

SESSION 8b

NOTES ON WEED CONTROL IN PASTURES AND ON ROADS  
IN QUEENSLAND, WITH SPECIAL REFERENCE TO  
SELECTIVE WEEDICIDES.

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On account of its warmer climate and predominately summer rainfall, Queensland has a great variety of weed pests, many of which do not occur in the Southern States. At the same time, the winter rainfall in the southern half of the State is adequate for the development of winter and spring germinating annuals. The majority of both pasture and agricultural weeds infest roadways, while many agricultural weeds may invade pastures. Many Queensland weeds of importance are woody perennials.

The experimental work of the Biological Section of the Lands Department may be termed practical experimentation, the aim being to determine the most practicable and economical methods of destroying specific plant pests in order that advice may be given to Local Authorities and landholders. Thus, the equipment used for the experimental work is that which the average landholder or Local Authority would possess.

W/86/Dod/1

The greater proportion of Queensland's grazing industry is carried out on natural pastures, most of which support trees. In dairying and cattle fattening districts, made pastures are frequently on hilly, often steeply hilly, country. Thus, the application of weedicides by means of boom sprays is out of the question under these conditions, and this is true, also, for most roadways. Generally throughout the State weed destruction on pastures, roads and other uncultivated land by means of stationary power units with hose and nozzle attachments, or per medium of knapsack sprays, assumes much greater importance than control among crops by the use of boom sprays.

Because of this position, selective weedkiller applications are generally given in this review in terms of per cent strength of the recommended solution, and not as lbs. acid equivalent per acre. It is quite impracticable to advise a landholder to apply a 2,4-D preparation at 1 or 2 lbs. acid content per acre, if his equipment is a power spray or knapsack spray, since the actual amount of 2,4-D used on each acre will depend on such variable factors as height and density of the weed, output of spray nozzles, and spraying technique of the operator.

A few general points of interest in connection with the application of 2,4-D weedkillers in Queensland are made as follows:-

(1) High pressure spraying, at 150 to 175 lbs. pressure, is considered more suitable than low volume spraying for many weeds, particularly where wetting of the stems is desirable in woody plants, such as Lantana and Groundsel Bush. Hence, most selective weedkiller treatment is carried out at high pressure.

(2) Ester formulations of 2,4-D have given poorer results than amine and sodium salts on certain weeds, e.g. Noogoora burr, Mint weed, Burr Ragweed, Sneezeweed, Lantana. For example in one set of experiments, amine 2,4-D at  $\frac{1}{2}$  lb. acid per acre gave a better kill of Noogoora burr than the ethyl ester at 1 lb. per acre. Up to the present juncture, ester 2,4-D has not been recommended for any specific weed.

(3) The inclusion of adequate wetting agents is desirable for certain weeds of a woody nature or with smooth shiny leaves. Furthermore, in inland areas under high temperature conditions, the inclusion of wetting agents would appear to give better results even on readily susceptible weeds such as Noogoora burr.

(4) References in this review to sodium 2,4-D deal with a particular preparation, United Weedkiller, which is formulated by a Brisbane firm. This preparation is a slurry type and is described as being a 50 per cent sodium salt (containing 5 lbs. acid 2,4-D per gallon); wetting agents are given as 36 per cent by volume sodium alkyl sulphate type; other ingredients include 3 to 4 per cent colloidal clay. United Weedkiller is considered an excellent form of 2,4-D for weeds of pastures and roads, and seems to be particularly suited to Lantana control. It will be noted that it has an unusually high wetting agent content.

The following notes on the present position concerning control of certain weeds are given as a result of field trials of the Biological Section. In the time available for this review, it is not possible to indicate many weeds on which experimental work has been or is being carried out. Unless otherwise stated, references to 2,4-D are confined to amine and sodium salts.

W/861 Doc/2

Noogoora Burr, Xanthium pungens: Considered Queensland's most serious weed pest. Has invaded the great majority of watercourses, both coastal and inland, and grows freely on roads and in cultivations. Of particular concern to the wool industry. Control: Readily susceptible in all stages of growth to 0.1 per cent 2,4-D sprays; a lesser dosage will destroy young plants. The spray treatment destroys the germinating qualities of the burrs, provided they are not ripe or ripening.

