22.25	8/11
ANTI-WASH®/GEOJUTE®	91	2-Year	2:1	Sand	25.21	9/11
Airtrol Plaster®	92	2-Year	2:1	Sand	29.57	10/11
CONTROL	91-92	2-Year	2:1	Sand	72.13	11/11

*Sediment Loss is in (kg/9.3 sq m)

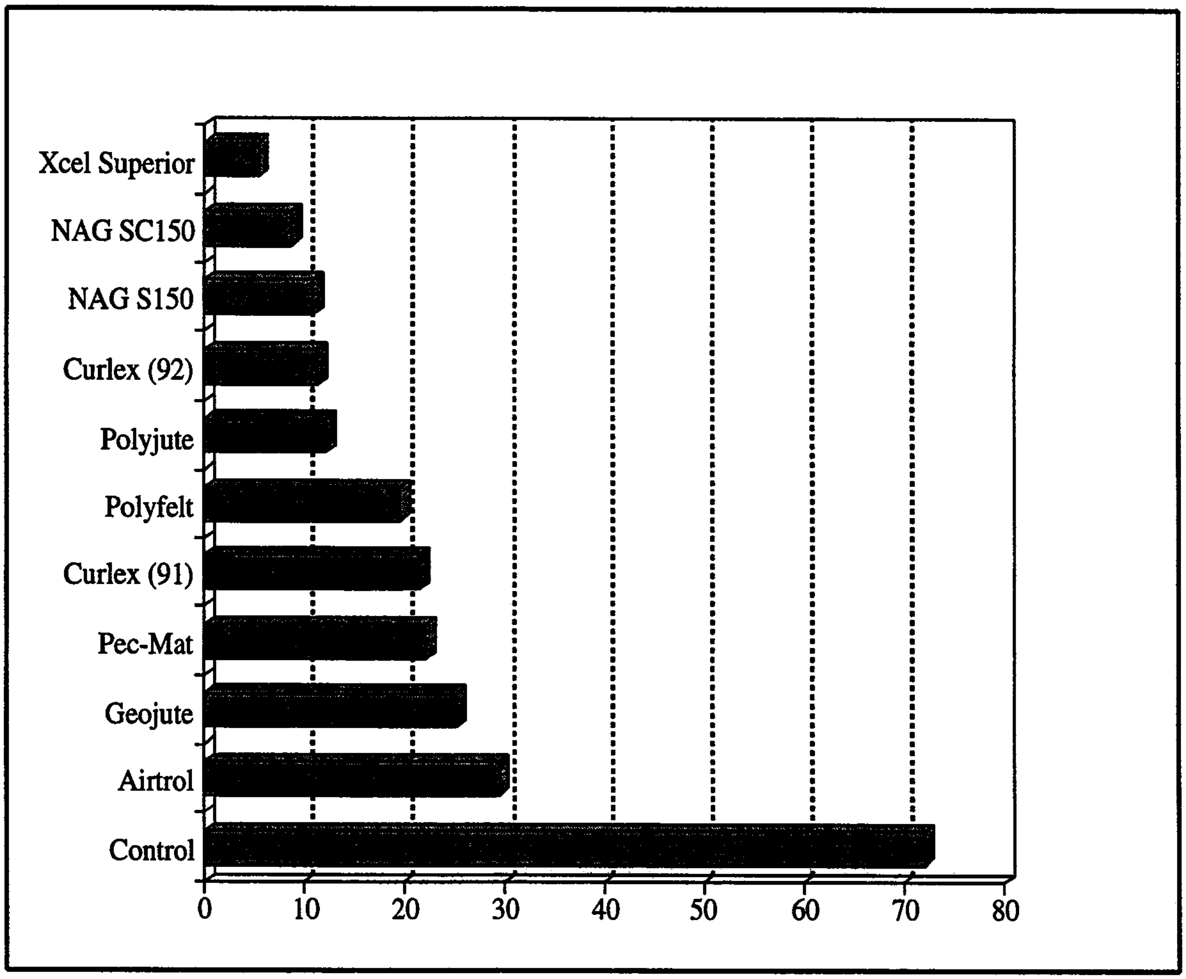


Figure 58F. Sediment Loss (kg/9.3 sq m)

Table F50. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	2:1	Sand	44.46	1/3
Airtrol Plaster®	92	5-Year	2:1	Sand	65.87	2/3
CONTROL	92	5-Year	2:1	Sand	70.90	3/3
Belton DEKOWE® 700	92	5-Year	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	5-Year	2:1	Sand	21.06	1/11
POLYJUTE™ 407GT	91	5-Year	2:1	Sand	24.20	2/11
North American Green® SC150	91	5-Year	2:1	Sand	28.48	3/11
Polyfelt® TS22	91	5-Year	2:1	Sand	30.59	4/11
North American Green® S150	91	5-Year	2:1	Sand	35.01	5/11
ANTI-WASH®/GEOJUTE®	91	5-Year	2:1	Sand	37.20	6/11
American Excelsior Curlex®	91	5-Year	2:1	Sand	38.13	7/11
GREENSTREAK® PEC-MAT™	91	5-Year	2:1	Sand	42.17	8/11
American Excelsior Curlex®	92	5-Year	2:1	Sand	44.46	9/11
Airtrol Plaster®	92	5-Year	2:1	Sand	65.87	10/11
CONTROL	91-92	5-Year	2:1	Sand	76.72	11/11

*Sediment Loss is in (kg/9.3 sq m)

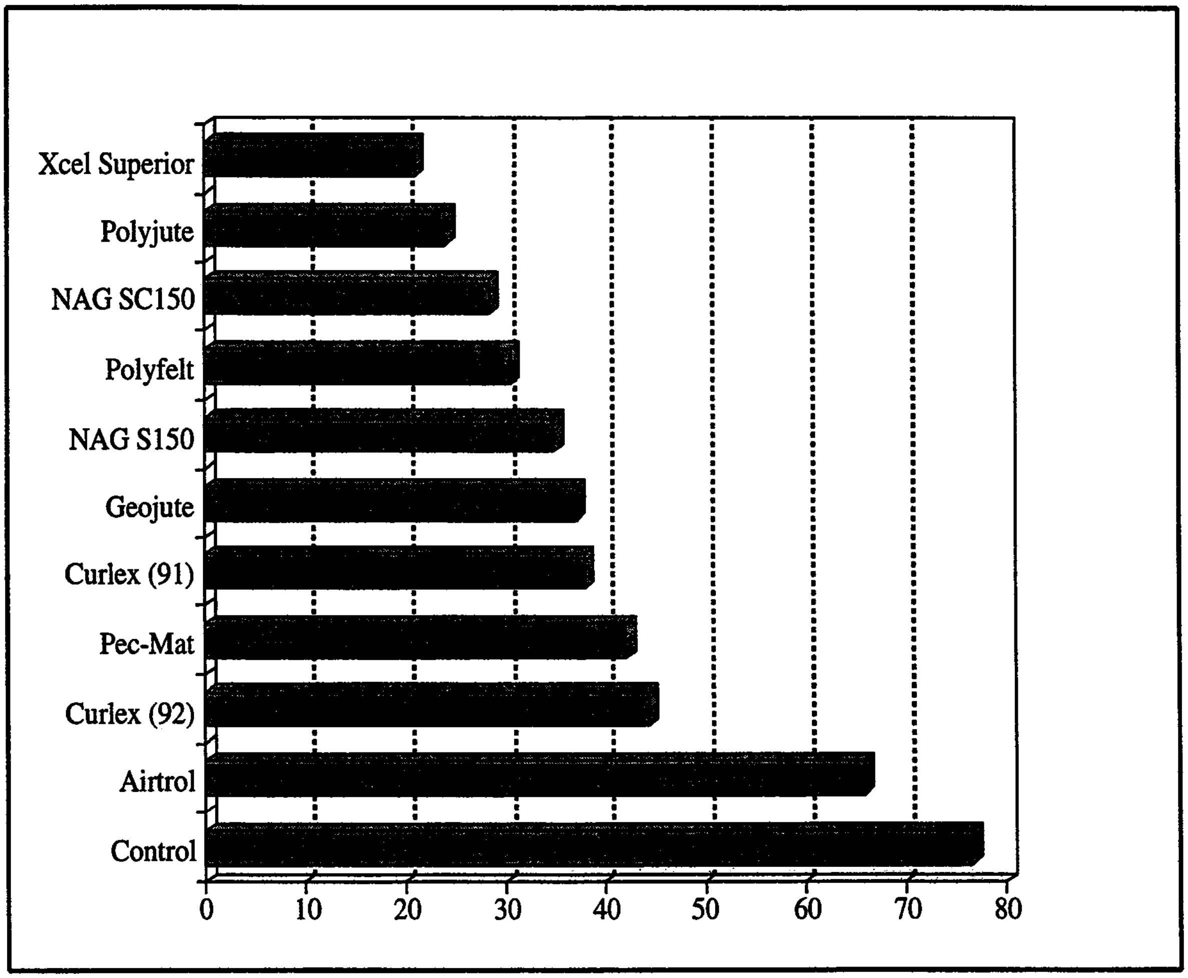


Figure 59F. Sediment Loss (kg/9.3 sq m)

Table F51. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	3:1	Clay	0.12786	1/3
Airtrol Plaster®	92	1-Year	3:1	Clay	0.23300	2/3
CONTROL	92	1-Year	3:1	Clay	0.32643	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	92	1-Year	3:1	Clay	0.12786	1/8
Airtrol Plaster®	92	1-Year	3:1	Clay	0.23300	2/8
American Excelsior Curlex®	91	1-Year	3:1	Clay	0.6761	3/8
GREENSTREAK® PEC-MAT™	91	1-Year	3:1	Clay	0.7179	4/8
verdyol®ERO-MAT®	91	1-Year	3:1	Clay	0.7518	5/8
CONTROL	91-92	1-Year	3:1	Clay	0.7992	6/8
North American Green® S75	91	1-Year	3:1	Clay	1.3175	7/8
Xcel Regular®	91	1-Year	3:1	Clay	1.6029	8/8

*Sediment Loss is in (kg/9.3 sq m)

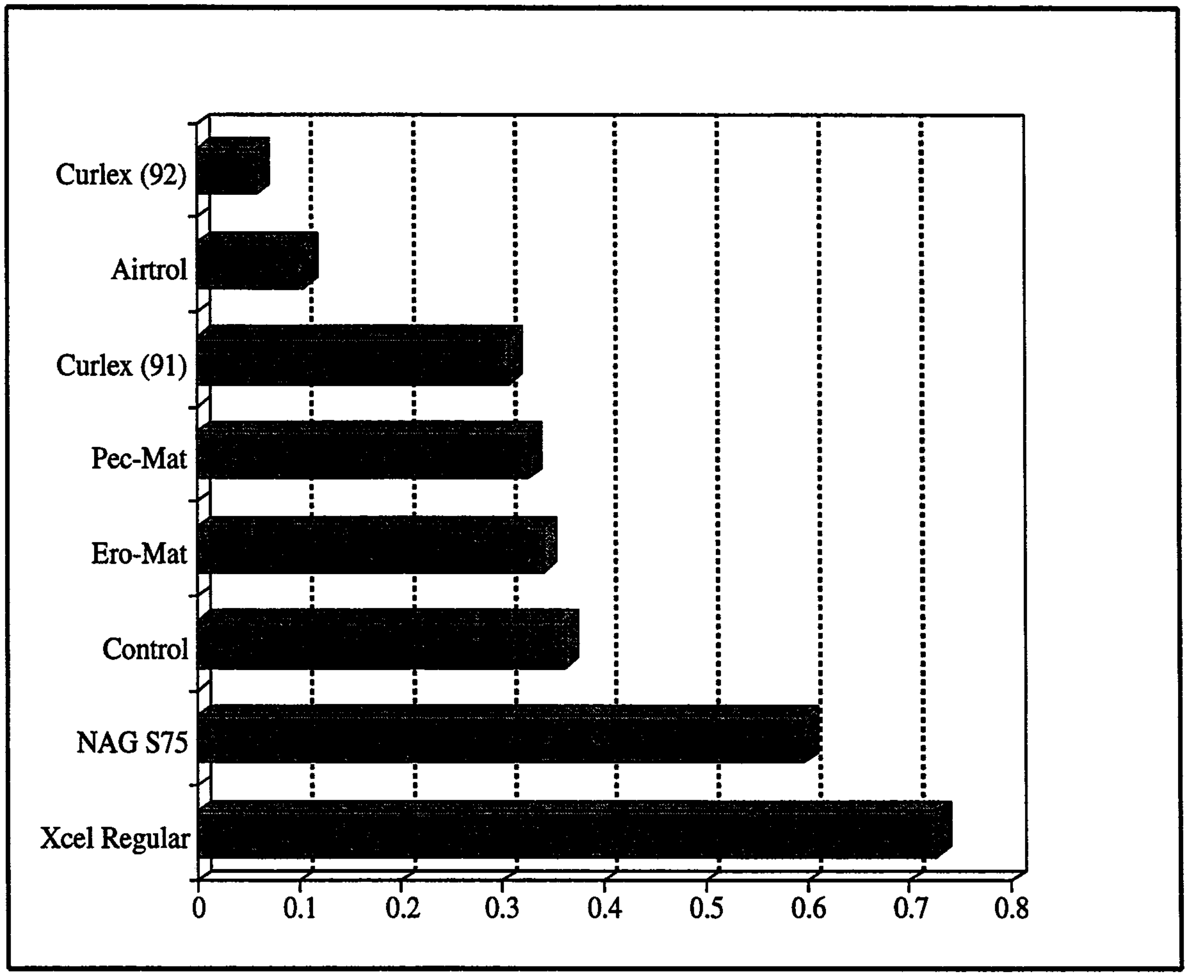


Figure 60F. Sediment Loss (kg/9.3 sq m)

Table F52. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	3:1	Clay	0.13	1/3
Airtrol Plaster®	92	2-Year	3:1	Clay	0.23	2/3
CONTROL	92	2-Year	3:1	Clay	1.58	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	91	2-Year	3:1	Clay	0.11	1/8
verdyol®ERO-MAT®	91	2-Year	3:1	Clay	0.13	2/8
American Excelsior Curlex®	92	2-Year	3:1	Clay	0.13	3/8
Airtrol Plaster®	92	2-Year	3:1	Clay	0.23	4/8
GREENSTREAK® PEC-MAT™	91	2-Year	3:1	Clay	0.24.	5/8
North American Green® S75	91	2-Year	3:1	Clay	0.29	6/8
Xcel Regular®	91	2-Year	3:1	Clay	0.31	7/8
CONTROL	91-92	2-Year	3:1	Clay	1.69	8/8

*Sediment Loss is in (kg/9.3 sq m)

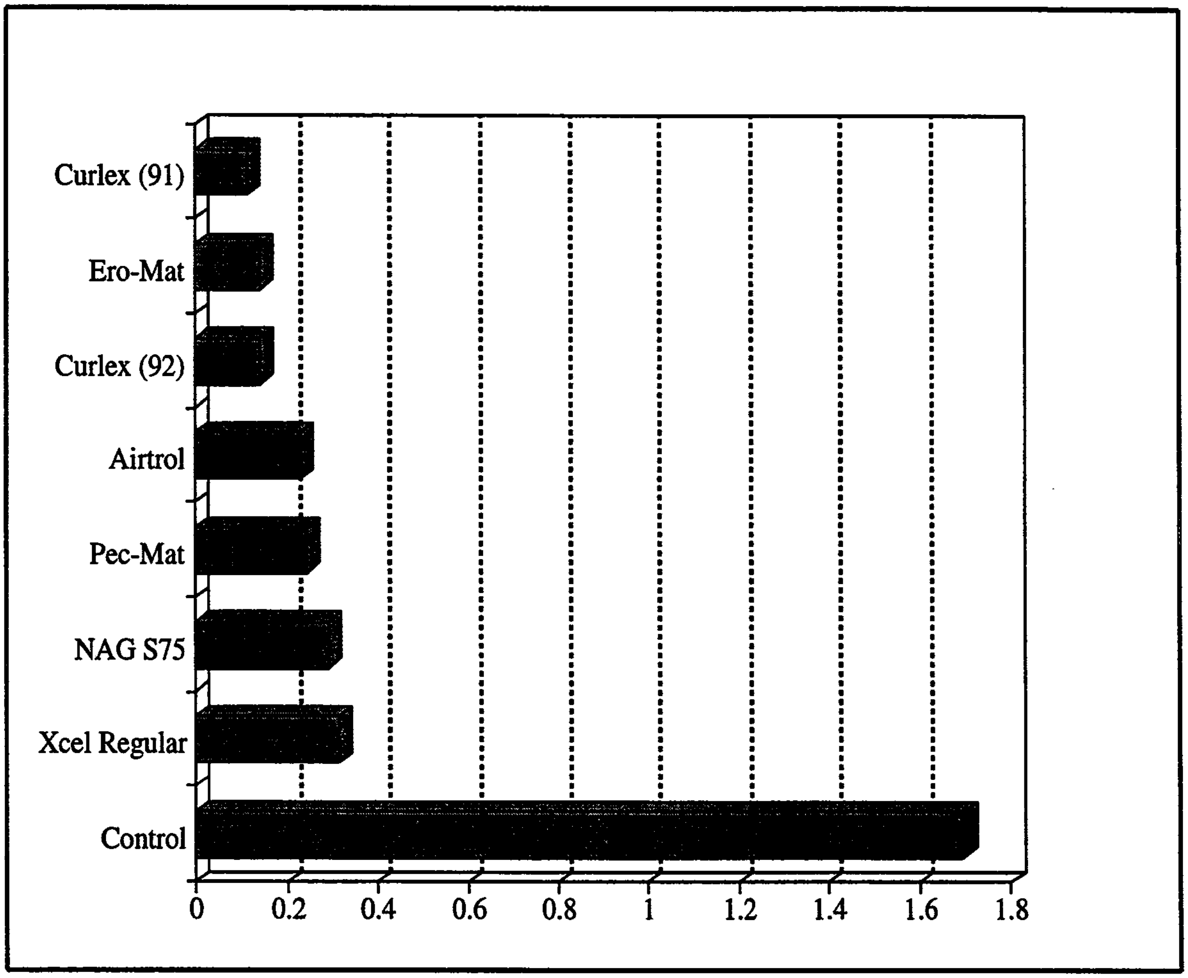


Figure 61F. Sediment Loss (kg/9.3 sq m)

