WEED CONTROL PRACTICES OF THE NEW ZEALAND RAILWAYS

D. A. KENNEDY
Plant Office, New Zealand Railways, Wellington

Summary

Chemical weed control practices on New Zealand's 3,300 miles of railway track and 1,000 miles of sidings are described. The necessity of relating different weed spcies to herbicide properties and dosage is emphasized. The variation in weed populations and weedkiller dosage for their cost efficient control between centre track and cesses are explained. The use of broad spectrum mixtures containing 2,2-DPA and amitrole plus diuron or simazine and sometimes 2,4-D and the technique of differential spray applications are described. Novel injection equipment for localized treatment of brush weeds with 2,4,5-T is described.

INTRODUCTION

UNTIL 1960, and in line with many countries overseas, the weed control programme adopted by the New Zealand Railways relied exclusively upon the application of sodium chlorate in mixture with fire suppressant on its 3,300 miles of track and 1,000 miles of sidings. During the past six years, however, evidence has been accumulated on a number of newer compounds and practical results have shown a number of these to have outstanding properties. In particular, the availability of residual herbicides such as the substituted ureas, triazines and uracils offered a new approach. Trial evidence showed that even low rates of 4 lb of diuron or atrazine applied with 3% surfactant would maintain a high standard of weed control on deep, clean stone ballast for a full year in certain areas. (All rates are expressed as active ingredient per acre.)

THE WEED PROBLEM

Deep stone ballast can be inhospitable to plants, but nevertheless, weeds do grow on such sites. In addition, organic matter falls on to the track from passing trains, especially from stock and fertilizer wagons, and is washed into the ballast forming pockets of fertility which further encourage weed growth. Seeds are deposited upon the track by various natural means and a continuing reservoir of potential weeds is maintained alongside the ballasted track.

To obtain successful total weed control, it is necessary to be familiar with the prevailing vegetation and to have a good knowledge of the susceptibility of the different weed species to each herbicide. The problem of deciding what compounds and what dosage rate of them to use can only be solved by regular and detailed track examination carried out either by walking or from a motor jigger.

The weed populations on railways can be placed in two separate categories—those growing in the ballasted centre track, and those growing beyond the shoulders into the cesses. Experience has shown that the cesses require up to 50% more herbicide to maintain a satisfactory level of weed control than does the track centre. Problem weeds such as prostrate amaranthus (*Amaranthus deflexus*), Californian thistle (*Cirsium arvense*), *Convolvulus* spp. and paspalum (*Paspalum dilatatum*) frequent the cesses and it is becoming increasingly necessary to find effective means of controlling these difficult-to-control weeds.

PRESENT SPRAY OPERATIONS

Ideally, clean stone ballast should be treated in early spring with residual herbicides as a preventive measure, whereas most perennial weeds are most effectively treated in late spring and early summer. However, the complexity of spray train programming means that some track must be treated either before or after the optimum period. Traffic requirements generally dictate a three-month operation between early September and the end of November.

Experience has shown that mixtures containing 2,2-DPA and amitrole with diuron or simazine and sometimes with the sodium salt of 2,4-D provide adequate all-round weed control on tracks. A standard formulation containing 2,2-DPA, 2,4-D and diuron has proved generally satisfactory on yards and sidings. The most effective general mixture used on main track provides for an average application across the 18 ft spray width of 5 to 10 lb of 2,2-DPA, 3 lb of amitrole and 4 lb of diuron or simazine.

It has been clearly demonstrated that it is false economy to reduce the initial cost of treating track by lowering the dosage rate to marginal levels, especially where treatments are applied only once annually. Inevitably, the hard-to-kill weeds gain ground when the competition from the more susceptible species is removed. Prescription weed control treatment must then be developed. However, after twelve months' application of a successful programme, it is often possible to reduce dosage rates to a maintenance level. It has been possible to reduce the initial dosage by 25% in the second and third years once the density of the original vegetation has been reduced.

The temptation to reduce initial dosage rates is greatest on tracks with a low classification from the traffic density stand-point. In point of fact, these tracks receive few maintenance practices and chemical weed control becomes even more vital.

EQUIPMENT

Because of the varying weed density across the 18 ft swath treated as standard on the track, equipment has been designed which applies differential dosages across the ballast. Normally the cess area receives twice the dosage rate applied to the 3 ft 6 in. between the rails, while the shoulder sections receive 50% more. This technique permits maximum economy in herbicide usage, while at the same time providing efficient weed control on the varying plant populations.

Mobile weed spraying units have been designed for towing behind Landrover vehicles fitted with flanged wheels for running on track. Each spray unit consists of a 1,000 gal tank, and, with an output of 50 gal per mile, the unit has a range of 20 miles per fill. The units operate at 10 mph.

The spray booms are divided into four sections, two inner booms and two outrigger booms. The outriggers can be manipulated so as to clear such objects as point levers and posts which occur alongside the track.

On the inner section, which covers 10 ft, 12 fan-type 59F nozzles are used. On each outrigger, three fan nozzles 67F are employed, supplemented by an off-centre nozzle OC12 directed towards the cesses. Using this equipment to apply the herbicide mixture described above, satisfactory grass and herbaceous broadleaf weed control is obtained, but brush weeds such as gorse (*Ulex europaeus*) broom (*Cytisus* spp) and blackberry (*Rubus futicosus* complex) infesting the cesses are little affected. A novel injection system has been developed to introduce 2,4,5-T into the OC12 nozzles for spot treatment of those weeds.

The system consists of a 15 gal modified QMB pressure feed tank mounted on the spray unit within the operator's reach and connected to the OC nozzles by plastic hose. A $^1/_{62}$ in. pipe was brazed into a hole drilled in the OC12 nozzles to act as injectors. Experiments showed that, when the OC12 nozzles were operating at 30 lb/sq. in., 40 lb/sq. in. was required in the injection line to satisfactorily introduce undiluted 2,4-5-T ester emulsifiable formulation into the spray pattern. The pressure was maintained by pressurizing the QMB pressure feed tank with compressed air. This system applies 4 lb 2,4,5-T and has proved most successful for the control of blackberry. The technique has particular economic advantage for spot treatment of brush weeds which may occupy only 10 yd in a 20 mile length of track.

CONCLUSIONS

The New Zealand Railways Department is certainly the largest single user of non-selective weedkillers in New Zealand. The development of new herbicides has brought many advantages, but the perfect weedkiller mixture for railways has not yet been devised. There is an urgent need for further research and education in the field of total vegetation control on railway sites, and the potential size of the market and the complexity of the problems must surely act as a continuing challenge to specialists in weed science.