



Weed Management in Riparian Forest Buffers

Riparian forest buffers (RFBs) provide improved water quality by reducing stream temperatures and supplying the food source for aquatic macroinvertebrates; fostering wider, slower streams with more biologically active streambed surface area; and creating a more diverse plant and soil community that effectively intercepts and utilizes suspended soil and nutrients coming from upland surface flow. RFBs also provide the foundation for diverse wildlife habitat. However, without effective weed control during establishment and ongoing maintenance early in the life of the planting, your RFB may never become a forest. It is not enough to plant the trees and 'let nature take its course'. The best habitat and ecological value comes from achieving canopy as soon as possible. To get to the forest, you need to 'farm' the trees.

This is especially true where RFBs are established in existing cool-season grass pastures or hay fields (the 'green death').

Effective weed control reduces competition (increases tree growth), reduces cover for pests such as meadow voles, and makes it easier to properly inspect the trees and tree shelters.

Control Weeds Before Planting

The best time to begin your weed control program is the season before the RFB is planted (two would be even better). Having weeds under control in the fall prior to a spring



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Figure 1. Preplant weed control in the fall before a spring planting gives trees a weed-free start, makes planting much easier, and allows you to manage weeds on a maintenance basis rather than continually needing to bring an infestation under control.



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Figure 2. Herbicide treatments that eliminate grass groundcover may 'release' problem species such as Canada thistle (Cirsium arvense, above). Maintenance treatments to keep the tree rows clean will not eliminate creeping perennials. Effective weed control in riparian forest buffer plantings requires both maintenance applications to provide vegetation-free area around each tree, and ongoing spot treatments with glyphosate to prevent perennial species from colonizing those bare areas.

planting provides better control of perennial species, allows you to plant earlier in the spring, and makes planting much easier (Figure 1).

Two basic approaches are to eliminate the existing groundcover and replace it with a less competitive groundcover, or establish weed free strips for the planted trees in the existing groundcover.

Where the existing cover is cool-season, forage grasses such as tall fescue, timothy, orchardgrass, or reed canarygrass, long term success of the RFB may be easier to achieve if you remove the grasses entirely and replace them with a forage legume such as white clover.

If you choose to establish weed-free strips, establish 4- to 6-foot wide strips. The wider the weed-free strip, the better the opportunity for fast tree growth. Wider weed-free strips also reduce cover for meadow voles, and decrease the chance of mower damage if you mow the vegetation between the strips during the establishment phase.

We recommend using a *glyphosate* herbicide (the active ingredient in 'Roundup' products) in September or October. *Glyphosate* is a non-selective, systemic herbicide that does not have residual soil activity. It controls a wide range of species and does not pose a risk of injury to your trees. Woody species such as multiflora rose need to be treated

prior to fall color and leaf drop. A later-season application improves control of perennial species and limits the opportunity for other weeds to germinate.

An additional issue to consider is whether there are problem species on site prior to planting. Creeping perennial species such as Canada thistle, crownvetch, Japanese knotweed, or Japanese honeysuckle should be aggressively treated prior to planting (Table 1). If you are going to establish strips, you should spot treat these species *wherever* they occur in the buffer. If you leave these species between the rows of trees, they will spread into the tree rows (Figure 2). For problem species, the fall *glyphosate* application should be the second application - the 'clean up' treatment after a late-spring or summer application.

Weed Control After Planting

To ensure rapid growth of your planted trees, maintain the weed-free strips in your tree rows. The best way to

maintain a weed-free condition is application of *glyphosate* plus a residual herbicide (e.g. *pendimethalin*) to the tree rows in the spring and early fall, plus spot-treatment as needed in the summer (Table 1). The residual herbicide prevents establishment of weeds growing from seed. Sprayer calibration is necessary for any application, especially if you use residual herbicides. If you maintain weed-free spots instead of rows, it is easier to calibrate if you use a flat-fan spray tip and make your spots square instead of round. Residual herbicides obviously increase the cost of application, but they will reduce the total number of applications and save your most valuable resource - time.

Effective weed control early in the planting will shorten the time between establishment and 'forest', reduce maintenance later in the planting, and improve the habitat value and water quality benefits of your riparian forest buffer by allowing them to take effect sooner.

Table 1. Effective weed control will provide faster canopy closure in your riparian forest buffer. Ongoing spot treatments with *glyphosate* will keep weeds suppressed, but regular use of residual herbicides will reduce your time input and reduce vegetative residue that provides vole cover. There are many suitable *glyphosate* products. 'Rodeo' is used as an example, not a recommendation.

no.	timing/targets	product examples	application rate (product/acre)	comments
1	Summer pre-plant control problem perennials the season before planting	'Stinger' or 'Milestone VM' or 'Rodeo'	8 oz/ac 7 oz/ac 3 quarts/ac	'Stinger' (<i>clopyralid</i>) or 'Milestone VM' (<i>aminopyralid</i>) can be used in the late spring to treat problem broadleaf species such as Canada thistle or crownvetch. A <i>glyphosate</i> product such as 'Rodeo' can be used on Japanese knotweed or problem woody species in early July. Regrowth should be treated with <i>glyphosate</i> in the fall (see Treatment 2), as <i>clopyralid</i> or <i>aminopyralid</i> may persist until spring and injure some tree species.
2	Fall pre-plant control of existing vegetation with <i>glyphosate</i>	'Rodeo'	1.5 to 3 quarts/ac	'Rodeo' (or one of its many equivalent products) is a concentrated form with 4 lb/gallon of <i>glyphosate</i> acid (or 5.4 lb/gallon of the salt). 'Rodeo' does not contain surfactant so you must add one to the spray mixture. This treatment can be used to establish 4 to 6 ft-wide weed-free strips, or to remove perennial grasses from the entire site. This application should be a follow-up treatment for earlier-treated problem species such as Canada thistle, crownvetch, or Japanese knotweed (see Treatment 1).
3	April-May maintain weed-free strips or spots around tree shelters.	'Rodeo' + 'Pendulum AquaCap'	1 to 1.5 quarts/ac + 2 to 3 quarts/ac	A <i>glyphosate</i> application at this time will control cool-season grasses that are present, as well as winter annuals, biennials, and seedlings. The addition of 'Pendulum' (<i>pendimethalin</i>) will provide residual control of annual weeds. There are several <i>pendimethalin</i> products available. The herbicides <i>flumioxazin</i> (SureGuard) or <i>oryzalin</i> (Surflan AS) are alternatives to <i>pendimethalin</i> .
4	As Needed spot treatment of weeds	'Rodeo'	1 to 1.5 quarts/ac	If only <i>glyphosate</i> is used, you will probably need to do this 2 to 4 times per season to prevent weed canopies from forming. If weeds are allowed to grow large before treatment, the residue may be sufficient to provide cover to voles.
5	September-October maintain weed-free strips or spots around tree shelters.	Treatment 3	see above	A fall application with <i>glyphosate</i> plus a residual herbicide will suppress perennial weeds and prevent establishment of winter annuals and biennials. A spring-and-fall residual herbicide program will reduce the need to spot treat.

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