

# MORE PROBLEMS FOR GROWERS

Although this report from the June issue of the British magazine *Grower* deals only with vegetable crops, we feel that there are several ornamental crops that will be sensitive to vapor emissions from some of the new materials being introduced into greenhouses.

## New Glazing Strip Damages Glass Crops

Within the last three months about a dozen cases of damage to glasshouse crops have been identified. In every case the glasshouse was built or reglazed within the last couple of years. In autumn 1980 a change in formulation of the glazing strip was made to include a more efficient plasticiser, to give flexibility to this PVC, which is rigid otherwise.

The plasticiser in the new formulation was approved for use in contact with human food and, at the time, nobody in the UK had any experience of its toxicity to plants. Nevertheless, this revised formulation has now caused severe problems in one or two crops, notably monocrop tomatoes and brassicas. The problem is accentuated when ventilation is minimal, during the winter months, but brassicas are very sensitive and may show severe chlorosis even in a reasonably ventilated house.

Plants of the family Cruciferae (which includes the brassicas) are particularly sensitive to di-butyl phthalate and di-iso-butyl phthalate (DBP and DIBP) which Imperial College at least is now fully convinced are the phytotoxic substances involved. Apart from the brassicas, a bedding plant nursery with a new house incorporating the culprit plasticiser has had problems with alyssum (a Crucifer) whilst its other lines have been perfectly satisfactory.

The other major sensitive crop is tomato and a few nurseries specializing in early tomatoes have had serious problems during the winter months when the houses are well sealed to keep in the heat and supplementary carbon dioxide when the toxin accumulated to damaging concentrations. Tomatoes planted in spring, and cucumbers, have not yet shown any adverse effects.

## Efford EHS

One of the tomato sites involved is Efford EHS in south Hampshire where the roof of the Mansard house was recently reglazed with the PVC strip containing butyl phthalate. Trials officer noticed symptoms of slight yellowing in marginal areas of young leaves which then developed into brown necrotic patches within about three to four weeks and finally some of these became paper-thin with white window-like patches anything from 1/2 in to 2 in across.

These were unknown symptoms which could not be induced by any known nutrient deficiency nor any known air pollutant such as sulphur dioxide, ozone or propylene. They were finally diagnosed as probably due to the glazing strip in mid-March. It was the first known case of toxicity from glazing strip. The mechanism of toxicity is not yet understood but the first effect is a marked inhibition of photosynthesis — which can occur before chlorotic symptoms are visible. Only very minute concentrations are needed and although threshold levels are not established yet: "we are probably dealing with parts per billion rather than parts per million of these plasticisers in the air which cause phytotoxicity."

Flexible PVC glazing strip has been in use since the late 60's but formerly the plasticiser was di-octyl phthalate which is much less volatile than the butyl phthalates and seems to have been quite safe. When the change to include di-iso-butyl phthalate was made this quite unwittingly created a major problem for some glasshouse manufacturers.

Some PVC hose pipes are a worry. They could be causing minor problems and there has certainly been a case of

tomato plants on a Kent nursery growing within 6 ft radius of flexible PVC hose used as downpipes for supplementary gutter drainage having shown typical symptoms of DBP/DIBP toxicity. In addition to the foliage effects on tomatoes DBP/DIBP reduces early yields; for example a first truss that would normally carry about eight Class 1 fruits on a nursery near Southampton, in a new block of one third acre, plants had first trusses carrying only one Class 1 fruit and about five second grade. Indeed, general effects on November planted tomatoes can be a 33% crop loss to end-May; possibly 12-15 tons/acre overall.

#### Workers

The main effect on Cruciferae is yellowing of leaves, especially the youngest ones, and stunting of growth so that brassica transplants being raised in glasshouses glazed

with flexible PVC strip containing DBP or DIBP are totally unuseable.

The levels of DBP/DIBP emission from PVC are thought to be less than a tenth of the levels of phthalates permitted in industry (eg, during manufacture) so that glasshouse workers should not be affected.

So far the problem appears to be confined to new glasshouses from two particular UK manufacturers and erected in the last couple of years; Dutch houses, especially the venlo types, appear to use exclusively butyl rubber for glazing and this material is not implicated in toxicity problems. Rigid PVC too is safe and so houses clad with this material have shown no problems, even though they are naturally less well ventilated than conventional glass; however, structures using flexible PVC would be at risk if the plasticiser used was butyl phthalate. Polycarbonate is also safe.