Table F53. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	3:1	Clay	0.05	1/3
Airtrol Plaster®	92	5-Year	3:1	Clay	0.28	2/3
CONTROL	92	5-Year	3:1	Clay	1.86	3/3
COMBINED 91-92 EVALUATION CYCLES						
verdyol®ERO-MAT®	91	5-Year	3:1	Clay	0.04	1/8
North American Green® S75	91	5-Year	3:1	Clay	0.04	2/8
American Excelsior Curlex®	92	5-Year	3:1	Clay	0.05	3/8
GREENSTREAK® PEC-MAT™	91	5-Year	3:1	Clay	0.05	4/8
Xcel Regular®	91	5-Year	3:1	Clay	0.06	5/8
American Excelsior Curlex®	91	5-Year	3:1	Clay	0.07	6/8
Airtrol Plaster®	91	5-Year	3:1	Clay	0.28	7/8
CONTROL	91-92	5-Year	3:1	Clay	1.55	8/8

*Sediment Loss is in (kg/9.3 sq m)

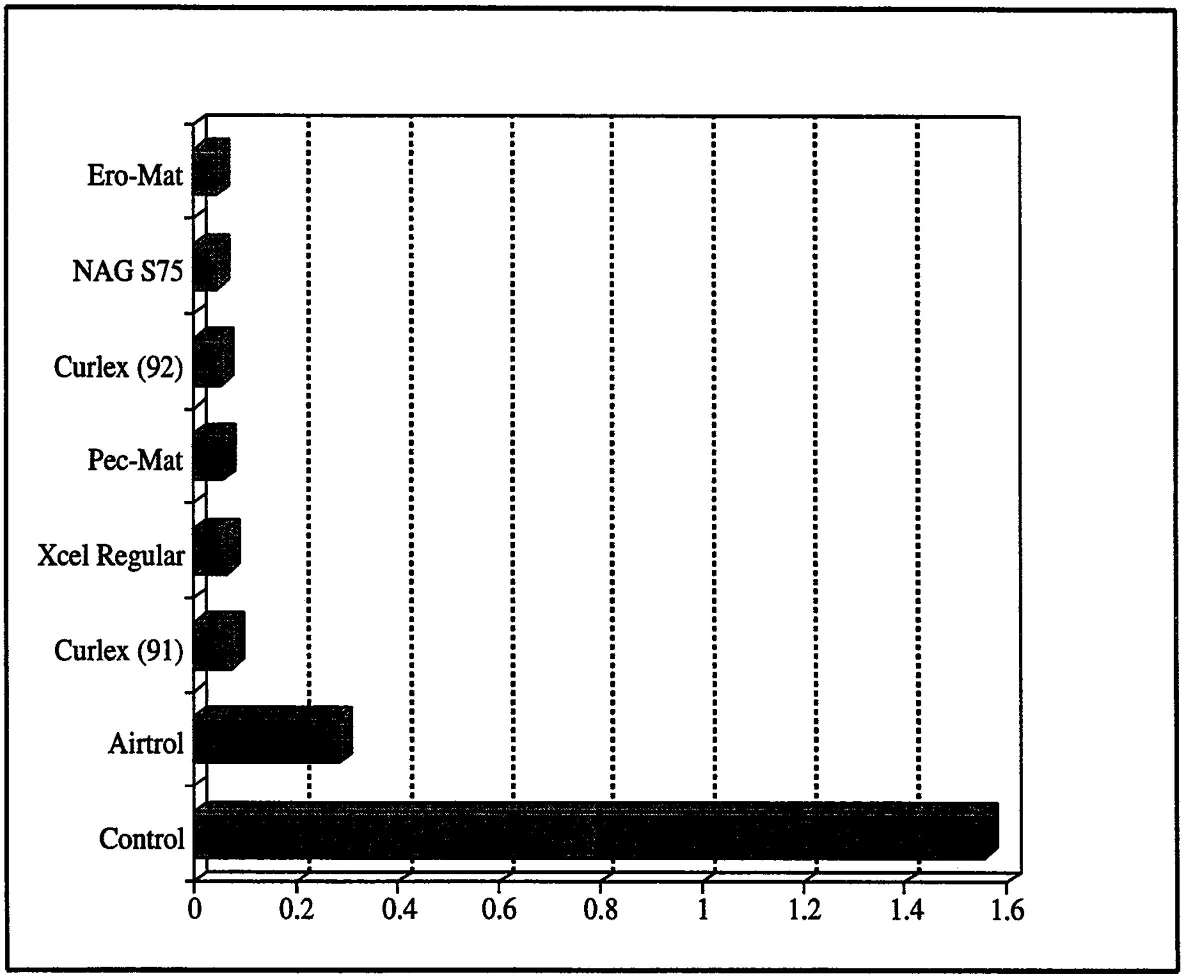


Figure 62F. Sediment Loss (kg/9.3 sq m)

Table F54. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	1-Year	3:1	Sand	0.46	1/3
Airtrol Plaster®	92	1-Year	3:1	Sand	1.25	2/3
CONTROL	92	1-Year	3:1	Sand	9.50	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	92	1-Year	3:1	Sand	.046	1/8
verdyol®ERO-MAT®	91	1-Year	3:1	Sand	0.49	2/8
Xcel Regular®	91	1-Year	3:1	Sand	0.64	3/8
North American Green® S75	91	1-Year	3:1	Sand	0.77	4/8
Airtrol Plaster®	92	1-Year	3:1	Sand	1.25	5/8
American Excelsior Curlex®	91	1-Year	3:1	Sand	2.02	6/8
GREENSTREAK® PEC-MAT™	91	1-Year	3:1	Sand	3.56	7/8
CONTROL	91-92	1-Year	3:1	Sand	9.02	8/8

*Sediment Loss is in (kg/9.3 sq m)

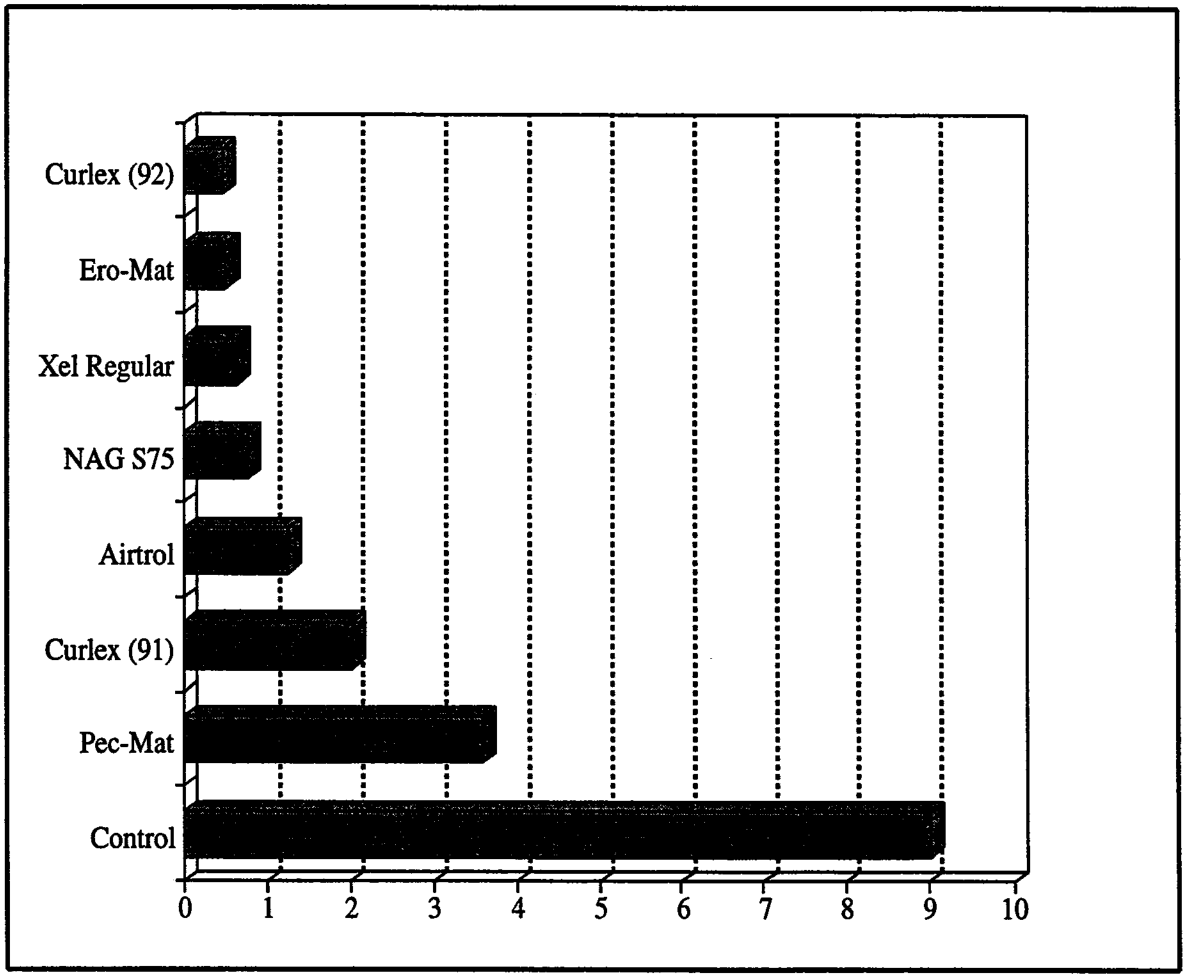


Figure 63F. Sediment Loss (kg/9.3 sq m)

Table F55. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	2-Year	3:1	Sand	2.93	1/3
Airtrol Plaster®	92	2-Year	3:1	Sand	11.13	2/3
CONTROL	92	2-Year	3:1	Sand	38.85	3/3
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	2-Year	3:1	Sand	2.73	1/8
American Excelsior Curlex®	92	2-Year	3:1	Sand	2.93	2/8
American Excelsior Curlex®	91	2-Year	3:1	Sand	3.26	3/8
verdyol®ERO-MAT®	91	2-Year	3:1	Sand	7.50	4/8
North American Green® S75	91	2-Year	3:1	Sand	8.40	5/8
Airtrol Plaster®	92	2-Year	3:1	Sand	11.13	6/8
GREENSTREAK® PEC-MAT™	91	2-Year	3:1	Sand	17.53	7/8
CONTROL	91-92	2-Year	3:1	Sand	36.01	8/8

*Sediment Loss is in (kg/9.3 sq m)

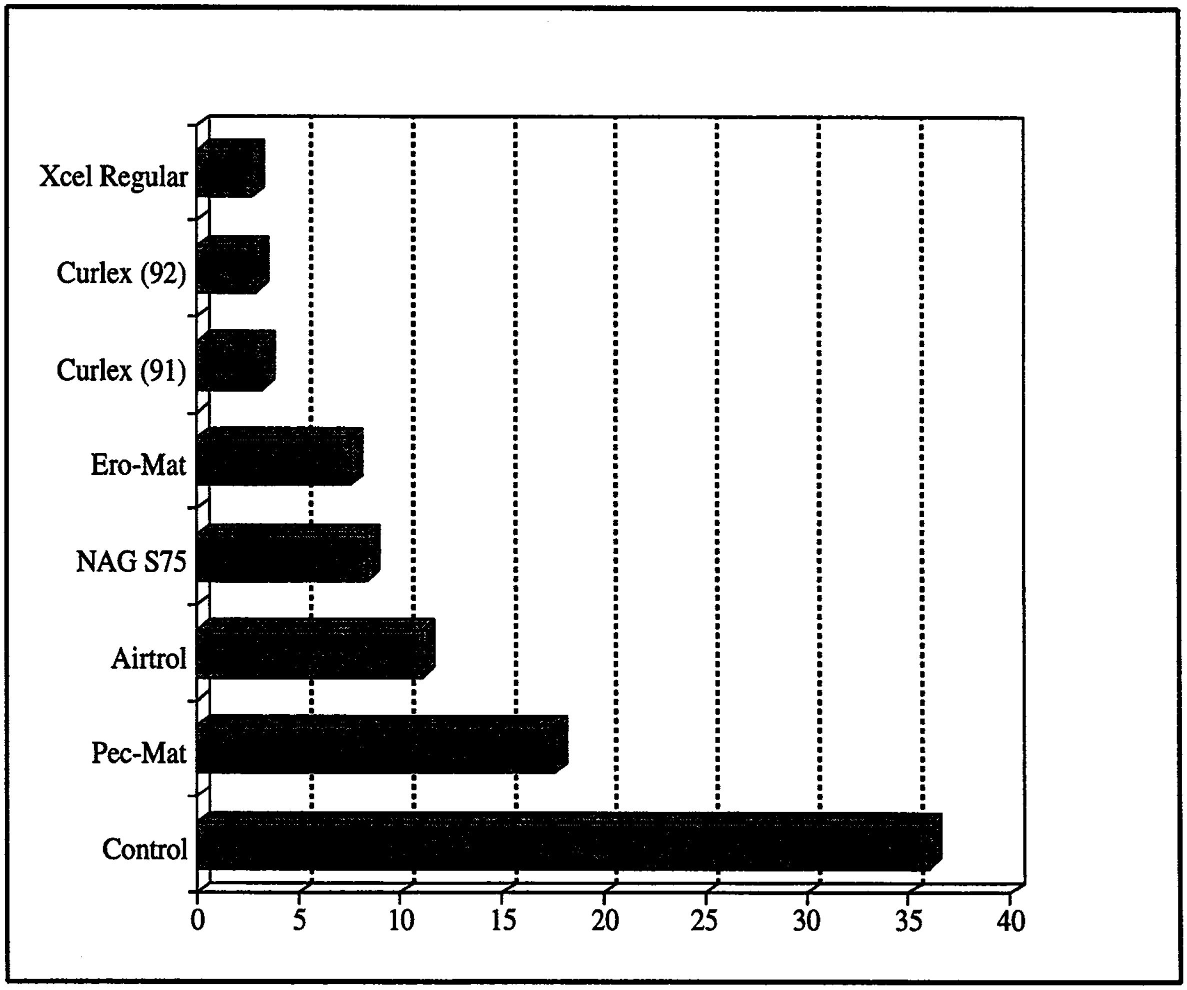


Figure 64F. Sediment Loss (kg/9.3 sq m)

Table F56. Level 8 - Sediment Loss Based Upon Simulated Rainfall Event, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Design Storm	Slope	Soil	Sdmt Loss*	Sdmt Rank
American Excelsior Curlex®	92	5-Year	3:1	Sand	6.31	1/3
Airtrol Plaster®	92	5-Year	3:1	Sand	22.45	2/3
CONTROL	92	5-Year	3:1	Sand	35.08	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	91	5-Year	3:1	Sand	4.98	1/8
Xcel Regular®	91	5-Year	3:1	Sand	5.88	2/8
American Excelsior Curlex®	92	5-Year	3:1	Sand	6.31	3/8
North American Green® S75	91	5-Year	3:1	Sand	7.89	4/8
verdyol®ERO-MAT®	91	5-Year	3:1	Sand	10.42	5/8
GREENSTREAK® PEC-MAT™	91	5-Year	3:1	Sand	16.33	6/8
Airtrol Plaster®	92	5-Year	3:1	Sand	22.45	7/8
CONTROL	91-92	5-Year	3:1	Sand	31.42	8/8

*Sediment Loss is in (kg/9.3 sq m)

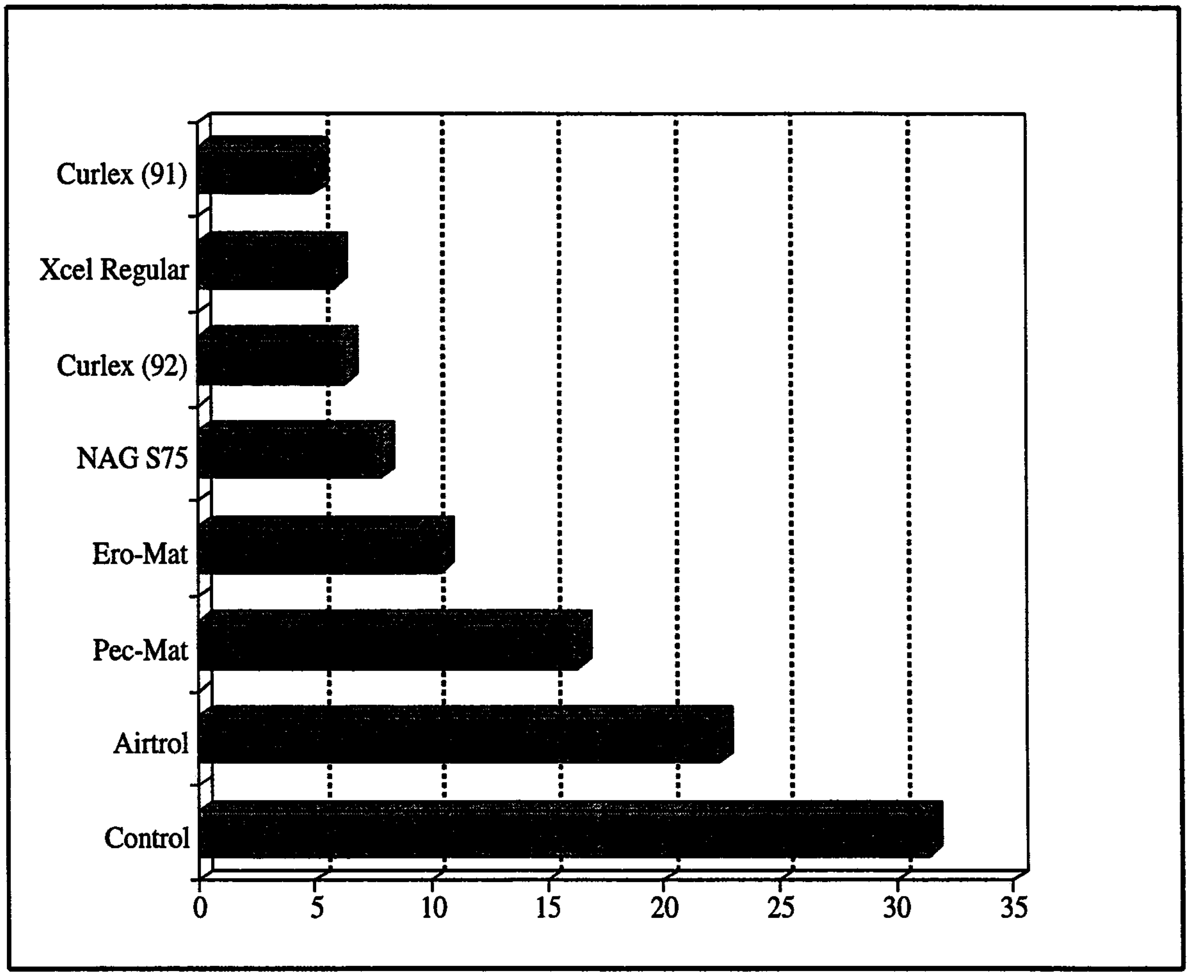


Figure 65F. Sediment Loss (kg/9.3 sq m)

