Competition Control For Cottonwood Plantation Establishment

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). Both industrial and private landowners quickly learned that establishing a successful cottonwood plantation required more input than pines.

Today, bioenergy and biofuels hold promise for rapidly growing short rotation species such as cottonwood. The same general concepts used in establishing a successful cottonwood plantation for pulpwood must also be employed for bioenergy plantations.

Eastern cottonwood is a tree species capable of rapid growth when planted on appropriate sites and when given sufficient cultural treatment to ensure establishment and early development. If planted off-site, eastern cottonwood at best survives, but growth ise greatly reduced. The worst case scenario will lead to poor early survival followed by high death rates because of insects and diseases.

This species is extremely sensitive to all forms of competition, and one of the greatest threats to successful establishment of cottonwood plantations is competition from undesirable vegetation.

Successful establishment of eastern cottonwood plantations depends on a wide variety of factors, including sufficient site preparation, critical attention to spacing, using properly prepared cuttings, and controlling competition.

In addition to competing for the resources of the site, undesirable vegetation also makes early cultivation more difficult by limiting your ability to see the planted row. Historically, mechanical cultivation was the only competition

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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 result in greater growth and development of competing vegetation, as well as growth loss and possible damage to newly established cottonwoods.

Recent Developments

Herbicides offer the possibility of controlling herbaceous weed competition without damaging planted cottonwood cuttings. The herbicide oxyfluorfen has great potential for controlling competition without harming young developing cottonwood trees.

Oxyfluorfen is typically applied during the dormant season near the end of January or the first of February. Field studies have shown that the most cost effective rate is 64 ounces of Goal 2XL® per acre with Triton AG-98® added at 0.25 percent volume/volume. Gramoxone® is added to the mix at the rate of 32 ounces per acre, and the mixture is applied as a 6-foot-wide band over the top of the planted cottonwood cuttings. Gramoxone® provides immediate control of any vegetation present in January/February, and Goal® provides competition control for the following 90 to 120 days. Typically, the applications are made using 20 gallons of spray solution per acre. Overall, 64 ounces of Goal 2XL® provide adequate competition control, and increasing the rate is not considered cost effective.

Oxyfluorfen is an excellent choice for preemergent weed control in eastern cottonwood plantations. 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 the timing of cultural operations can have a great impact on the growth and development of cottonwoods. However, use of mechanical treatments in the first 120 days following planting is often difficult to achieve because of weather and site conditions, and can result in damage or destruction of the planted cuttings. For that reason, competition control with herbicides is preferable for plantation establishment. Using herbicides enhances both the survival and growth of the crop trees compared to untreated areas.

Eastern cottonwood plantation managers now have an alternative to early mechanical cultivation. The potential impact of this option on cottonwood production is significant as it reduces the number of entries with machinery that could pose possible unintended injury during the cultivation process.

In addition to controlling competition, insects may play a critical role in first-year survival. In particular, cottonwood leaf beetles and June beetles and their larvae feed on the tender leaves and shoots of first-year cottonwood, causing loss of growth and even death.

To control this type of insect feeding, you can spray with Sevin® 4F or Sevin® XLR Plus at the rate of one quart per acre. Another technique that works is to soak the dormant unrooted cuttings in a solution of water and Admire Pro® Systemic Protectant for eight hours before planting. The rates needed are 5.8 to 11.6 fluid ounces for unhydrated cuttings or 11.6 to 17.5 fluid ounces for partially hydrated cutting in a 100 gallons of water. The cuttings draw in the insecticide, providing up to 2 years control of various beetles. The only problem in using such a technique is the planters must use waterproof gloves while planting to avoid contact with the insecticide.

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