Fluoridation – a cause for concern in plant nutrition

By Prudence Leith-Ross

Do growers have anything to fear from water fluoridation? While the Ministry of Agriculture, Fisheries and Food insist that there is nothing to worry about, their reassurance seems to be based on the minimum of research using only a handful of plant varieties.

The chief danger is likely to lie in the use of hydroponic cultures but, so far as can be ascertained, no research at all has been done with this or with plants grown in a sand and peat mixture which might also be susceptible.

Recent research by J. A. Tolley has shown that crops of cress (rape) became poorer and more stunted as the fluoride level in which they were grown increased.

This crop was selected because it grows quickly, is easy to handle and a good yield can be obtained within a small area. Using samples of Liverpool tap water, which contains fluoride at 0.1 ppm for comparison, he made up solutions containing 1.0 and 4.0 ppm (milligrams per litre), growing samples in each simultaneously under standard conditions of light and air.

Sparse and stunted

While the crop grown in ordinary tap water was healthy and prolific, growth in the other two samples was comparatively sparse and stunted, particularly the cress grown in the water containing the highest level. There were also signs of necrotic fluorosis on the roots of both these crops. This would indicate a considerable reduction in yield where fluoridated water is used for irrigation purposes, though obviously the effects on other crops are likely to vary.

Analyses were made to discover the actual amount of fluoride which had entered the fibres of the plant. These showed a considerable increase. The cress grown in the tap water with 0.1 ppm contained 0.05 mg per kg while the corresponding figures for the 1.0 and 4.0 concentrations were 0.2 and 0.4 mg per kg respectively.

This experiment demonstrates clearly that plants are able to concentrate fluoride and possibly other poisons from the water supply and it seems possible that slower growing crops might assimilate even more.

Where a cumulative poison such as fluoride is concerned which has neither taste nor smell and with no known antidote, and which is considered so dangerous that its addition is banned by law from all foods except baking powder, the possible long-term effects on people eating such crops must cause concern, particularly in view of the fact that fluoride from water is only one of several sources of this chemical to be taken up by food crops.

The Dutch Growers' Association was largely instrumental in getting fluoridation stopped in the Netherlands and experiments there and in the United States have shown that the keeping qualities of cut flowers are affected by the fluoride content of the water in which they stand. The leaf tops and flower sheaths of gladioli browned after only four days while the heads of roses tended to droop rather than open. Other flowers which have also proved sensitive to fluoridated water include freesias, gerberas, poinsettia bracts and dracaena cuttings.[1-12]

Growing onion bulbs

An experiment with growing onion bulbs, placing them in fluoridated water, was carried out by Professor A. H. Mohamed of Missouri University.[13] He found chromosomal aberrations after only six hours. Admittedly he used a strong concentration. It was a solution 180 times more concentrated than artificially fluoridated tap water. But the chemicals used in water fluoridation are of necessity highly soluble and little is known of the long term effects of water on the soil. That it might eventually affect the seed bearing quality of plants should not be overlooked. Because this does not happen in naturally fluoridated areas cannot necessarily count as reassurance, for natural fluoride nearly always occurs as the highly insoluble calcium fluoride.

Industrial pollution from fluoride occurs in many areas and cattle have been frequent sufferers through the years. Only last November several farmers near the aluminium smelting plant at Invergordon lost herds through fluorosis because of polluted grazing. It is not unknown for Borough Environmental Health Officers to advise that fruit and vegetables cultivated in certain areas should be well washed before consumption. Residents in parts of Tamworth, for instance, have for some years been advised that all locally grown produce should be washed before being eaten because of high fluoride levels in fall-out from several brick and ceramic works and an aluminium recovery plant in the area. But this is considered a local issue and there is no information available as to how many other areas in the country are affected.

Superphosphates

Not only do we have all this pollution but fluorine is also taken up from superphosphate fertilizers. An application of 1,000 Ib of superphosphate to one acre has been estimated to add approximately 17.5lb of fluorine, which would increase the soil content down to plough depth to 7.5 ppm while a similar quantity of rock phosphate would roughly double the amount.[14]

In 1970 Soviet soil scientists reported that the regular application of superphosphates over a long period increased the fluorine content and decreased the productivity of certain crops, particularly maize.[15] Similar fluorine accumulations in soils had already been noted in the United States.[16]

Amounts of fluorine in 28 plant products grown in Virginia on soils fertilized with superphosphate over a period of 15 years showed spinach containing 28.3 ppm and lettuce and parsley 11.3 ppm.[16]

A study at Aichi in Japan showed a jump in the fluorine levels of food during the seven-year period ending 1965, with pumpkin and watermelon increasing by 429 and 831 percent respectively.[17] If these plants take up fluorine, it seems likely that marrow and courgettes will be similarly affected.

