THE EFFECTS OF TWO CULTURAL TREATMENTS ON FIVE CHRISTMAS TREE SPECIES GROWN ON RECLAIMED MINED LAND

AND

CHRISTMAS TREES DEMONSTRATION SITE

Brad Hamilton, Aaron Kimberlin, Steven Marcum and Maggie Orr
Mountain Empire Community College

STUDY A: THE EFFECTS OF TWO CULTURAL TREATMENTS ON FIVE CHRISTMAS TREE SPECIES GROWN ON RECLAIMED MINED LAND

Introduction:

This report provides an overview of a multi-year mined-land restoration trial carried out by Mountain Empire Community College students. The five-year project was designed to determine if the two cultural treatments would have an effect on the development and growth of five Christmas tree species. It summarizes results for the fifth year survival rates as well as the overall survival rates of the five-year time period.

Overall Objectives:

- - - - Research - - - -

1. To determine what effects slow-release fertilizer will have on the growth and establishment of Christmas trees at planting time.

2. To determine if using Brush Blanket® will promote growth by inhibiting unwanted weed growth, raising soil temperatures, and increasing moisture retention around seedlings.

- - - - Educational - - - -

1. To establish an area that can be used for educational programs in the local area.

2. To give students proper instructions on how to plant and grow Christmas trees.

Methods And Materials:

This multi-year research/educational project was started in the spring of 2000. The study site, known as the Powell River Project, is located eight miles east of Norton, Virginia. The species of tree selected for this project are as follows:

1. **Douglas Fir**
2. **Fraser Fir**
3. **White Pine**
4. **Scotch Pine**
5. **Blue Spruce**

The following plots were used and growth of trees compared:

1. **Plots that received slow-release fertilizer**
2. **Bare Plots**
3. **Plots that were covered with Brush Blanket®**

Soil samples were collected from all the plots. The samples were tested for:

1. **Nitrogen (N)**
2. **Phosphorus (P)**
3. **Potassium (K)**

Second-year students in the Forestry and Environmental Science programs did the testing.

A 6' X 6' grid was used to ensure that the trees would have adequate space for proper growth and development. The trees were planted in rows. Agriform ®21g slow-release fertilizer pellets were placed six inches from the seedlings in the fertilizer plots. These pellets were placed four inches deep in the soil and four to six inches on two sides of the seedlings. The Bare plots did not receive any treatment. The Brush Blanket® plots will promote rapid growth of seedlings by inhibiting unwanted weed growth.

Results And Discussion:

This is the fifth and final year of the project. Students have used standard deviation, range, and means in their statistical analysis. The standard deviation is an index of dispersion of individuals about the mean (Table 2).

There were variations in the soil pH. The soil pH levels ranged from 5.0 to 6.5 overall. The soil test also showed variations in needed nitrogen, potassium, and phosphorus.

The species showed varying results in vigor and survival rates for the fifth and combined year results (Tables 1 and 3, Figures 1 and 2). Figure 1 showed the distribution of living tree species by treatments for the fifth year, whereas Figure 2 showed the distribution of living tree species according to treatments, average of five years combined.

Conclusion:

The fifth year results showed that the trees that were treated with Brush Blanket® had the best survival rate. The fertilizer plots performed better than the bare plots.

It was also noted that Douglas Fir had the best survival rate out of the five species.

We have drawn our final conclusions based on data collected from year one to five. The conclusions are:

1. There were differences between the different treatments.

2. The Brush Blanket® had the best survival rate.

3. Out of the five different species, Douglas Fir had the best survival rate.

4. Blue Spruce, Scotch Pine, and Fraser Fir had about the same rate of survival.

5. The White Pine's survival rate was the worst over the years.

Table 1: Living Trees with Maximum of 20 Trees per Row

Treatments			Species		
	White Pine	Douglas Fir	Blue Spruce	Scotch Pine	Fraser Fir
Fertilizer	9	11	8	8	6
Bare Plot	6	11	4	5	4
Bush Blanket	12	13	10	10	12

Table 2: Means, Standard Deviations, and Ranges of Treatment

Function			Species		
	White Pine	Douglas Fir	Blue Spruce	Scotch Pine	Fraser Fir
Standard Deviation	3.00	1.15	3.06	2.52	4.16
Mean	9.00	11.67	7.33	7.67	7.33
Range	6-12	11-13	4-10	5-10	4-12

