Chemical versus Mechanical Site Preparation in Loblolly Pine Stand Management

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Introduction

Stand establishment is a very critical decision-making phase in the life of a pine plantation. Site preparation (chemical, mechanical, combinations with or without burning), species selection, seedling genetics, seedling size, weed control, fertilization, and spacing decisions made prior to, during, and soon after planting have long-term effects on stand survival, growth, wood yields, rotation age, and products grown. Site preparation goals include: control of competing vegetation, amelioration of soil conditions that restrict root growth, improving near-term nutrient status, minimizing near- and long-term negative site productivity impacts, and making the site easier to plant. Competition control through site preparation treatments and post-plant herbaceous weed control are intended to enhance seedling survival and growth following planting.

Growth response and economics of chemical site prep and herbaceous weed control (HWC) versus mechanical site prep and no HWC

Pienaar and Rheney (1996) noted that loblolly pine growth and yield was much greater under a chemical site preparation, burn, HWC regime than with mechanical only, chop/burn or shear, pile, disk site preparation. The total cost per acre for each management regime (Table 1) was $161 (chop, burn, plant), $268 (shear, pile, disk, plant), and $234 (chemical, burn, plant, HWC, Dubois et al. 1999). Chip and saw production was much greater for the herbicide-burn-HWC management regime (29 cds/acre of CNS) than for the chop-burn (13 cds/acre CNS) or the shear-pile-disk (16 cds/acre CNS) management regime (Figure 1). Revenues from each management level indicate that for loblolly pine on a 24-year rotation (at $17/cord for pulpwood and $73/cord for chip&saw) the chop, burn, plant regime gave a $1339/acre value, the shear, pile, disk regime gave a $1514/acre value, while the chemical, burn, plant, HWC regime gave a $2558/acre value (Figure 2). Rate of return (ROR) for the chemical, burn, plant, HWC stand establishment regime was 10.5%, whereas the ROR for the chop, burn, plant was 9.33%, and the shear, pile, disk, plant was 7.48% (Figure 3).

Table 1. Cost assumptions (Dubois et al. 1999) for a 24-year loblolly pine rotation under three levels of management. Planting cost was $73/acre for all three scenarios (@ 725 TPA).

Site Preparation Treatment	**HWC**	**Site prep cost ($/acre)**	**Total cost/acre ($/acre)**
Chop + burn	no	70 + 18 = 88	161
Shear, pile, disk	no	155 + 40 = 195	268
Chemical+burn	yes	88 + 18 + 55 = 161	234

Summary and Conclusions

Herbaceous weed control in the first growing season after planting can be a cost-effective forest management tool, even in light of today=s relatively depressed stumpage prices (TMS 2000). A single banded (5 to 6 feet wide) application with the right forest herbicide applied at the right time at the proper dosage can increase loblolly pine early growth. Work done by Lauer and others (1993) on loblolly pine seem to indicate that broadcast applications of forest herbicides or a 2-year application generally does not give a significantly larger growth or survival benefit over the first year banded application. In droughty growing seasons and where competing herbaceous vegetation is abundant HWC can significantly increase pine survival. The HWC benefits are greatest when both survival and early growth are improved. For those that are establishing low density stands (<500 to 550 TPA), maximizing early survival is critical and HWC can help in droughty years or where herbaceous competition is expected to be fierce. Economically HWC is attractive for those that are planting a stand for pine straw production by possibly reducing the time to the first rake or when one considers a reduction in rotation age.

Site by site prescriptions should be made to maximize HWC benefits. Hardwoods, shrubs (i.e. gallberry, ty-ty, and wax myrtle), and volunteer pines can have a longer lasting negative effect on stand growth and should be controlled before planting (Miller et al. 1991).

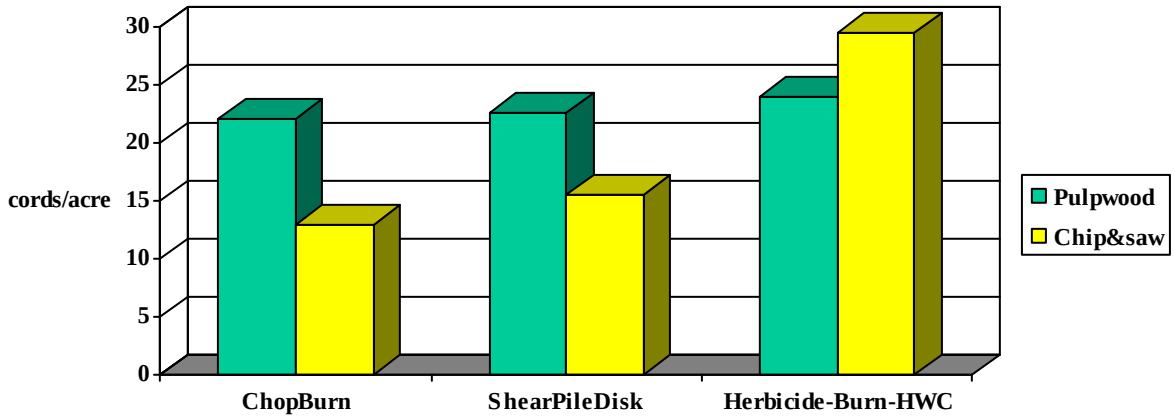

Figure 1. Modeled wood flow estimates for 24-year-old loblolly pine under three management levels (Pienaar and Rheney 1996).

