# DEPARTMENTAL NOTES

## THE PRINCIPLES UNDERLYING SPRAYING FOR THE CONTROL OF PLANT DISEASES*

MALCOLM PARK, A.R.C.S.,
*MYCOLOGIST*

SPRAYING for the prevention or control of plant diseases is a relatively expensive practice. It should only be undertaken when other methods of control, such as the improvement of agricultural conditions, improvement of drainage and general sanitation or the adoption of a suitable crop rotation, are not likely to provide the satisfactory control of a disease. Again, the loss of crop or the extent of damage caused by a disease must be sufficiently great to warrant the expenditure on spraying. An exception to this might be made in gardens where the disfigurement of plants by fungus diseases may only affect their aesthetic value.

In tropical countries like Ceylon, where the temperature is always suitable for the development of fungi, humidity is often the main factor governing the incidence and spread of plant diseases. In consequence, in some parts of the Island it is necessary to spray regularly for the satisfactory control of many of our diseases. This fact should be appreciated before a spraying programme is undertaken since money spent on spraying is largely wasted unless the spraying is conscientiously done and repeated when required.

The function of a fungicidal spray is either to kill the fungus concerned or to prevent the attack by a protective action. According to their mode of action it is thus possible to divide fungicidal sprays into two groups: direct and protective.

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## DIRECT FUNGICIDAL SPRAYS

Direct or eradicative fungicidal sprays kill through contact with the fungus on the plant surface. Such sprays are unfortunately of limited application since they can be used only against diseases in which the fungus is mainly on the *outside* of the plant. Diseases which come into this class are few, the chief being the powdery mildews, such as that which is common on orange trees. In spraying against these diseases, it is necessary only to spray when the disease first makes its appearance on the plants and to continue to spray only so long as the fungus causing the disease is alive and active.

## PROTECTIVE FUNGICIDAL SPRAYS

The principle of a protective fungicidal spray is to deposit on the plant a film or layer of fungicide so that when the spores or seeds of the parasite fall on the surface of the plant they are killed before they can penetrate the plant cells and set up disease. It is obvious that protective sprays must be applied before the fungal infection is established or they are useless. Once a fungus has penetrated *into* the plant tissues no amount of fungicide deposited on the surface of the plant will cure the disease and consequently the excision or removal of diseased tissue should precede the inauguration of a spraying programme.

To provide complete protection, the film or layer of fungicide must be complete. Every part of the plant liable to infection must be covered. In spraying to control a leaf disease, for example, the upper and lower surfaces of every leaf should be sprayed completely.

A well-prepared and well-applied fungicidal spray will give a protective film on the surface of plants which will last for a considerable time. In plants where growth is continually taking place, spraying must be repeated at frequent intervals in order to ensure the protection of developing tissues. But it should be remembered that in these repeated sprayings it is necessary to spray only the developing tissues ; the protective film will persist on the mature tissues. The intervals at which plants must be sprayed will depend not only on the suitability of the weather conditions for the spread of the disease but also on the manner in which the plant sprayed produces new growth. If new growth occurs at infrequent intervals, as when trees

put on new bursts of foliage, the spraying need only be repeated as and when new shoots are developing and be continued until the new leaves have completed their development. (This applies, of course, only when the disease to be controlled is one affecting the leaves).

## POINTS TO BE REMEMBERED IN SPRAYING

When applying the *direct* fungicidal sprays an endeavour should be made to wet thoroughly every part of the plant on which the fungus is observed. The fungicide must come into intimate contact with the fungus or it cannot kill it. The spray in this instance must therefore be in the nature of a drench and may be delivered from a coarse nozzle. In this respect its application differs from that of protective sprays.

*Protective* fungicidal sprays must be applied in the form of a fine mist. A fine mist of spray is obtained partly by the use of a suitable nozzle and partly by delivering the spray through the nozzle at a high pressure. In a fine mist of spray, the fungicide is dispersed into minute drops and the deposit of fungicide on the surface of the plant is more complete than with coarser sprays. The waste of spray is less when a fine mist is used. The ideal to aim at is to cover the plant with fungicide to such an extent that it just does not drip from the leaves. In practice, it will be found that it is best to spray until drops begin to fall from some of the leaves. The density of the fungicidal deposit is less when so much spray is applied that it drips from the plants than when it just does not drip. Excessive protective spraying is therefore not only wasteful but it is also less satisfactory than proper spraying.

Spraying should not be undertaken when plants are wet with rain or dew. The water present dilutes the spray fluid or prevents it from coming into contact with the surface and thus makes it less effective. Once the spray has dried on the plants rain will not wash it off to any great extent, provided that it has been properly prepared and applied.

Some sprays are inclined to scorch foliage if they are applied in bright sunshine. Spraying should therefore be undertaken if possible in the early morning, after the dew has dried, or in the late afternoon or on a dull cloudy day.

Spraying should not be done in a high wind if it can be avoided. If not, advantage should be taken of minor wind currents to see that both sides of the plants or trees receive sufficient spray.