

# Pesticides Application Equipment

**Improvements in equipment keep pace with the rapid development of new types and formulations of pesticides**

## GROUND DUSTING EQUIPMENT

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**New adaptations of the ground duster are coming into use as dust concentrates increase**

**T**HE GROUND DUSTER is, and will continue to be, a very important applicator of pesticides. Its wide adaptability makes it suitable for the control of insects and diseases on fruit and truck crops, for a large portion of the cotton acreage, and for general use wherever agriculture crops are grown. Its simplicity of design assures that pesticide application will be economical and that operation difficulties will be few. The fact that the machine is light and carries relatively few pounds of pesticides means that soil packing is a minor factor. These factors also allow for speed and timeliness in application, which is important in control of plant diseases in particular. Thorough coverage of the pesticide on the treated surface is also attained with ease.

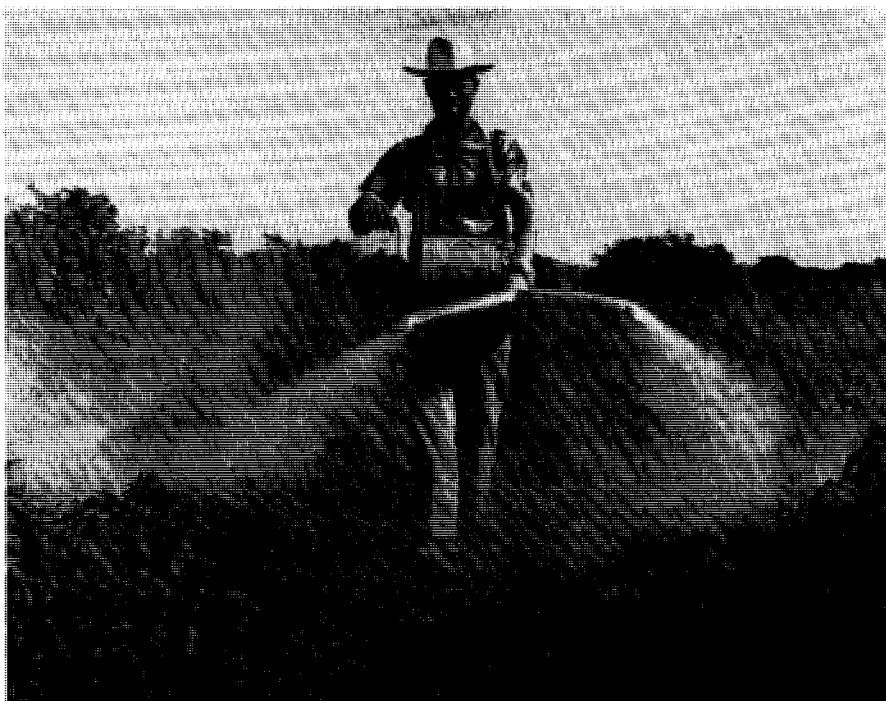
Investigations are in progress that will adapt the ground duster to new uses as dust concentrates come into more general use and as research in the field of organic pesticides points the way to new and enlarging fields of pest control. An example of this is current work in the West on dusting of crops with hormone weed killers.

### **Types of Dusters**

The hand duster has been used for many years. Its popularity is increasing

because the home owner has more leisure for work in his yard and garden. Designs include the following general types:

Hand operated dusters for small areas have undergone modification and improvement as shown, to give good coverage



sifter top cans, pole and bag, plunger dusters, bellows blowers, knapsack-bellows, rotary hand dusters, and compressed air dusters. Some of the smaller applicators are now made from plastics or disposable paper.

Traction dusters came into general use, and a few power dusters appeared, in the early 1900's, when dry pesticides began to be accepted. Among the first of the traction dusters was the planter type, the power for which was taken from a large front bull wheel to operate two



Example of a row crop tractor-mounted, power-take-off, duster used for large scale applications

outlets directed diagonally downward and rearward behind the machine. This machine was drawn by one horse and guided by one man. Some of these planter-type machines now dust four rows and are still used on small farms. In this period a very successful type for the relatively large farm was the high wheel model, dusting three or more rows, and operated by one man riding a machine pulled by two horses. Some of these dusters now treat as many as six to twelve rows with one, two, or three nozzles per row. With the advent of power, the high wheel duster was drawn by a tractor.

