



## Evaluation of Small Trees and Shrub Plantings on Reclaimed Surface Mines in West Virginia

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### Project Description and Objectives:

This project was designed to recommend additional woody species that can be used in reforestation projects to enhance wildlife habitat and ecosystem services. To do this, survival and growth of 20 small tree and shrub species on FRA reclaimed surface mines in West Virginia were determined and the degree of species suitability for reclamation was determined by their success on four reclaimed coal mines.

### Applicability to Mining and Reclamation:

The forestry reclamation approach (FRA) is a five-step method for reclaiming mine lands to forest in Appalachia.

The Steps Include:

- 1) Creating a suitable substrate growth media for trees,
- 2) Not compacting the substrate,
- 3) Seeding a non-aggressive herbaceous cover,
- 4) Planting both economically and ecologically important tree types,
- 5) Planting trees properly.

The 4<sup>th</sup> step, planting more than one tree type, has not had adequate scientific testing to show which woody plant species could be planted and contribute to wildlife habitat, forest diversity and ecosystem development. This project examined the survival and growth of 20 small tree and shrub species on four reclaimed surface mines in West Virginia.

### Methodology:

This project was developed and established by Rick Williams and Williams Forestry on four reclaimed surface mines in central Appalachia (West Virginia) in 2008 and 2010: Elk Run Mine in Boone County owned by Alpha Natural Resources, Hobet Mine in Logan County owned by Blackhawk Mining Company, Fola Mine in Clay County owned by Consol Energy, and ICG-Birch River Mine in Webster and Nicholas County owned by Arch Coal. At each mine, four blocks were established and 100 plants of each of the 20 species were planted on each site. Species survival and growth were determined in the year of establishment and in 2015 and 2016.



Figure 1. Alexis Monteleone standing beside a highbush cranberry at Elk Run in 2015.

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**Highlights:**

The results of this study demonstrated that several small tree and shrub species have potential for planting on surface mines in West Virginia. Species like black chokeberry, black cherry, Washington hawthorn, and nannyberry, which had greater than 50% survival after 6 or 8 years, are the most likely candidates. Other species which are adapted to better soil conditions did not perform well and should not be considered for plantings.

**Results and Findings:**

Table 1. Survival and height of 20 species of trees and shrubs and separated into good, moderate and poor survival.

Common Name	Scientific Name	Survival (%)	Height (m)
<b>Good Survival</b>			
Black chokeberry	<i>Aronia meanocarpa</i> Michx.	56	0.8
Black cherry	<i>Prunus serotina</i> Ehrh.	55	1.7
Washington hawthorn	<i>Crataegus phaenogyrum</i> L. f.	54	1.5
Nannyberry	<i>Viburnum lentago</i> L.	52	1.6
Hazelnut	<i>Corylus avellana</i> L.	50	0.9
<b>Moderate Survival</b>			
Highbush cranberry	<i>Viburnum trilobum</i> L.	47	1.5
Eastern redbud	<i>Cercis Canadensis</i> L.	45	1.3
Choke cherry	<i>Prunus virginiana</i> L.	44	1.4
Gray dogwood	<i>Cornus racemose</i> Lam.	44	1.9
Serviceberry	<i>Amelanchier arborea</i> Michx. f. Fernald	44	1.7
Wild plum	<i>Prunus Americana</i> Marshall	44	1.7
Common apple	<i>Malus pumila</i> Mill.	41	1.1
Red mulberry	<i>Morus rubra</i> L.	41	1.3
American crabapple	<i>Malus coronaria</i> L.	40	1.1
Common pear	<i>Pyrus communis</i> L.	37	1.7
Persimmon	<i>Diospyros virginiana</i> L. f.	37	1.5
<b>Poor Survival</b>			
Blueberry	<i>Vaccinium corymbosum</i> L.	30	0.9
Elderberry	<i>Sambucus Canadensis</i> L.	27	1.1
Flowering dogwood	<i>Cornus florida</i> L.	10	1.2
Pawpaw	<i>Asimina triloba</i> L.	9	-



Figure 2. Alexis Monteleone measuring an eastern redbud in ICG in 2015.



Figure 3. Alexis Monteleone measuring a hazelnut at Fola in 2015.

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