

ENGLISH HOP PLANTINGS 1968/69 AND 1969/70 AND THE PROBLEMS OF ARABIS MOSAIC VIRUS

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Recent work has established the importance of arabis mosaic virus and its nematode vector *Xiphinema diversicaudatum* Micol. in causing diseases of hop. The virus is one of the complex responsible for nettlehead disease. It also causes severe split leaf blotch in the variety Fuggle in which the yields of affected plants may be halved. In other varieties it drastically reduces yield without obvious symptoms, except when growth commences in the spring. Affected hills then show the 'bare bine' or 'spidery hop' condition.

At some sites arabis mosaic virus is spread by *Xiphinema* in the soil and infection recurs at the sites whenever hops are grown. Elsewhere, the nematode may be absent and infection is due to the planting of diseased stock.

Acreage changes

New plantings during the winter of 1968/69 totalled 1132 ac and 2311 of the existing 17 898 ac were grubbed. New plantings during 1969/70 totalled 1071 ac and only 579 ac were grubbed.

In all districts an important stimulus to grub and replant was the need to change the existing pattern of varieties. Losses caused by nettlehead in the West Midlands and by progressive wilt in the Weald of Kent and Sussex also necessitated much additional replanting.

The West Midlands

The Hereford and Worcester districts together comprise the West Midlands Region where a third of the national acreage is grown. The region is still virtually free from progressive wilt and the few reported outbreaks have been eradicated and grassed down. Only wilt-sensitive varieties are grown, to avoid any risk that the disease could become established in tolerant varieties without causing symptoms. Fuggle and Goldings still account for 77% and 14% of the regional acreage respectively, with much smaller but increasing acreages of Northern Brewer and Bullion.

East Kent, Hampshire, Berkshire, and Surrey

The scattered gardens in these districts grow 15% of the national acreage. They are virtually free from progressive wilt and only four growers have planted wilt-tolerant varieties. Goldings account for 67% of the regional total with a declining acreage of Fuggle and an increasing acreage of Bullion and Northern Brewer.

The Weald of Kent and Sussex

Half the national acreage is grown in the various hop-growing districts of the Weald of Kent and Sussex. Progressive wilt has caused severe losses amongst the sensitive varieties and for some years there has been a change to wilt-tolerant varieties which accounted for 53% of the regional total in 1969. Nevertheless Fuggle (30%) remained the most important single variety with only small acreages of the other wilt sensitives Bullion, Northern Brewer, and Goldings.

W.G.V. was the most widely grown wilt-tolerant variety in 1969, but each winter many plants die and have to be replaced. Hence the increasing importance of Bramling Cross and Progress which are replacing W.G.V. and the wilt sensitives

Origin of the stocks planted 1968/69 and 1969/70

In both winters and in each of the regions approximately one-third of all new plantings were of bedded sets from specialist propagators in East Anglia. They originated from

tested clones released from East Malling Research Station or from Wye College. They are usually free of arabis mosaic virus and are raised under the stringent isolation and other standards of the 'A plus' certification scheme of the Ministry of Agriculture.

A high proportion of Fuggle plantings involved 'A plus' sets because supplies were adequate to meet the decreasing demand for this variety. Moreover Fuggle seems particularly prone to nettlehead and split leaf blotch and growers try to avoid these diseases by buying certified stocks.

Plantings of Alliance and Progress were also mainly from 'A plus' stocks as these varieties were released through the East Anglia propagators by arrangement with the Hops Marketing Board. Until recently there has been little demand for other varieties and 'A plus' stocks were not readily available.

One-third of all plantings were made with own grown stocks and a third were bought from other producers within the hop-growing areas. These involve the hazard that arabis mosaic virus is common in symptomless plants of many growers' stocks as shown recently by serological tests. Virus has been detected in up to half the parent plants of some important suppliers. This infection decreases productivity and causes increasing losses at sites where *Xiphinema* occur.

Previous history of the sites planted 1968/69 and 1969/70

Many sites have had a prolonged and almost uninterrupted history of hop cultivation. This favours the establishment, survival, and increase of infective populations of *Xiphinema* and soil-borne diseases. Thus nettlehead tends to recur at the same sites in successive plantings and half the new plantings were at sites with a history of nettlehead.

The likelihood of infection recurring is increased by the generally short interval between plantings. Many sites were replanted immediately after grubbing and 74% were replanted within two seasons. This is because of the need to maintain production and because hop posts and wirework impede the cultivation of most other crops.

Unfortunately at new sites where hops are being grown for the first time only the same small proportion of 'A plus' stocks were planted, despite the high risk of introducing infection to hitherto clean land.

Discussion

To decrease the losses caused by arabis mosaic virus it is imperative to use virus-tested stocks for all future plantings. Unfortunately, 'A plus' stocks of several varieties are insufficient at present and production from permanent layer beds is an inflexible technique which cannot be adjusted very quickly to accommodate new varieties or to cope with sudden changes in demand. It is possible that mist propagation may be used more extensively and that propagators in the hop-growing areas may be encouraged to establish plots of selected material at carefully chosen sites free from *Xiphinema*. The selection of such sites will be facilitated by the soil tests now undertaken by the National Agricultural Advisory Service although the sampling and estimation of nematode numbers in large volumes of soil presents formidable difficulties.

It is obviously hazardous to plant hops in land infested with *Xiphinema* where there is a previous history of nettlehead, split leaf blotch, or bare bine. Such sites should be avoided until fumigation or other pre-planting techniques have been developed. It is even more important to use 'A plus' stock for planting new sites irrespective of the presence of *Xiphinema* as shown by preplanting tests.