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Guidelines For Establishing Poplar Plantations In The North-Central U.S.

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ABSTRACT.—Gives guidelines for planting and tending poplar plantations as an agricultural crop, using intensive culture and 6- to 10-year rotations.

KEY WORDS: Short rotation, wood energy crops, hybrid poplar, biomass.

Poplar trees have begun to be grown like agricultural row crops such as corn or soybeans, except that these trees take 6- to 10-years to mature. Yields range from 3 to 6 dry tons of wood plus bark per acre per year. Growing poplar requires thorough site preparation, planting of improved stock, careful and timely weed control, and occasional fertilization. This guide describes a step by step description how to establish a poplar plantation and refers you to additional sources of information. It is meant to supplement advice from your local extension forester.

BEFORE YOU START

Talk to your local forester about recommended tree spacing and choice of hybrids or clonal planting stock. Tree spacing typically is 8 x 8 feet up to 10 x 10 feet, which requires 700 to 400 trees/acre, respectively. Closer spacings result in shorter rotations, but rows need to be spaced wide enough to allow equipment access. Several poplar clones should be planted to reduce impact of insects or diseases, but each clone should be in a "pure" block.

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SITE SELECTION

- * Select deep, fertile sandy-loam to clay-loam soils with a pH between 5 and 7.5 (1).
- * Choose sites with a high water-holding capacity (greater than 10 inches in the top 60 inches of soil) or a shallow water table at 1 to 6 feet (2).
- * Test soil fertility, and fertilize according to recommendations for corn. Nitrogen is the element most often deficient (3).

SITE PREPARATION

- * On fields in sod, pasture, or hay, apply glyphosate (Roundup) and plow by July. Leave fallow during the remainder of the season. (Note: seed a fall cover crop, leave vegetated strips, or use other conservation tillage practices where soil erosion is a potential problem.)
- * On fall-cropped fields, apply glyphosate if perennials are present after harvest.
- * **Plow at least 10 inches deep** in the fall (4).
- * Field cultivate or otherwise **till 10 inches deep** a day or two before planting in the spring.
- * Do not use no-till unless required for erosion control (5).

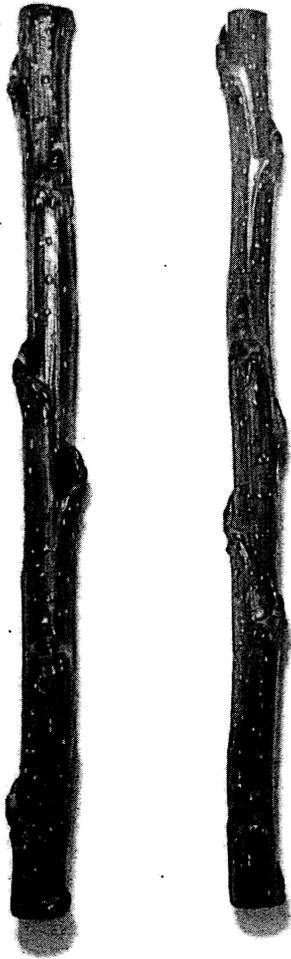
CLONAL SELECTION

- * Use only disease-resistant clones that have been tested over a number of years in your locality (6). Clones recommended at this time are DN-17 (Robusta), DN-34 (Eugenei, Imperial Carolina, etc.), DN-182 (Raverdeau), and Siouxland (7). Check with your local extension forester.

CUTTING PREPARATION

Cuttings are sections of tree stems typically 10 inches long and 3/8- to 3/4-inch diameter with well-developed buds. They should be free from disease and bark damage (8).

- * For short-term storage prior to planting, keep cuttings sealed in plastic bags and store at 32 to 40°F.
- * Warm and soak the cuttings for 5 to 10 days before planting. Make small slits in the bag, leave cuttings in the bag, and immerse 3/4 of their length in water (8). Place the cuttings in shade at 50 to 70°F. **Make sure buds point up.**
- * Cuttings are ready to plant when the buds start elongating, showing some bright green around the bud scales, and just before roots begin to grow.

