



Appalachian Regional Reforestation Initiative (ARRI) 2008 Mined Land Reforestation Conference

Forestry Reclamation Approach (FRA) Step 3 – Use Native & Non-Competitive Ground Covers that are Compatible with Growing Trees

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Remove Existing Barriers – Step 3

- Technical – eliminate excessive surface compaction, ground cover competition, and inappropriate growth medium; plant quality hardwood trees
- Ground-cover vegetation used in reforestation requires a balance between erosion control and competition for the light, water, nutrients and space required by trees. Ground covers should include grasses and legumes that are *slow growing, have sprawling growth forms and are tolerant of a wide range of soil conditions.*

Step 3. Use ground covers that are compatible with growing trees

- Fast growing and competitive grasses such as Kentucky-31 tall fescue and aggressive legumes such as sericea lespedeza and crown vetch should not be used where trees will be planted. Slower-growing grasses such as red top and perennial rye grass, and legumes such as birdsfoot trefoil and white clover, when used in a mix with other appropriate species will increase seeding survival while controlling erosion over the longer term as the trees and accompanying vegetation mature to form a forest. Fertilizer rates should be low in nitrogen, relative to rates commonly used to establish pastures, so as to discourage heavy ground cover growth while applying sufficient rates of phosphorus and potassium for optimal tree growth.

Tree Species Planting Guide By Moisture Regime

Species Listed in Order of Preference

Yellow Indicates Early Successionary Species, Gray Indicates Later Successionary Species

(Plant at least 4 or 5 species Per Planting Area From the Following List)

MOISTURE REGIME

Wet	Moist – Moderate	Moderate	Moderate – Dry	Dry
1	2	3	4	5
TREES	TREES	TREES	TREES	TREES
White Ash	White Ash	White Ash	White Ash	Black Oak
Yellow Poplar	White Oak	White Oak	White Oak	Chestnut Oak
Yellow Poplar	N. Red Oak	N. Red Oak	Black Oak	Scarlet Oak
Black Willow	Black Cherry	Black Oak	Chestnut Oak	Native Hickories
Black Walnut	Sugar Maple	Black Cherry	Scarlet Oak	Red Maple
Butternut	Yellow Poplar	Sugar Maple	Native Hickories	
Silver Maple	Black Walnut	Yellow Poplar	Black Locust	Norway Spruce
Red Maple	Cucumbertree	Cucumbertree	Big-Tooth Aspen	Virginia Pine
American Beech	Basswood	Basswood	Quaking Aspen	
River Birch	Black Locust	Black Walnut	Red Maple	
	Persimmon	Black Locust	Sweet Birch	
Eastern Hemlock	Red Maple	Red Maple	Sweet Gum	
	Butternut	Big-Tooth Aspen		

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MOISTURE REGIME

Wet	Moist – Moderate	Moderate	Moderate – Dry	Dry
1	2	3	4	5
TREES, CONT'D	TREES, CONT'D	TREES, CONT'D	TREES, CONT'D	TREES, CONT'D
	American Beech	Quaking Aspen	White Pine	
	Big-Tooth Aspen	Persimmon	Short-Leaf Pine	
	Quaking Aspen	Native Hickories	Virginia Pine	
	Sycamore	Sweet Birch	Red Spruce	
	Black Willow	Sweet Gum	Norway Spruce	
	Silver Maple			
	Sweet Birch	White Pine		
	Sweet Gum	Short-Leaf Pine		
	River Birch	Norway Spruce		
	White Pine			
	Eastern Hemlock			

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MOISTURE REGIME

Wet	Moist – Moderate	Moderate	Moderate – Dry	Dry
1	2	3	4	5
SHRUBS	SHRUBS	SHRUBS	SHRUBS	SHRUBS
Black Alder	Black Alder	Flowering Dogwood	Flowering Dogwood	Flowering Dogwood
Willow	Eastern Red Bud	Eastern Red Bud	Eastern Red Bud	Black Adler
	Red Mulberry	Red Mulberry	Black Adler	Gray Dogwood
	Crab Apple	Black Adler	Crab Apple	
	American Holly	Crab Apple	Gray Dogwood	
	Hawthorn	Gray Dogwood	Hawthorn	
		American Holly		
		Hawthorn		