Table F57. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	2:1	Clay	36.781	1/3
Belton DEKOWE® 700	92	Round 1	2:1	Clay	30.658	2/3
Airtrol Plaster®	92	Round 1	2:1	Clay	24.427	3/3
COMBINED 91-92 EVALUATION CYCLES						
CONTROL	91-92	Round 1	2:1	Clay	31.388	1/11
Belton DEKOWE® 700	92	Round 1	2:1	Clay	30.658	2/11
Airtrol Plaster®	92	Round 1	2:1	Clay	24.427	3/11
POLYJUTE™ 407GT	91	Round 1	2:1	Clay	4.394	4/11
American Excelsior Curlex®	91	Round 1	2:1	Clay	3.791	5/11
GREENSTREAK® PEC-MAT™	91	Round 1	2:1	Clay	2.266	6/11
ANTI-WASH®/GEOJUTE®	91	Round 1	2:1	Clay	2.039	7/11
North American Green® S150	91	Round 1	2:1	Clay	1.581	8/11
Xcel Superior®	91	Round 1	2:1	Clay	1.327	9/11
North American Green® SC150	91	Round 1	2:1	Clay	0.482	10/11
Polyfelt® TS22	91	Round 1	2:1	Clay	0.466	11/11

**Vegetative Density is in percent

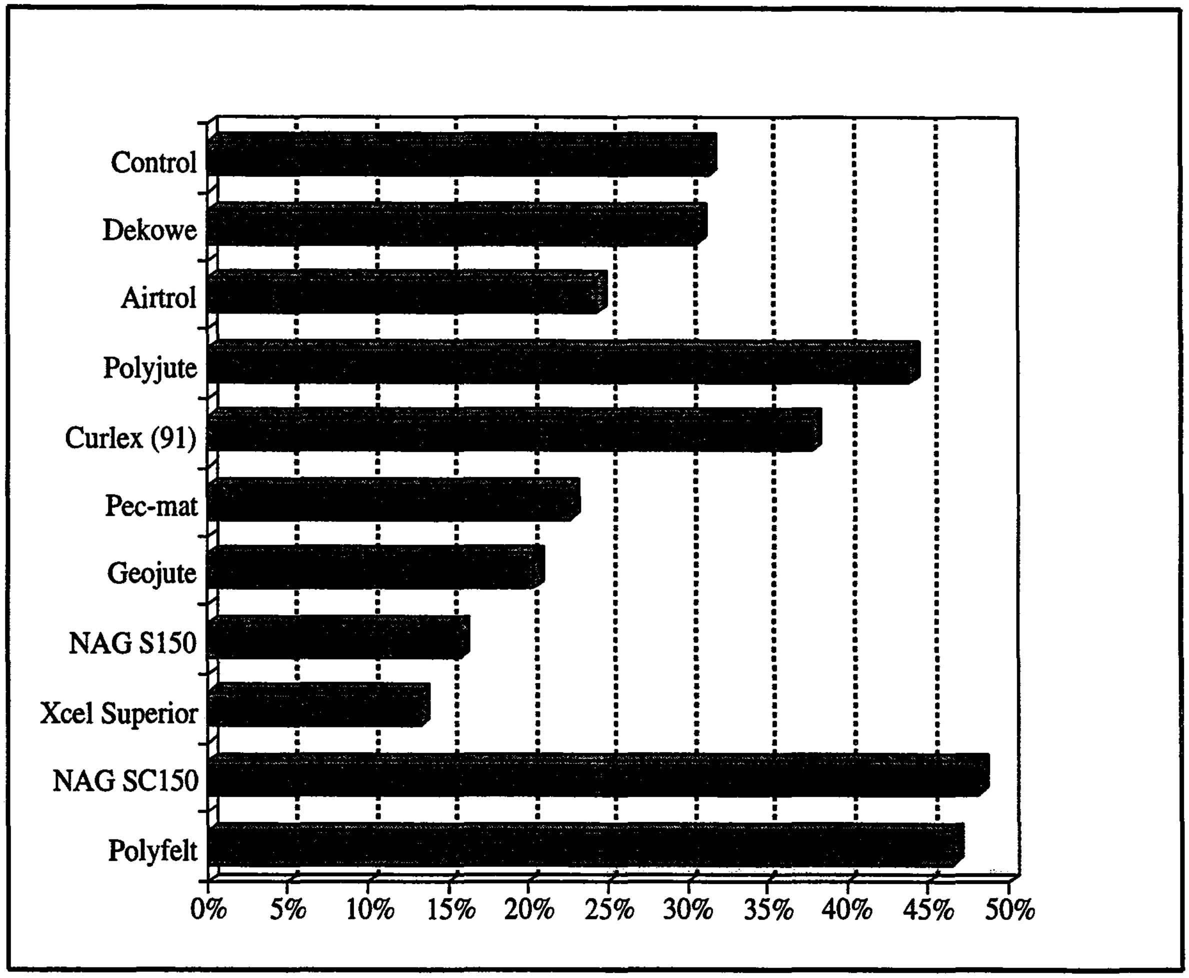


Figure 66F. Vegetative Density (%)

Table F58. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 2	2:1	Clay	96.398	1/3
Airtrol Plaster®	92	Round 2	2:1	Clay	76.610	2/3
Belton DEKOWE® 700	92	Round 2	2:1	Clay	75.272	3/3
COMBINED 91-92 EVALUATION CYCLES						
Airtrol Plaster®	92	Round 2	2:1	Clay	76.610	1/11
Belton DEKOWE® 700	92	Round 2	2:1	Clay	75.272	2/11
American Excelsior Curlex®	91	Round 2	2:1	Clay	69.786	3/11
CONTROL	91-92	Round 2	2:1	Clay	69.612	4/11
Xcel Superior®	91	Round 2	2:1	Clay	54.382	5/11
POLYJUTE™ 407GT	91	Round 2	2:1	Clay	46.749	6/11
GREENSTREAK® PEC-MAT™	91	Round 2	2:1	Clay	31.764	7/11
North American Green® SC150	91	Round 2	2:1	Clay	31.442	8/11
North American Green® S150	91	Round 2	2:1	Clay	29.503	9/11
ANTI-WASH®/GEOJUTE®	91	Round 2	2:1	Clay	26.075	10/11
Polyfelt® TS22	91	Round 2	2:1	Clay	4.436	11/11

**Vegetative Density is in percent

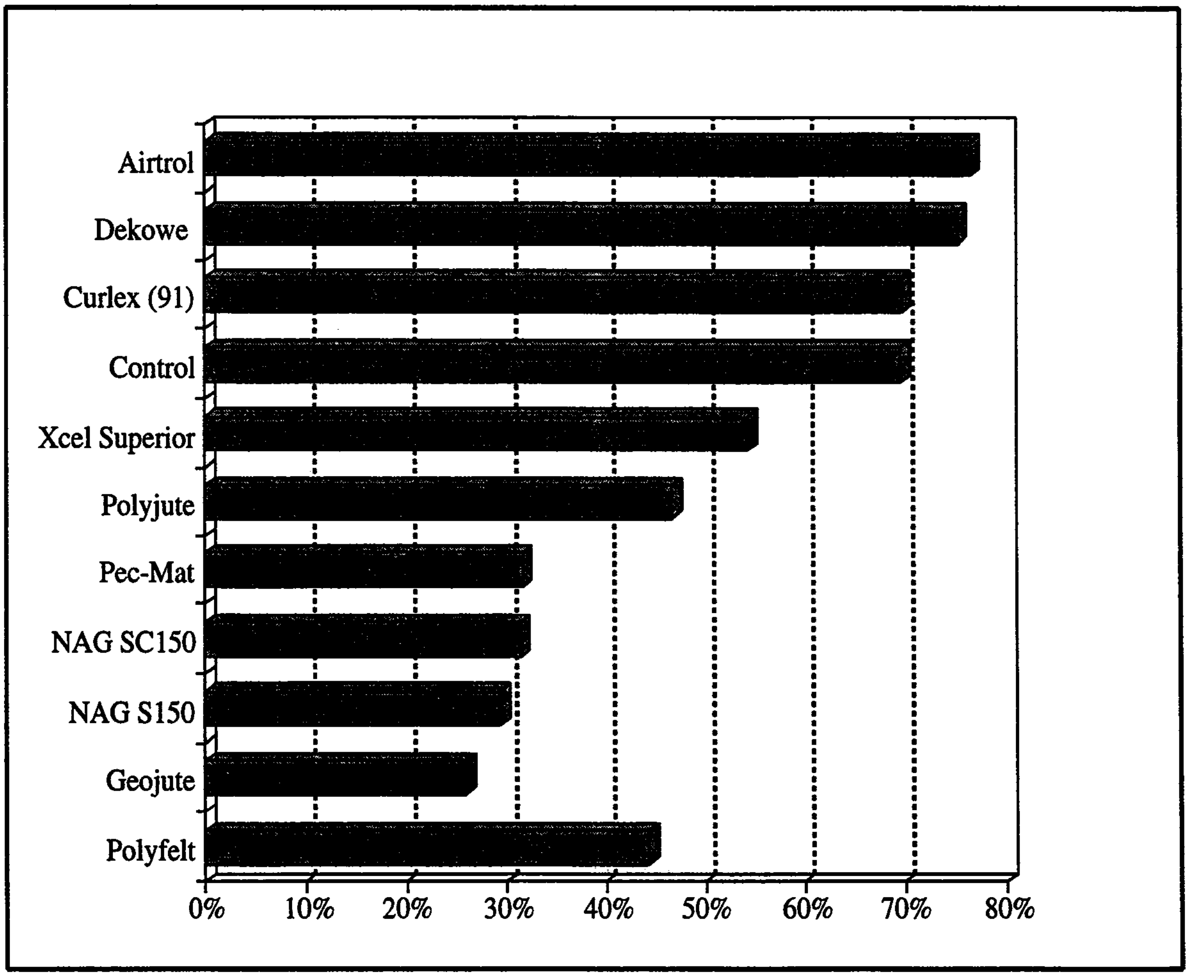


Figure 67F. Vegetative Density (%)

Table F59. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 3	2:1	Clay	96.615	1/3
Betlon DEKOWE® 700	92	Round 3	2:1	Clay	81.041	2/3
Airtrol Plaster®	92	Round 3	2:1	Clay	79.281	3/3
COMBINED 91-92 EVALUATION CYCLES						
POLYJUTE™ 407GT	91	Round 3	2:1	Clay	98.763	1/11
Xcel Superior®	91	Round 3	2:1	Clay	94.947	2/11
CONTROL	91-92	Round 3	2:1	Clay	94.500	3/11
North American Green® S150	91	Round 3	2:1	Clay	93.921	4/11
ANTI-WASH®/GEOJUTE®	91	Round 3	2:1	Clay	93.840	5/11
North American Green® SC150	91	Round 3	2:1	Clay	90.680	6/11
American Excelsior Curlex®	91	Round 3	2:1	Clay	87.019	7/11
Belton DEKOWE® 700	92	Round 3	2:1	Clay	81.041	8/11
GREENSTREAK® PEC-MAT™	91	Round 3	2:1	Clay	79.928	9/11
Airtrol Plaster®	92	Round 3	2:1	Clay	79.281	10/11
Polyfelt® TS22	91	Round 3	2:1	Clay	32.107	11/11

**Vegetative Density is in percent

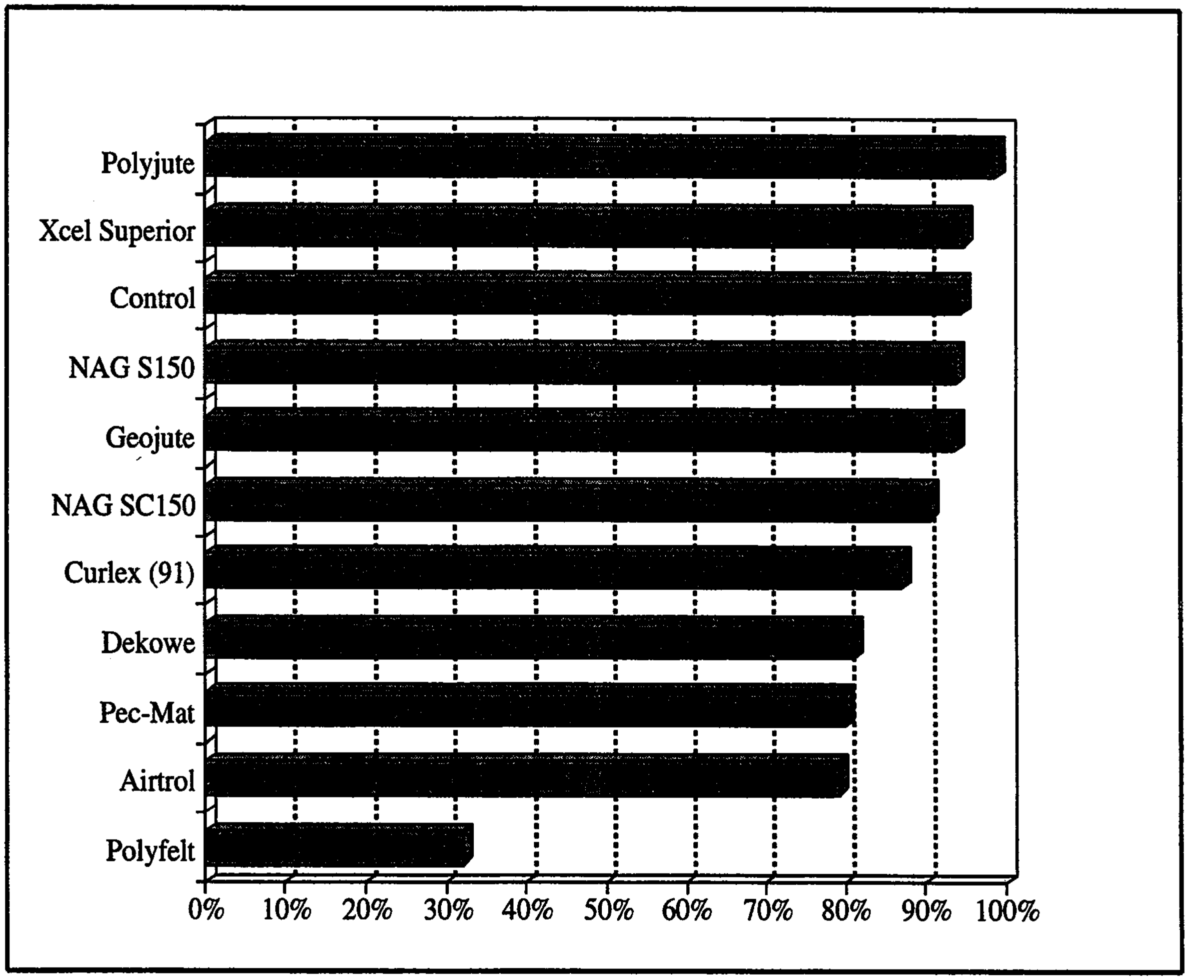


Figure 68F. Vegetative Density (%)

Table F60. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 4	2:1	Clay	97.081	1/3
Airtrol Plaster®	92	Round 4	2:1	Clay	86.094	2/3
Belton DEKOWE® 700	92	Round 4	2:1	Clay	73.717	3/3
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 4	2:1	Clay	98.814	1/11
American Excelsior Curlex®	91	Round 4	2:1	Clay	97.834	2/11
POLYJUTE™ 407GT	91	Round 4	2:1	Clay	96.151	3/11
North American Green® S150	91	Round 4	2:1	Clay	92.014	4/11
ANTI-WASH®/GEOJUTE®	91	Round 4	2:1	Clay	90.058	5/11
North American Green® SC150	91	Round 4	2:1	Clay	89.979	6/11
GREENSTREAK® PEC-MAT™	91	Round 4	2:1	Clay	87.580	7/11
CONTROL	91-92	Round 4	2:1	Clay	86.400	8/11
Airtrol Plaster®	92	Round 4	2:1	Clay	86.094	9/11
Belton DEKOWE® 700	92	Round 4	2:1	Clay	73.717	10/11
Polyfelt® TS22	91	Round 4	2:1	Clay	35.909	11/11

**Vegetative Density is in percent

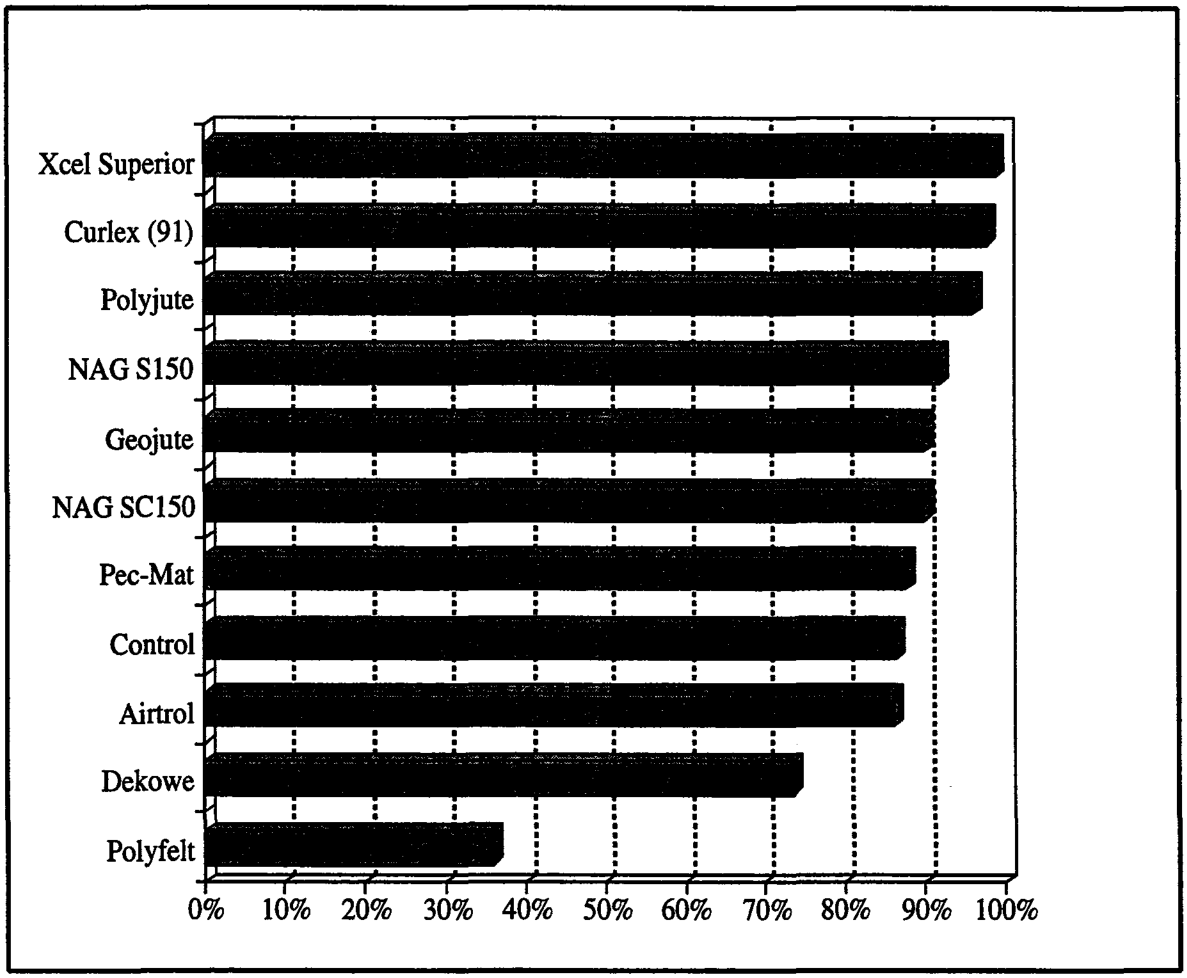


Figure 69F. Vegetative Density (%)

