



Autonomous weeder for Christmas tree plantations

H. Have, S. Blackmore, S. Fountas, H. Nielsen (KVL)
B. Keller, F. Theilby (FSL)



Application of herbicides is the most common method of weed control in Christmas tree plantations. Mechanical methods are being developed, but tend to be ineffective and costly compared to chemical methods (Fig.1).

The aim of this project is to develop a light, Autonomous Christmas tree Weeder (ACW) that can operate unattended for long periods of time, and which is cheaper and causes less environmental damage than present mechanical weeders.

A feasibility study has been completed, which considered technological, economic and environmental issues such as safety, system outline and operation patterns.

An experimental ACW is being designed, built and tested.



Fig. 1. A self-propelled row weeder for Christmas trees (courtesy: A. Bergstedt)

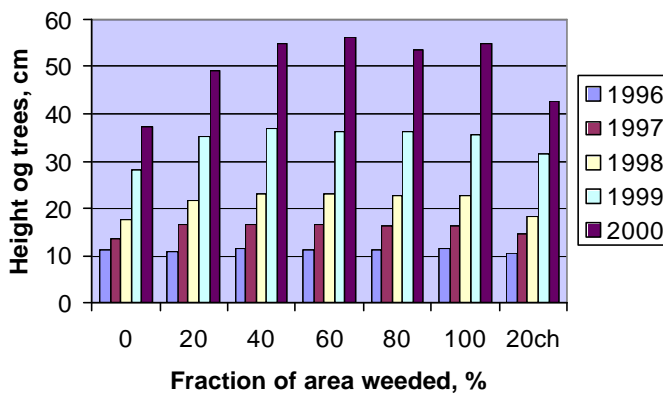


Fig. 2. Field experiments showed that weeding within a 40 cm radius around each tree (about 40% of the area) produced satisfactory growth, even compared to chemical treatment.

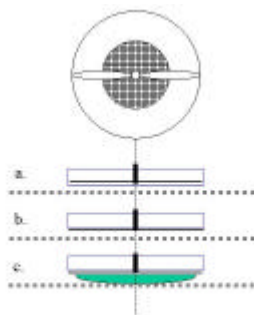


Fig. 3. Weeding will be accomplished by a shielded rotor cutter working close to the ground and to the trees

The ACW will be equipped with a RTK-GPS positioning system and other sensors to obtain information about vehicle movement, its surroundings, locations of trees and the vehicle itself (self-check). This system and “intelligent” control algorithms are being developed in this and related projects.

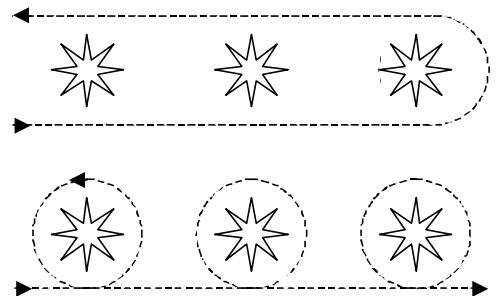


Fig. 4. Possible ACW operation patterns to control weeds close to trees while leaving more remote vegetation undisturbed

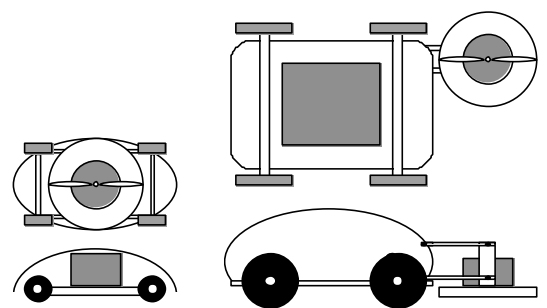


Fig. 5. Some concept drawings for an ACW

Annual costs of using an ACW are estimated to be similar to or less than those of present mechanical weeding machines.

Because of longer operating hours, ACW operating costs are less affected by the purchase price than manned machines.