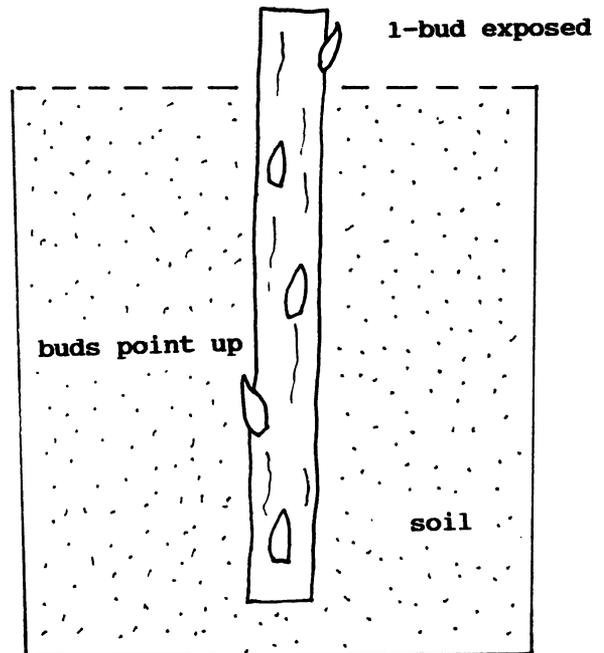


Cuttings ready for planting.

- * If weather prevents planting when cuttings are ready, cuttings can be held for weeks by placing them in cold storage at 34°F or by covering them with crushed ice (9).

PLANTING

- * Plant between mid-April and early June. Best time is when soil temperatures reach 50°F, or when corn is being planted locally (10).
- * Soils should be moist; otherwise, delay planting until after rain (11).
- * Keep cuttings wet while planting.
- * Hand plant using a marked wire-core rope for a spacing guide, or machine plant with a tractor driver and two planters. Hand planting rates are 3 acres/day/person; machine rates are 20 acres/day/three-person crew.
- * Cuttings should be planted with one bud above the soil surface (usually about 1 inch of the cutting exposed) (12). **Plant with buds pointing up.**



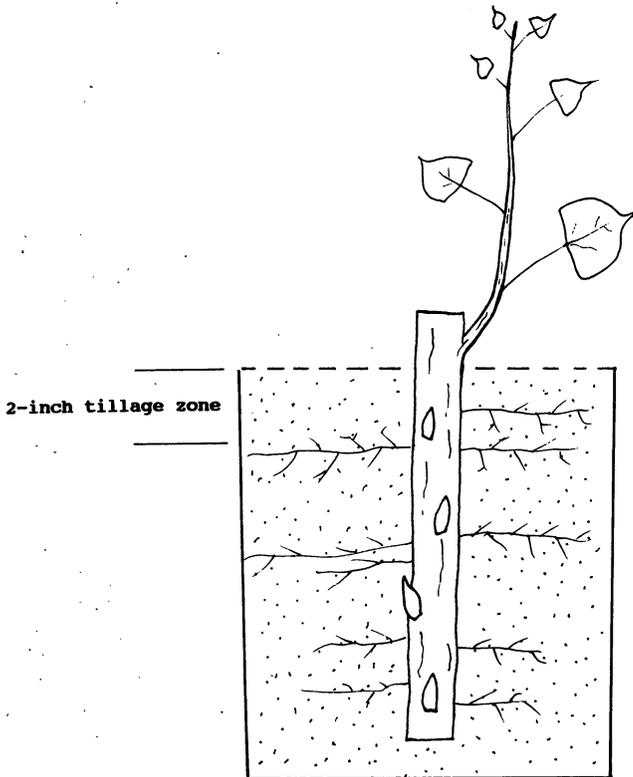
Planted cutting.