Table F61. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 1	2:1	Sand	9.081	1/3
Airtrol Plaster®	92	Round 1	2:1	Sand	0.711	2/3
CONTROL	92	Round 1	2:1	Sand	0.693	2/3
Belton DEKOWE® 700	92	Round 1	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 1	2:1	Sand	9.676	1/9
American Excelsior Curlex®	92	Round 1	2:1	Sand	9.081	2/9
POLYJUTE™ 407GT	91	Round 1	2:1	Sand	5.973	3/9
ANTI-WASH®/GEOJUTE®	91	Round 1	2:1	Sand	1.152	4/9
CONTROL	91-92	Round 1	2:1	Sand	1.037	5/9
GREENSTREAK® PEC-MAT™	91	Round 1	2:1	Sand	0.779	6/9
American Excelsior Curlex®	91	Round 1	2:1	Sand	0.751	7/9
Airtrol Plaster®	91	Round 1	2:1	Sand	0.711	8/9
Polyfelt® TS22	91	Round 1	2:1	Sand	0.610	9/9
North American Green® S150	91	Round 1	2:1	Sand	N/A	N/A
North American Green® SC150	91	Round 1	2:1	Sand	N/A	N/A
Belton DEKOWE® 700	92	Round 1	2:1	Sand	N/A	N/A

**Vegetative Density is in percent

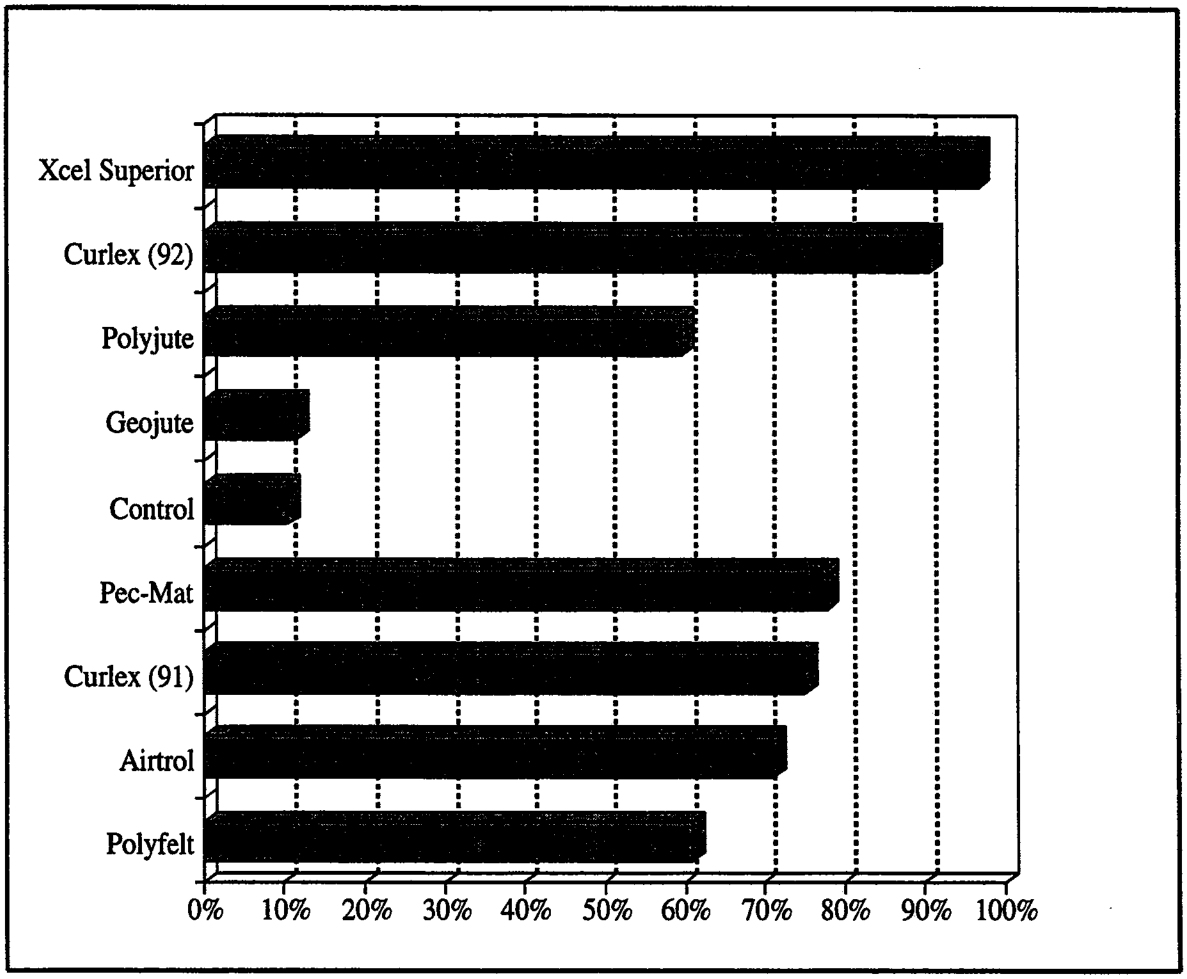


Figure 70F. Vegetative Density (%))

Table F62. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 2	2:1	Sand	21.697	1/2
Airtrol Plaster®	92	Round 2	2:1	Sand	18.369	2/2
CONTROL	92	Round 2	2:1	Sand	N/A	N/A
Belton DEKOWE® 700	92	Round 2	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 2	2:1	Sand	64.747	1/11
POLYJUTE™ 407GT	91	Round 2	2:1	Sand	47.156	2/11
North American Green® SC150	91	Round 2	2:1	Sand	31.362	3/11
North American Green® S150	91	Round 2	2:1	Sand	31.016	4/11
American Excelsior Curlex®	91	Round 2	2:1	Sand	26.051	5/11
ANTI-WASH®/GEOJUTE®	91	Round 2	2:1	Sand	22.458	6/11
American Excelsior Curlex®	92	Round 2	2:1	Sand	21.697	7/11
Airtrol Plaster®	92	Round 2	2:1	Sand	18.369	8/11
Polyfelt® TS22	91	Round 2	2:1	Sand	8.881	9/11
CONTROL	91-92	Round 2	2:1	Sand	4.079	10/11
GREENSTREAK® PEC-MAT™	91	Round 2	2:1	Sand	0.449	11/11
Belton DEKOWE® 700	92	Round 2	2:1	Sand	N/A	N/A

**Vegetative Density is in percent

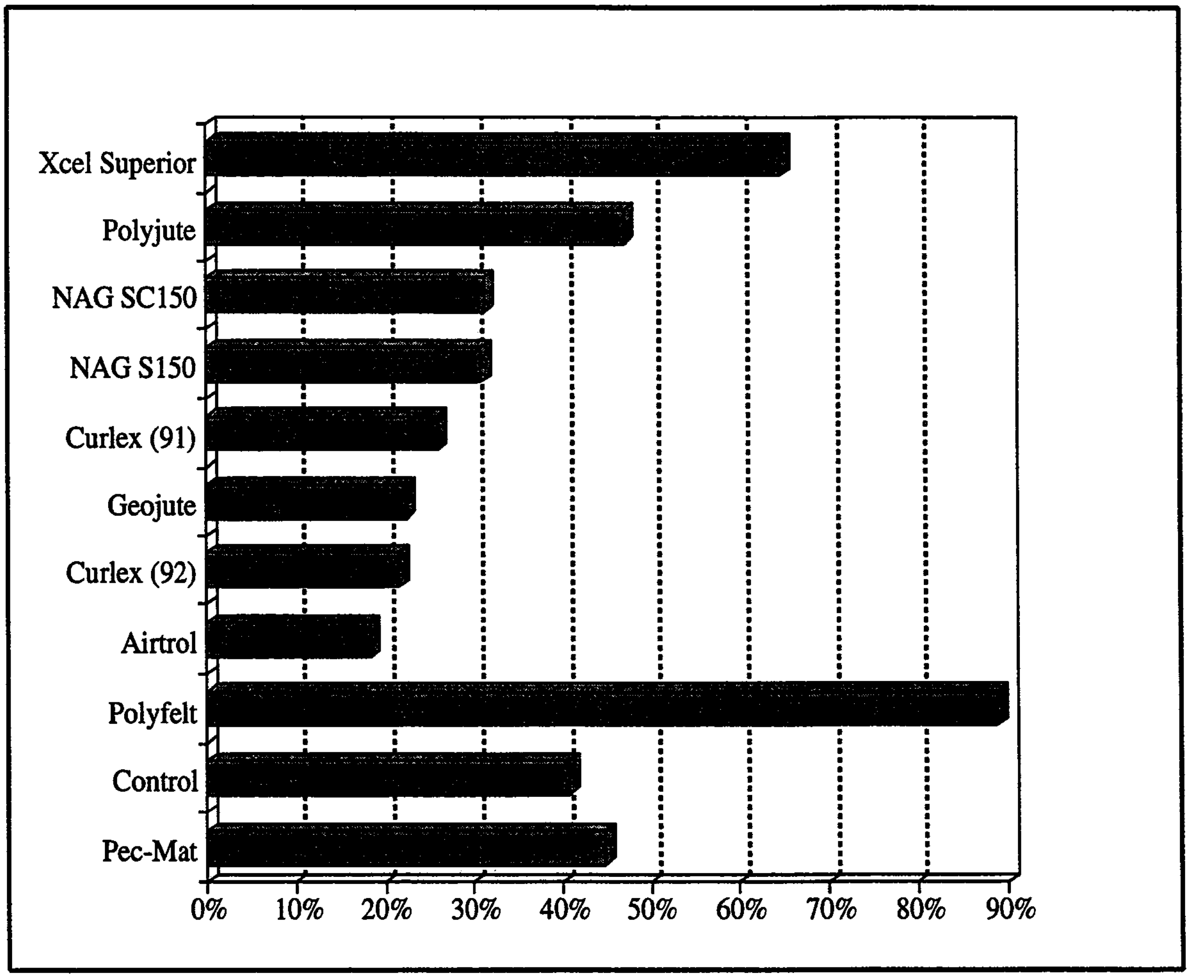


Figure 71F. Vegetative Density (%)

Table F63. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 3	2:1	Sand	39.611	1/2
Airtrol Plaster®	92	Round 3	2:1	Sand	35.291	2/2
CONTROL	92	Round 3	2:1	Sand	N/A	N/A
Belton DEKOWE® 700	92	Round 3	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 3	2:1	Sand	87.307	1/11
POLYJUTE™ 407GT	91	Round 3	2:1	Sand	82.710	2/11
North American Green® SC150	91	Round 3	2:1	Sand	78.226	3/11
North American Green® S150	91	Round 3	2:1	Sand	66.736	4/11
American Excelsior Curlex®	91	Round 3	2:1	Sand	65.011	5/11
Polyfelt® TS22	91	Round 3	2:1	Sand	41.680	6/11
ANTI-WASH®/GEOJUTE®	91	Round 3	2:1	Sand	41.121	7/11
American Excelsior Curlex®	92	Round 3	2:1	Sand	39.611	8/11
Airtrol Plaster®	92	Round 3	2:1	Sand	20.651	9/11
CONTROL	91-92	Round 3	2:1	Sand	20.086	10/11
GREENSTREAK® PEC-MAT™	91	Round 3	2:1	Sand	12.525	11/11
Belton DEKOWE® 700	92	Round 3	2:1	Sand	N/A	N/A

**Vegetative Density is in percent

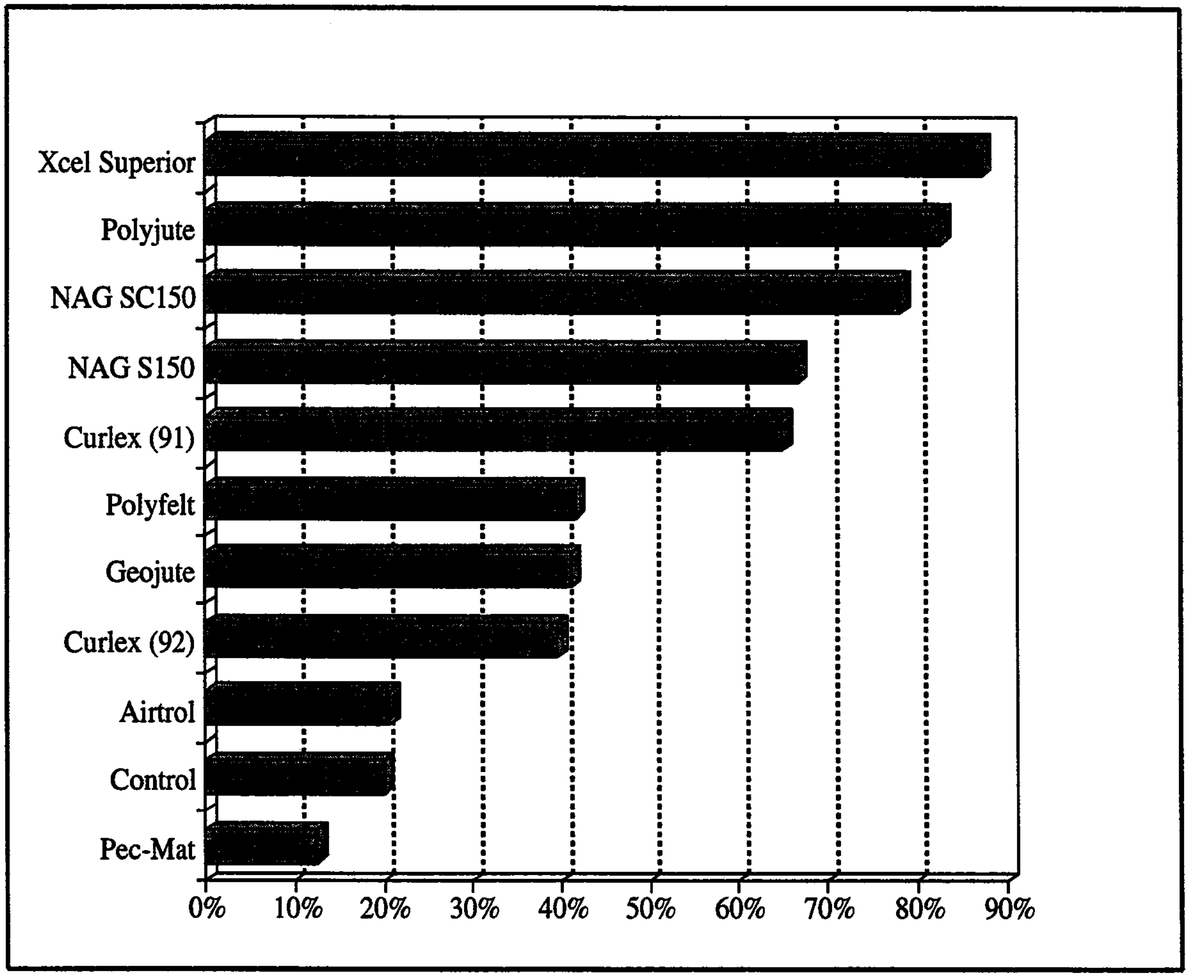


Figure 72F. Vegetative Density (%)

Table F64. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 4	2:1	Sand	47.335	1/3
Airtrol Plaster®	92	Round 4	2:1	Sand	41.882	2/3
CONTROL	92	Round 4	2:1	Sand	35.834	3/3
Belton DEKOWE® 700	92	Round 4	2:1	Sand	N/A	N/A
COMBINED 91-92 EVALUATION CYCLES						
Xcel Superior®	91	Round 4	2:1	Sand	85.805	1/11
North American Green® S150	91	Round 4	2:1	Sand	84.746	2/11
North American Green® SC150	91	Round 4	2:1	Sand	76.409	3/11
POLYJUTE™ 407GT	91	Round 4	2:1	Sand	74.302	4/11
American Excelsior Curlex®	91	Round 4	2:1	Sand	52.674	5/11
ANTI-WASH®/GEOJUTE®	91	Round 4	2:1	Sand	51.372	6/11
American Excelsior Curlex®	92	Round 4	2:1	Sand	47.335	7/11
Polyfelt® TS22	91	Round 4	2:1	Sand	46.051	8/11
Airtrol Plaster®	92	Round 4	2:1	Sand	41.882	9/11
CONTROL	91-92	Round 4	2:1	Sand	40.123	10/11
GREENSTREAK® PEC-MAT™	91	Round 4	2:1	Sand	38.716	11/11
Belton DEKOWE® 700	92	Round 4	2:1	Sand	N/A	N/A

