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# THE DIFFERING HEALTH STATUS OF THE HOP PLANTING MATERIAL NOW AVAILABLE

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Hop growers have repeatedly been advised to use 'A plus' Ministry certified material for all new plantings. This material is raised from the healthiest stocks currently available from the collaborative programme of research at Wye College and EMRS and it is produced at isolated sites outside the main hop-growing areas to avoid the risk of progressive verticillium wilt and virus diseases.

Stocks raised within the hop-growing areas are less stringently safeguarded and they are not eligible for 'A plus' certification. Nettlehead and arabis mosaic virus occur in some stocks and those produced in Kent and Sussex may be affected by progressive wilt. The overall quality is uneven and generally inferior to that of 'A plus' plants. Nevertheless, there is a thriving trade in locally produced material and this has been a major factor in disseminating viruses and wilt, including the recently discovered resistance-breaking strains now causing so much concern. (see *Report for 1974*, p 155).

The 'A plus' scheme has been under-utilized but otherwise has worked satisfactorily for many years and growers have had access to stocks free from progressive wilt and from the obvious virus diseases such as mosaic and nettlehead. However, even the best clones eligible for the 'A plus' scheme were infected with viruses that caused no obvious symptoms. Some of these viruses have now been eliminated from certain varieties by further selection or by meristem-tip culture. The performance of these newer clones is being evaluated in field trials at Wye College and there is already evidence that some outyield existing 'A plus' stocks and those produced in the hop-growing areas. Some of the first of the improved clones have been made available to the specialist propagators and they are now being offered for sale commercially.

Ultimately it may be possible to release entirely virus-free material into a clearly designated special stock (SS) certification scheme of the type already available for strawberry and some other crops. Such a scheme cannot be considered until additional meristem clones have been produced and until the existing ones have been fully evaluated. Meanwhile, the present confusing situation is likely to continue for some years as the health status of planting material becomes increasingly diverse.

In the past surprisingly few growers were aware of the marked superiority of 'A plus' material or of the great and unpredictable differences in the health of stocks grown within the hop-producing areas. The situation has become even more complex with the introduction of the first meristem clones that now coexist with earlier material in the 'A plus' certification scheme. These developments are of great practical and economic significance and must be fully understood by growers and propagators wishing to exploit the latest technical innovations. For optimum yields it is essential to use the best available material for all new plantings and to ensure that these are carefully sited in relation to existing gardens so as to decrease the risk of infection. Thus it will be possible to decrease the losses now caused by disease and so increase productivity at a time of crucial competition from overseas producers.

Information is here summarized on the health status of the various 'A plus' and other clones now available, so as to assist growers in deciding on planting material and policy. *Present recommendations may have to be revised if entirely virus-free clones are found to be superior to those now advocated.*

In assessing the relative merits of 'A plus' and other stocks no mention is made of hop latent virus or of hop mosaic virus in tolerant varieties, as it is not yet certain that they have detrimental effects on growth or crop. Moreover, there is no further reference to progressive verticillium wilt because there is already an overwhelming case for using 'A plus' stocks to avoid the risk of introducing infection on contaminated plants raised within the hop-producing areas.

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Growers should appreciate that the various meristem and other improved clones can become reinfected once they have been issued. It is essential, therefore, to site new plantings where they are exposed to the least risk of infection. Varieties of the Golding type are sensitive to hop mosaic virus and should be grown away from all other varieties as these are mosaic-tolerant and therefore symptomless carriers of infection. Males should be mosaic-sensitive for use with Goldings and mosaic-tolerant for all other varieties.

Pending further information on the spread of prunus necrotic ringspot virus in hop it is prudent to use only uninfected males with uninfected varieties, which should be sited away from older plantings that are already infected throughout.

The following abbreviations are used:

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| AMV | Arabis mosaic virus |
| NRSV | Prunus necrotic ringspot virus |
| N | Nettlehead |

For convenience the main commercial varieties are considered in three distinct groups:

a) Those with NRSV throughout all available clones
b) Those for which NRSV-free selections are available
c) Those for which NRSV-free meristem clones are available

Group a

Bramling Cross (OT48), Goldings, Keyworth's Mid-season (OR55),Progress.

All available clones of these varieties contain NRSV and some of the stocks produced within the hop-growing areas also contain N and AMV, which are absent from 'A plus' material. The meristem-tip culture technique has been used to produce NRSV-free clones of Progress, Bramling Cross and some Goldings but they have not yet superseded the existing clones within the 'A plus' scheme and they are not being propagated commercially.

RECOMMENDATION: *Until NRSV-free meristem clones are available the existing 'A plus' clones should be used for all new plantings. These can be sited alongside NRSV-infected material of similar mosaic status.*

Group b

Wye Challenger, Wye Northdown, Wye Saxon, Wye Target, Wye Viking.

These recently introduced varieties are now being widely grown and stocks of diverse health status are available. Some of those produced within the hop-growing areas are affected by N, AMV or NRSV, which is particularly prevalent in material of Wye Target derived from the original 'crash programme' of propagation arranged by the Hops Marketing Board in 1972. 'A plus' clones are carefully selected for their freedom from N, AMV and NRSV and they outyield equivalent NRSV-infected material, mainly by an effect on α-acid content.

RECOMMENDATION: *The standard 'A plus' NRSV-free clones should be used for all new plantings. Ideally these should be sited away from material already infected with NRSV.*

Group c

Brewers Gold, Bullion, Fuggle 'N' and '37', Northern Brewer, W.G.V. (1147)

Until recently all available clones of these varieties were infected with NRSV. Some of those raised within the hop-growing areas also contain N and AMV, which are absent from 'A plus' material.

NRSV-free clones have been raised recently from meristem tips and these have outyielded equivalent NRSV-infected material, mainly by an effect on α-acid content. The meristem clones have superseded existing material within the 'A plus' scheme and are now available from some propagators.

RECOMMENDATION: *The recently introduced NRSV-free 'A plus' meristem clones should be used in preference to earlier 'A plus' material for all new plantings. Ideally these should be sited away from plantings already infected with NRSV.*

**Summary**

Hop growers intending to make a new planting now have available to them a bewildering array of stocks of greatly diverse origin and health status. It is imperative that the best possible

material is used for establishing all new areas and that these should be sited as advantageously as possible in relation to existing plantings to decrease the risk of infection.

The healthiest stocks now available are produced by specialist 'A plus' propagators in East Anglia and at other isolated sites. Information is summarized on the health status of the various clones now being propagated so as to assist growers in their choice of planting material and policy.