

REVIEW OF METHODS OF APPLYING CHEMICALS

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In the past almost all devices used for the application of herbicidal chemicals have been developed from those originally designed for fungus disease and insect pest control.

The development during the last decade or so of woodkillers which are effective at very low rates of application per unit area has stimulated agricultural engineers all over the world to devise equipment for the economic application of such chemicals.

This revolution in chemical application equipment has been most apparent in the design of spraying machinery for broad-acres weed control in cereal crops, although it has not taken the landowner, nor the weed-control contractor, long to realise the potential of these types of machines for wood control in improved pasture and grassland generally.

The acreage of grassland being sprayed is increasing steadily, and, in Australia at least, will rival the cereal acreage when the benefits are fully appreciated and techniques for all conditions and kinds of grassland worked out.

After considering the suitability of other methods of weed control, one can say that in general, the type of equipment to be used for the application of weedicidal chemicals will depend upon:-

1. The weed or association of weeds to be treated,
2. The type of herbicide necessary to bring about the desired control,
3. The size and location of the weed-infested area.

Broadly, chemical application equipment can be grouped into the following classes:-

1. Sprayers, both low- and high-volume,
2. Atomisers,
3. Dusters,

4. Dry dusters,
5. Soil placement equipment,
6. Smearing equipment,
7. Aircraft.

Sprayers:

For many years the run-off method of spraying, employing large volumes of spray solution, had been standard practice. This technique still has an important place in our "spraying husbandry".

However, since it was noted that only relatively small amounts of hormone-like weedkillers were necessary to achieve effective control over large areas, and that volume of spray fluid per acre was of minor importance as compared with the weight and uniform distribution of active material, rapid progress has been made in the design of equipment for low-volume solution application.

The low-volume sprayer has now become a popular piece of farm machinery; they are relatively cheap and will do an excellent job when handled properly and used for the jobs for which they were designed.

The more expensive high-volume and dual-purpose sprayers, although at present somewhat neglected by the man-on-the-land, will come into their own in the near future.

Low-volume sprayers commercially available in Australia today are limited-use machines. Farmers, with typical ingenuity, are discovering that they have many other profitable jobs for a sprayer around their farms, and are demanding sprayer pumps, lines and nozzles that will handle wettable powders, whitewash and other abrasive materials, as well as the now familiar hormone-like weedkillers.

Single-nozzle-type booms, or (as they are more popularly known in the U.S.A.) one-jet sprayers, have been developed which provide a coverage of 10 to 50 feet or more. Although uniformity of coverage is believed to be subject to the effects of wind velocity and direction this type nozzle may prove useful where extreme accuracy of coverage is not required such as for roadside and right-of-way spraying and possibly other uses.

Spraying "aids" developed by the engineers in response to user demand have simplified accurate chemical weedkiller application. Such devices as the manifold type of control valve for controlling the flow of liquids to the several segments of the boom or to the hand-line spray wand, and the tractor speedometer make possible a much more precise application of weedkilling chemicals, serving also as a guide to prevent overdosing which can be harmful and is costly and under-dosing which may be ineffective.

High clearance self-propelled sprayers, developed during the last few years and at present used more extensively overseas than here, will be employed on a larger scale in this country when research reveals more of the answers to our row-crop weed control problem, although scope for their use already exists in the insect pest and plant disease fields.

The humble knapsack sprayer, be it of the familiar manually operated or the compressed air type, is playing an increasingly important part in the farm chemical weed-control programme.

On a field scale its use is out of the question, but where large fields of noxious weeds have been reduced to small patches by other methods, and for use as spot-spraying equipment, the knapsack sprayer, in some form or other, will remain an essential piece of chemical weed-control equipment.

Atomisers:

Atomisers developed or modified from those used for pesticides when 2,4-D, M.C.P.A. and similar growth-regulating substances were introduced, now find only limited acceptance, not through any inefficiencies of such equipment, but because of the dangers associated with drift of the applied chemical onto non-tolerant crop growth adjacent to or near the area being treated.

Dusting Equipment:

Dusting equipment, partly because of proven inefficiency of dusts when compared with sprayed solutions, and partly because of the drift problem, are similarly out of favour at present.

The possibility that dry dressings of weedicides, for application to the soil like fertilisers as distinct

from the operation of dusting on to the weeds, may be developed rapidly cannot be overlooked.

It will be, however, many years before a full range of selective powders has been produced for all weeds in all types of crops.

Soil Placement Equipment:

Soil placement equipment, applying herbicides and weed seed toxicants in a similar manner to that now employed for the control of soil-inhabiting plant pests and diseases, is already playing a more important part in weed control than formerly. Economic factors chiefly, such as the relatively high cost of both equipment and suitable chemicals when compared with that involved in, say, low-volume spraying, at present limit the use of this method of weedkiller application.

The scythe or the sickle equipped with a smearing device which applies weedkiller to the cut surface of perennial weeds possessing stiff upright stems and underground runner-roots, as soon as the stem is cut can be employed very effectively by the skilled operator.

One firm manufacturing motor scythes in England has developed a similar smearing-attachment for use on the company's motor cutter. Currently designed for the smear treatment of bracken, perennial thistles and other weeds with sodium chlorate solution, more experiments are warranted with smearing devices. Very little is known about time to carry out the treatment of various weeds, the most effective concentrations of solution, and whether chemicals other than sodium chlorate will give better results.

The use of aircraft for applying chemicals to weedy areas has progressed rapidly during the last few years, a number of machines being available now that have been designed specifically for the purpose.

Although aircraft spraying has the advantage of speed (thereby making timely application possible) and is very satisfactory for low-volume application of the newer translocated hormone-like weedkillers, it is generally not satisfactory for high-volume applications. A much greater danger from drift of spray particles exists when spraying is done by aircraft of the conventional type, but the more recently developed technique, helicopter-spraying, overcomes this problem to a large extent.

As weedicidal dust applications from the air present an even greater chemical drift problem than does spray application, aerial application of herbicidal dusts is generally not recommended.

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