**Vegetative Density is in percent

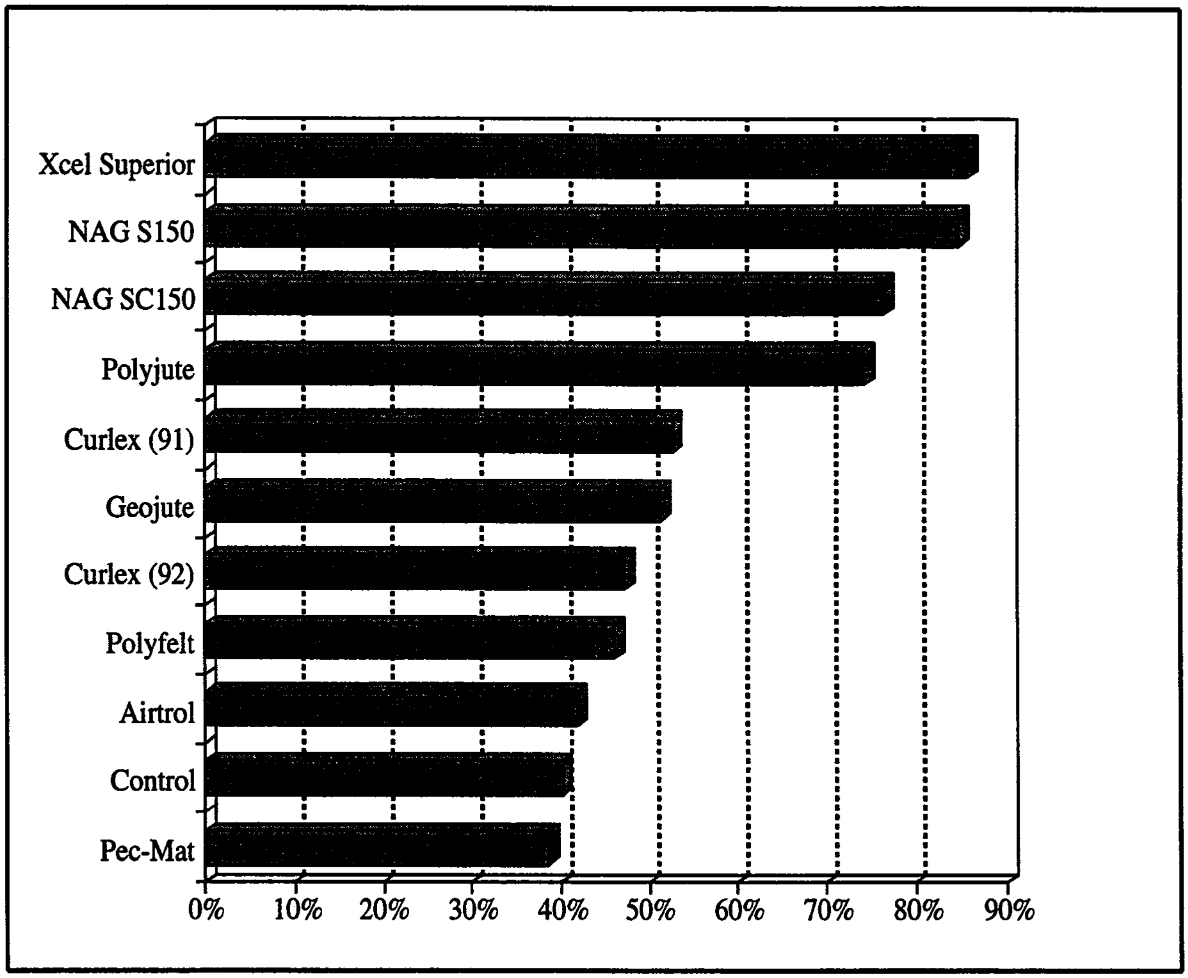


Figure 73F. Vegetative Density (%)

Table F65. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	3:1	Clay	21.511	1/3
Airtrol Plaster®	92	Round 1	3:1	Clay	13.622	2/3
American Excelsior Curlex®	92	Round 1	3:1	Clay	8.532	3/3
COMBINED 91-92 EVALUATION CYCLES						
CONTROL	91-92	Round 1	3:1	Clay	19.194	1/8
Airtrol Plaster®	92	Round 1	3:1	Clay	13.622	2/8
American Excelsior Curlex®	92	Round 1	3:1	Clay	8.532	3/8
GREENSTREAK® PEC-MAT™	91	Round 1	3:1	Clay	8.513	4/8
Xcel Regular®	91	Round 1	3:1	Clay	6.469	5/8
North American Green® S75	91	Round 1	3:1	Clay	5.481	6/8
American Excelsior Curlex®	91	Round 1	3:1	Clay	1.505	7/8
verdyol®ERO-MAT®	91	Round 1	3:1	Clay	0.000	8/8

**Vegetative Density is in percent

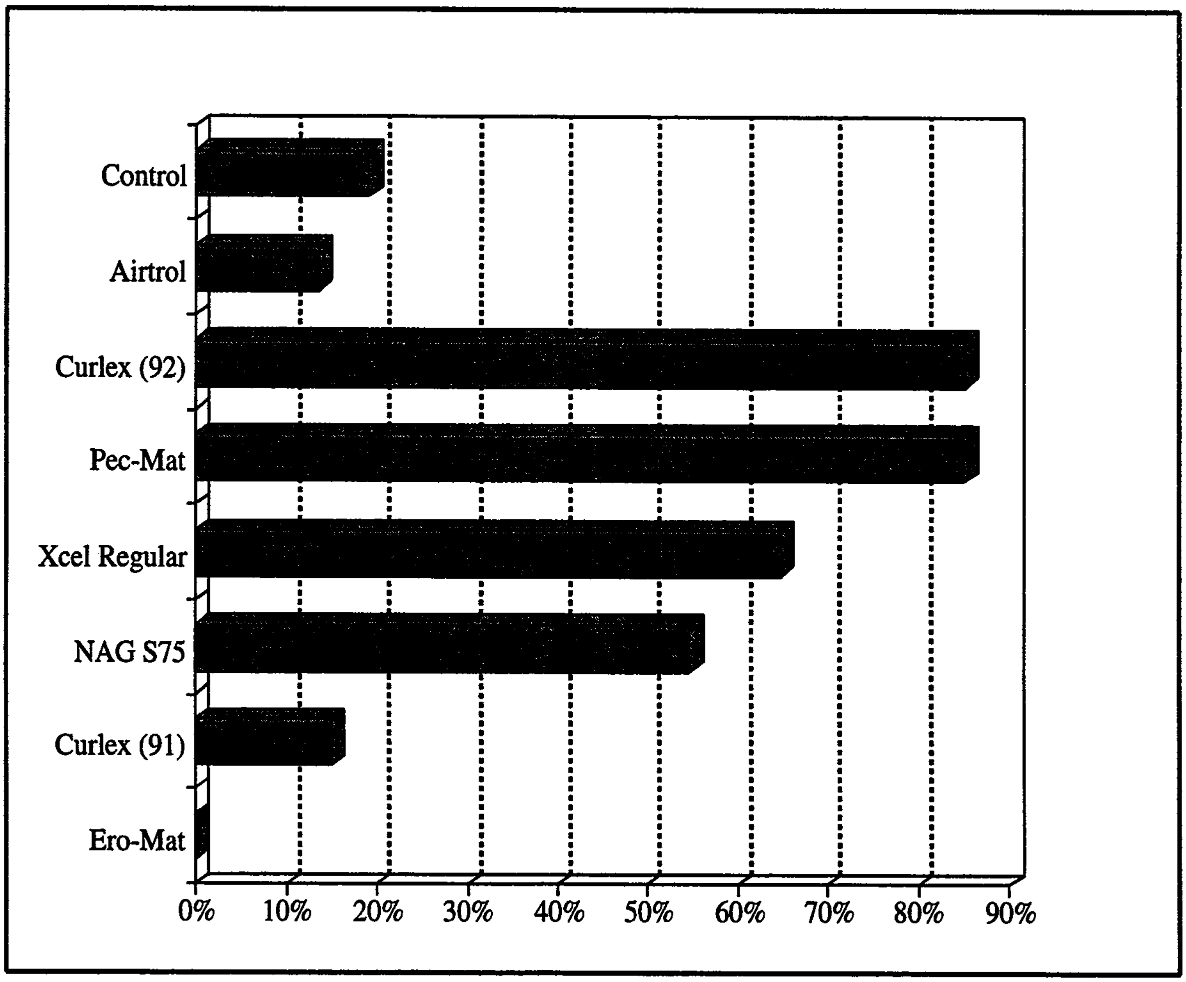


Figure 74F. Vegetative Density (%)

Table F66. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtrol Plaster®	92	Round 2	3:1	Clay	77.193	1/3
American Excelsior Curlex®	92	Round 2	3:1	Clay	70.230	2/3
CONTROL	92	Round 2	3:1	Clay	68.645	3/3
COMBINED 91-92 EVALUATION CYCLES						
Airtrol Plaster®	92	Round 2	3:1	Clay	77.193	1/8
American Excelsior Curlex®	92	Round 2	3:1	Clay	70.230	2/8
Xcel Regular®	91	Round 2	3:1	Clay	56.160	3/8
North American Green® S75	91	Round 2	3:1	Clay	54.713	4/8
CONTROL	91	Round 2	3:1	Clay	44.824	5/8
GREENSTREAK® PEC-MAT™	91-92	Round 2	3:1	Clay	41.439	6/8
verdyol®ERO-MAT®	91	Round 2	3:1	Clay	30.193	7/8
American Excelsior Curlex®	91	Round 2	3:1	Clay	16.155	8/8

**Vegetative Density is in percent

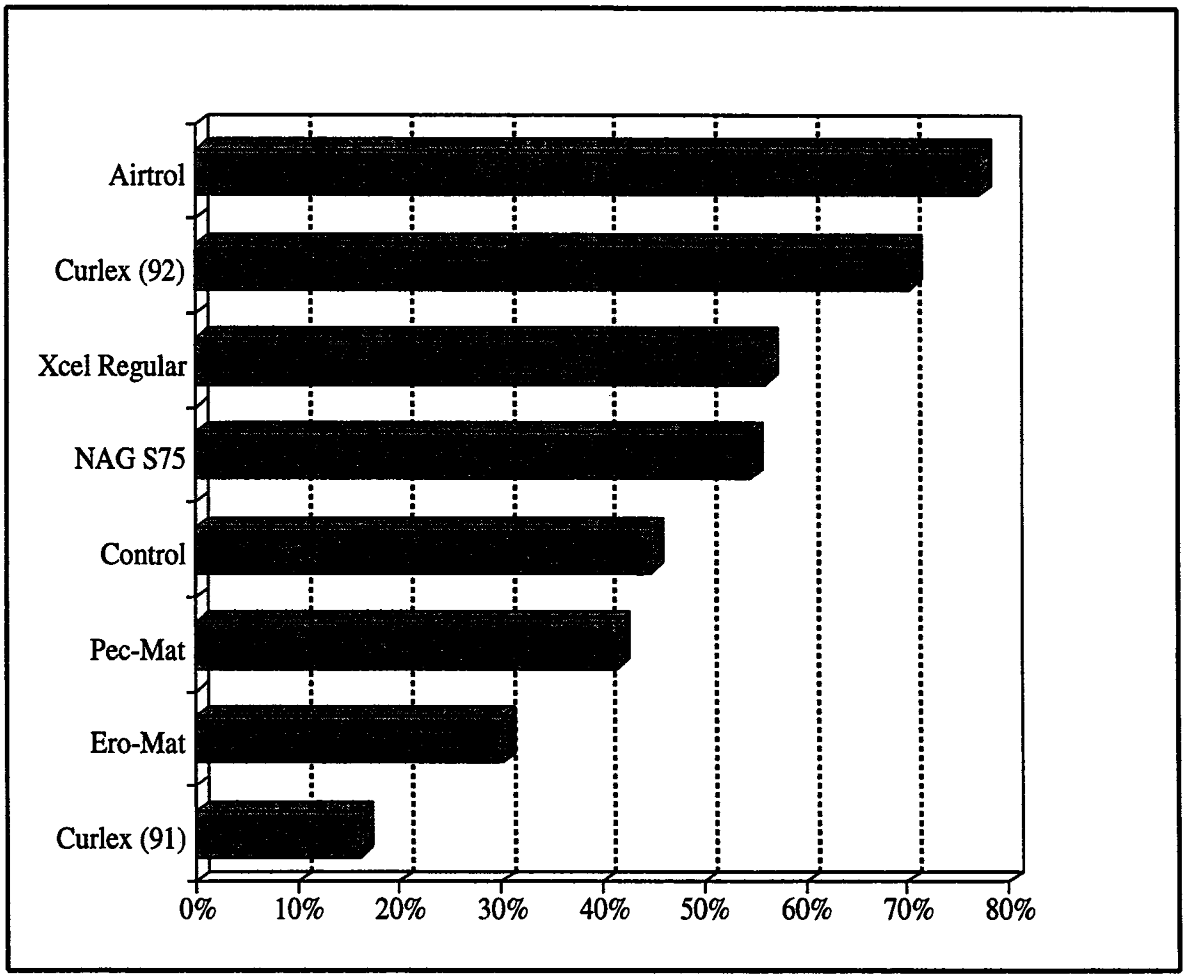


Figure 75F. Vegetative Density (%)

Table F67. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 3	3:1	Clay	96.995	1/3
Airtrol Plaster®	92	Round 3	3:1	Clay	85.115	2/3
CONTROL	92	Round 3	3:1	Clay	73.876	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	92	Round 3	3:1	Clay	96.995	1/8
North American Green® S75	91	Round 3	3:1	Clay	95.122	2/8
GREENSTREAK® PEC-MAT™	91	Round 3	3:1	Clay	92.061	3/8
Airtrol Plaster®	92	Round 3	3:1	Clay	85.115	4/8
Xcel Regular®	91	Round 3	3:1	Clay	84.222	5/8
CONTROL	91-92	Round 3	3:1	Clay	70.056	6/8
verdyol®ERO-MAT®	91	Round 3	3:1	Clay	69.620	7/8
American Excelsior Curlex®	91	Round 3	3:1	Clay	58.731	8/8

**Vegetative Density is in percent

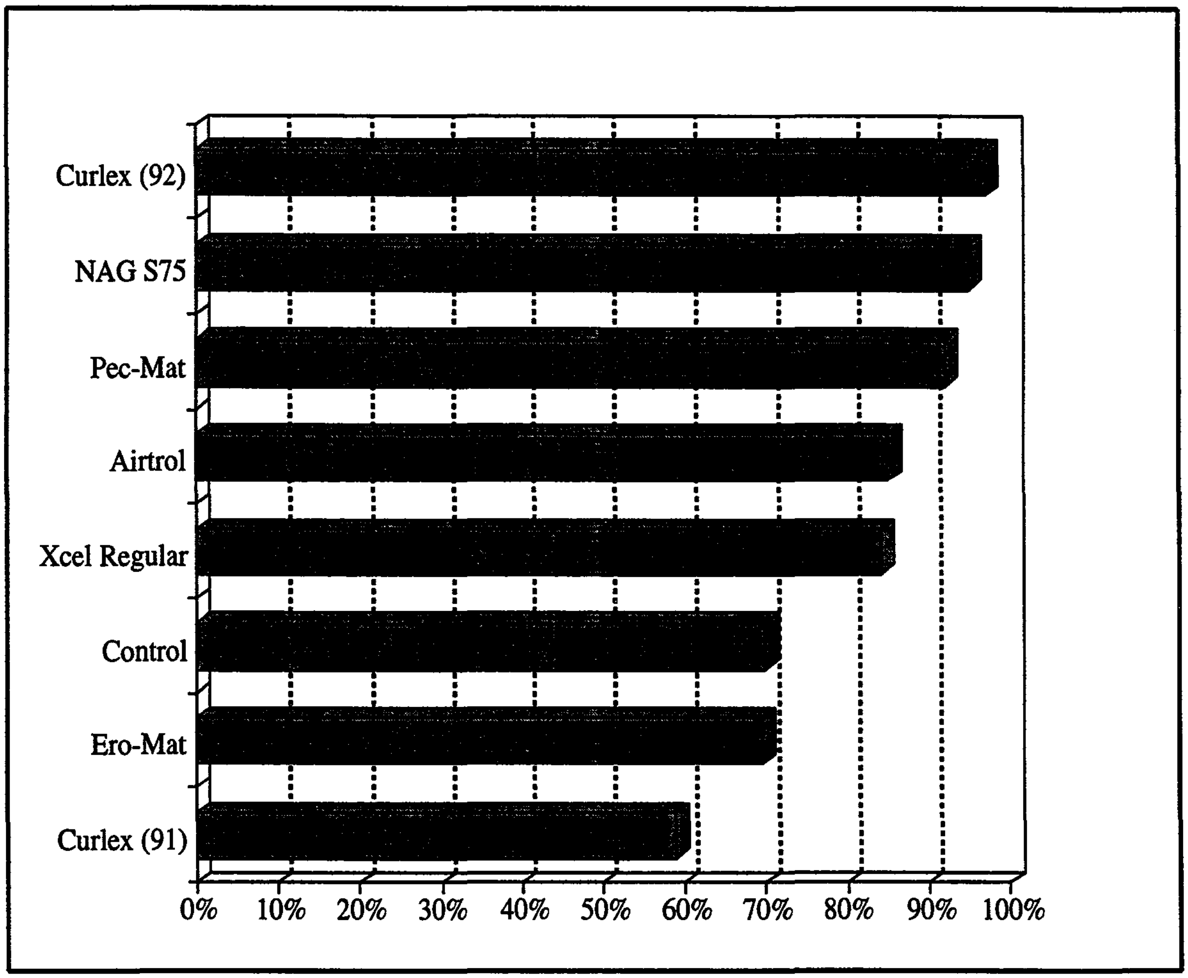


Figure 76F. Vegetative Density (%)

Table F68. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Excelsior Curlex®	92	Round 4	3:1	Clay	98.125	1/3
Airtrol Plaster®	92	Round 4	3:1	Clay	86.444	2/3
CONTROL	92	Round 4	3:1	Clay	75.562	3/3
COMBINED 91-92 EVALUATION CYCLES						
American Excelsior Curlex®	92	Round 4	3:1	Clay	98.125	1/8
North American Green® S75	91	Round 4	3:1	Clay	96.187	2/8
GREENSTREAK® PEC-MAT™	91	Round 4	3:1	Clay	90.524	3/8
Xcel Regular®	91	Round 4	3:1	Clay	90.166	4/8
verdyol®ERO-MAT®	91	Round 4	3:1	Clay	87.808	5/8
Airtrol Plaster®	92	Round 4	3:1	Clay	86.444	6/8
CONTROL	91-92	Round 4	3:1	Clay	67.286	7/8
American Excelsior Curlex®	91	Round 4	3:1	Clay	63.230	8/8

