Those which responded well to the hydrosolaric system; *Philodendron* plants developed very rapidly, with huge dark green leaves, many offshoots, and a long and spreading root system. *Gardenia* and *Ficus* had difficulties adjusting at first, but subsequently developed very well. *Anthurium* developed excellent growth with many large flowers as compared with the plants growing in a conventional greenhouse. The *Anthurium* root system was concentrated in the upper layer of the tuff, and did not penetrate through the basket. *Brassáia* adjusted very rapidly to the hydrosolaric environment, developed huge leaves and stems with many aerial roots. The root system penetrated through the tuff and into the growth solution. 2) The second group of plants included species which at present have not been shown to benefit from the hydrosolaric system. Especially interesting in this group was the growth habit of *Kalanchoe,* since shoots developed very well, with almost no root system. 3) The third group consisted of plants which failed to grow in the hydrosolaric system.

Plants that had been growing under hydroponics, adjusted immediately to the system and continued their normal growth (except for *Fatshedera lizei*), while plants that had been growing previously in soil took time to adjust; in many of them the old roots died and new ones formed. There was no difficulty involved in transplanting plants from the hydrosolaric system to conventional, soil media and greenhouse conditions.

Conclusion

The hydrosolaric system is a closed growth system which permits CO_2 enrichment of the greenhouse air and maintains a very high level of humidity and a reasonable growing temperature (without heating) for foliage plants during the Israeli winter.

In addition, the hydroponic growth medium permits the maintenance of an optimal root environment. The system was found to be excellent for growing tropical foliage plants; other species did not show any clear response to the system, and some species failed to grow under these conditions.

It is possible to separate between the 2 components of the hydrosolaric system—hydroponics and solar heating of the greenhouse. Thus, the system can be used just to control the greenhouse air atmosphere (heating, cooling, raising humidity, and maintaining a high CO_2 level), and the plants can be grown in conventional solid media.

The advantages of the hydrosolaric system in the cultivation of some tropical foliage plants are clear: Very rapid production of an excellent quality tropical foliage plant without the need for any heating. The practical use of the system is presently under investigation.

Literature Cited

1. Levav, N. and N. Zamir. 1978. Energy saving methods in the Israeli industry. *Acta Hort.* 87:421-432.

Guidelines for Measuring and Reporting the Environment for Plant Studies[1]

Growth Chamber Working Group of the American Society for Horticultural Science

Guidelines for measurement and reporting of the environment in plant growth chambers have been developed by research scientists in the United States and Canada and are presented in Table 1 to encourage their use and adoption by horticulturists.

Detailed and complete measurements are needed, because of the large variation in environmental conditions in different laboratories and chambers even though attempts are made to maintain similar control. These differences occur because of variations in the reflectivity of surfaces, size of chambers, direction of air flow, degradation of lamps, carbon dioxide concentration of makeup air, humidity level of makeup air, temperature cycling of chambers and various other reasons.

These guidelines were developed initially by the North Central Regional 101 Growth Chamber Use Committee composed of Agronomists, Horticulturists, Botanists and Engineers from Experiment Stations and government laboratories across the United States and then discussed in detail at a Controlled Environment Working Conference held at Madison, Wisconsin in March, 1979 (3). This workshop was jointly sponsored by the North Central Regional 101 Growth Chamber Use Committee, SE 303 Environment and Plant Structures Committee of the American Society of Agricultural Engineers, the Growth Chamber Working group of the American Society of Horticultural Science and by the Biotron at the University of Wisconsin. The guidelines published here have been revised and edited by the NCR 101 Committee in March, 1980.

These guidelines are an expansion of the guidelines published in HortScience in 1972 (2) and 1977 (1) and encourage more complete and precise reporting of the plant growing environment. These guideline provide recommendations on types of instruments to utilize for measurement, where measurements should be taken, when measurements should be taken, and the format and units that should be utilized in reporting the environment of each study. These guidelines have incorporated SI units to a large extent, but for certain parameters, common usage has dictated recommendations for units that are not in the accepted SI units. It is anticipated that these guidelines will be continually updated as instrumentation is improved and the need for greater environmental precision is demanded by environmental researchers. Scientists are encouraged to utilize the sample paragraph that was published with the 1977 guidelines (1) for reporting the environmental conditions monitored. A listing of useful instruments for making measurements to meet these guidelines can be obtained by writing to the Growth Chamber Working Group, American Society of Horticultural Science, Mt. Vernon, VA, 22121.

