TWO MAIN DANGERS TO BLACKCURRANTS

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THE blackcurrant gall mite was first described attacking blackcurrant bushes as long ago as 1869 and is regarded as the most serious pest attacking the crop in Great Britain and some other European countries.

Unlike the familiar red spider mites which feed on leaf surfaces, gall mites appear to feed only on the internal tissue of buds, within which large populations develop. Mites remain in the buds throughout the year and emerge only during the early part of the growing season, when they disperse from the old buds to those of the new growth.

This is the most vulnerable part of the life cycle and the period when sprays are applied in attempts at chemical control. The object is to destroy mites as they leave the old buds, while they are on the stem and leaf surfaces, or (as a last resort) soon after they have invaded the new buds.

Infested axillary buds fail to develop leaves and flower primordia and usually become swollen and rounded. For this reason they are often referred to as 'big bud'. However, this term is misleading because some infested buds are very small and *shape rather than size* is the key feature in identification (see Fig 1 shown overleaf).

Invaded apical buds grow less rapidly than those of uninfested shoots and produce severely distorted leaves which become almost trifoliate. These 'strawberry' or 'clover' leaves have in the past been confused with those caused by reversion disease (Fig. 2). However, they are due to mites alone and during the summer months provided a useful indication that the pest is present, at a time when this can be demonstrated otherwise only by laborious dissections under a microscope.

Reversion disease was first described in Holland and then Britain in the early part of this century. Affected bushes gradually became almost sterile and developed leaves of a typical shape and venation which were said to revert to the character of a wild ancestral type.

This condition has long been known to be caused by a virus and it remains the most serious disease of blackcurrants throughout the country. Many nursery stocks are contaminated with mites, reversion or both, and healthy material soon becomes affected when exposed to spread from nearby sources.

Reversion is undoubtedly a major factor in the low national average of 1 to 2 tons per acre, which compares unfavourably with crops of 4 to 5 tons obtained consistently by some growers. Some plantations never come into full productivity before they have to be grubbed because of reversion and others are retained despite heavy losses. Rendall in the Bristol University Economic Survey of the blackcurrant crop comments that in practice the length of time for which reversion can be controlled determines the economic life of plantations.

Reversion virus has a pronounced effect on the flower buds which appear conspicuously bright and highly coloured, compared with the grey downy appearance of the buds of healthy bushes. This is because of an effect on the number of surface hairs (Fig. 3 on page 1379).

Reverted leaves are characterised by a flat coarse appearance and have no pronounced sinus (indentation) where the leaf stalk joins the leaf. Affected leaves also have fewer marginal serrations and fewer main veins than normal foliage (Fig. 2).

It has long been a common experience of growers that attacks of blackcurrant gall mite and reversion virus frequently occur together and this suggested that mites were spreading the disease. This was demonstrated by Lees and Massee in some of the earliest investigations at the Long Ashton and East Malling research stations. This work has been confirmed recently, but it has become evident that mites are not very efficient in transmitting virus. Indeed they often become established on bushes without infecting them.

Other mites are killed by sprays of endrin or endosulfan after they have successfully infected bushes with reversion. These observations explain why virus and vector do not invariably occur together and why each can be found alone. This has sometimes led growers to suggest that mites are not the only vector and that an insect is responsible. Such views have never been substantiated and all attempts to transmit reversion by insects such as aphides or capsids have been unsuccessful.

Large numbers of galls are common on reverted bushes, but large infestations are rare on those which are healthy. This led Lees to suggest that reversion virus increases the sus-

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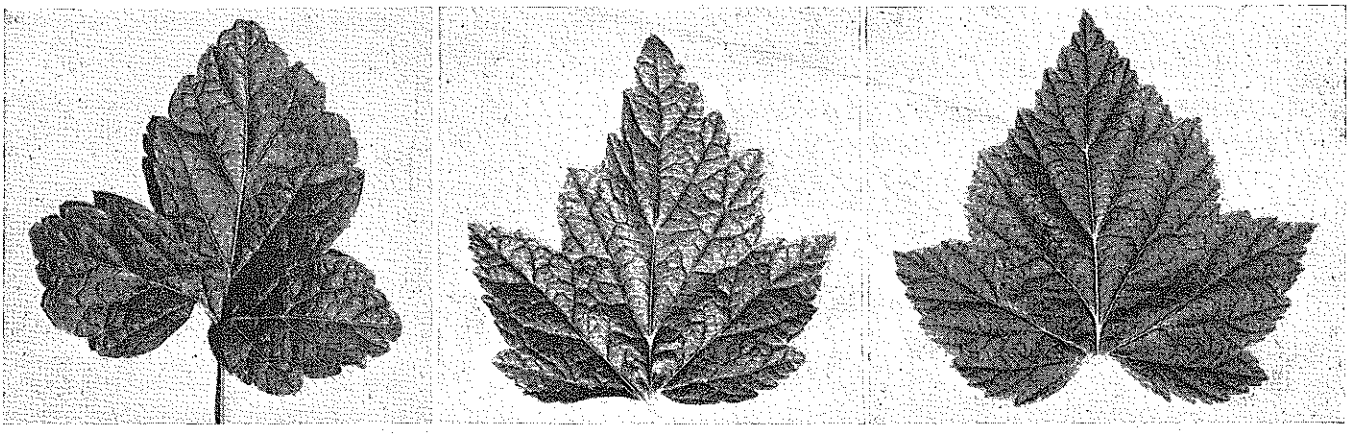

Fig. 2. The leaves of blackcurrant at mid-summer showing (left) severely malformed and almost trifoliate leaf affected by mites; (centre), a reverted leaf and (right), a healthy leaf.