**Vegetative Density is in percent

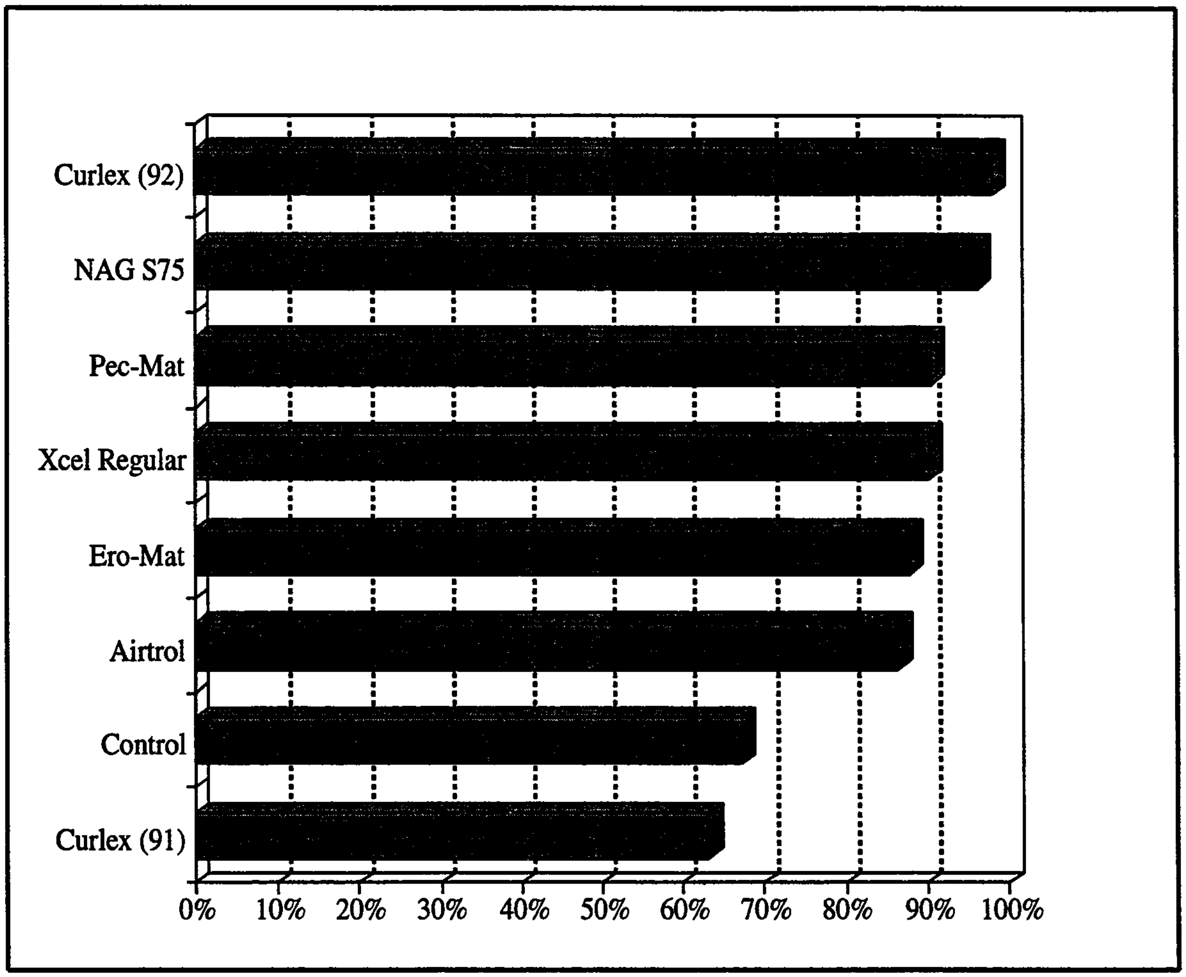


Figure 77F. Vegetative Density (%)

Table F69. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Soil and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
CONTROL	92	Round 1	3:1	Sand	22.164	1/3
Airtrol Plaster®	92	Round 1	3:1	Sand	13.031	2/3
American Excelsior Curlex®	92	Round 1	3:1	Sand	5.121	3/3
COMBINED 91-92 EVALUATION CYCLES						
CONTROL	91-92	Round 1	3:1	Sand	19.501	1/8
Airtrol Plaster®	92	Round 1	3:1	Sand	13.031	2/8
North American Green® S75	91	Round 1	3:1	Sand	10.975	3/8
Xcel Regular®	91	Round 1	3:1	Sand	8.123	4/8
American Excelsior Curlex®	92	Round 1	3:1	Sand	5.121	5/8
verdyol®ERO-MAT®	91	Round 1	3:1	Sand	2.615	6/8
American Excelsior Curlex®	91	Round 1	3:1	Sand	2.506	7/8
GREENSTREAK® PEC-MAT™	91	Round 1	3:1	Sand	1.304	8/8

**Vegetative Density is in percent

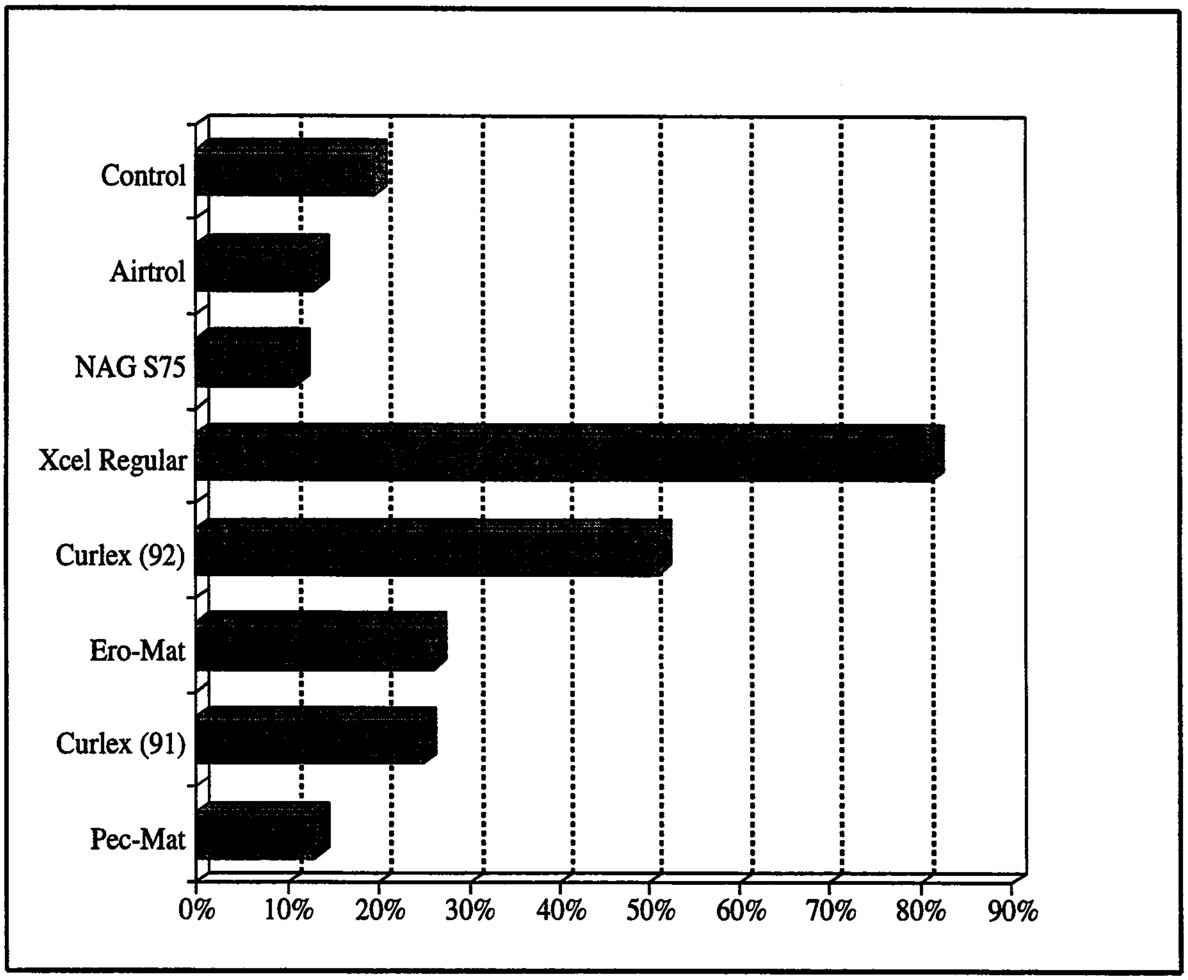


Figure 78F. Vegetative Density (%)

Table F70. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtrol Plaster®	92	Round 2	3:1	Sand	40.725	1/3
CONTROL	92	Round 2	3:1	Sand	37.762	2/3
American Excelsior Curlex®	92	Round 2	3:1	Sand	21.286	3/3
COMBINED 91-92 EVALUATION CYCLES						
Xcel Regular®	91	Round 2	3:1	Sand	56.320	1/8
North American Green® S75	91	Round 2	3:1	Sand	51.507	2/8
American Excelsior Curlex®	91	Round 2	3:1	Sand	48.413	3/8
verdyol®ERO-MAT®	91	Round 2	3:1	Sand	41.884	4/8
Airtrol Plaster®	92	Round 2	3:1	Sand	40.725	5/8
CONTROL	91-92	Round 2	3:1	Sand	30.933	6/8
GREENSTREAK® PEC-MAT™	91	Round 2	3:1	Sand	30.219	7/8
American Excelsior Curlex®	92	Round 2	3:1	Sand	21.286	8/8

**Vegetative Density is in percent

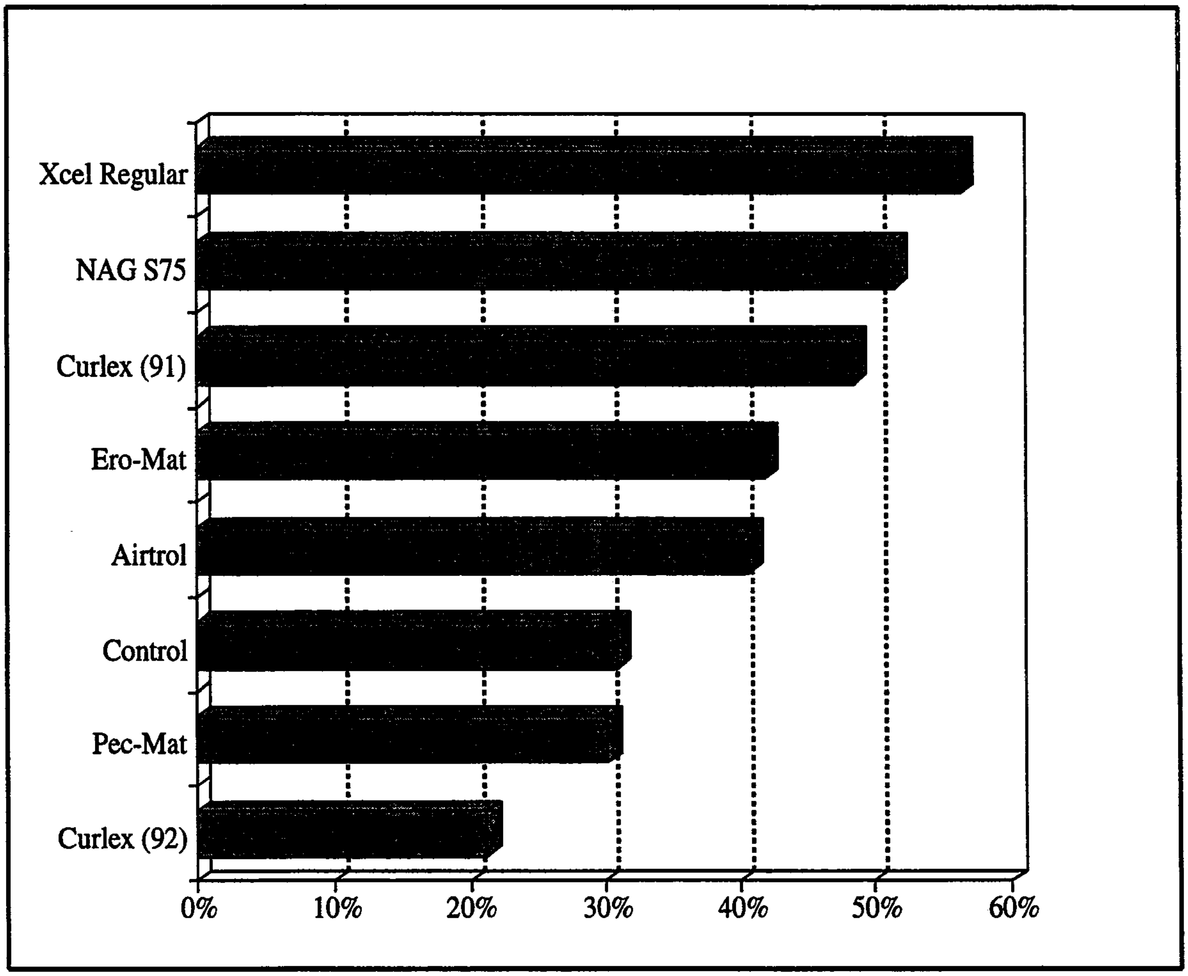


Figure 79F. Vegetative Density (%)

Table F71. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtol Plaster®	92	Round 3	3:1	Sand	43.195	1/3
CONTROL	92	Round 3	3:1	Sand	42.041	2/3
American Excelsior Curlex®	92	Round 3	3:1	Sand	41.080	3/3
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S75	91	Round 3	3:1	Sand	84.576	1/8
Xcel Regular®	91	Round 3	3:1	Sand	68.758	2/8
verdyol®ERO-MAT®	91	Round 3	3:1	Sand	59.706	3/8
American Excelsior Curlex®	91	Round 3	3:1	Sand	59.511	4/8
GREENSTREAK® PEC-MAT™	91	Round 3	3:1	Sand	57.687	5/8
CONTROL	91-92	Round 3	3:1	Sand	49.689	6/8
Airtrol Plaster®	92	Round 3	3:1	Sand	43.195	7/8
American Excelsior Curlex®	92	Round 3	3:1	Sand	41.080	8/8

**Vegetative Density is in percent

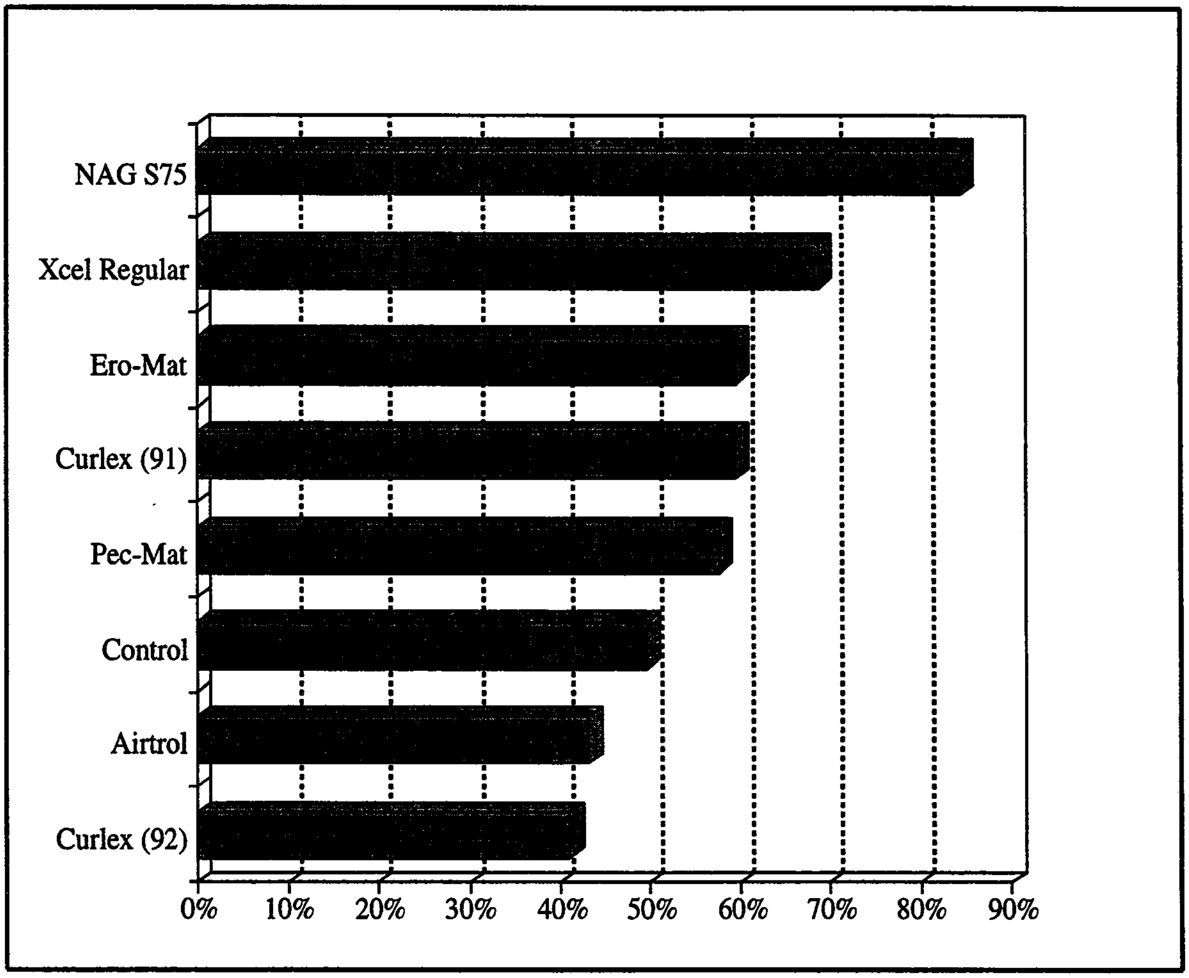


Figure 80F. Vegetative Density (%)

Table F72. Level 8 - Vegetative Density Based Upon Measurement Round, Steepness of Slope and Type of Soil

Product Tested	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
Airtol Plaster®	92	Round 4	3:1	Sand	68.749	1/3
CONTROL	92	Round 4	3:1	Sand	41.298	2/3
American Excelsior Curlex®	92	Round 4	3:1	Sand	33.232	3/3
COMBINED 91-92 EVALUATION CYCLES						
North American Green® S75	91	Round 4	3:1	Sand	77.904	1/8
verdyol®ERO-MAT®	91	Round 4	3:1	Sand	73.202	2/8
Xcel Regular®	91	Round 4	3:1	Sand	72.263	3/8
Airtrol Plaster®	92	Round 4	3:1	Sand	68.749	4/8
GREENSTREAK® PEC-MAT™	91	Round 4	3:1	Sand	62.385	5/8
American Excelsior Curlex®	91	Round 4	3:1	Sand	60.937	6/8
CONTROL	91-92	Round 4	3:1	Sand	47.553	7/8
American Excelsior Curlex®	92	Round 4	3:1	Sand	33.232	8/8

