

# Growing Seedlings on a Production Scale in a Shadehouse<sup>1</sup>

Thomas M. Smith<sup>2</sup>

Abstract.--In Albuquerque, New Mexico five (5) crops (approximately 400,000 seedlings) of ponderosa pine (*Pinus ponderosa*, Rocky Mountain form) were grown in single 30'X96' greenhouse from January 1985 to December 1985.

## INTRODUCTION

On January 3 & 4, 1985 crop number one was sown using Acoma, New Mexico, and Zuni, New Mexico seed sources. Crop number one was moved to the shadehouse on May 3, 1985. Crop number two was sown on May 6 & 7, 1985 using a Zuni, New Mexico seed source, and moved to a shadehouse on June 7, 1985. Crop number three was also a Zuni, New Mexico source sown on June 10 & 11, 1985, and moved to a shadehouse on July 10, 1985. Crop number four was a Jicarilla, New Mexico seed source sown on July 15 & 16, 1985, and moved to the shadehouse on September 6, 1985. Crop number five, a Santa Clara, New Mexico seed source was sown on September 9 & 10, 1985 and moved to the shadehouse on December 23, 1985.

All seedlings were ponderosa pine (*Pinus ponderosa*, Rocky Mountain form). SpencerLeMaire Tinus (21.5 cubic inches) Roottrainers were used. Each crop was approximately 80,000 seedlings. The Bureau of Indian Affairs (BIA) greenhouse located in Albuquerque, New Mexico was used.

## DISCUSSION AND RESULTS

The Bureau of Indian Affairs greenhouse in Albuquerque, New Mexico is a 30'X96' doublepoly Nexus style greenhouse. The growth fertilizer was Peters 20-20-20, and Peters 9-45-15 was used after flushing and stressing, Peters STEM was added to every fertilizer application for trace

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<sup>2</sup>Thomas M. Smith is Forest Development Officer, Bureau of Indian Affairs, Southern Pueblos Agency, Branch of Forestry, Albuquerque, New Mexico.

elements. None of the seed was stratified.

Crop number one was sown on January 3 & 4, 1985 and grown using the usual procedure for the BIA facility in Albuquerque, New Mexico. Table 1 details the procedure.

TABLE 1, Normal Water & Fertilizer Program

Wk Stage	Boom Time	Fertilizer of Crop Passes (20-20-20+STEM)
1 Germination	2 Daily am & pm	None
2 Germination	2 Daily am & pm	None
3 Juvenile	5 M-W-F am	M-W .5 lb #3 Pass
4 Juvenile	5 M-W-F am	M-W 1 lb #3 Pass
5 Juvenile	5 M-W-F am	M-W 1.5 lb #3 Pass
6* Exponential	5 M-W-F am	M-W 2 lb #3 Pass

\*Remains the same until flushing and stressing then 2 lbs 9-45-15+STEM substituted for 20-20-20.

The crop was moved to the shadehouse on May 3, 1985, and outplanted in August and September, 1985 when soil moisture was adequate.

On May 6 & 7, 1985, crop number two was sown and moved to the shadehouse on June 7, 1985. The crop had been thinned and transplanted and was about to begin the exponential growth stage by that time. The greenhouse water and fertilizer schedule was maintained until the crop was flushed on September 23, 1985.

Crop number three was sown June 10 & 11, 1985 and moved to the shadehouse on July 10, 1985. As with crop number two this allowed time for thinning, transplanting and the beginning of the exponential growth stage. This crop was also maintained on the exponential water and fertilizer schedule until September 23 flushing.

Crop number four was sown on July 15 & 16, 1985 and kept in the greenhouse until September

1985. This was to allow additional development under greenhouse conditions prior to the onset of winter. This crop was also flushed on September 23, 1985.

Flushing on September 23 was done to allow natural hardening off to occur in the shadehouse. Watering was cut back to twice per week and fertilizer with 2 lbs 9-45-15+STEM.

Crop number five was sown on September 9 & 10, 1985 and moved to the shadehouse on December 23, 1985. The house was flushed on November 15 and the hardening off procedure was begun at that time.

Throughout this accelerated program only two environmental problems occurred.

Spring cottonwood seed drop created a large thinning problem in the shadehouse. Crop number two had 1 pine seedling and from 5-10 cottonwood seedlings. Only crop number two was affected. Shadecloth over the shadehouse roof during seed fall, should reduce this problem in the future.

After flushing the shadehouse, for Albuquerque, it rained quite frequently. There were several small stressings instead of one long one. The seedlings developed all the usual signs of stressing.

Root tip elongation was first noted on March 3, 1986. Shoot elongation was first noted on April 1, 1986 for May, June and July crops, elongation for September crop began on April 14, 1986. Shoot elongation tends to be later when a crop is forced into dormancy in a greenhouse, in Albuquerque.

#### CONCLUSIONS

The accelerated growth schedule using the greenhouse in Albuquerque, New Mexico as a germinator worked very well on a production scale. The seedlings developed to a stage enabled them to overwinter under shadehouse conditions. Further research regarding field survival needs to be done.