Mint Weed, Salvia reflexa: Darling Downs and other districts of southern half of State. A weed of cultivations, roads, and, to some extent, pastures. Control: Susceptibility to 2,4-D varies. If plants growing quickly, 0.1 per cent 2,4-D sprays will kill. Where growth has ceased temporarily, although plants healthy, 0.2 per cent applications may not give complete kill.

Clockweed, Gaura parviflora: Darling Downs and South Burnett, usually on darker soils. A comparatively new weed that is increasing rapidly. Winter and spring germination. Tends to choke out, or prevent development of, other plants and grasses. Control: Susceptible to 0.2 per cent 2,4-D in all stages. Younger plants in rosette stage, readily killed at 0.1 per cent dosage.

Sneezeweed, Helenium tenuifolium: A summer annual, to 18 inches high. Well established on and in vicinity of an aerodrome in South-east Queensland used by United States Forces during 1939-45 War. Spreading. Control: Readily killed by 0.1 per cent 2,4-D; 0.2 per cent dosage required if plants not actively growing.

Galvanised Burr, Bassia birchii: Inland districts, often forming dense infestations on pastures and roads. Control: 0.2 per cent applications of both 2,4-D and of mixed esters of 2,4,5-T plus 2,4-D have given excellent kill in summer when plants in good condition with abundant foliage. It is not considered satisfactory to apply treatment during periods of sparse foliage and many wiry stems.

Thorn Apples, Datura spp., especially D. ferox: Southern half of State, coastal and sub-coastal districts including Darling Downs. D. ferox a serious pest in summer grain crops, increasing in importance and spreading. Control: A thorough wetting with 0.2 per cent applications of 2,4-D and

W/801/Dod/3

of 2,4,5-T plus 2,4-D has given good results; esters appear to give a quicker kill than amine and sodium salts, but ultimate results not much different. Vigorously growing plants killed more readily. Where plants healthy, but not growing due to temporary dry conditions, the treatment suppressed growth but after five weeks most young plants in amine and sodium 2,4-D plots looked as though they might recover; however, although heavy rains fell 6 to 10 weeks after treatment, no recovery occurred, and all plants died within three months. Young, rapidly growing plants in late summer have been satisfactorily suppressed by dosages as low as  $\frac{1}{2}$  lb. 2,4-D per acre, but 1 lb. treatments were not effective on older plants.

Burr Ragweed, Franseria sp.: A deep-rooted perennial with underground runners; two isolated infestations known to occur. Forms massed infestations completely suppressing grass and other growth. Control: Amine and sodium 2,4-D at 2 lbs. per acre effectively kills above ground growth. Two treatments have given high degree of control but not eradication.

Blue Heliotrope, Heliotropium amplexicaule: South-east districts. A deep-rooted perennial forming low dense mats; pastures, roads, cultivations. Spreading and increasing. Control: Very difficult to kill with any chemical, as re-growth develops freely from below ground. Two sprayings with arsenicals have given fair measure of control in pastures. 2,4-D not effective. Ester 2,4,5-T will kill to ground level and has reduced density of infestations.

Groundsel Bush, Baccharis halimifolia: Probably the most serious weed of South-east coastal and sub-coastal districts; spreading and increasing. A bushy woody shrub growing to height of 20 feet, forming dense thickets. Control: Effectively killed with 0.2 per cent sprays of 2,4-D and mixed esters of 2,4,5-T plus 2,4-D; plants may take 4 to 5 months to die. With older, larger plants, recommended treatment is to chop off and treat cut butts with 1.0 per cent applications; this should give 100 per cent kill. Amine and sodium salts 2,4-D have proved just as effective as mixed esters 2,4,5-T plus 2,4-D for both spraying and cut butt treatment.

Crofton Weed, Eupatorium adenophorum: South-east corner of State. A bushy perennial to several feet high; grows very densely to exclusion of all other growth. Aggressive. Spreading. Control: Difficult to destroy. Heavy spray applications of arsenicals and of sodium chlorate required; with dense

growth, two treatments usually necessary. 2,4-D has little killing effect. 2,4,5-T gives better results, but not satisfactory for dense growth. However, brushing of plants and spraying regrowth in late summer with 0.4 per cent 2,4,5-T or mixed esters 2,4,5-T plus 2,4-D has given a satisfactory measure of kill; some landholders prefer this treatment to the use of arsenicals and sodium chlorate.