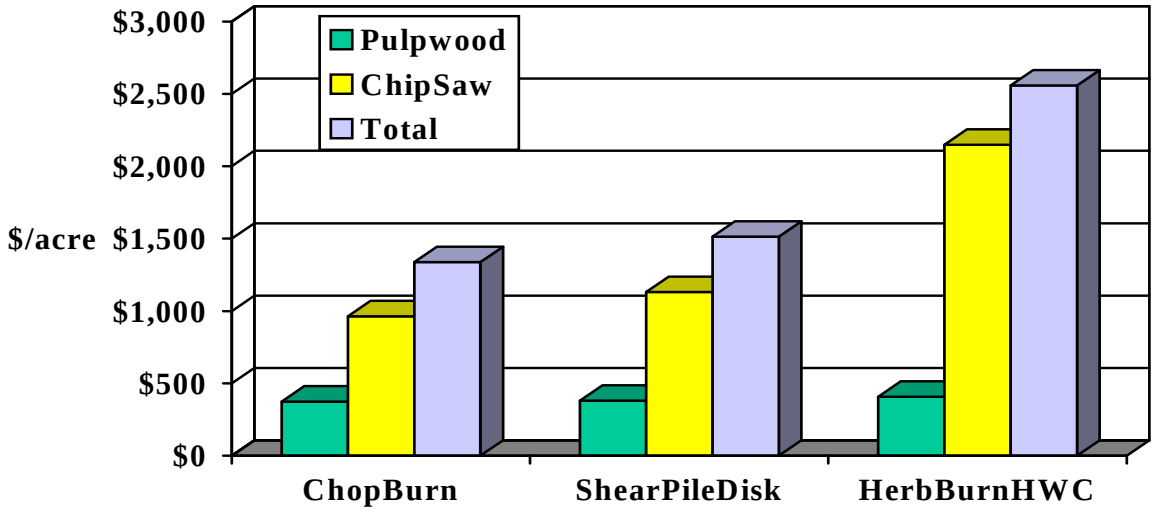

Figure 2. Modeled loblolly pine revenues at age 24-years under three stand establishment regimes (Pienaar and Rheney 1996).

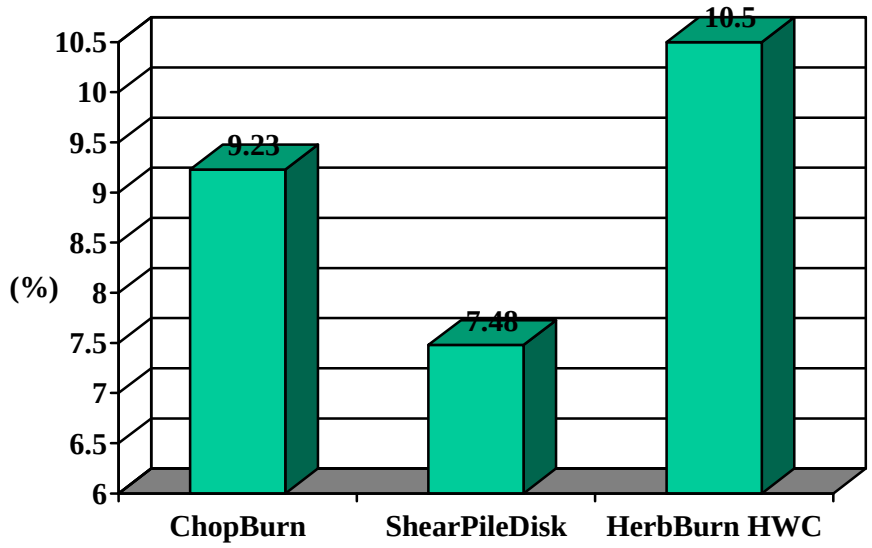

Figure 3. Rate of return for modeled loblolly pine age 24-years under three stand establishment regimes (Pienaar and Rheney 1996).

Literature Cited

Dubois, M.R., K. McNabb, and T.J. Straka. 1999. Costs and cost trends for forestry practices in the South. *Forest Landowner* Magazine. Vol. 58(2):3-8.

Glover, G.R, Creighton, J.L., and D.H. Gjerstad. 1986. Vegetation control significantly increases loblolly pine growth for ten years. Auburn Univ. Silvi. Herb. Coop., Auburn Ala. Res. Note 86-6.

Haywood, J.D. and A.E. Tiarks. 1990. Eleventh-year results of fertilization, herbaceous, and woody control in a loblolly pine plantation. SJAF 14(4):173-177.

Lauer, D.K., G.R. Glover, and D.H. Gjerstad. 1993. Comparison of duration and method of herbaceous weed control on loblolly pine response through mid-rotation. Can. J. For. Res. 23:2116-2125.

Miller, J.H., B.R. Zutter, S.M. Zedaker, M..B. Edwards, J.D. Haywood, and R.A. Newbold. 1991. A regional study on the influence of woody and herbaceous competition on early loblolly pine growth. SJAF 15(4):169-179.

Miller, J.H., B.R. Zutter, S.M. Zedaker, M..B. Edwards, J.D. Haywood, and R.A. Newbold. 1991. Response of loblolly pine to complete woody and herbaceous control: projected yields and economic outcomes - The COMP project. In the 8th Biennial So. Silvi. Res. Conf. Nov 1-3, 1994. Auburn, AL.

Peinaar, L.V. and J.W. Rheney. 1996. Potential productivity of intensively managed pine plantations. GA Consortium for Tech. Competitiveness in Pulp and Paper Final Report. 41 p.

Tiarks, A.E. and J.D. Haywood. 1086. *Pinus taeda* L. Response to fertilization, herbaceous plant control, and woody plant control. For. Ecol. Manage. 14:103-112.

TMS. 2000. Timber Mart South pine stumpage prices for South Georgia. 2nd Quarter. 2000. UGA-Warnell School of Forest Resources, Athens, GA.