Adoption of research results in relation to herbicide usage for the control of a noxious weed

M.H. Campbell
Department of Agriculture, Orange 2800, New South Wales

SUMMARY

A survey of local government weed control authorities was undertaken to assess the rate of adoption of 2,2-DPA for the control of serrated tussock (*Nassella trichotoma*) in New South Wales. Landholders have been supplied almost entirely with 2,2-DPA from local government authorities.

Results showed that there was an approximate straight line increase in usage of 2,2-DPA from 1225 kg in 1962 to 40092 kg in 1968; thereafter, between 27000 kg and 34000 kg were used annually. The acceptance curve differed from normal because there was no lag phase or early innovator phase.

INTRODUCTION

Serrated tussock (*Nassella trichotoma*) was first declared a noxious weed in New South Wales in 1938. Up to the early 1950s the only weedicide used in practice to kill serrated tussock was crude oil. Uneconomically high rates (1960 ℓ/ha) were used which were not always effective. In New South Wales and New Zealand, the herbicide TCA (sodium trichloroacetate) became available for research work in 1951 and the herbicide 2,2-DPA (sodium 2,2-dichloropropionate) in 1955. Research on the efficiency of these and later herbicides in killing serrated tussock has been continued ever since.

Publications began emerging on the results of this research from 1956 onwards. The first publications reported on the efficiency of TCA in killing serrated tussock (Leonard, 1956; Beggs and Leonard, 1959). Later, the effects of TCA and 2,2-DPA, combined with burning and the oversowing of improved pasture, in controlling mature and seedling serrated tussock were noted (Campbell, 1960, 1961; Campbell and Annand, 1962; Leonard, 1962). In these experiments, 2,2-DPA proved more efficient than TCA in killing serrated tussock.

The first extension publication in New South Wales recommending practical application of 2,2-DPA was published in 1962, followed by more detailed extension publications in 1965 and 1968 (Campbell, 1962, 1965, 1968).

The first aerial spraying of serrated tussock occurred in New Zealand when TCA was aerially applied (Beggs and Leonard, 1959). In New South Wales, experiments in the central tablelands in 1962, 1963, 1964 and in the southern tablelands in 1965, 1966 investigated the efficiency of aerially applied 2,2-DPA and aerially sown pastures in controlling serrated tussock (Campbell, 1964, 1965).

The above is a brief history of early research into the effect of herbicides in controlling serrated tussock. Recently, a survey of local government weed control authorities was undertaken in New South Wales to ascertain the amount of 2,2-DPA used over time in relation to the above publication history. Local government authorities have supplied most of the 2,2-DPA to landholders for the control of serrated tussock. This afforded the landholder price economies because of bulk buying by the authorities.

This paper attempts to evaluate the factors that influenced the rate of acceptance of 2,2-DPA by landholders for use in controlling serrated tussock.

METHOD

A mail survey was sent to all appropriate loval government weed control authorities in New South Wales asking them to supply records of the amount of 2,2-DPA they had purchased each year since the herbicide was first used in New South Wales to control serrated tussock. This 2,2-DPA was either supplied to landholders or used by the weed control authorities to control serrated tussock on roads and Crown land. 2,2-DPA purchased privately by landholders or that used by public bodies, e.g. Forestry Commission, Water Resources Commission, was not included in the figures.

RESULTS

Of the 19 local government weed control authorities that had more than 100 ha of serrated tussock in the area under their jurisdiction, 14 were able to provide figures of the amount of 2,2-DPA purchased annually; of the remaining five only two used substantial quantities of 2,2-DPA.

Figure 1 shows that the total amount of 2,2-DPA used increased annually from 1225 kg in 1962 to a maximum of 40092 kg in 1968. This was almost a linear increase in consumption of 2,2-DPA. From 1969 to 1976 the amount used stabilized within the range 27192 to 33919 kg.

DISCUSSION

The quick acceptance of 2,2-DPA by landholders could be attributed to a number of factors.

The extension of preliminary research results prior to 1962 may have developed a potential demand for 2,2-DPA. As the weedicide used to kill serrated tussock before 1962, crude oil, was most unsatisfactory, the promise of a new easy-to-use herbicide must have appeared attractive. In 1962 there was little to choose between crude oil and 2,2-DPA economically, both costing over $100/ha for the material alone. However, 2,2-DPA had the promise of killing the weed more effectively than crude oil.

Large scale aerial spray-sow experiments set down from 1962 to 1966 allowed landholders to inspect areas of serrated tussock killed by the aerial application of 2,2-DPA. The first field day demonstrating the effects of aerial application of 2,2-DPA was held in 1964 in the central tablelands and in 1966 in the southern

tablelands. A few landholders began aerial application of 2,2-DPA before these field days but they had prior access to the experimental results. A rapid increase in the use of aerial spraying after the field days helps explain the rapid increase in use of 2,2-DPA from 1964 to 1967.

In the early 1960s results achieved from the application of 2,2-DPA were considered by landholders to be a break-through in the control of serrated tussock. The opinion that 2,2-DPA would solve the problem of serrated tussock control was widespread. This was a vast oversimplification of the position. However, as 2,2-DPA offered a method of controlling serrated tussock on non-arable land, where previously it was thought to be uncontrollable, landholders were prepared to expend more effort to control the weed on arable land. The net effect was mainly psychological in that landholders began to believe that they could overcome the problem. Thus 2,2-DPA had the indirect effect of promoting control by pasture improvement on arable land as well as the direct effect of offering a method of control on non-arable land.

The price of 2,2-DPA decreased rapidly from $5/kg in 1962 to $1/kg in the early 1970s. This, coupled with reasonable economic returns to landholders, also fostered the acceptance of 2,2-DPA.