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Lantana, L. camara: Control: Considerable field experiments in Southern Queensland indicate that in higher rainfall areas, 50 inches upwards annually, spraying of large plants or dense growth with 0.2 per cent amine or sodium (United) 2,4-D gives a good kill, provided plants in good foliage. In 30 to 35 inch rainfall areas, best results obtained by spraying 2 to 3 feet long regrowth in late summer; spraying of primary plants usually gives poor results. Spraying with mixed esters of 2,4,5-T plus 2,4-D has given definitely inferior results, and straight 2,4,5-T ester poorer still, except in certain trials on regrowth in the lower rainfall area where mixed esters have given results comparable with 2,4-D. In the higher rainfall districts, landholders appear satisfied with 2,4-D treatment, either for primary plants or for regrowth. One practice is to spray the dense growth, burn off later, and subsequently spot spray any regrowth. In a 50 inch rainfall area, brushing and spraying the freshly cut butts with 1.0 per cent amine or sodium 2,4-D has given 75 to 100 per cent kill; again all 2,4,5-T treatments were inferior. In 30 to 35 inch rainfall areas, this method has given varying results; 85 to 100 per cent kill on some plots, much poorer on others; results too variable to indicate whether 2,4-D or 2,4,5-T superior.

Rubber Vine, Cryptostegia grandiflora: A vigorous semi-climber forming dense masses. Spreading and increasing. Dense infestations on various rivers of Gulf of Carpenteria; has assumed pest proportions in Charters Towers and Chillagoe districts. Control: In experimental trials, good kill of younger plants with 0.2 per cent 2,4-D or 2,4,5-T; best results with sodium (United) 2,4-D and ester 2,4-D. Chopping off large plants close to ground and applying 1.0 per cent solutions to cut butts has given very good kills in all 2,4-D and 2,4,5-T treatments. Basal spraying with 1.0 per cent solutions not successful generally; however, in certain trials, esters of 2,4,5-T plus 2,4-D in dieselene gave 100 per cent kill.

Wild Tobacco Tree, Solanum auriculatum: Quick growing woody plant to 20 feet high; infests rain forest country; a serious pest on Atherton Tableland, especially on newly cleared country. Control: 0.2 per cent sprays of 2,4-D and of 2,4,5-T plus 2,4-D effective on young plants, the latter being superior as a general rule. With large plants, 1.0 per cent applications to cut butts very effective with both 2,4-D and 2,4,5-T. Basal spraying with 2,4-D and 2,4,5-T at 1.0 per cent not effective, but power kerosene and dieselene very successful; this method is not practicable in dense infestations.

Harrisia Cactus, Harrisia martinii: A straggling plant, very thorny, the longer segments prostrate or semi-prostrate. Where the arms touch the ground, taproots develop at frequent intervals; such roots are semi-bulbous or tuberous, and constrict to narrow necks at intervals. In one cattle grazing district in North Queensland, there are thousands of acres of dense growth and a very large area, extending for 60 miles, of scattered infestations. A very difficult problem, on which the Lands Department is spending large sums of money. Control: The problem is to destroy the taproots, of which there may be hundreds in an area of a few square yards. Arsenical sprays readily destroy above ground growth but, as a rule, do not translocate through the whole of each taproot system; any small portion of the tubers not killed by the treatment will produce regrowth, even from 18 inches below soil level; such regrowth may delay its appearance for as long as two years. Control methods in operation are:- For dense areas, annual spraying with arsenic pentoxide for 3 or more years to reduce growth and regrowth to point where it is practicable to destroy the taproots by chopping off below ground level and pouring a small quantity of solution on and around exposed surface of taproot. For single plants, it is possible to eradicate in one operation by this chopping off method. However, even this method does not give 100 per cent success. Selective weedkillers not effective as over-all sprays, but can be used to destroy taproots by the chopping off and solution pouring practice; one pint of a 0.2 per cent solution may give a complete kill. But results vary, and to date, have not proved as consistent as with arsenical treatment. 2,4-D solutions have given better results than 2,4,5-T.

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