

PLANT BLINDNESS

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Blindness and distortion of bedding plants is a problem that has defied consistent explanation, much less solution, over several years. The answer may be disarmingly simple or complicated by more than one factor. The disorder is particularly common on antirrhinum and petunia.

For those fortunate enough not to have experienced this trouble, symptoms may also include malformed, thick, fleshy and brittle leaves which, in the case of petunia, are often reduced to tiny polyp-like knobs. In antirrhinums, leaves may be upcupped to give a box (hedge) effect, and here a common feature is multiple white shoots from below ground level.

Other types affected have been carnations, seedling geraniums, mesembryanthemums, pansies, salvias, verbena, and also French marigolds and tagetes, where succulent-like plants are produced with thick fleshy stems and tiny leaves. A constant factor in all cases is the excellent root system which is usually entirely disproportionate to the size of the tops.

A percentage of plants may eventually recover by production of healthy basal shoots but, in practice, competition from normal plants in the box makes this unlikely, particularly in a case of leafy petunias.

Symptoms at first or second leaf stage

The stage at which symptoms are noticed is usually first or second true leaf and since plants are normally pricked out at the cotyledon stage, the grower is involved in the expense of 'making good'. The trouble does not appear to be consistently associated with any particular seed source or cultivar, a range of both F₁ and F₂ hybrids having been affected. Neither is it new but, not until 1971, did it reach

epidemic proportions on a few holdings in Surrey. A questionnaire sent to every county producing in the region of 100,000 boxes did not evoke much response, though since then local epidemics have been reported.

Simple explanations as to possible causes have been premature, as the following chart implies, and it has been difficult to separate irrelevant facts from those which may eventually provide the essential pieces of a jig-saw.

What common denominator can explain the epidemics of the 70's? A fitting explanation for past losses would be a seed factor which only becomes significant under certain growing conditions, since investigations of these conditions alone has not provided the answer. If such a susceptibility factor is indeed present in a proportion of seeds, then presumably this could be related not only to breeding but to relative position of the seed on the parent plant, a maturity response perhaps to weather, sprays, or nutrition.

Possibilities

Other possibilities, such as pest attack (eelworm, tarsonemid mite, thrip), and use of modern fungicides (drazoxolon, benomyl) have in the process of time been discounted.

The erratic occurrence of this bedding plant trouble has not helped local investi-

gations. An ADAS trial on two previously troubled nurseries in 1977, where GCRI seed and potting composts were compared to proprietary peat composts containing slow release nitrogen, and in each case with or without the addition of boron, yielded no results. The symptoms did not develop!

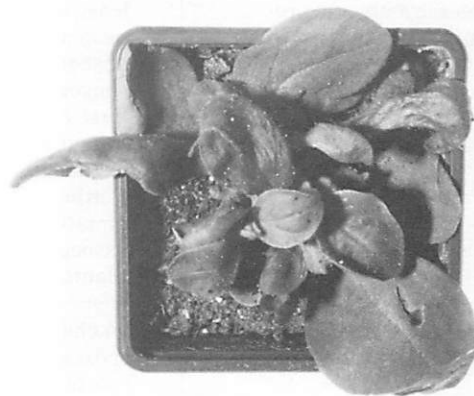
The trouble was not experienced at Cleppa Park but one rather unkindly hopes for some future occurrence at an experimental centre where irrelevant facts can be more easily eliminated by replicated experiments. In the meantime, two suggestions can perhaps be offered to the grower with a distortion history.

1. A small comparative trial with composts containing no slow release nitrogen such as the GCRI seed and potting composts. This would, of course, mean early liquid feeding.
2. In order to avoid 'making good,' leave susceptible types in the seed box to a later (true leaf) stage before pricking out when symptoms are more readily seen. This would involve thinner sowings and more space in the propagating house.

Information supplied by growers experiencing blindness and distortion of bedding plants would be valuable in helping the ADAS team of advisors and specialists in their continuing investigations.



Susceptibility of Petunia may be relative to the positioning of the seed on the parent plant.



F₁ hybrid for petunia. Distortions reached epidemic proportions in 1971, in areas of Surrey.

