MISSISSIPPI STATE UNIVERSITY EXTENSION

Competition Control for Cottonwood Plantation Establishment

Figure 1. Young cottonwood trees.

Figure 2. A researcher measures the height of cottonwood trees.

Forest landowners have always been interested in the possibility of growing a crop of trees in a few years rather than in a few decades. In the 1960s, eastern cottonwoods (*Populus deltoides*) were planted to produce pulpwood on a short rotation (typically fewer than 10 years). Landowners quickly learned that establishing successful cottonwood plantations requires more input than pines, and, like other hardwoods, they perform best on sites with appropriate soil and moisture conditions.

Eastern cottonwood is a tree species capable of rapid growth when planted on appropriate sites and given sufficient cultural treatment to ensure establishment and early development. If planted off-site, eastern cottonwood at best lives, with greatly reduced survival. Often, off-site plantings lead to poor early survival followed by high death rates because of insects and diseases. Successful establishment of eastern cottonwood plantations depends on a wide variety of factors, including sufficiently preparing the site, attending to spacing, using properly prepared cuttings, and controlling competition.

In addition to competing for resources, undesirable vegetation also makes early cultivation more difficult by limiting your ability to see planted rows. Historically, mechanical cultivation was the only competition control used in cottonwood plantations. Although cultivation is very important for soil aeration and competition control, it can seriously injure or kill young sprouting cottonwood cuttings. Any delays in mechanical cultivation caused by inclement weather and unacceptable site conditions will typically result in greater growth of competing vines and weeds, which makes it even more difficult to obtain adequate control. If competition gets out of hand, cottonwood survival and growth will be dramatically reduced.

Herbicides and Insecticides

Herbicides offer the possibility of controlling herbaceous weed competition without damaging planted cottonwood cuttings. The herbicide oxyfluorfen, marketed as Goal 2XL, has great potential for controlling broadleaf competition without harming young, developing cottonwood trees.

Goal 2XL is typically applied soon after planting while cottonwood cuttings are dormant. This application is usually done in January or early February. If planting occurs later, then the application should be done immediately after planting.

Field studies have shown that the most cost-effective rate is 64 ounces of Goal 2XL per acre. The mixture is applied as a 6-foot-wide band over the top of planted cottonwood cuttings. Goal 2XL provides broadleaf competition control for 90 to 120 days. Typically, applications are made using

20 gallons of spray solution per acre. Overall, Goal 2XL (64 ounces per acre) provides adequate competition control, and increasing the rate is not considered cost-effective.

During the first year, researchers have examined using sulfometuron-methyl (Oust XP) as a pre-emergent, with results showing extremely high rates of mortality. However, if applied following the end of the first growing season to a well-tilled plantation along with Goal 2XL, it alleviates the need for competition control during the second year. Tested rates were between 0.25 and 1 ounce of Oust XP (depending on soil pH) in conjunction with 32 ounces of Goal 2XL.

Applications should be direct-sprayed toward tree bases. Goal 2XL applied as a pre-emergent during the first year can be mixed with pendimethalin (Pendulum 3.3EC) to control pre-emergent grasses in cottonwood plantations. Apply Oust XP only at the end of the first growing season and in combination with Goal 2XL to control competition during the second year. If grass species are persistent, apply clethodim (Select 2EC) post-emergent at rates of up to 16 ounces per acre. Use a non-ionic surfactant at 0.25 percent volume/volume. Remember, this herbicide regime will control only grasses.

Competition control using herbicides is only one component of successful cottonwood plantation establishment and management. Mechanical cultivation during the first years of a plantation may still be highly desirable on many sites, and timing of cultural operations can have great impact on growth and development of cottonwoods. However, mechanical treatments in the first 120 days following planting are often difficult because of weather and site conditions, and can result in damage or destruction of planted cuttings. For that reason, competition control with herbicides is preferable for plantation establishment. Using herbicides enhances both survival and growth of crop trees.

Eastern cottonwood plantation managers now have alternatives to early mechanical cultivation. The potential impact of these options on cottonwood production is significant because they reduce the number of entries with machinery that could result in unintended injury during cultivation.

Publication 3648 (POD-06-24)

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