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Principles of Effective Spraying

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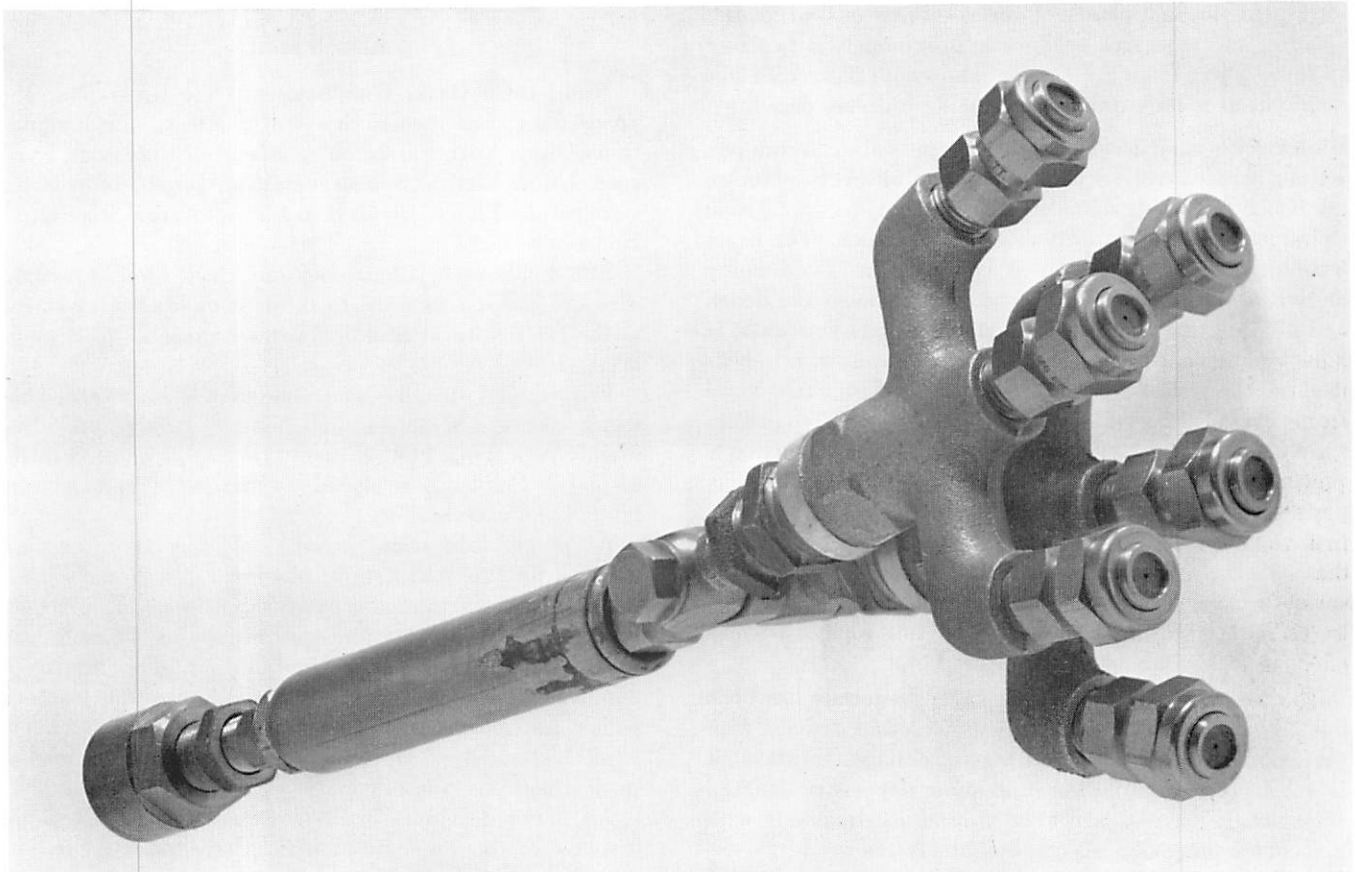
The Objectives of Spraying are to uniformly distribute a toxicant and provide maximum deposit of the toxicant over the leaf surface. Both of these objectives are related to the pressure used, the volume distributed, and the nozzle employed.