Table 3: Five Years Average for Living Trees Maximum of 20 Trees

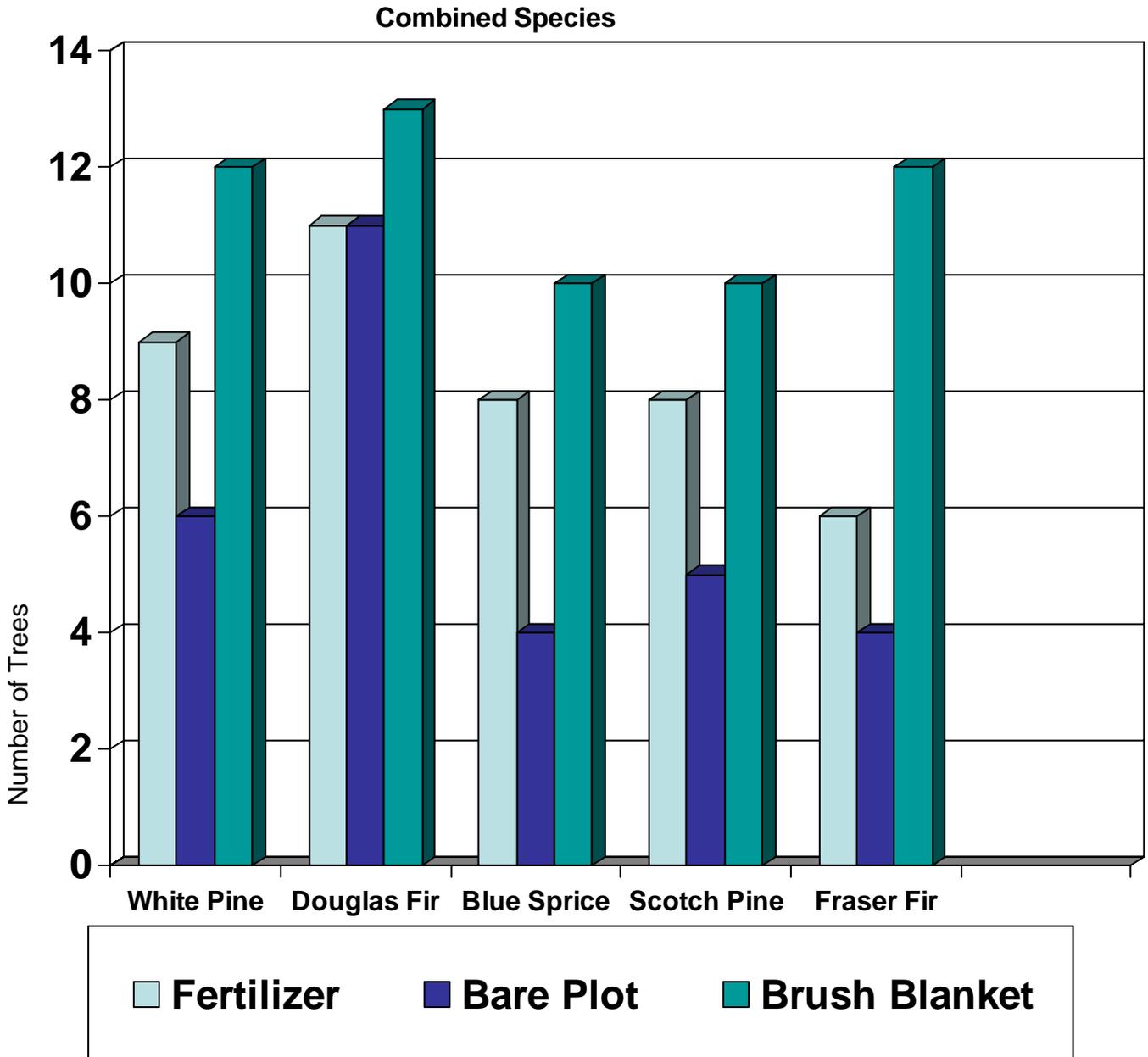| Treatments			Species		
	White Pine	Douglas Fir	Blue Spruce	Scotch Pine	Fraser Fir
Fertilizer	9	15	12	13	13
Bare Plot	8	13	11	12	10
Brush Blanket	11	15	13	14	15