The acceptance curve for the use of 2,2-DPA (Fig. 1) did not follow the classical curve for the acceptance of a new research finding in agriculture. There was no lag phase and no early innovator stage. The curve for 2,2-DPA usage began in the third stage, i.e. the mass acceptance stage. This could be explained partly by the factors discussed above and partly by the fact that serrated tussock was a noxious weed and thus control measures were enforced by local weed control authorities. Weed inspectors were the first link in the extension chain. They were advised of the results of the early small-plot experiments and were physically involved in the first aerial spray-sow trials. Thus, when 2,2-DPA proved effective for the control of serrated tussock the inspectors were able to advise receptive landholders and instruct unreceptive landholders to use 2,2-DPA.

REFERENCES

Beggs, J.P. and Leonard, W.F. (1959).- Nassella tussock controlled in Marlborough. *N.Z. J. Agric.* 98 : 539-46.

Campbell, M.H. (1960).- A method of eradication of serrated tussock on non-arable areas by the use of herbicides and improved plant species. *Proceedings 2nd Aust. Weeds Conf., Canberra* 1 : paper 11.

Campbell, M.H. (1961).- Serrated tussock control. A review of the efficiency of chemicals in killing serrated tussock. *Agric. Gaz. N.S.W.* 72 : 116-30.

Campbell, M.H. (1962).- Kill serrated tussock with chemicals. *Agric. Gaz. N.S.W.* 73 : 626-31.

Campbell, M.H. (1964).- Two trials of aerial techniques for the control of serrated tussock. *Agric. Gaz. N.S.W.* 75 : 1442-50.

Campbell, M.H. (1965).- It pays to control serrated tussock. *Agric. Gaz. N.S.W.* 65 : 606-13.

Campbell, M.H. (1965).- Investigations for the control of serrated tussock on arable and non-arable land. M.Sc.Agr. thesis, University of Sydney.

Campbell, M.H. (1968).- Procedure for aerial spraying serrated tussock. *Agric. Gaz. N.S.W.* 79 : 16-20.

Campbell, M.H. and Annand, A.M. (1962).- Effect of herbicides and burning treatments in killing serrated tussock. *Aust. J. Exp. Agric. Anim. Husb.* 2 : 35-39.

Leonard, W.F. (1956).- Nassella tussock control. *Proceedings 9th N.Z. Weed Cont. Conf.* 29-35.

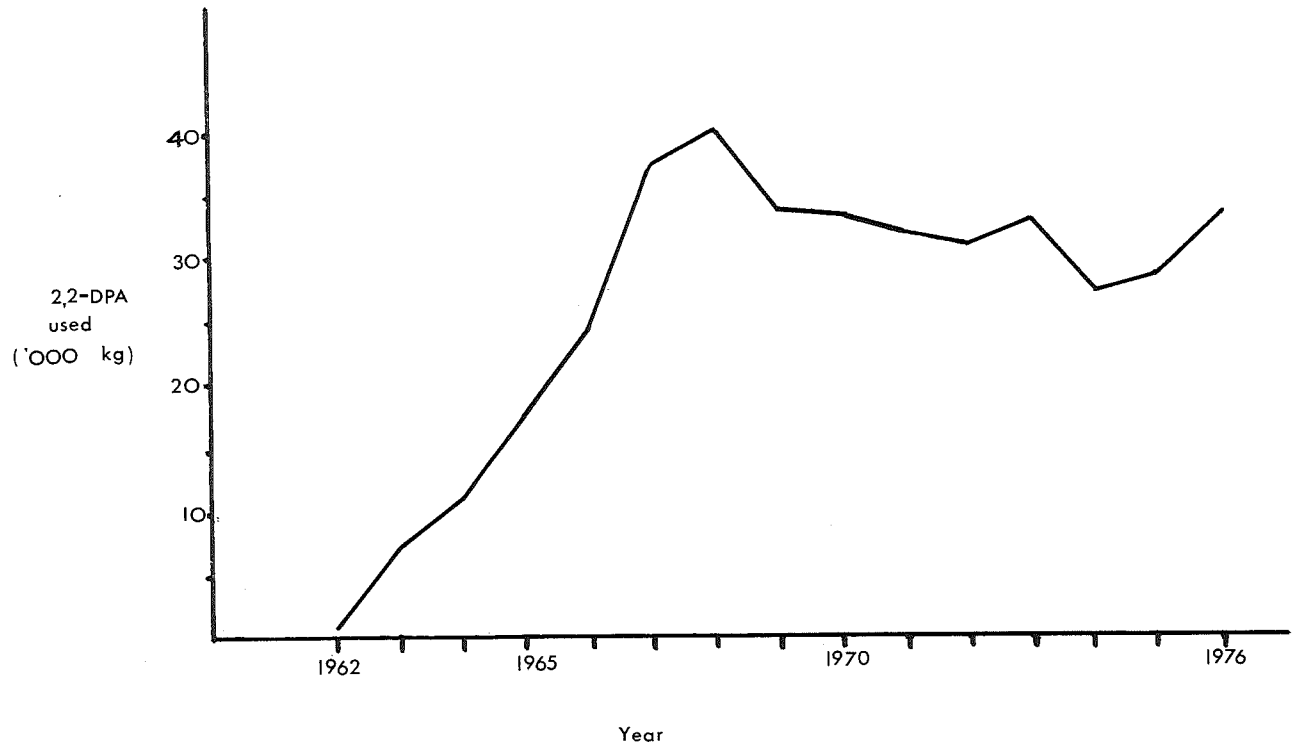

Fig. 1. Usage of 2,2-DPA in 14 shires in N.S.W. for control of serrated tussock from 1962 to 1976.