Maximum Deposit is influenced by distribution. However assuming uniform distribution maximum deposit becomes a function of droplet size and the velocity of droplet at impact with the leaf. These two factors are related to each other in the common formula: momentum = mass X velocity. It is therefore, the momentum of the droplet that determines whether or not impingement and consequently deposit will occur on the foliage. In order

to produce maximum deposit the optimum momentum is required. If the momentum is low, as in a smoke bomb, the result is a low deposit except in horizontal leaf surfaces; if the momentum is high, such as you would obtain with a fire hose, you also produce low deposits. Therefore, in choosing a spray nozzle we attempt to relate pressure, volume, droplet size, and velocity in order to produce droplets of optimum momentum in order to produce maximum deposit.

Without relating these factors to absolute values it is possible to empirically determine when a nozzle arrangement is producing optimum deposit. We have obtained

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Multiple headed nozzle effectively used for greenhouse spraying purposes.

Principles

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maximum deposits and consequently appropriate droplet sizes and velocities with the six nozzle spraying head pictured above. With this nozzle arrangement we are controlling droplet size and producing the right velocity in order to achieve maximum deposit. In describing such a nozzling arrangement and its effective use it is well to remember that pressure and volume are related to each other thru the nozzle. The engineering specifications of the nozzle determine what volume will be produced at any indicated pressure. We are producing thru this six nozzle arrangement approximately two gallons per minute at 200 pounds pressure. This combination of pressure and volume has been achieved when No. 2 discs and No. 23 cores are used. A slightly lower volume approximately $1\frac{1}{2}$ gallons per minute is achieved at 200 pounds pressure when the combination of No. 1 disc and No. 13 core is employed. The smaller disc size and core size produces smaller droplet size and a lower velocity and is helpful in certain specific situations particularly with young carnation and chrysanthemum plants, as well as young rose plants. It is also helpful in producing deposits on delicate foliage and petalage. The larger disc size and core size produces droplets that are larger and moving at a higher speed consequently droplets with higher momentum and is helpful in distributing the spray over a larger area such as over the top of several chrysanthemum beds or projecting spray to tall plants. Both combinations of orifice opening and core size produce approximately a two foot swath $1\frac{1}{2}$ feet from the nozzle. The swath pattern of this nozzle head is important in producing uniform deposit.

Uniform Deposit is a function of application technique. The principal involved is to attempt to hit every plant on the bench from every conceivable angle. Thus application technique is largely an art and not a science. The exact technique you use whether it is a circular overlapping motion or whether it is walking up and down the bench and holding the nozzle at different angles as you walk, is a method of your choice. The principle however, is to bear in mind the necessity of hitting every leaf on every plant from every conceivable angle. This certainly implies spraying both sides of the bench and being particularly concerned about tilting the nozzle upward to achieve deposit on the under leaf surfaces. In the event however, that you are interested in controlling disease organisms that attack petalage or upper leaf surfaces directing the spray over the tops of the plants and permitting the droplet to settle on top of the petalage and foliage is very effective and will achieve the desired end.

The use of wetting agents in spray materials has been the subject of a number of discussions and articles with particular concern about wetting the foliage. However, it is well to bear in mind that maximum deposit is achieved when wetting agents are at a minimum. In plants with glaucous foliage, deposit can be quickly removed by overspraying particularly when a wetting agent is added to the

spray tank. In most cases it is not necessary to add extra wetting agent when using the six headed nozzle described above. There are exceptions however, and these exceptions exist when you are attempting to wet insects such as mealy bugs, when uniform maximum deposit is not as desirable as actual wetting of the insect. This is true also of aphids hidden in the tips of chrysanthemums or the florets of standard mums. In these cases extra wetting agents permits the flow of insecticides to the hard-to-wet plant parts and the hard-to-wet insect cuticle.

It is usually not necessary to stick this six headed nozzle within the bed in order to reach the plants growing in the center. Keeping the nozzle on the outside of the bed and using appropriate application techniques has been satisfactory to provide adequate deposit in the center of the bed.

It is extremely important in using this nozzle to be sure that the in-line strainer that serves as a handle is cleaned after every application. Cleaning the strainer right after every application assures ease of cleaning. Make it a practice to remove the strainer and clean it out after every application.