Combined Species

Figure 1: Distributions of Living
Trees by Treatments
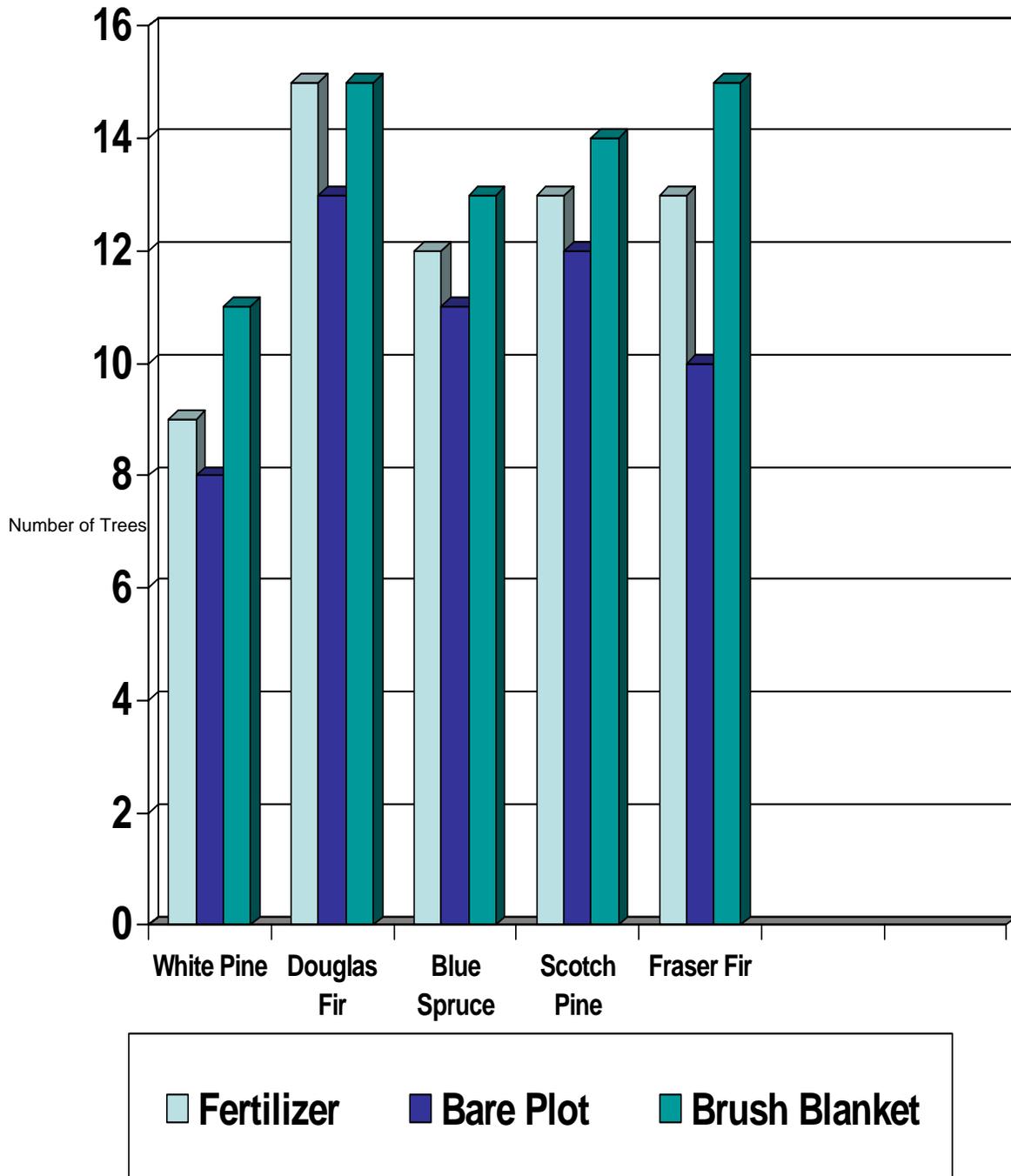
Figure 2: Distributions of Living Trees by
Treatments For 5 Years Average

STUDY B:

CHRISTMAS TREES DEMONSTRATION SITE

Introduction:

The Christmas tree plots were first established during the spring of 1994 by the Environmental Science Club. The Christmas trees that are being grown at Powell River Project can be used for home decoration during the Christmas season.

One of the main advantages of growing Christmas trees is that they require less care than agronomic crops. They are also suitable for growth in soils where regular broad-leaf trees simply cannot grow.

Materials And Methods:

The plots were established with seedlings ranging from two to three years old.

The following seedlings were planted on a random basis:
1.   Douglas Fir
2.   Fraser Fir
3.   White Pine
4.   Scotch Pine
5.   Blue Spruce

To correct nutrient deficiencies, fertilizer pellets were placed in holes four inches deep and four to six inches on each side of the seedlings. During summer months, the plots were mowed as needed by students. The trees were sheared with pruning knives during the month of June.

Objectives:

- - - Educational - - -
1.   To demonstrate to students the proper methods of pruning and harvesting.
2.   To illustrate different planting methods to students.
3.   To illustrate to students the proper care for Christmas trees.
4.   To illustrate to students the effective ways to market Christmas trees.
5.   To provide a demonstration site that can be used by the community for field trips.

To keep insects away, during the month of November 2004, the trees were sprayed with Malathion. This was mainly used to control aphids and spider mites. Before spraying, an insect survey was conducted by using mantis vacuum to collect insects, eggs and dead remains.

Results And Discussion:

About twenty trees were harvested this year. These trees were sold for $205.00.

The Christmas tree plantation is used for the following:
1. AGR 205: Soil Fertility and Management
2. AGR 208: Insect Control
3. FOR 100: Introduction to Forestry
4. FOR 215: Applied Silviculture
5. FOR 115: Dendrology
6. ENV 290/FOR 290: Internship
7. Governors School
8. Field Trips – Local Schools

Conclusions:

Students have concluded that the problem of tree mortality can be attributed to many factors, such as root rot, weather (too wet or too dry), late frost damage, and soil compaction.

A greater survival rate would be attained if Brush Blankets® were used on all seedlings.