The adoption of these guidelines by researchers, and adherence to these suggestions by review editors wherever possible, will significantly improve the quality of environmental research and greatly aid in making comparisons among studies conducted in different laboratories. We strongly urge and encourage our society to adopt these guidelines.

Literature Cited

1. American Society Horticultural Science Special Committee on Growth Chamber Environments. 1977. Revised guidelines for reporting studies in controlled environments. *HortScience* 12:309-310.
2. Krizek, D. T. 1970. Proposed guidelines for reporting studies conducted in controlled environment chambers. *HortScience* 5:390.
3. Tibbitts, T. W. and T. T. Kozlowski (eds.). 1979. Controlled environment guidelines for plant research. Academic Press, New York.

[1]Received for publication July 3, 1980.

Table 1. Proposed guidelines for measuring and reporting the environment for plant studies[z].

Parameter	Typically used unit[y]	Measurements		
		Where to take	When to take	What to report
Radiation				
PAR (Photosynthetically active radiation)				
a) Quantum flux density 400-700 nm with cosine correction	$\mu E\ m^{-2}s^{-1}$	At top of plant canopy. Obtain average over plant growing area.	At start and finish of each study and biweekly if studies extend beyond 14 days.	Average over containers at start of study. Decrease or fluctuation from average over course of the study. Wavebands measured.
or				
b) Irradiance 400-700 nm with cosine correction	$W\ m^{-2}$	(Same as quantum flux density)	(Same as quantum flux density)	(Same as quantum flux density)
Total irradiance				
With cosine correction. Indicate bandwidth.	$W\ m^{-2}$	(Same as quantum flux density)	At start of each study.	Average over containers at start of study. Wavebands measured.
Spectral irradiance				
250-850 nm in <20 nm bandwidths with cosine correction	$\mu E\ m^{-2}s^{-1}nm^{-1}$ or $W\ m^{-2}nm^{-1}$	At top of plant canopy in center of growing area.	At start of each study.	Graph of irradiance for separate wavebands at start of study.
Photometric[x]				
380-780 nm with cosine correction	klx	(Same as quantum flux density)	At start of each study.	(Same as total irradiance)
Temperature				
Air				
Shielded and aspirated (>3 m sec^{-1}) device	°C	At top of plant canopy. Obtain average over plant growing area.	Hourly over the period of the study. (Continuous measurement advisable)	Average of hourly average values for the light and dark periods of the study with range of variation over the growing area.
Soil and liquid	°C	In representative area of container.	Hourly during the first 24 hr of the study. Start immediately after watering (monitoring over the course of the study, advisable).	Average of hourly average values for the light and dark periods for the first day or over entire period of the study if taken. Location of measurement.
Atmospheric moisture:				
Shielded and aspirated (>5 m sec^{-1}) psychrometer, dew point sensor or infrared analyzer	% RH or dewpoint temperature or gm^{-3}	At top of plant canopy in center of plant growing area.	Once during each light and dark period, taken at least 1 hr after light changes. Monitoring over the course of the study, advisable.	Average of once daily readings for both light and dark periods with range of diurnal variation over the period of the study (or average of hourly values if taken).
Air velocity	$m\ s^{-1}$	At top of plant canopy. Obtain maximum and minimum readings over plant growing area.	At start and end of studies. Take 10 successive readings at each location and average.	Average and range of readings over containers at start and end of the study.
Carbon dioxide	$mmol\ m^{-3}$	At top of plant canopy.	Hourly over the period of the study.	Average of hourly average readings and range of daily average readings over the period of the study.
Watering	liter		At times of additions.	Frequency of watering. Amount of water added per day and/or range in soil moisture content between waterings.
Substrate				Type of soil and amendment Components of soilless substrate. Container dimensions.
Nutrition	Solid media: $kg\ m^{-3}$ Liquid culture: μ or $mmol\ \ell^{-1}$		At times of nutrient additions.	Nutrients added to solid media. Concentration of nutrients in liquid additions and solution culture Amount and frequency of solution addition and renewal.
pH	pH units	In saturated media, extract from media, or solution of liquid culture.	Start and end of studies in solid media. Daily in liquid culture and before each pH adjustment.	Mode and range during study.
Conductivity	$dS\ m^{-1}$ (decisiemens per meter)[w]	In saturated media, extract from media, or solution of liquid culture.	Start and end of studies in solid media. Daily in liquid culture.	Average and range during study.

[z]Proposed by the North Central Regional Committee NCR-101 on Growth Chamber Use.

[w]1 dS m^{-1} = 1 mho.

[x]Report with PAR reading for historical comparison.

[y]Report in other subdivisions of indicated units if more convenient.