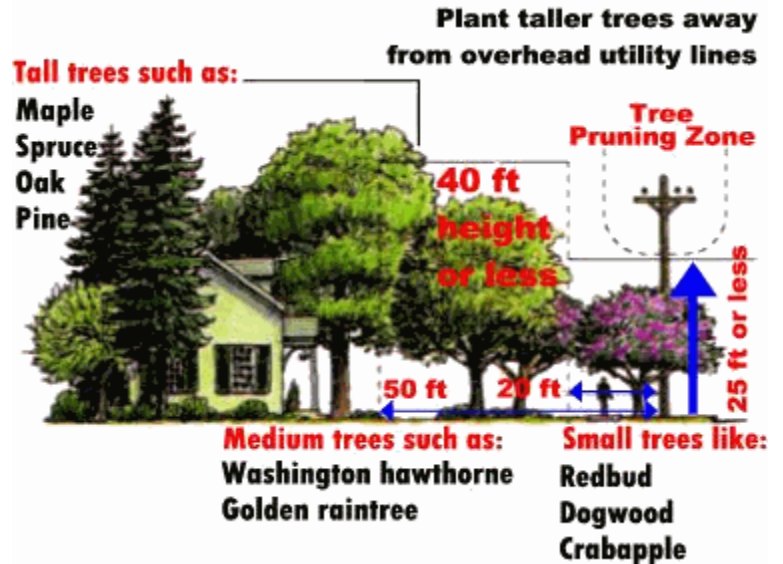


TREE GROWTH STUDY

One of the main goals of Firelands Electric Cooperative is to provide reliable and affordable energy to our members. Pruning of yard trees that are incompatible near power lines often results in gross disfigurement of the tree's crown, costly ongoing pruning cycles, and damage to the tree's health. Inadequate pruning will jeopardize electric reliability and public safety as branches grow into conductors. Trees genetically disposed to grow 50' to 100' feet tall with a wide crown will attempt to reach their potential regardless of the best efforts to control their size. These tree situations present a significant challenge to achieving Firelands' goals. Our right-of-way vegetation management practices are constantly evolving to meet these challenges.



To help us achieve the appropriate tree to line clearance in yard situations Firelands has conducted an extensive study to determine the growth rate of the trees found commonly in yard areas on our system. Yard trees include those trees located in a lawn area or those whose close proximity to the home provide integral value to the landscape. The study was intended to differentiate growth rates that occur naturally, as opposed to growth that occurs from re-sprouting following pruning cuts. Over 20 of the most common tree species were studied in order to establish line clearance specifications relevant to growth rates. Sprout measurements of up to 50 individual trees of each species were taken throughout the service area. The results have made credible guidelines for obtaining minimum clearance distances, avoidance of pruning when it may not be necessary, and properly selecting trees for removal.

The information derived from the study also enables Firelands to communicate with members about the clearance distances needed on yard trees to avoid line contact before the next scheduled maintenance. It provides the basis for determining when a member request for a variance of the required clearance distance should result in a maintenance charge to pay for necessary mid-cycle pruning. The clearance guidelines for primary lines are calculated to ensure 1 to 2 feet of side and under clearance until the next maintenance cycle. This buffer helps compensate for variations in growth due to site conditions and provides some margin for windy conditions.

If you are considering planting a tree (or trees) which may be located near Firelands' power lines, call the office and ask for our System Right-of-Way Arborist, Jim Cuson, to visit with you about which species to plant and where your tree(s) should be located. Jim has a wealth of information available about the best kinds of trees to plant in our area, and he can help choose a safe location, which won't cause problems with power lines in the future. Please [contact](#) Firelands at (800) 533-8658

The following tables provide additional data about growth rates in Firelands' service territory:

- **AVERAGE PRUNING RESPONSE GROWTH RATES BY TREE SPECIES**
- **NORMAL GROWTH CHARACTERISTICS BY SPECIES**
- **REQUIRED LINE CLEARANCES IN YARDS BY TREE SPECIES**

