

frequently and are grown on mounds, ready for easy removal. Fine old specimens sell for \$10,000 or more. Such trees are pruned, thinned, and trained with extreme care on an annual basis. The branches are fastened to a bamboo support while the twigs are tied down or pulled up with twine to obtain the desired angle. Roots are sometimes gradually exposed to produce bizarre effects. Out in the fields we saw rows of young pines in training, the branches either tied with ribbons to bamboo stakes or trained with wire around the stems.

Many of the rare plants grown in these nurseries may be found for sale in the garden departments (usually on the roof) of major department stores in Tokyo, Osaka, and Kyoto. The diversity of distinctive plant materials available in department stores and flower shops is most impressive. For example, a modest flower shop in a residential section of Tokyo contained a good selection of bonsai including *Jasminum*, *Zelkova*, *Acer*, and *Prunus mume*, as well as an excellent collection of alpiners such as *Houstonia*, *Phlox*, *Dianthus*, *Rhodohypoxis*, and *Gentiana*. In this shop also were fine specimens of *Shortia* in full flower growing on moss-filled wire frames placed in a large saucer of water. The western visitor is constantly amazed by the ingenuity and passion for fine detail of the Japanese people.

## FUNGICIDE ALLERGIES?

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The title for this short presentation is posed as a question and instead of singling out just fungicides I would like to broaden the scope and ask the question, "Horticultural chemical allergies, or worse?"

In our meetings of the 1950's and '60's, we were constantly reminded to use fungicides like Captan, Phaltan, Phygon and Terraclor in preventive spray-programs in our propagation. What was the attitude of the average grower or propagator to these relatively new materials? We were supposed to be very cautious, read the labels carefully and follow all the instructions we were given conscientiously.

But did we really do all those things? Thinking back to my experiences as a propagator in Lake County, I have to admit that I, as well as most of the growers that I knew and met, were rather casual and even lax when it came to spraying. After all, the labels were often not too specific as far as warnings for dangerous consequences were concerned. And word of mouth

in our area was that fungicides were really rather harmless. I don't recall ever wearing even an ordinary dust-mask while spraying the greenhouses with fungicides on a regular basis.

In 1960 I started my own operation and continued merrily blasting away at cuttings with a fungicide every 10 days, of course without bothering with face protection. I never paid any attention to the fact that every winter I was constantly plagued by sore throats and laryngitis that continued on without let-up for months on end. That inconvenience was blamed on our well-known northern Ohio climate. After all, what can you expect when you run constantly in and out of warm greenhouses into a howling "north-eastern" or into our never ending snow squalls. But that explanation was really too pat. After much persuasion by my wife, I finally went to see a nose and throat specialist in 1967. One of the first questions he asked me after taking a good look at the sorry mess that became visible when I opened my mouth, was what did I do for a living. I told him that I spent a good deal of my time during the winter working in greenhouses. He immediately suggested that I pay a lot closer attention to the chemicals I was using on a regular basis because my throat condition showed no indication of a common cold infection. He admitted that he was unfamiliar with the effects of such chemicals, but he suggested that my problem might be some kind of an allergy.

It had really never occurred to me that there might be a connection between my throat condition and the sloppy spraying habits I was practicing during the winter in the confined greenhouse interiors. But to make a long story short I took his advice, started wearing a mask whenever I was spraying with fungicides, especially when using Captan, and that was the end of my bouts with sore throat and laryngitis.

Why did I single out Captan? All I have to do even today is walk into a greenhouse freshly sprayed with Captan and within a couple hours I am coughing again. I have discussed this experience with other growers and plant-pathologists and they have told me about similar experiences.

Why did I bother to tell this distinguished audience about this personal experience with fungicides? Because a lot of changes have occurred during the last 6 years with respect to chemicals. Attitudes toward the environment in general and chemicals in particular have changed drastically. E.P.A. has entered the scene, several important pesticides have been banned, and agriculture and horticulture are being hampered in their activities by a severe curtailment of chemicals still allowed for regular use. In my opinion this approach smacks somewhat of overkill.

On the other hand I, like numerous people in this audience, have knowledge of accidents or of cases of health deterioration that took place not only as a result of working with the more dangerous chemicals, but also from working with seemingly harmless materials used in our industry. I have been told by extension people that a number of the older materials including Captan and Benlate are being re-investigated at the present time. I for one consider myself fortunate that the potential danger of chemicals was pointed out to me in a rather simple incident and ever since we have become scrupulously careful when working with chemicals at our nursery.

## MANAGEMENT OF SMALL POOLS: VEGETATIVE PROPAGATION OF SELECTED WATER PLANTS<sup>1</sup>

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**Abstract.** The development and maintenance of the aquatic garden at the U.S. National Arboretum, Washington, D.C. is discussed as a general guide for the management of small pools. Information is given on the culture and vegetative propagation of hardy and tropical water-lilies, lotus, and other aquatic plants. Methods for the control of algae and insect pests are also described. The aquatic plants grown in the pool in the 1976 season are listed.

Aquatic displays in parks and gardens in our urban areas are generally open areas of high visibility and, consequently, intense visitor interest. Annual vegetative propagation, seasonal maintenance, and advance planning are necessary to maintain an exciting summer display, year after year. This paper will describe the maintenance of an aquatic garden, the culture and vegetative propagation of hardy and tropical water-lilies, lotus, and various aquatic background plants, and the control of algae and insect pests.

### THE POOL — SIZE, CLIMATE AND CONTAINERS

A large display pool at the U.S. National Arboretum, Washington, D.C., partially encompasses the Administration Building. This concrete pool covers approximately 1/3 acre and contains 115,000 gallons of water from 22"-30" deep. Twenty-six

<sup>1</sup> Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture and does not imply its approval to the exclusion of other products that may also be suitable.

<sup>2</sup> Plant Propagator