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Effects of full and partial clearing, with and without herbicide, on weed cover, light availability, and establishment success of white ash in shrub communities of abandoned pastureland in southwestern Quebec, Canada

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Abstract. Shrub communities established on former pasture land are currently under-used and their forestry potential is of interest to land owners wishing to increase valuable hardwood regeneration on their properties. The comparative effects of strip clearing and total clearing, both treatments applied with or without herbicide, on competing vegetation cover, light availability, and survival and growth of planted white ash *(Fraxinus americana* L.) were examined in two different shrub dominated sites for 3 years in southwestern Quebec, Canada. Survival was high in all treatments. At the site with the richest soil and in comparison to total clearing, strip clearing produced the lowest light level in the third year, which induced lower total herbaceous weed cover. These combined effects produced the same growth results for white ash seedlings in all treatments. At the second site, with the highest woody vegetation regrowth, strip clearing has promoted seedling height growth and produced the highest height: diameter ratio for white ash. This ratio was also superior at this site in the absence of herbicide. Treatment effects were soil/site dependant. Because partial clearing in strips has never reduced tree growth in comparison to total clearing, it represents a promising method for the establishment of valuable hardwoods in shrubby vegetation, with lower management intensity and lower landscape impact than total clearing.

Introduction

During the last century, the modernization of agricultural methods has led to the abandonment of less productive lands (Houerou 1993; Orwig and Abrams 1994; Tatoni and Roche 1994). These abandoned agricultural lands have become re-vegetated with new plant communities, including shrub dominated vegetation (Meilleur et al. 1994b; Stover and Marks 1998). These environments are currently under-used and their forestry potential should be studied.

From 1971 to 1996, the total agricultural area in the province of Quebec has decreased by 21%, for an average of 36,600 ha/year; during the same period,