AVERAGE PRUNING RESPONSE GROWTH RATES BY TREE SPECIES

Average Sprout Measurements of Various Trees at Annual Growth Intervals

SPECIES	PRUNE TYPE	Average Feet of Growth by Age of Sprout					
		1 Year	2 Years	3 Years	4 Years	5 Years	6 Years
Ash, all	SIDE	2.1	4.2	5.8	7.1	9.3	10.7
	TOP	4.5	7.4	9.4	0.0	0.0	0.0
Basswood	SIDE	2.2	4.3	5.7	6.9	10.2	10.4
	TOP	3.0	5.4	7.4	8.8	9.9	14.8
Birch	SIDE	2.8	6.0	6.3	6.7	7.3	9.4
	TOP	3.4	6.0	7.7	7.8	8.9	10.8
Black locust	SIDE	4.1	5.7	7.3	0.0	0.0	0.0
	TOP	4.5	8.0	9.2	11.3	12.8	14.0
Boxelder	SIDE	2.6	4.8	6.9	8.3	9.9	11.5
	TOP	4.0	7.6	9.8	12.0	0.0	0.0
Butternut	SIDE	1.3	3.6	4.5	0.0	0.0	0.0
	TOP	3.6	5.9	7.1	11.6	14.2	13.5
Cottonwood	SIDE	3.5	6.5	7.4	7.8	8.3	9.0
Elm	SIDE	2.9	4.3	6.4	7.7	9.2	10.4
	TOP	1.9	6.9	10.6	0.0	0.0	0.0
Elm, American	SIDE	2.8	5.3	7.0	9.1	12.0	12.8
	TOP	5.0	7.8	8.4	0.0	0.0	0.0
Honeylocust	SIDE	3.9	7.0	10.3	0.0	0.0	0.0
	TOP	3.5	5.8	0.0	0.0	0.0	0.0
Maple, Norway	SIDE	2.1	3.7	5.6	0.0	0.0	0.0
	TOP	3.8	6.8	7.1	7.4	8.2	0.0
Maple, red	SIDE	2.5	5.1	5.8	6.3	7.3	7.8
	TOP	2.8	4.8	6.0	6.7	0.0	0.0
Maple, silver	SIDE	3.1	5.6	7.7	9.1	10.4	11.6
	TOP	5.8	9.9	11.5	12.8	13.3	14.0
Maple, sugar	SIDE	2.0	4.1	6.5	7.6	9.5	11.1
	TOP	2.2	5.3	8.0	8.6	11.3	0.0
Oak, bur	SIDE	1.4	2.5	3.6	4.3	5.2	5.7
	TOP	1.6	3.3	4.5	5.9	6.5	6.9
Oak, pin	SIDE	1.3	2.5	3.7	5.0	6.3	7.1
Oak, red	SIDE	2.0	4.0	5.4	6.8	7.3	8.3
	TOP	2.3	4.7	6.6	8.8	11.7	14.6
Pine, red	TOP	1.8	3.2	4.6	5.7	6.9	8.0
Pine, white	TOP	1.7	3.8	5.1	5.7	6.8	8.0
Poplar, white	SIDE	3.0	4.4	6.2	6.8	7.4	8.3
	TOP	4.6	6.9	10.8	12.7	13.8	14.8
Quaking aspen	SIDE	6.4	11.2	12.0	12.8	13.8	14.5
	TOP	5.6	8.5	10.7	0.0	0.0	0.0
Spruce	TOP	1.3	2.5	3.6	5.3	6.4	9.2
Walnut, black	SIDE	3.2	5.0	7.1	7.9	8.4	0.0
	TOP	4.0	6.2	7.1	0.0	0.0	0.0
Willow	SIDE	5.9	9.0	13.0	13.1	14.4	21.3
	TOP	8.8	12.3	12.8	0.0	0.0	0.0