Extreme left: Fig. 1 shows a dormant shoot of blackcurrant. Note at the top the normal elongated bud contrasted with the typical swollen, rounded gall infested with mites, bottom, and, centre, a very small infested bud. The right-hand picture (Fig. 3) compares an almost hairless flower bud of a reverted bush (left) with a normal flower bud right.

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ceptibility of blackcurrant bushes to mites. Field observations supporting this view have been made at Long Ashton and East Malling and they were corroborated by the following experiment in 1963.

Healthy cuttings and others taken from sources infected with reversion virus but free of mites, were first propagated in an isolated nursery where endrin was used frequently to prevent mites from becoming established. After a year no galls were found and to confirm that mites were absent a proportion of the buds was examined under a microscope. Healthy and reverted bushes were then planted alternately in six rows of twenty-four. Large bushes infected with reversion virus and heavily infested with mites were planted at the ends of each row. Mites spread to the buds of the new growth in April, May and June 1963. By June, leaves severely malformed by mites were common on most of the reverted shoots, but on very few of the healthy plants.

This suggests that the apices of reverted shoots are much more susceptible to mites than healthy ones and also explains why the symptoms caused by mites were for so long confused with those due to reversion. That the axillary buds of reverted bushes are also particularly susceptible to mites was shown by counts of galls in November. Infection with reversion virus resulted in a ten-fold increase in the number of galls.

It seems that healthy bushes have considerable natural resistance and that they become satisfactory hosts of mites only if they are successfully infected with reversion virus. This result has important practical applications in commercial practice and in designing future experiments. Thus it is *imperative* that all *reverted bushes should be diagnosed and removed as they appear,* to prevent the explosive build up of mites which is so often a consequence of chronic virus infection.

If roguing is done efficiently on the blossom and leaf symptoms so that all the remaining bushes have considerable inherent resistance to mites, it seems likely that the latter can be controlled efficiently by existing spray materials and methods. Mites then fluctuate according to seasonal factors at a level which may well be so low that they cause insignificant damage. Where roguing is not practised it is a common experience that spray measures are so ineffective that mites become very numerous. They menace all other bushes in the vicinity and make it impossible to control the spread of reversion virus.

The latest information on reversion disease is that it can be kept under satisfactory control by attention to three vital points:

1. *Inspections* in nurseries and fruiting plantations are essential to observe the occurrence of galled buds and to remove reverted bushes as they occur.

Inspections for galls can be done anytime during the winter, although March is probably the best month, when the galls are swollen but not obscured by the developing foliage. Particular care should be taken to ensure that infested bushes are not planted or used to provide cuttings.

As an additional measure to ensure that cuttings are free of mites, they may be treated during the winter in a warm-water bath maintained at the required temperature by a accurate thermostat. Treatments at 113 deg. F. for 15 minutes, or 117 deg. F. for five minutes have eradicated mites and their eggs without affecting the growth of cuttings. The success of these experimental treatments warrants larger trials to test the possibilities of the technique in commercial practice.

Roguing for reversion should be done first on the blossom at late grape stage just before the flowers start to open. The foliage should be inspected first at the end of May and again in June and July, considering only the extension growth of undamaged shoots which are unaffected by other pests or diseases.

Where stool bushes are used to provide cuttings they should be labelled individually. The cuttings from each bush can then be kept in separate labelled groups in the nursery and destroyed should reversion or other virus diseases affect the parent. This practice is particularly valuable if bushes are to be planted as yearlings, as these cannot be certified because of the difficulty of roguing for reversion symptoms until the second year.

2. *Intensive spraying* should be practised to control the mite vector during the spring dispersal period. The use of endrin, endosulfan, lime sulphur and perhaps wettable or colloidal sulphur for this purpose has been discussed in detail in a recent growers' bulletin (*Annual Report East Malling Research Station for 1963,* 184-189).

Critical Years

The years in the nursery and before fruiting plantations come into bearing are critical, as there is then no restriction on the type or frequency of application. Five sprays are advised at 10 to 14-day intervals starting the week after bushes in the neighbourhood have begun to flower. The spray programme for fruiting bushes is much more restricted because of the possibility of affecting the crop.

3. *Isolation.* It is critically important to site nurseries and new plantations as far away as possible from any sources of infection. This is not always convenient, but a distance of 100 yards is necessary if the bushes are to be certified. An even greater distance is desirable and it is important to avoid sites along the line of the prevailing wind from known sources of infection.