Theory

Seed, ie genetical abnormality

For

There is considerable variation in susceptibility between named hybrids or mixtures grown on the same nursery in any one year. Also, symptoms can be evenly distributed throughout the seed box as indicated below:

1. Antirrhinums
Experienced pricklers out have reduced losses from 25 to two per cent by discarding plants with thick cotyledons.

Both normal and distorted plants have developed in the same planting hole when gathered

Against

Trouble can also occur in patches. The same seed packet can produce both normal and affected plants at different sowing times.

	<p>up together in the seed box and by inexperienced prickers out.</p> <p>2. Petunias Trouble has subsequently developed throughout the seed box when this was discarded due to 90 per cent loss after pricking out of apparently normal plants at the cotyledon stage.</p>	
Leafy gall (<i>Corynebacterium fasciens</i>)	The symptoms agree, especially proliferation of shoots below soil level commonly met with on antirrhinums. The bacteria can be seed-borne, is very infectious and could therefore be spread from a few infected seeds on the fingers of the prickers out. It could already be present on the nursery.	<p>This was initially thought to be responsible since it was confirmed in most cases either on the first or the second samples submitted. Confirmation is now rare, however.</p> <p>'<i>Corynebacterium fasciens</i> like' organisms have been isolated from about 30 per cent of affected bedding plant specimens but it has not been possible to reproduce the symptoms by inoculation on to test plants.</p>
Compost contamination, eg by hormone weedkillers	The symptoms are similar.	<p>Plants are affected in different types of compost with peat a common denominator but this has been from various sources.</p> <p>TBA tests have proved negative.</p>
Boron: initial deficiency or unavailability in seed or potting compost	<p>The symptoms agree.</p> <p>The presence of normal cotyledons and, in some cases, the first true leaf could indicate that the seed contained enough trace element up to this stage. Boron may be deficient due to omission of trace elements from peat/sand composts or be rendered unavailable by high pH.</p>	The trouble can occur in composts where analysis suggests sufficient boron is present and also under low pH conditions (down to 5.3). Boron sprays at 5ppm applied promptly to affected pricked out antirrhinums in 1977 did not alleviate the symptoms, also severe distortion was reported in bedding plants on an Evesham nursery in 1977 where there was excess boron in the water supply.
Boron: effect of slow release ammonia producing fertilisers	Ammonia as a breakdown product of slow release nitrogenous fertilizers can accumulate in peat as well as in steamed loam, due to an absence of ammonia-converting bacteria and a consequent break in the nitrogen cycle. In peat based composts, this can render boron temporarily unavailable by raising the pH by as much as one unit. (Reference 'Modern Potting Composts' by A C Bunt). High ammonia and nitrate nitrogen levels are often associated with composts producing affected plants.	<p>Symptoms of high ammonia in the past in J1 composts using steamed loam and with hoof and horn as a source of slow release nitrogen were very different, namely root death without blindness or distortion of growing points.</p> <p>Growers have tended to step up trace element content by use of proprietary fertilisers containing these in loam as well as in peat based composts.</p>
Boron: microorganism effect	A change in physical as well as chemical compost ingredients has taken place. Higher proportions of peat could lead to an increase in microorganisms which lock up boron.	Trouble has also occurred in loam based composts though even here the tendency has been to increase the peat at the expense of the loam.
Molybdenum deficiency or unavailability	This could affect the growing point. It may be lacking through trace element omission in peat/sand composts or rendered unavailable by low pH. High nitrate nitrogen in composts could make greater demands on molybdenum for protein synthesis.	<p>The trouble has also occurred in alkaline composts (up to pH 7.4). Other expected symptoms such as leaf tip scorch or yellowing are absent.</p> <p>Sprays of 0.025 per cent sodium molybdate promptly applied to affected antirrhinums and petunias in 1977 did not alleviate the symptoms.</p>
Low temperature or by-product of low temperature	In antirrhinums, where early sowings were kept warm, a case of two per cent distortion became 100 percent when later sown plants from the same seed packet were kept under cold conditions.	On petunias, trouble has been serious (related to individual F ₁ hybrids) where high temperatures were maintained.
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