A correlation between the geographical distribution of mortality from gastric cancer and the fluorine content of the population's staple diet, rice, was also shown.[17] In normal years potatoes might be considered a basic ingredient of our diet and it would be interesting to know whether these also take up fluorine.

Variety of factors

What happens when fluorine is added to the soil seems to depend on a variety of factors such as the form in which it is applied, the amount added at any one time, now much lime and phosphate are also present, the species of plants grown and the soil type and its geology.[14]

So, do we really want fluoride in the water supply as well? While there is no suggestion that its use would kill any crop, it is possible that in certain conditions yields might be reduced, as happened with Mr. Tolley's cress. Yields normally fluctuate from year to year and a grower might not immediately realise that fluoridation was the cause of a poor crop and would certainly find it hard to prove. Certainly it would seem advisable for much more research to be carried out before this additional pollutant is inflicted upon us.

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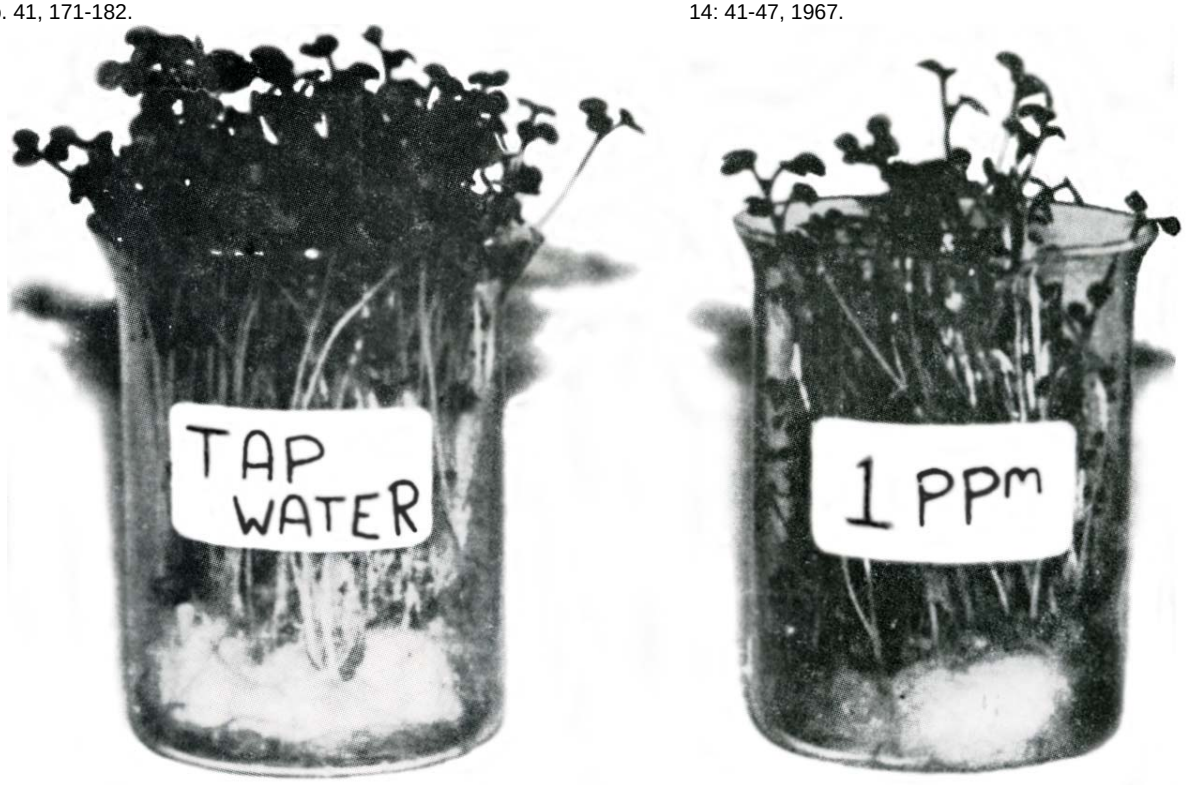

Cress grown in unfluoridated tap water and water fluoridated at 1 ppm

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