Forestry Reclamation Approach Step 3 – Use Native & Non-Competitive Ground Covers that are Compatible with Growing Trees

- Tall Fescue including Kentucky-31, Sericea Lespedeza, and all clovers except Ladino should be avoided.
- Competitive ground cover will inhibit both tree survival and productivity.
- Tree compatible grasses include Foxtail Millet, Rye, Red Top, Perennial Ryegrass and Orchard Grass.

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- Tree compatible legumes include Kobe Lespedeza, Birdsfoot Trefoil and Ladino Clover.
- These species will provide sufficient ground cover, but will aggressively compete with tree seedlings for rooting space, sunlight and soil moisture. High levels of introduced ground cover vegetation will affect tree survival and productivity; therefore, seeding rates and fertilizer rates should be reduced.

7.6.e. Revegetation

- 7.6.e.1. Temporary erosion control vegetative cover shall be established as contemporaneously as practical with backfilling and grading until a permanent tree cover can be established. This cover shall consist of a combination of native and domesticated non-competitive and non-invasive cool and warm species grasses and other herbaceous vine or shrub species including legume species and shrubs. All species shall be slow growing and compatible with tree establishment and growth. The ground vegetation shall be capable of stabilizing the soil from excessive erosion, but the species should be slow growing and non-invasive to allow the establishment and growth of native herbaceous plants and trees. Seeding rates and composition must be in the planting plan.

7.6.e. Revegetation

- The following ground cover mix and seeding rates (lb./acre) are strongly recommended: winter wheat or oats (10 lbs./acre), fall seeding, foxtail millet (5 lbs./acre), summer seeding, weeping lovegrass (3 lbs./acre or redtop at 5 lbs./acre), kobe lespedeza (5 lbs./acre), birdsfoot trefoil (10 lbs./acre), perennial rye grass (10 lbs./acre) and white clover (3 lbs./acre). Kentucky 31 fescue, serecia lespedeza, all vetches, clovers (except ladino and white clover) and other aggressive or invasive species shall not be used. Please note alternate seeding rates and composition will be considered on a case by case basis by the Secretary and may be approved if site specific conditions necessitate a deviation from the above. All mixes shall be compatible with the plant and animal species of the region and forestland use.

Reforestation Costs

- One must know the costs associated with a reforestation project to determine if the project is feasible. On Title IV sites, these costs vary greatly from site to site, ranging from \$200 to \$2,000 per acre for optimal tree growth, depending primarily on the site conditions and the physical and chemical nature of the soil. This is because soils often need physical and nutritional enhancement and the cost of soil improvements can vary significantly.

Reforestation Costs

- Most of the costs associated with reclamation of Title V sites are the same regardless of the post-mining land use. The difference in cost is determined through the final grading, site preparation and planting costs. In the past, reclamation to hay and pastureland had the perception of being less costly than reclamation to forestland. However, by using the FRA, actual reclamation costs can be substantially less for forestland. It is very expensive to compact surface mine spoil. In those areas where stability is not a problem, low compaction final grading, which is encouraged for forestland, reduces the hours required of dozer time and undercarriage wear. Surface rocks, small mounds and depressions are encouraged because this more closely matches natural forestland conditions. There are reduced costs for seed and fertilizer because dense aggressive ground covers are not encouraged.

Reforestation Costs

- Reforestation also eliminates the cost of liming because trees generally perform well in slightly acidic soil conditions and native acid-tolerant ground-cover species are naturally more compatible with trees. These cost savings can be considerably more than the cost of tree planting. Maintenance of the site through the bond liability period can be less for forestland. In most cases, pastureland will require maintenance throughout the bond liability period to maintain site productivity and to eliminate rills and gullies. Forestland requires very little maintenance and formation of stabilized gullies can remain because they are compatible with forestry land uses not prohibited by federal regulations.