NORMAL GROWTH CHARACTERISTICS

Growth Characteristics by Species

<u>Species</u>	<u>Normal Growth¹</u>	<u>Pruning Response Growth²</u>	<u>Mature Height</u>
Ash (all species)	Fast	Fast	50-60'
Balsam Fir	Slow	Slow	45-75'
Basswood	Medium	Fast	60-80'
Birch	Fast	Fast	50-70'
Black Locust	Fast	Fast	30-50'
Black Walnut	Slow	Fast	50-75'
Boxelder	Fast	Fast	30-50'
Burr/White Oak	Slow	Slow	70-80'
Butternut	Slow	Fast	40-60'
Cottonwood/poplar	Fast	Fast	75-100'
Elm	Fast	Fast	60-80'
Honeylocust	Fast	Fast	30-70'
Norway Maple	Medium	Medium	40-50'
Red Maple	Fast	Medium	40-60'
Red Oak	Fast	Fast	60-75'
Scotch Pine	Medium	Medium	30-60'
Red Pine	Medium	Medium	50-80'
Silver Maple	Fast	Fast	50-70'
Spruce	Medium	Medium	40-60'
Sugar Maple	Slow	Fast	60-75'
White Pine	Fast	Medium	50-80'
Willow	Fast	Fast	75-100'

¹ Normal Growth refers to vertical increase in height. Slow: 1' or less, Medium: 1-2', Fast: 2' or more per year

² Pruning Response Growth designations: slow: less than 5.3', medium: 5.4-7', fast: 7' or more after three years

The following chart is a guide used by tree contractors for pruning yard trees. Larger cities are usually on a 4 year maintenance cycle while most other areas are on a 6 year cycle. "Under Clearance" refers to trees located under the line and several species are recommended for removal as indicated by "R/V".

Minimum Required Under Clearance Distances in Feet for Yard Trees by Species (After Pruning)

	<u>Primary</u>		<u>Open Secondary</u>		<u>Triplex</u>	
	<u>6yr</u>	<u>4yr</u>	<u>6yr</u>	<u>4yr</u>	<u>6yr</u>	<u>4yr</u>
Ash (all species)	R/V	R/V	12	12	6	6
Balsam Fir	9	8	6	5	4	4
Basswood	R/V	R/V	12	12	6	6
Birch	R/V	R/V	12	12	6	6
Black Locust	R/V	R/V	12	12	6	6
Black Walnut	R/V	R/V	12	12	6	6
Boxelder	R/V	R/V	12	12	6	6
Burr/White Oak	9	8	6	5	4	4
Butternut	R/V	R/V	12	12	6	6
Cottonwood/poplar	R/V	R/V	12	12	6	6
Elm	R/V	R/V	12	12	6	6
Honeylocust	R/V	R/V	12	12	6	6
Norway Maple	11	9	9	7	5	5
Red Maple	11	9	9	7	5	5
Red Oak	R/V	R/V	12	12	6	6
Scotch Pine	11	9	9	7	5	5
Red Pine	11	9	9	7	5	5
Silver Maple	R/V	R/V	12	12	6	6
Spruce	11	9	9	7	5	5
Sugar Maple	R/V	R/V	12	12	6	6
White Pine	11	9	9	7	5	5
Willow	R/V	R/V	12	12	6	6

*R/V: These must be removed or approved for a variance, subject to member participation!

Required Side Clearance Distances in Feet for Limbs of Yard Trees by Species (After Pruning). Main Trunk Must be a Minimum of 8 Feet from Conductors

	<u>Primary</u>		<u>Open Secondary</u>		<u>Triplex</u>	
	<u>6yr</u>	<u>4yr</u>	<u>6yr</u>	<u>4yr</u>	<u>6yr</u>	<u>4yr</u>
Ash (all species)	16	14	12	11	6	5
Balsam Fir	6	4	5	4	3	3
Basswood	16	14	12	11	6	5
Birch	16	14	12	11	6	5
Black Locust	16	14	12	11	6	5
Black Walnut	16	14	12	11	6	5
Boxelder	16	14	12	11	6	5
Burr/White Oak	7	6	6	5	4	4
Butternut	16	14	12	11	6	5
Cottonwood/poplar	16	14	12	11	6	5
Elm	16	14	12	11	6	5
Honeylocust	16	14	12	11	6	5
Norway Maple	10	8	10	8	5	5
Red Maple	10	8	10	8	5	5
Red Oak	16	14	12	11	6	5
Scotch Pine	6	4	5	4	3	3
Red Pine	6	4	5	4	3	3
Silver Maple	16	14	12	11	6	5
Spruce	6	4	5	4	3	3
Sugar Maple	16	14	12	11	6	5
White Pine	6	4	5	4	3	3
Willow	16	14	12	11	6	5