**Vegetative Density is in percent

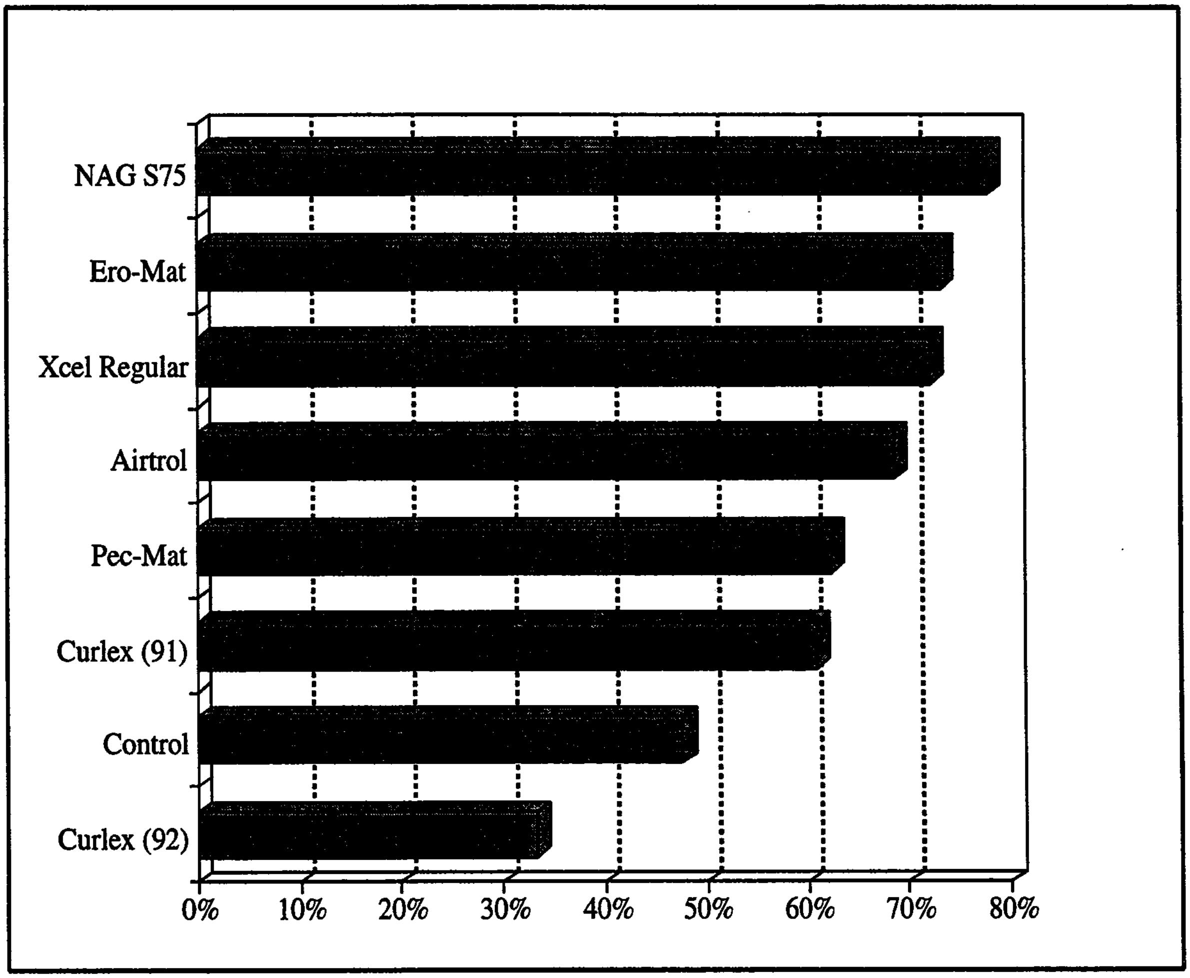


Figure 81F. Vegetative Density (%)

APPENDIX G

ANALYSIS LEVEL RESULTS
FOR
HYDRAULIC MULCHES

ANALYSIS LEVEL DESCRIPTION

There were four logical analysis levels identified by the research team that provided answers to how a particular product performed. Generally, this analysis approach starts "broad-brush" and then isolates different variables in an increasingly specific manner.

Level 1: Analyzed the product's *overall performance* without separating performance with respect to type of soil or application method.

Level 2: Analyzed the product's performance with respect to *soil type only,* without separating performance by application method.

Level 3: Analyzed the product's performance with respect to *application methods only,* without separating performance by soil type.

Level 4: Analyzed the product's performance with respect to *soil type and application method.*

Table G1. Level 2 - Analysis Based Upon Type of Soil

Product Evaluated	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
MULCH CONTROL	92	Round 4	3:1	Clay	82.708	1/4
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	Clay	82.169	2/4
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	Clay	77.968	3/4
American Fiber Mulch®	92	Round 4	3:1	Clay	66.611	4/4

**Vegetative Density is in percent

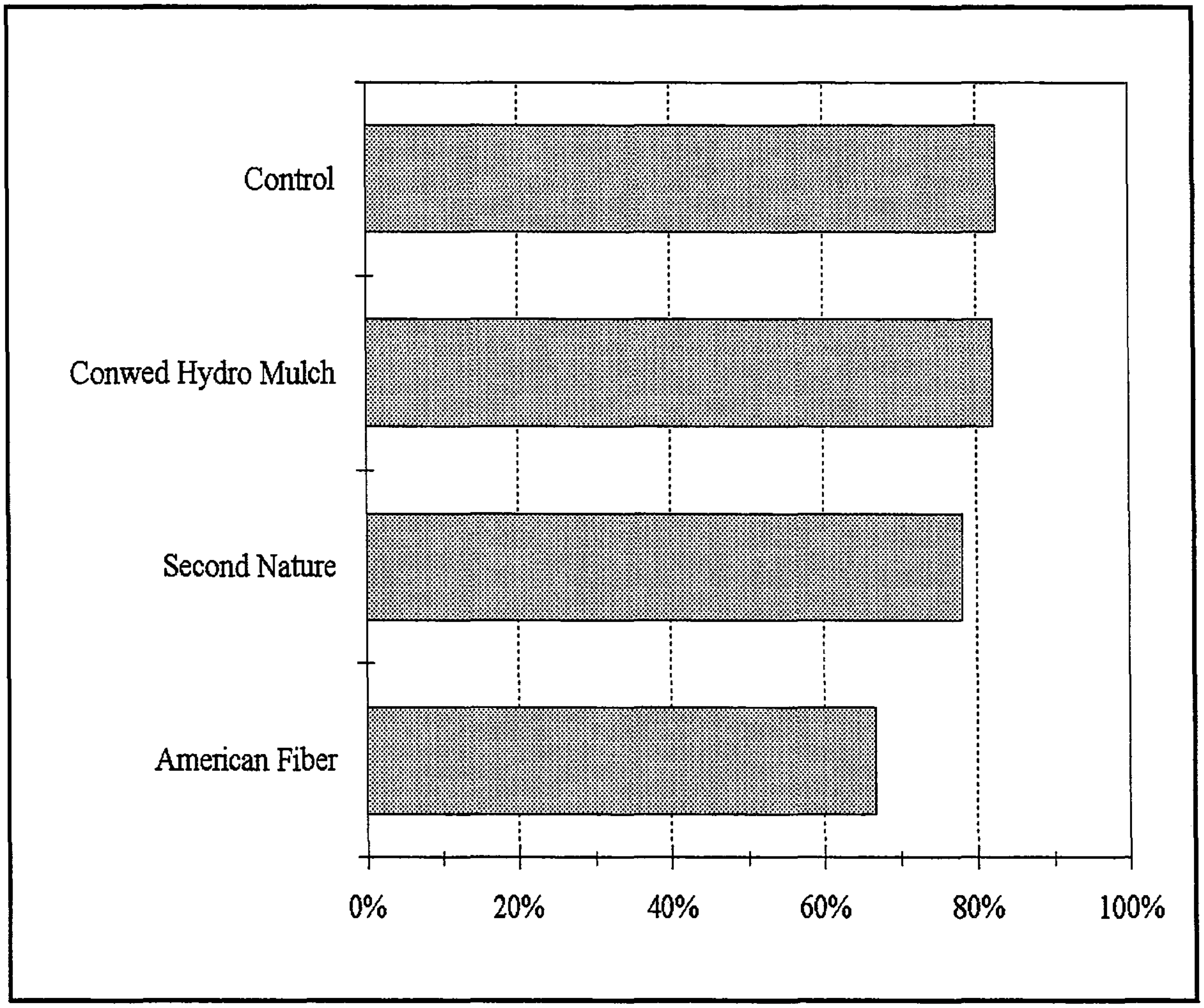


Figure 1. Vegetation Density (%)

Table G2. Level 2 - Analysis Based Upon Type of Soil

Product Evaluated	Test Cycle	Measurement	Slope	Soil	Veg** Density	Veg Rank
American Fiber Mulch®	92	Round 4	3:1	Sand	40.987	1/4
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	Sand	40.272	2/4
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	Sand	31.551	3/4
MULCH CONTROL	92	Round 4	3:1	Sand	25.988	4/4

**Vegetative Density is in percent

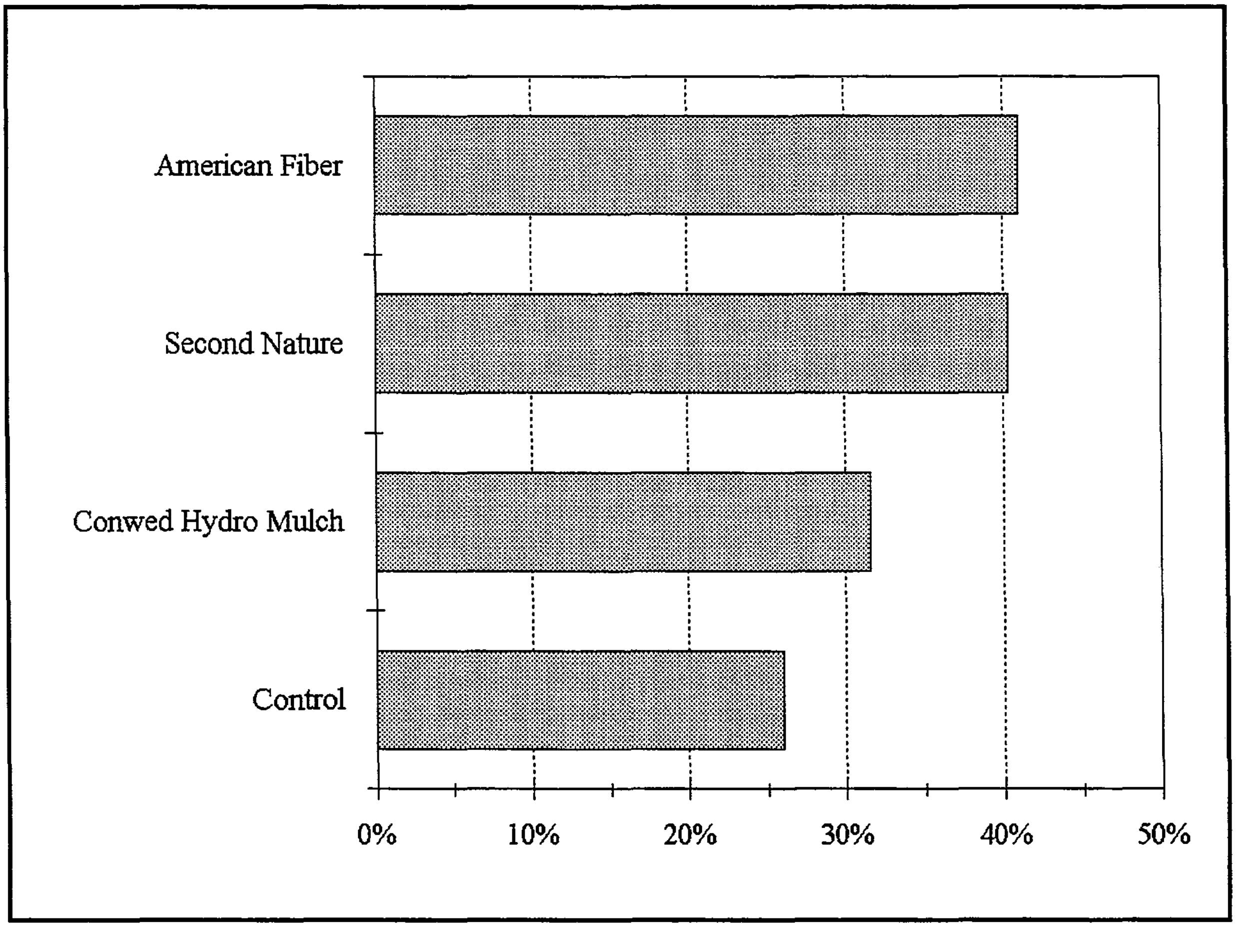


Figure 2G. Vegetative Density (%)

Table G3. Level 3 - Analysis Based Upon Application Method Only

Product Evaluated	Test Cycle	Measurement	Slope	Soil (Step 1)	Veg** Density	Veg Rank
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	All	64.178	1/4
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	All	56.863	2/4
American Fiber Mulch®	92	Round 4	3:1	All	55.178	3/4
MULCH CONTROL	92	Round 4	3:1	All	51.744	4/4

**Vegetative Density is in percent

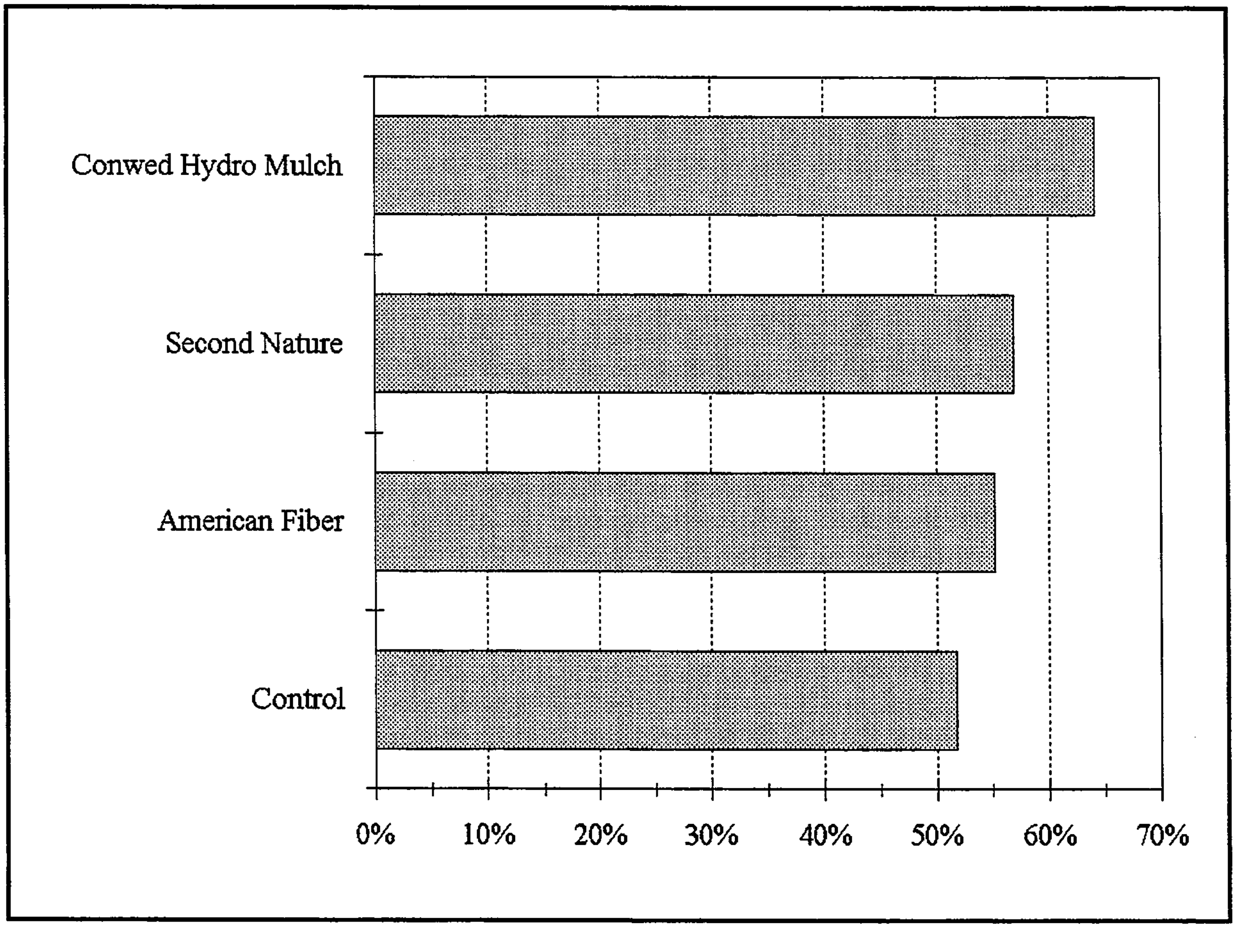


Figure 3G. Vegetative Density (%)

Table G4. Level 3 - Analysis Based Upon Application Method Only

Product Evaluated	Test Cycle	Measurement	Slope	Soil (Step 2)	Veg** Density	Veg Rank
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	All	61.356	1/4
MULCH CONTROL	92	Round 4	3:1	All	58.582	2/4
American Fiber Mulch®	92	Round 4	3:1	All	51.849	3/4
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	All	49.542	4/4

**Vegetative Density is in percent

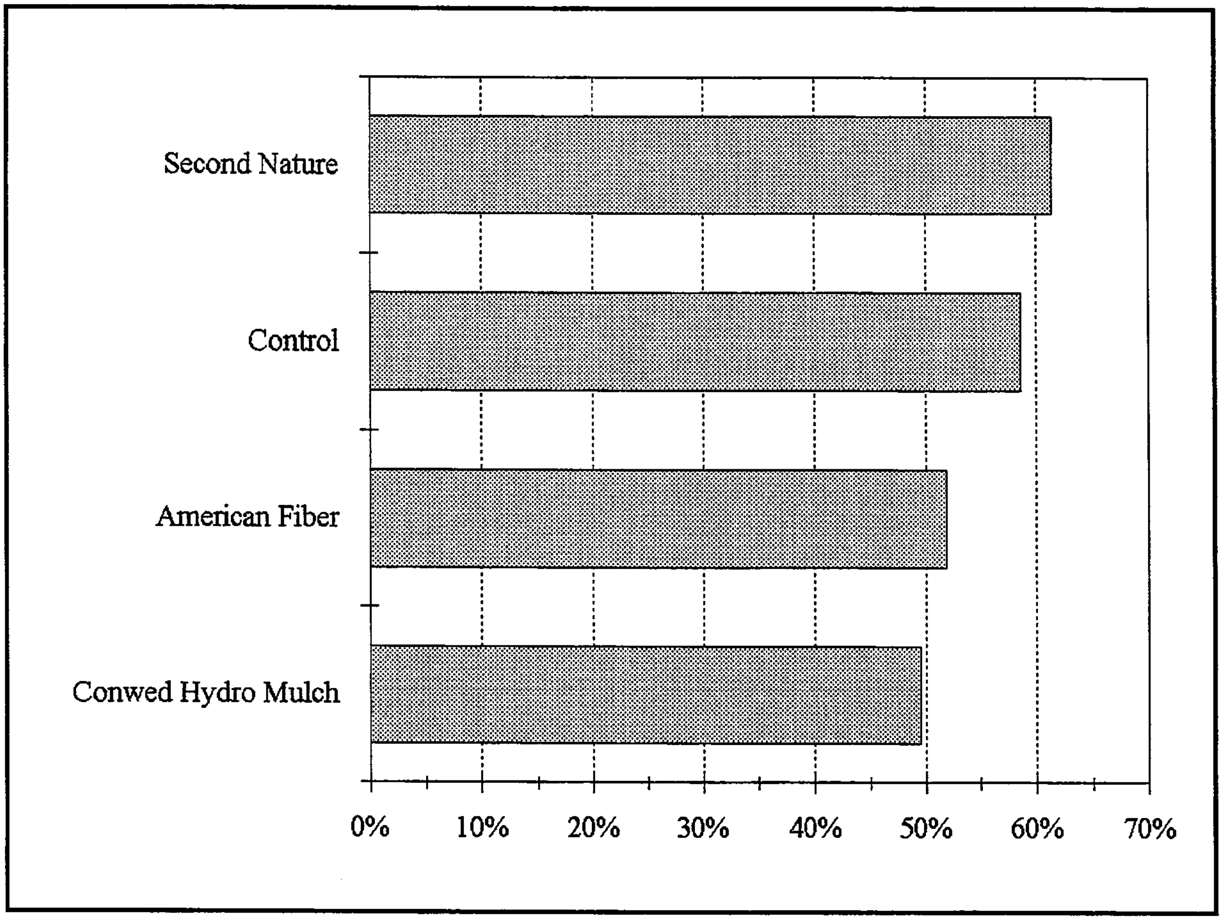


Figure 4G. Vegetative Density (%)

