

# 1998 Progress Report

**Study Number: 29A145 - Wear Tolerance Demonstration of Vegetation in High Traffic Areas**

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## **Introduction:**

This demonstration will aid in the selection of vegetation which is the most tolerant to wear by vehicle or troop traffic. The demonstration will take place at Fort Leonard Wood, Missouri. Selection criteria of species are known or thought to have resistance to wear.

## **Problem:**

Travel corridors to and from training areas and repetitive training in concentrated areas severely affects vegetation's ability to survive and provide adequate cover to prevent erosion. Under continued use, the vegetation is thinned or completely eliminated. As the vegetation degenerates, the probability of soil erosion increases. With continued use, and no and/or unsuccessful revegetation attempts, the area becomes eroded with sediment causing pollution and in many situations, renders the area unusable for training.

Soil movement and loss of training area are only two of the problems associated with the loss of vegetation on travel corridors. Stream degradation, surface water pollution, loss of wetlands, sedimentation of drainage ways and loss of wildlife habitat are also affected.

## **Objectives:**

To determine which vegetative species are the most tolerant to wear from troop and vehicle traffic at specific problem sites on an individual military installation.

To determine which species are effective on different soil and site conditions under different traffic regimes.

The species found to be wear tolerant will be recommended for use to revegetate denuded corridors or newly developing high traffic areas in their area of effectiveness.

## **Literature Review:**

Literature was reviewed for information on wear, shade and drought tolerance; maintenance and fertility requirements; height of plants; and reproduction method for establishment. Sources of information were the Agriculture Handbook No. 170, Grass Varieties of the United States; Agriculture Research Service, National Turfgrass Evaluation Program; U.S. Golf Association, Turfgrass and Environmental Research Summary; and other NRCS, Natural Resource Department at Ft. Leonard Wood and University personnel.

## **Location:**

Fort Leonard Wood, Missouri

<u>Site No.</u>	<u>Site Name</u>	<u>Site Description</u>	<u>Problem</u>
#1	Barracks	Open Lawn	Foot Traffic
#2	TA-244	Disturbed Open	Heavy Vehicle

		Upland	Traffic
#3	Landfill Area	Disturbed Open Bottomland	Wheel Traffic
#4	Bivouac Area	Heavy Upland Shade	Heavy Foot Traffic
#5	Shooting Range	Disturbed Open Upland	Traffic and Small Arms Damage

**Procedure:**

- A. Assembly: A listing of the species/varieties to be planted for evaluation is shown in Table #1.
- B. Planting Plan:
1. Design: Randomized split plot, randomized complete block plot, or latin square.
  2. Replications: Four or five
  3. Plot Size: Varies between sites
  4. Seed Method: PMC plot planter or by hand
  5. Seed Rate: See Tables #2- #6
  6. Date of Establishment: April - June, 1998
  7. Duration: Three years
- C. Management:
1. Seedbed Preparation: Spray, rip, disk
  2. Fertilization: Soil test recommendations and critical area rates.
  3. Weed Control: To be determined - spray and/or mow as needed.
- D. Evaluation Measurements:
1. Plant Performance: See attachment #7
    - a. Establishment year (1998)
      - (1) Measurements:
        - (a) First seedling emergence date.
        - (b) Visual estimates of % stand and canopy cover, and vigor every two weeks during the growing season for the planted species.
        - (c) Visual estimates of total canopy cover of all species in the plot every two weeks.
        - (d) Stand density measurements (electronically or stem counts per square foot) at end of growing season.
        - (e) Soil compaction.
    - b. Succeeding years (1999 and 2000)
      - (1) Measurements:
        - (a) Stand density just prior to traffic event.
        - (b) Type and duration of traffic event (to be determined for each site).
        - (c) Vigor of plant before and one week after traffic event or at two week intervals for continuous traffic.

- (d) Stand density each month.
- (e) Plant height each month.
- (f) Document periods of growth and dormancy.
- (g) Document resistance to disease and insects.
- (h) Soil compaction before and after traffic events.

**Cooperators:**

The United States Department of the Army, Fort Leonard Wood, Missouri (FLW) and the United States Department of Agriculture, Natural Resources Conservation Service (NRCS).

**Discussion:**

**1998**

The discussion of erosion problems and a wear tolerance study began during the summer of 1997. David Lorenz, Environmental Specialist, submitted a statement of work (SOW), and on 8/20/97 was given approval to proceed. A draft copy of the Study Plan was sent out for review on 10/30/97 and after comments were discussed and revisions made, the final signatures were obtained 2/3/98.

The five sites were established during April, May, and June. The cool season plots were planted between early April and early May. The warm season plots were planted late April to mid May with some pluggs and sod planted in June. All plots were evaluated throughout the summer for stand establishment. Data for the end of the growing season can be found in table #7.

**Site #1 Barracks Upland Lawn**

This site established well with adequate precipitation through mid summer but crabgrass became a problem. The plots recieved chemical weed control but did not receive 100% control in most plots. A late summer extremely dry period, along with weed competition and droughty, compacted soils led to thin stands of some cool season plots by the end of the growing season. The warm season plots did very well except the buffaloegrass did not fill in. A winter dormant reseeding of fescue plots with sparce stands is planned.

Evaluations of wear tolerance using foot traffic is planned to start in June, 1999.

**Site #2 TA-244 Upland Disturbed**

This site established slowly and adequate stands were only achieved with indiangrass, switchgrass, and tall fescue. The little bluestem is present but not very thick. It is typically a slow starter and may be adequate by next year. The lespedeza's were a problem all year. The whole site was infested with volunteer lespedeza and it was hard to tell how much of the planted species was actually there. Probably not very much. Evaluations will be conducted on the unplanted species or pluggs will be brought in to reestablish the plots next spring.

Evaluations of wear tolerance using tire and track traffic is planned to start in June, 1999.

**Site #3 Disturbed Bottomland**

This site was the most severly affected by weed preasure and the summer dry spell. The only species with adequate stands are the KY 31 tall fescue and Cave-In-Rock switchgrass. It has not yet been

determined what is going to be done as for as reestablishment and wear tolerance evaluations for next year.

#### Site #4 Bivouac Area

This site established very well and no weed control was used. This site is ready for wear tolerance evaluations but still depends on scheduling and if the rest of the area is adequate.

These sites were vegetated in the fall in prior years. The spring seeding of the plots and the successful establishment of all plots demonstrates that spring seeding is also an option.

#### Site #5 Shooting Range

This site did not receive an establishment period with no bullet impact. The most intense bullet damage is not in the middle of the plots but rather on the side of the plot. The opposite side of the plots receive much less impact so a comparison can be made between establishment and damage from bullets. The centipedegrass (plugs), buffalograss (plugs and seed), and bermudagrass (seed), established the best, but the squireltail and lespedeza were very sparse. This site is very harsh and did not require much weed control. The only weed control performed was some of the bermudagrass plots were sprayed with Methar 30.

The three species that did establish are also holding up somewhat to the traffic. None were able to withstand the intense bullet impact directly in the bullet trench but were trying to maintain on the edges. It will be interesting to see how they persist over a longer period of time.

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