- * When hand planting, push cutting into soil by hand if the soil is loose. If soil is firm, use a dibble to make a hole and insert the cutting. Fill any air gaps by pushing the soil against the cutting. **Do not pack the soil.** If machine planting, be sure that soil tillage is adequate for firm, but not excessive, soil packing around the cutting.

FIRST-YEAR WEED CONTROL

Growing Season

- * Apply linuron (Lorox) at 1 to 2 lbs/acre (active ingredient) immediately after planting or no later than when weed seed begins germinating (13).
- * When linuron effectiveness begins to decline (in 4 to 6 weeks), rotary hoe at 7- to 10-day intervals until trees are 1 foot tall, or until hoe begins to cause top damage.
- * After rotary hoeing, till between rows as needed (about once a month) with a cultivator or 5-foot disc. **Do not till deeper than about 2 inches** because the trees have shallow roots.



Growing cutting.

- * If annual grasses invade the tree rows, apply Sethoxydem (Poast) at 1 pint/acre before grasses are 5 inches tall. Use only vegetable oil concentrate or none at all; **do not use petroleum-based concentrates. All broadleaf herbicides will damage growing trees.**

Dormant Season

- * After fall leaf drop, apply Roundup at 1 lb/acre and Lorox at 2 lb/acre (active ingredients) to control perennials, winter annuals, grasses, and spring germinants. (Or, apply these herbicides in the spring before June 1 (14,15)). Apply herbicides with a small tractor or all-terrain-vehicle (ATV) pulling a sprayer/trailer.



1-year-old plantation with good weed control.

SECOND- AND THIRD-YEAR WEED CONTROL

- * Delay first tillage until herbicides no longer control weeds, then disc as necessary (two to three times a summer). **Keep tillage shallow (less than 2 inches) to minimize root pruning.**
- * Apply Poast if grasses invade tree rows.
- * Apply Roundup and Lorox after fall leaf drop as prescribed for first year.

FOURTH-YEAR WEED CONTROL

If you used good cultural practices during the first 3 years, the trees should be shading out the weeds by the fourth year, reducing or eliminating the need for weed control. If some weed control is necessary, use practices prescribed for the second and third years.

FERTILIZATION

- * Maintain leaf nitrogen content above 3.0 percent. Sample the uppermost fully expanded leaves on the terminal shoot in

late June to determine N status. When samples are consistently lower than 3 percent, apply N at 150 lbs/acre.

HARVEST

- * Harvest the plantation when average annual growth begins to decline; your local forester can advise you when this begins to happen.
- * Contact your local forester for information about harvesting methods, contractors, and the market.

POST-HARVEST OPTIONS

- * Replant with new improved stock (faster growing, disease resistant).
- * Retain plantation with coppice (stump sucker) regrowth. A coppice cycle will be a few years shorter than the first rotation. Do not thin coppice clumps unless you want single-stem trees; thinning does not result in greater growth of the dominant stem, and it may reduce total yields (16).

OTHER THINGS TO CONSIDER

- * If you want single-stem trees, remove multiple stems with a shears during the first fall or winter.

- * In certain geographical areas, Surflan or Goal may provide better annual weed control than Lorox.
- * Perennial quackgrass invading during the growing season can be controlled with Fusilade applied in a split application of 16 oz and 8 oz per acre before the grass is 6 inches tall.
- * If cottonwood leaf beetles invade, apply Malathion at 16 oz/acre (6).
- * Clean cultivation and a weed-free border around the plantation will keep populations of rodents (mice, rabbits, gophers) from increasing to the point of causing widespread damage. Browsing by deer is generally confined to edge trees. Most trees grow above the browse zone during the second growing season (17).

SOME FINAL COMMANDMENTS

Soak and plant cuttings with buds pointing up.
Deep plow for site preparation.
Till shallow for weed control.
Keep weeds out!!!!!!



10-year-old plantation.

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