

FUTURE NEEDS FROM INTERMOUNTAIN NURSERIES
FOR MINE RECLAMATION

by
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Introduction

In past meetings of the Intermountain Nurserymen's Association, Richard L. Hodder, Senior Research Associate at Montana State University, discussed with you the research techniques that were being tested to improve the survival rate of trees and shrubs planted at major mining sites and roadsides in eastern Montana. I have prepared a short slide series of these techniques as a review to those who attended earlier meetings and as an introduction of our work for those who are unfamiliar with the problems of shrub and tree plantings on mine spoils. I will limit most of my talk to a discussion of shrubs and trees for sake of brevity and to be in line with your interests, but I will have a word to say about grasses since your program indicates that people who deal with the propagation of grasses will be in attendance.

Dryland Planting Techniques for Shrubs and Trees

First of all, there is the old and well-tested technique of bare-root plantings. Ponderosa pine (*Pinus ponderosa*) as 2-0 stock has been successfully planted on mine spoils by this technique. A plantation has been set out at Colstrip, Montana, in conjunction with several soil surface treatments. A top dressing of scoria seems to be helpful in reducing competition from weeds and minimizing soil evaporation--thus increasing the survival rate. Other shrubs and trees have also been successfully planted using the bare-root transplant method.

Direct seeding by airplane, hand spreader, or tractor-drawn drill holds some promise for establishment of shrubs and trees, although our work so far indicates that far greater success with this method is achieved with grasses. Large acreages can be treated easily and costs can be minimized by this method, but research needs to be done to determine ways of successfully establishing a variety of shrub and tree species which are rigorous enough to survive severe competition from other vegetation, i.e., grasses and forbs.

Tubelings or containerized shrubs and trees can be successfully planted on mine spoils and, perhaps, will offer the greatest assurance of long-term survival. A variety of tubeling materials as well as planting methods have been tested in our work.

The use of plastic mulches or "condensation traps" is another technique which may have particular usefulness on mine spoils. Plastic mulches may increase soil temperature and reduce evaporative loss while condensation traps may augment soil water by directing condensate to the roots.

Double-root planting techniques were tested in experiments on mine spoils. A shrub, such as snowberry (*Symphoricarpos*), having a spreading root system can be used in this method. The aerial portion of one or two interconnected shrubs is removed and the remaining shrub, with in effect a double-root system, is planted by conventional methods. However, care must be taken to plant the double-root system in a vertical altitude to ensure that contact will be made with moist soil.

Large front-end loaders of the kind used in mining operations and capable of transporting many yards of material can be used to transplant either single trees or root pads of native plant communities. Although only a one-third survival rate with large Ponderosa pine was observed at Colstrip, greater success ratios could probably be obtained with increased care in choice of the transplant specimens. Survival of root pads has not been fully evaluated at this time.

As I have illustrated with the slides, the technology exists to establish shrubs and trees--but at a cost. The question does not seem to be whether trees and shrubs can be planted but what methods are to be used and how many should be planted. This point brings us to the real purpose of this talk: What are the future needs of stock from Intermountain Nurseries? Will there be a market worth developing? What should be the role of you as nurserymen in developing this market?

A Market for Intermountain Nursery Stock

There is a demand now, and there will continue to be one in the future. I do not anticipate a crash tree planting program as has occurred in some places in the East but a demand that will vary according to many factors and which will need to be considered on a mine site basis.

The needs of each mine will vary according to its reclamation objectives. Companies will meet minimum state requirements for the planting of shrubs and trees, but additional planting beyond this minimum will depend upon incentives, factors which may be economically attractive to the company, e.g., development of a recreational complex.

The diversity of land ownership will be a complicating factor in the demand for shrub and tree plantings. Railroad land, company-owned land, Indian agency land, and privately leased land will need to be treated separately as the interests of the land owners are obviously different from each other.

In the State of Montana, the use of the land before mining will have a large influence on proportion of shrubs and trees that will be planted. The Montana Strip Mining and Reclamation Act of 1973 requires a diverse mixture of plant species to be established capable of sustaining itself

under natural conditions (including drought) and withstanding grazing pressure from a quantity of wildlife and livestock comparable to that which existed previous to mining. A drought resistant community will likely need to be diverse and contain a substantial portion of native shrubs, trees, and grasses. Shrubs are needed to support a wildlife population.

One last factor which I do not believe should be underemphasized is that of public opinion. This factor will be a driving force in compelling mining companies to reduce the immediate and starkly visual impact of mining by plantings of shrubs and trees. Careful placement of large trees on ridgelines, for example, in conjunction with good ground cover will do much to alleviate the harsh break between mined and non-mined areas. Such reclamation will be expensive, but the cost will be willingly paid by the mining companies.

Availability of Nursery Stock

The actual demand for shrub and tree nursery stock will depend in part upon what is available. Native trees, shrubs, and grass will be needed, as well as certain introduced species which establish and produce well on mine spoils. The following are some species that are in demand as two or three-year-old stock (bare-root or containerized):

Native Species

<u>Common Name</u>	<u>Scientific Name</u>
Buffalo-berry	<u>Sphepherdia argentea</u>
Chokecherry	<u>Prunus spp.</u>
Golden Currant	<u>Ribes aureum</u>
Honeysuckle	<u>Lonicera utahensis,</u> involucrata
Juniper	<u>Juniperus spp.</u>
Ponderosa pine	<u>Pinus ponderosa</u>
Skunkbush sumac	<u>Rhus trilobata</u>
Snowberry	<u>Symphoricarpos albus,</u> occidentalis
Willows	<u>Salix spp.</u>

Introduced Species

Matrimony vine	<u>Lycium halimifolium</u>
Oldman wormwood	<u>Artemisia abrotanum</u>
Sea-buckthorn	<u>Hippophae rhamnoides</u>
Caragana	<u>Caragana spp.</u>
Russian olive	<u>Eleagnus angustifolia</u>

In addition to shrubs and trees, there appears to be no commercial source for native warm season grasses. Some species are available but are from

stock grown in southern latitudes and are not necessarily suitable for planting in the Northern Great Plains. Some of these grasses that would be of high demand for research and operational reclamation plantings are side-oats grama (*Bouteloua curtipendula*), needle-and-thread grass (*Stipa comata*), green needlegrass (*Stipa viridula*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and sand bluestem (*Andropogon hallii*).

Numbers of Nursery Stock

In the discussions I have had with various mining company people and with other researchers in reclamation, I have not been able to obtain specific and quantitative estimates of nursery stock to be needed on a regional or individual mine basis. One large eastern Montana company was reluctant to commit itself because, as they claimed, there was too much uncertainty as to State requirements and availability of nursery stock. I am of the opinion that other companies as well are reluctant to state figures for similar reasons. This, to me, points to a real communication problem--the uncertainties of State reclamation requirements set aside for a moment. Nurserymen and mining people need to work together more closely to understand each others' needs and problems. The seriousness of the communication problem is compounded when one realizes that two to three years are needed to propagate nursery stock and ready it for planting. Company reclamation people will need to make long-term plans for reclamation plantings and assure the nurseryman that his investment in time and money will be rewarded. The nurseryman must, I believe, take the initiative to let the mining people know what species can be propagated with present methods, the number which can be produced and at what relative costs, and the length of time that will be necessary.

Conclusion

I have not been very specific about future needs of Intermountain Nursery Stock for mine reclamation, as such information is apparently unavailable. I do feel, however, the demand will be considerable but not immense; will vary according to many factors as I discussed previously; and will become more certain with better communication between the producer (the nurseryman) and the consumer (mining companies and their reclamation needs).