Power dusters may be classified as: crop dusters, fruit dusters, or combination dusters for both fruit and crops.

Power crop dusters vary in size from a small one- or two-row lightweight, self-contained power unit to large multiple-row dusters drawn by a tractor and driven by a power take-off.

Small power dusters for one or two rows may be propelled like a wheelbarrow or self propelled for use on small acreages. Some are designed to be attached to garden tractors or drawn by them.

The next larger size of crop power duster usually is capable of dusting four to six rows, and it may be attached directly to a standard farm tractor, or driven from the power take-off shaft. Other models of this size machine may be tractor-drawn on a trailer, and power take-off driven or engine powered.

The largest size of crop power machine may take six to 12 rows and be either tractor attached, or drawn, or self-propelled.

A variation of the regular row crop

duster with hoses for individual row application is the broadcast duster which has a single outlet which discharges a dust air blast in the general direction of the crop to be covered. It is usually used for speedy covering of large areas.

Power fruit dusters also vary in size from a small self-contained unit including an engine to the large machines for covering fruit and large shade trees.

Small machines may be skid mounted for placing in a pick-up truck or on a wagon and usually have a manually operated, flexible hose outlet. As the machine passes a tree the operator directs the discharge in a fashion so as to completely envelop the entire tree with dust.

Larger machines are made with greater air blasts for manual or mechanical operation of the discharge nozzle for faster coverage and to attain greater distances of coverage.

The largest size power fruit duster is a machine with tremendous power and a large volume and velocity air blast discharge. The machine is used on fruit and nut trees where the discharge pattern takes the shape of a semicircle with the machine in the center and is capable of completely covering two rows. The discharge nozzle from this machine consists of a large opening around both sides and across the top. The air is discharged in a fan shaped pattern surrounding the machine. These machines are usually controlled from the tractor operator's seat and are used for fast and efficient fruit tree applications.

Combination power dusters are those which may be converted from multiple outlets for crops to a single flexible hose outlet which may be manually operated.

## Elements of Ground Dusting Machines

A duster receives dust material, fluffs it sufficiently to meter it accurately, and discharges the dust in intimate mixture with a suitable volume of air as a carrier.

The dust hopper is usually a container of a size suitable for the design of the machine, with sloping sides and paddles, blades, or spirals for pushing the dust in the general direction of the metering or feeding mechanism.

Metering of the dust is usually enhanced with a fluffing or aerating action of the agitator, accomplished by forcing the dust through a small aperture, and regulated by opening or closing a portion thereof.

The fan may or may not be attached directly to the hopper mechanism. The function of the fan is to discharge the dust and air under pressure without exerting a separating influence on the dust and air. Special techniques have been devised to accomplish this and to obtain an even distribution and deposit of the dust.

Fans may be classified as: centrifugal (paddle-wheel type) or axial flow, similar to a cooling fan. Centrifugal fans have the advantage of high velocity characteristics, while axial flow fans have high volume characteristics. Both types are used in current dusters. Generally speaking, crop dusters have centrifugal fans, while a few fruit dusters have axial flow fans. Selection of the fan is usually determined by the distance the air blast is to be blown. A dust-laden air blast can be very penetrating and may carry long distances for complete coverage.

## Distribution

Distribution of dusts from the ground duster to row crops is usually accomplished by using tubular hose arranged radially from the periphery of the fan housing, or through a main tube that is subdivided into many tubes. For treating fruit trees, the dust is usually forced through vertical slits in the form of an arc. For broadcast purposes or for forming drift clouds, no supplementary discharge hoses of any kind are necessary.

When dust is directed to a row through tubes an even distribution at a specific rate of application is attained. To assist in guiding the dusts into and around the treated areas, fan type nozzles are used at the end of the tubes.

When nicotine was commonly used as dust, a hooded trailer was sometimes provided to confine it for a short period after it left the nozzle. There are suggestions that this device should be used again with some of the new pesticides.

## Areas for Research

There are several areas in which fundamental research would accelerate im-