COMPETITION CONTROL AND CROP TOLERANCE IN PLANTED HARDWOOD SEEDLINGS FOLLOWING APPLICATIONS OF VARIOUS MIXTURES OF OXYFLUORFEN AND SULFOMETURON METHYL. L. Walton, Rohm and Haas Co., Tupelo, MS 38801 and A.W. Ezell, Department of Forestry, Mississippi State University, Mississippi State, MS 39762.

ABSTRACT

A total of nine herbicide treatments were applied over-the-top of recently planted hardwood seedlings. Hardwood species utilized in the study included cherrybark oak (Quercus pagoda), Nuttall oak (Q. nuttallii), sycamore (Platanus occidentalis), sweetgum (Liquidambar styraciflua) and yellow poplar (Liridendron tulipfera). All seedlings were 1-0, bareroot nursery stock and were planted in February 2000. Preemergent treatments were applied March 1, 2000 and postemergent treatments were applied June 23, 2000. All treatments had three replications in a completely randomized design. All applications utilized a total spray volume of 20 gpa. Evaluations were conducted at 30, 60, 90, and 120 DAT and consisted of ocular evaluations of percent cover by different vegetative types and any symptoms of damage to crop species from the herbicide application. In November 2000, survival measurements were recorded by species and treatment. Generally, the treatments which included Oust maintained a higher percentage of clear ground for the first 90DAT. This was primarily due to the presence of grass species which Goal 2XL does not control. Control of broadleaf species was comparable in all treatments. By 120DAT, vines and grass cover had eliminated most clear ground in all treatment plots. Crop tolerance - None of the treatments resulted in any damage to any of the seedlings. Survival - The growing season of 2000 experienced an extreme drought with little or no rainfall between late June and November. However, most trees had adequate resources to establish themselves prior to the onset of the drought and only yellow poplar exhibited any notable mortality prior to the end of the growing season. The yellow poplar mortality was attributed to an early onset of physiological activity by these seedlings in combination with a late freeze, and the mortality was uniform irrespective of herbicide treatment. Thus, the results for yellow poplar in this study are considered inconclusive due to freeze damage. Other species all had 70-88% survival at the end of the year. Summary - Both herbicides can be used safely on the species in this study. Goal 2XL can be applied either pre- or postemergent with no damage. Competition control will vary by the weed species complex on the site.

BROWNOUT OF VELPAR L+GLYPHOSATE MIXTURES FOR THE PREPARATION OF PINE SITES. J.L. Yeiser and A.W. Ezell, Stephen F. Austin State University, Nacogdoches, TX 75962; and Mississippi State University, Mississippi State 39762.

ABSTRACT

The objective of this study was to assess the potential of Velpar L+ DuPont glyphosate pre-mix for the brownout and control of post-harvest, unwanted herbaceous and woody vegetation occupying pine sites.

One site in Mississippi (Oktibbeha County) and one in Texas (Angelina County) were tested. The Mississippi site was harvested in November 1999. Treatments were applied at two timings. Early treatments were applied on May 12 and late treatments on June 26, 2000. Soil was a clay loam and moist on application day. Panicgrasses, broomsedge, and sedges were dominant grass species. Dominant broadleaf weeds were goldenrod, dogfennel, and small flower morning. Unwanted woody species include mockernut and shagbark hickory, red maple, and post oak. In Texas, the site was harvested in December 1999. An industry check treatment (Velpar L (6qt)) was applied on May 22 with all other treatments applied on July 12, 2000. The soil was a sandy loam and moist on application day. Moderate levels of grasses, (panic grasses, broomsedge, and sedges) broadleaf weeds (goldenrod, dogfennel, and late boneset), and woody species (winged elm, mixed oak and yaupon) were common to all test plots.

In Mississippi, early treatments were: (1) Velpar L+DuPont glyphosate (6qt+2qt), (2) Velpar L+DuPont glyphosate (4qt+4qt), (3) Velpar L (8qt). Late treatments were: (4) Velpar L (8qt), (5) Velpar L+DuPont glyphosate (6qt+2qt), (6) Velpar L+DuPont glyphosate (4qt+4qt), (7) Chopper+Accord+Timberland 90 (48oz+1qt+1pt), and (8) Accord SP+Chopper (5qt+16oz). In Texas, test treatments were: (1) Velpar L (6qt), (2) Velpar L (8qt), (3) Velpar L+DuPont glyphosate (6qt+2qt), (4) Velpar L+DuPont glyphosate (4qt+4qt), (5) Chopper+Accord SP+Timberland 90 (48oz+1qt+1pt), (6) Accord SP+Chopper (5qt+16oz), and (6) untreated check. Mississippi and Texas plots were evaluated eight weeks after application for brownout (%).

