

WILLIAM STUDEBAKER: That is a good point. You also need to backup every day because some day you are going to have your data wiped out.

CAMERON SMITH: One thing that I have seen many small businesses get in trouble with is the lack of fully documented software. Anyone considering custom software, no matter how minor the change from stock, should be well documented. See a good CPA firm.

WILLIAM STUDEBAKER: That is a very good point. It is very difficult to get that from a programmer.

PETER VERMEULEN: For a multifaceted use, such as office procedure, propagation, etc, would we be better to go with a mini or several micro computers?

WILLIAM STUDEBAKER: I am not sure if I can answer that question right off. It depends on if you have a large data base and a lot of interaction going on in your business. If a lot of your people will use the same data all the time then you need a mini. If you have stand alone functions then micros will work.

RALPH SHUGERT: I would just like to echo a comment you made on sharing. Zelenka Nursery is involved in sharing and feels very comfortable with that format.

WATER QUALITY IN PLANT PROPAGATION

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Most propagators, I believe, do not really think about water except that they have a sufficient amount to do the job. The most important factors seem to be an adequate supply and that it is sufficiently clean to prevent clogging of nozzles in the greenhouse.

Also, in the past, I believe that life was simpler, most nurseries were off by themselves, or they were on city water and most water supplies were naturally clean. Many often used cisterns to collect rainwater which was, in those days, considered to be as clean as you could get. However, today with urbanization, industrialization, extensive use of herbicides, shortages of water in some areas, and increased costs of city water, propagators need alternate sources such as ponds

and wells for water supply. Therefore, concern for good quality water for use in propagation has become increasingly important.

Acid rain, herbicide runoff, algae control, mineral content, etc. are all factors that have to be considered when using natural, untreated water in confined areas such as propagation benches. These factors likely would not be a problem when watering stock in the field.

When I started searching the literature for information on water quality I drew a blank. What did prompt the need for the search was a problem that arose with one of the propagators I work with in Ontario.

Being located in an urbanized area, water was readily available from the city, but the increasing cost prompted the grower to dig a well as an alternate supply. They were fortunate to hit an adequate supply of water and thought their problems were solved. The grower is an excellent propagator, but during the first winter of use of the water from the new well, they suddenly noticed their losses were greater than usual. The mystery was added to when one of their employees, who had a small greenhouse, volunteered to propagate some of the material for them and his losses, using the same cutting material, were negligible. Following a great deal of soul-searching and by the process of elimination, it was decided that the water might be the factor that was affecting the losses. Upon checking both water samples at a commercial water treating firm, and at the University of Guelph Greenhouse Soil Testing Laboratory, very high levels of sodium were found in the well water. With the addition of some very expensive filtration equipment the problem was solved.

When it was suggested that I present this paper, I felt that I needed more evidence to substantiate this particular problem and learn if there might be problems with other elements. After much looking and asking questions, it was pointed out to me that there was an article on this subject in Vol. 18 of the IPPS Proceedings. This paper, presented to the Western Region meeting by J. L. Paul (1) provided the answers. Paul reported on the effects of sodium, magnesium, and total salts on the rooting of chrysanthemums under mist. I do not intend to discuss this paper in any depth as some of the work required further study. However, it was demonstrated that total salts and magnesium and sodium levels did affect rooting and high levels were very detrimental.

Whitcomb (2) reiterated this same information in his publication on propagation. He suggested that generally chlorinated city water and water from deep wells which are low in

total salts and boron levels, are to be preferred to lake, stream, or pond water in propagation houses.

These references were the only ones that I found referring to water quality but I am sure that a serious literature search would turn up more. I am convinced that this lack of information probably stems from the lack of problems reported for poor water quality. Most of the problems I have encountered in propagation as a crop advisor have been diagnosed as too much water or poor drainage in the benches. However, from now on I will be asking more questions on water sources, for some of these problems may be related to poor water quality as well. Also, if I do nothing else today, maybe I will stimulate someone at the research level to take a further look at the problems that can be caused by poor water quality in propagation.

LITERATURE CITED

1. Paul, J.L., 1968. Water quality and mist propagation. *Proc. Inter. Plant Prop. Soc.* 18:183-186
2. Whitcomb, C. 1978. Propagating woody plants from cuttings. *Okla. State Univ. Bul. No.* 733.

RALPH SHUGERT: Have you found any information on high pH water and propagation of plants or subsequent establishment?

BURKE McNEIL: I have heard of no problems even with a pH of 8. In containers it is a problem but that is all I am aware of. It would be a good research problem.

PETER ORUM: It should be standard practice for any good nurseryman to have his water analysed several times each year. I can give you an example of what happened to a well known nursery in Europe that almost destroyed it. They did it only once a year and during a dry summer the city kicked in auxilliary wells that contained more sodium and they were not aware of it. Sodium built up to the point that their container crop was almost destroyed.

DICK WOLFF: I nearly went bankrupt using city water. We were propagating rhododendrons and maples outdoors without any problems. In the greenhouse, however, something was wrong. We traced it to the water which had a pH of 8.3 to 8.5. We dug a well with pH of 6.1 and the difference was like day and night. The township people told us they put out high pH water because the pipes do not rust as fast.

RAY MALEIKE: We had a grower who had a problem with high pH water and the accumulation of white deposits. He cured it simply by putting magnets around his intake. I don't know what it does but it sure cleared up the problem. I will be glad to send you the info if you want it.

MIKE DODGE: We had a problem with salts and high pH during our propagation. Dr. Paul Read in an article on the rooting of 'Northern Lights' azaleas suggested either injecting a small quantity of acid or rooting in a poly tent. Since we went to a poly tent for rooting our Exbury azaleas we do not have that problem.

INFLUENCE OF WILLOW AND POPLAR EXTRACTS ON ROOTING CUTTINGS^{1,2}

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Abstract. Crude water extracts were prepared from shoots (1 g freeze-dried powder/25 ml H₂O) of weeping willow (*Salix alba* var. *tristis*) or of lombardy poplar (*Populus nigra* 'Italica') collected at intervals during the year. Extracts from both species or combinations of extracts + 5,000 or 20,000 mg/liter IBA inhibited rooting of *Cotoneaster acutifolius* cuttings. In comparison with water-treated (control) cuttings, cuttings of both *Philadelphus coronarius* 'Aureus' and *Ribes alpinum* (but not *Cornus alba* 'Argenteo-marginata') showed consistently better rooting after treatment with seasonal willow extracts.

INTRODUCTION

Plant extracts of diverse species have been known to influence rooting of cuttings. Went (24) observed that *Acalypha* leaf extract induced rooting in *Carica* cuttings. Bouillenne and Went (2) found in cotyledons, leaves, and buds substance(s), given the name "rhizocaline", which stimulated rooting. Nelson (20) showed that alfalfa extract contained an unknown active ingredient which increased the speed and rooting percentage of juniper cuttings. Girouard and Hess (7) suggested the presence of four root-promoting substances in extracts from stem cuttings of juvenile *Hedera helix*. In addition, other

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