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WEED-SPRAY TRAINS ON N.Z. RAILWAYS

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Summary

Railways demand a high level of weed control. Reliance on hand-weeding diminished and eventually ceased following the introduction of herbicides. The first spray train in New Zealand was set up in 1946. Subsequent developments overcame limitations associated with wheel-slip, automatic signalling problems, limited range and traffic congestion, culminating in a train unit capable of treating 150 km without refilling.

INTRODUCTION

A high level of weed control is essential to the safe and efficient movement of rail traffic. For many years this was achieved by the tedious and time-consuming process of hand-hoeing; but the situation was radically altered by the advent of herbicides and by spray-train application.

EARLY USE OF SPRAY-TRAINS

In New Zealand the first trial with a weed-spray train was in 1946 when sodium chlorate was used successfully. The train had a tank capacity of 25,000 litres with two coaches employed to carry equipment and to accommodate the crew.

There were, however, problems with material and equipment. Sodium chlorate was said to cause wheel-slipping and to interfere with the electrical signalling system. With only one train to serve the whole country, progress was also slow and optimum timing of applications impractical.

DISTRICT COVERAGE

In the late 1950's spray units were designed to be towed by converted road vehicles (Kennedy 1967). The initial tank capacity of 4,500 litres allowed only 32 km to be treated before refilling. While progress was slow and interference to rail traffic excessive, the provision of a unit in each of the eight railway districts was a major step forward.

To help overcome the problem of low capacity, larger tanks were introduced in 1971 with the trains once again being pulled by locomotives (Kennedy 1972). Two trains were provided for the North Island and two for the South Island. Each was made up of a 20,000 litre converted gasometer (VB) wagon, an enclosed (VS) wagon for herbicides and equipment, a flat-top (XC) wagon carrying a 4,500 litre spray tank for gun-spraying isolated infestations of woody weeds and another flat-top carrying the main spray tank. The only variation was that on the South Island trains the main spray tank had a capacity of only 4,500 litres while that of the North Island ones was 9,000 litres.

1978 MODEL

The most recently-developed spray-train comprises a locomotive, guard's van and four functional wagons (Appendix 1). One is an enclosed

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(VS) wagon for storage of herbicides while the second carries a 4,500 litre tank for gun-spraying of woody weeds.

The other two wagons make up the heart of the spray unit. One carries a 23,000 litre water tank while the other, as well as carrying the boom, contains a 3,800 litre mixing tank, a 10,000 litre spray tank and the associated pumping equipment.

Sufficient chemical for 10,000 litres of spray-mix is fed through a venturi hopper into the partly-filled mixing tank. This is then topped up with water while being agitated by a centrifugal pump. The contents of the mixing tank are transferred to the spray tank which in turn is topped up with water. The train then sprays 30 km of track while herbicide for the next 30 km is prepared in the mixing tank. In this way the train can spray up to 150 km without refilling.

Pumping is done by two centrifugal pumps 3400 litres/min capacity), both driven by one 4 cylinder petrol engine. A shaft drive serves the main spray tank pump with a belt drive to the mixing tank pump. Manual valves are used on the suction side but all valves on the delivery side are controlled by 12-volt solenoids.

The boom covers a swath of 8 metres. It is fitted with four "low-drift" nozzles, these being two Accutrol TM "large V365" and two "SF 370". At a speed of 15 km/hr and pressure of 400 kPa the boom applies 232 litres/ha (186 litres/km).

This type of nozzle, which has been used on all trains since 1974, minimises spray drift and appears to increase the efficiency of the chemical being applied.

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