In Mississippi, late (82%) treatments provided more brownout of grass than early (67%) treatments. Best brownout of grasses (84%) was achieved with a late application of Velpar+DuPont glyphosate (4qt+4qt), Chopper+Accord SP+Timberland 90 (48oz+1qt+1pt) or Accord SP+Chopper (5qt+16oz). Broadleaf weeds were browned best (94%) by a late application of Velpar+DuPont glyphosate (4qt+4qt), Chopper+Accord SP+Timberland 90 (48oz+1qt+1pt) or Accord SP+Chopper (5qt+16oz). Least brownout (75%) of broadleaf weeds was accomplished with an early application of Velpar L+DuPont glyphosate (4+4) or Velpar L (8) and a late application of Velpar L+DuPont glyphosate (6qt+2qt). Woody species were browned best (78%) with a late application of Chopper+Accord SP+Timberland 90 (5qt+16oz+1pt). Intermediate brownout resulted from an early application (64%) of Velpar L+DuPont glyphosate (6qt+2qt, 4qt+4qt) and a late application of Velpar L+DuPont glyphosate (6qt+2qt) or Accord SP+Chopper (5qt+16oz). Least brownout (55%) resulted from Velpar (8qt both early and late) and a late application of Velpar L+DuPont glyphosate (4+4). All treatments sufficiently browned grasses, broadleaf weeds and woody species to carry a fire.

In Texas, no differences were detected among treatments for brownout of grasses eight weeks after treatment. Values ranged from 100% for the high to 57% for the low. Furthermore, all hexazinone and Accord SP+Chopper (5qt+16oz) treatments achieved 100% brownout. Chopper+Accord+Timberland 90 (48oz+1qt+1pt) provided 70%

brownout and the untreated check had 57% brownout, reflecting the drought and high temperatures. Brownout of broadleaf weeds was similar for all herbicide treatments. All treatments of hexazinone and Accord SP+Chopper (5qt+16oz) achieved 100% brownout. Chopper+Accord SP+Timberland 90 (48oz+1qt+1pt) provided 83% brownout while the untreated check displayed 37% brownout. Brownout of woody species was similar for all treatments of hexazinone and Accord SP+Chopper (5qt+16oz) and greater than for Chopper+Accord+Timberland 90 (48oz+1qt+1pt). Values for brownout ranged from 80% for the high (Velpar L in May) to 10% for the check. In conclusion, although statistical differences were detected among treatments, all herbicide treatments conditioned foliage of grasses, broadleaf weeds, and woody species sufficiently to carry a fire.

A METHOD OF ASSESSING ECONOMIC THRESHOLDS OF HARDWOOD COMPETITION. S.A. Knowe, Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville, TN 37901-1071.

ABSTRACT

A procedure was developed for computing economic thresholds of hardwood competition in loblolly pine plantations. The economic threshold represents the break-even level of competition above which hardwood control is a financially attractive treatment. Sensitivity analyses were conducted to examine the relative importance of biological facors (site index and planting density) and economic factors (cost of a hardwood control treatment, pine stumpage value, and interest rate) in determining economic thresholds.

Growth models were used to determine the level of hardwood basal area (HBA) at which the discounted cost of a hardwood control treatment equals the reduction in present value of merchantable timber due to competition.
A basal area prediction model was fit with absolute HBA, rather than percent HBA, and then used to simulate the effects of hardwood competition in loblolly pine plantations. Loblolly pine yield response models at age 25 were developed for each level of site index. The intercept (α) and slope (β) of the yield response models were highly correlated with site index (SI). Therefore, the yield response models were generalized by expressing the intercepts and slopes as linear functions of SI:

$$Y = \alpha + \beta \times HBA = [\alpha_0 + \alpha_1 SI] + [\beta_0 + \beta_1 SI] \times HBA$$

where Y=loblolly pine yield (tons/acre), SI=loblolly pine site index (base age 25), and other terms as previously defined. The generalized yield models were used to compute HBA when the net present value of the pine response was zero. The economic threshold concept was expressed by setting the present value of merchantable volume lost to competition (VL) equal to the present value of the cost of a hardwood control treatment (TC), and then rearranging as follows:

$$HBA_{ET} = \frac{TC \times (1 + i)^{r-t}}{VL \times SV}$$

where HBA_{ET}=hardwood basal area (ft^2/acre) at the economic threshold, TC=cost of hardwood control treatment ($/acre), VL=volume lost to hardwood competition (tons/acre), SV=pine stumpage value ($/ton), i=interest rate, r=rotation age, and t=age of hardwood control treatment. Volume lost to hardwood competition is the product of slope of the generalized loblolly pine yield response model, which is a function of site index, and hardwood basal area. A hardwood basal area growth model was developed for projecting hardwood basal area to age 3, which is when release treatments would be applied. In this example, r (rotation age) was set at 25 years and t (age of hardwood control treatment) was set at 3 years.

Sensitivity analyses examined the relative importance of site index, interest rate, pine stumpage value, and treatment cost in determining economic thresholds for loblolly pine. The most important biological factor was site index, and interest rate was the most important economic factor, especially on poor sites. A 1% increase in interest increased the economic threshold level of hardwood basal area by 1-2 ft^2/acre on good sites and by 5 ft^2/acre on poor sites. Pine stumpage value and cost of hardwood control treatment cost were relatively unimportant in determining economic thresholds. Increasing loblolly pine stumpage value decreased the economic threshold by 0.5 ft^2/acre on good sites and by 1.0 ft^2/acre on poor sites. A $5/acre increase in treatment cost increased the economic threshold level of hardwood basal area by 0.50 ft^2/acre on good sites and by 0.75 ft^2/acre on poor sites.

This procedure can be used to determine whether hardwood competition control treatments are economically justified for particular plantations. The ability to prescribe site-specific competition control treatments is important in ensuring the public that herbicides and other treatments are used judiciously.