tion of the techniques being developed. Much of the technology referred to will only be used by the specialist but I hope I have helped make you aware of the possibilities. You might also be able to see other potential applications of relevence to your particular area of interest.

SALINITY MEASUREMENTS IN POTTING MEDIA

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One of the most common problems encountered in nurseries is salinity, although the grower is often not aware of it. Excessive salinity may be the result of over-fertilization, combined with lack of leaching, and/or high levels of salts in the water supply. It will dramatically reduce growth rates, often before there are any visible symptoms. Low levels of soluble salts in the potting mix can also be a useful indicator of fertilizer deficiency.

The salt level in pots may also change rapidly, even on a daily basis. For example, in heat-wave conditions there may be rapid fertilizer release from controlled-release fertilizers, especially if it has been recently applied. A single heavy watering can also dramatically reduce the salt level. Since salinity readings can be "out of date" quickly, measurement at the actual nursery is very desirable.

A number of techniques for measuring the salinity of potting media are being evaluated by the Department. The techniques are:

(a) *Saturated paste extract method* (SP). This is a widely used standard technique. A paste is made of the potting medium, the water is extracted under vacuum and the electrical conductivity (EC) of the solution is measured. This technique is time consuming, requires specialised equipment, and may not be suitable for very coarse potting media.

(b) 1:1.5 medium/water dilution technique (1:1.5). Moist potting medium is mixed with 1.5 times its own volume of water. The EC of this slurry is then measured. Because of its simplicity this technique is gaining in popularity and gives reasonable results. However, it does not take into account fully the bulk density of the media.

(c) *1:5 medium/water dilution technique* (1:5). Potting medium is mixed with 5 times its weight of water. The

electrical conductivity (EC) of the solution is then measured. This technique is more suited to mineral soils as it does not take into account the water holding capacity of the media.

(d) *Pour-through technique* (PT). This is a simple and recently developed non-destructive technique which can be used directly on plants growing in pots. Water is added to the surface of the potting medium. The leachate is then collected (about 100 ml) and its EC measured.

The problems associated with the interpretation of the results of dilution techniques (1:1.5 and 1:5) have been pointed out by many workers. These techniques do not take into account fully the water holding capacity of the medium and, in the case of the 1:5 technique, the variation in bulk density among media makes it difficult to interpret results. This places serious restrictions on their use in determining salt levels in potting media. The use of the SP and the simpler PT technique would thus appear to be preferred.

Table 1 illustrates the difficulties involved in comparing results among techniques. The saturated paste technique is considered by many to best represent the salt level in the potting medium because its use minimises differences in bulk density and water holding capacity. However, when it is used to measure salt levels in soils of varying clay content, a "conversion factor" based on clay content is usually used to determine if the salt level in the soil is excessive.

Table 1. Salinity measurements in various potting media. Measurement is by electrical conductivity (μS).

Medium	Method used			
	1:5	1:1.5	S P	P T
(a) sawdust, peat, pinebark, sand (1:1:1)	239	640	1260	1456
(b) peat, sand (1:1)	263	953	2558	3720
(c) peat, pinebark, perlite (2:1:1)	671	1047	1863	1842
(d) peat, perlite (1:1)	741	961	1950	1912
(e) peat, ricehulls, sand (2:1:1)	364	1012	2332	2737

l.s.d. = 288

Similar conversion factors may also be necessary for its use with potting media. In three of the five media in Table 1 there was no significant difference in salt level as determined by the SP or PT method. However, in the other two media the PT method gave significantly higher readings. Because the PT technique tends to displace the medium solution rather than dilute it, it may more accurately reflect the salinity level in the medium as perceived by the plant. The reason(s) for the variation between the PT and SP techniques for the different potting media is being investigated. It

has been demonstrated that the difference is not simply due to dilution with inert components (e.g. sand). The effect of the properties of the organic components on the difference between the two techniques is now being investigated.

At present, no standards exist for interpretation of the PT technique results. However, because of the wide ranges allowed, the existing SP standards (Table 2) may be used, with care, to interpret the PT results.

In conclusion the pour-through technique would appear to offer nurserymen a quick and simple method for determining the level of salinity in their nursery growing media.

Table 2. Interpretation of conductivity readings, based upon saturated paste extracts (μS).

Plant tolerance	Desirable range (μS)
Low	1000–2000
Medium	2000–4000
High	4000–6000

(After Bunt, 1976). Note, this a general guide only.

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