Table G5. Level 4 - Analysis Based Upon Soil Type and Application Method

Product Evaluated	Test Cycle	Measurement	Slope	Soil (Step 1)	Veg** Density	Veg Rank
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	Clay	89.099	1/4
MULCH CONTROL	92	Round 4	3:1	Clay	84.932	2/4
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	Clay	78.685	3/4
American Fiber Mulch®	92	Round 4	3:1	Clay	69.354	4/4

**Vegetative Density is in percent

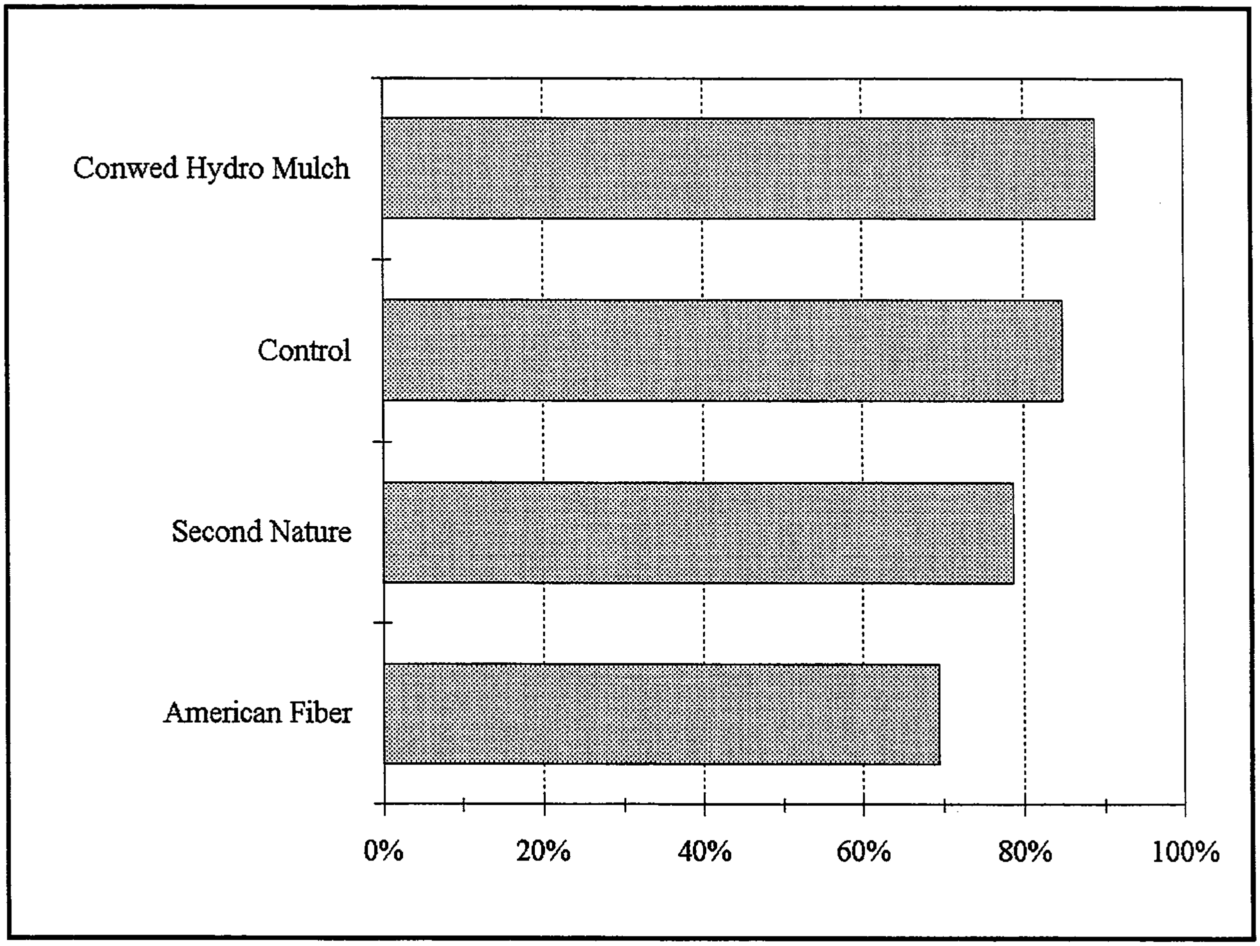


Figure 5G. Vegetative Density (%)

Table G6. Level 4 - Analysis Based Upon Soil Type and Application Method

Product Evaluated	Test Cycle	Measurement	Slope	Soil (Step 2)	Veg** Density	Veg Rank
MULCH CONTROL	92	Round 4	3:1	Clay	80.485	1/4
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	Clay	77.251	2/4
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	Clay	75.239	3/4
American Fiber Mulch®	92	Round 4	3:1	Clay	64.142	4/4

**Vegetative Density is in percent

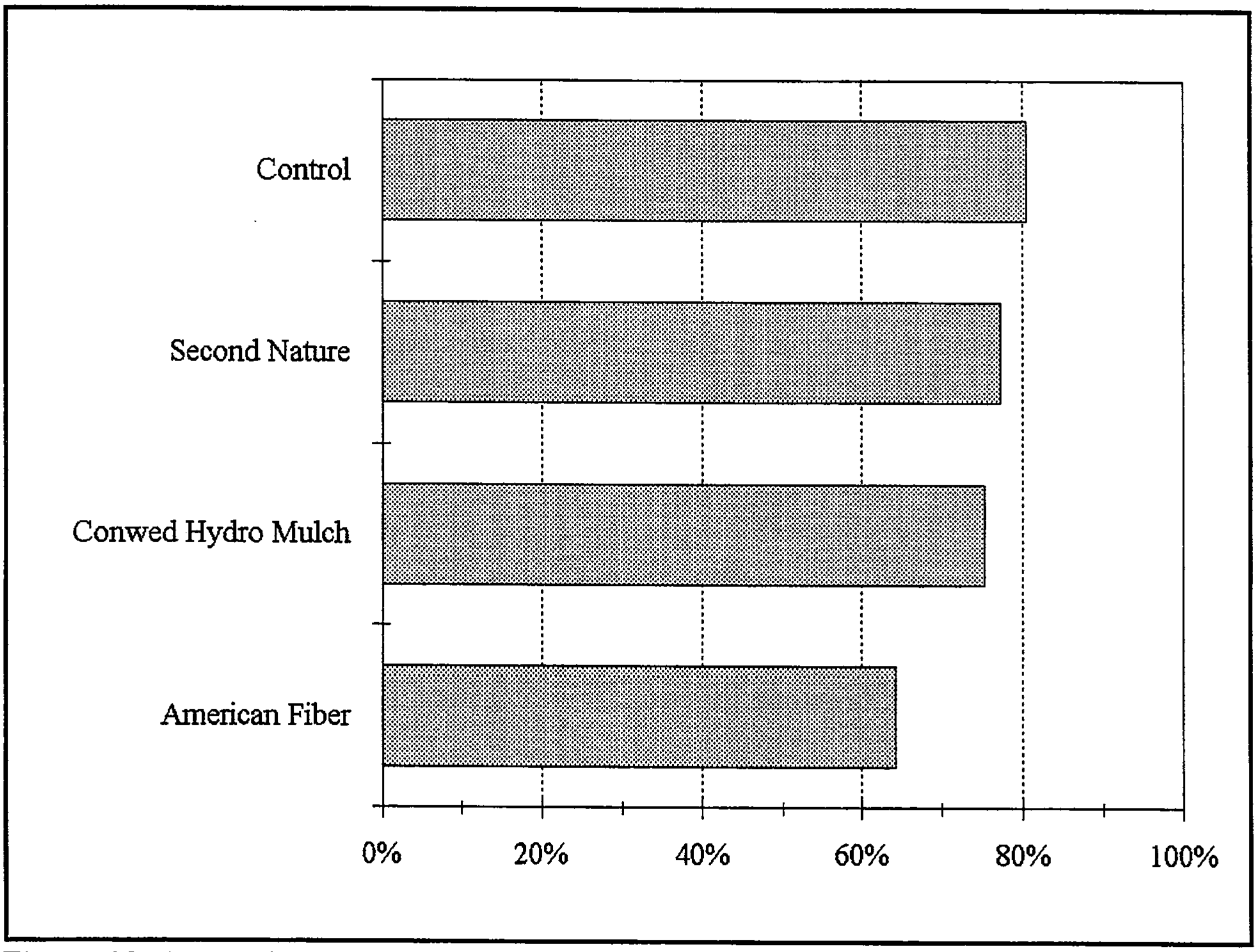


Figure 6G. Vegetative Density (%)

Table G7. Level 4 - Analysis Based Upon Soil Type and Application Method

Product Evaluated	Test Cycle	Measurement	Slope	Soil (Step 1)	Veg** Density	Veg Rank
American Fiber Mulch®	92	Round 4	3:1	Sand	42.419	1/4
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	Sand	39.257	2/4
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	Sand	35.082	3/4
MULCH CONTROL	92	Round 4	3:1	Sand	18.557	4/4

**Vegetative Density is in percent

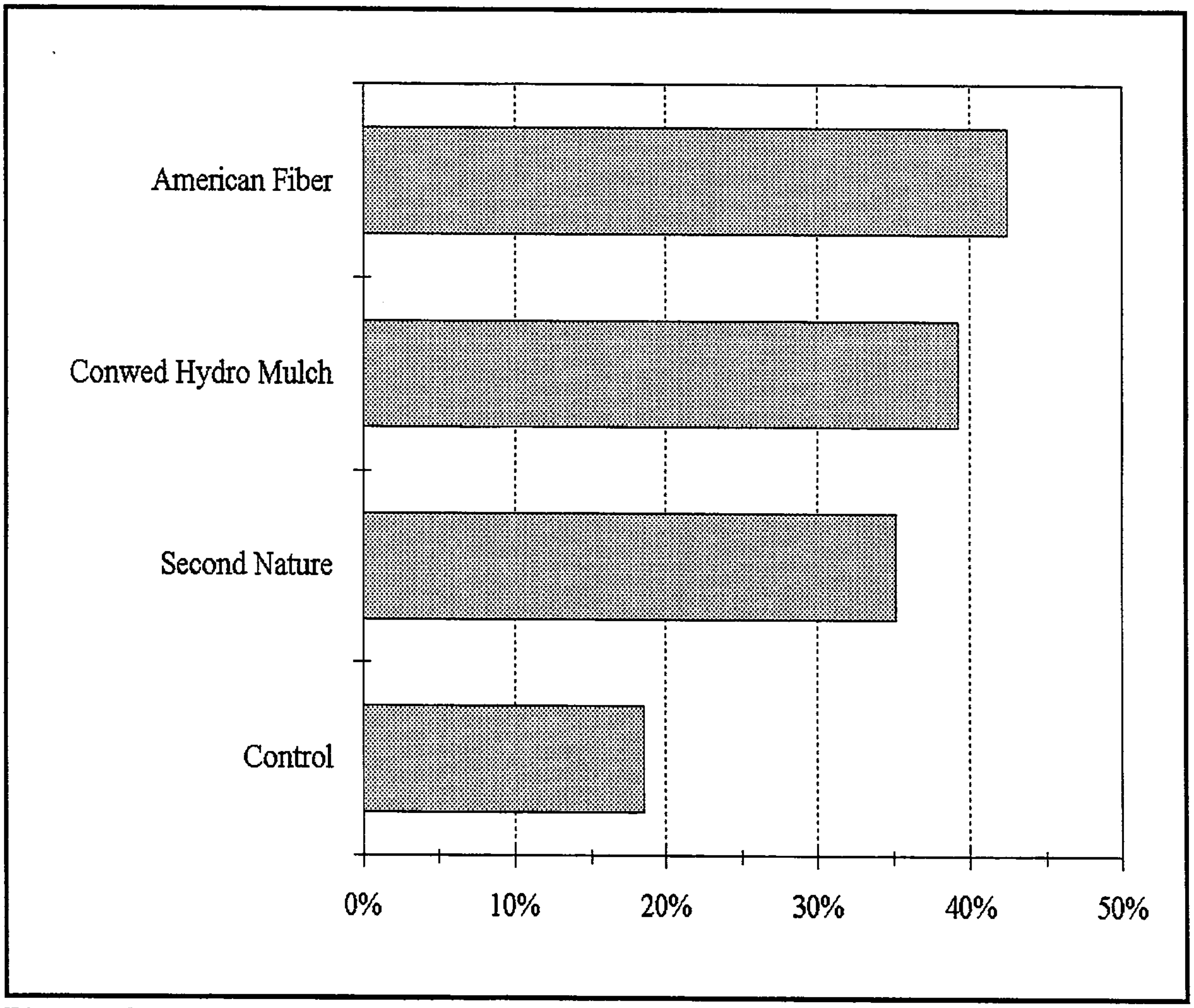


Figure 7G. Vegetative Density (%)

Table G8. Level 4 - Analysis Based Upon Soil Type and Application Method

Product Evaluated	Test Cycle	Measurement	Slope	Soil (Step 2)	Veg** Density	Veg Rank
Second Nature® Regenerated Wood Fiber	92	Round 4	3:1	Sand	45.462	1/4
American Fiber Mulch®	92	Round 4	3:1	Sand	39.556	2/4
MULCH CONTROL	92	Round 4	3:1	Sand	34.246	3/4
Conwed® Fiber Hydro Mulch®	92	Round 4	3:1	Sand	23.845	4/4

**Vegetative Density is in percent

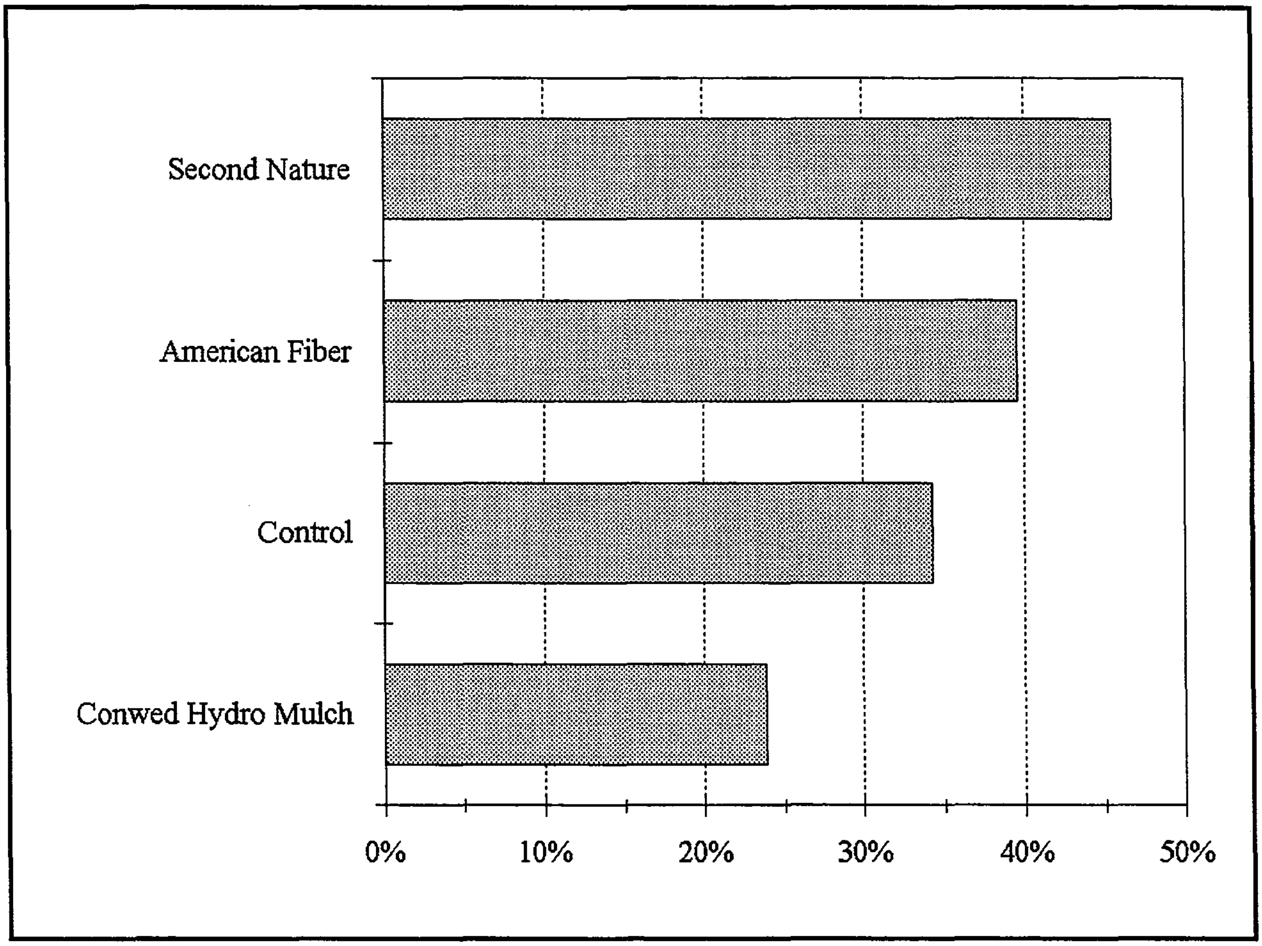


Figure 8G. Vegetative Density (%)