COLORADO GREENHOUSE GROWERS ASSOCIATION, INC.

Research Bulletin

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POINSETTIA TOUR 1982 OBSERVATIONS AND COMMENTS

William E. Healy[1]

The November 10 poinsettia tour presented a good opportunity for growers to see a wide range of developmental stages and cultural details. Each grower's temperature control, and temperature management, was evident in the stage of development of the crop. Growers who grew their poinsettias at about 60° had slow growth, retarded bract development and, overall, a "green" crop. It is essential to maintain at least 64° at the *coldest* part of the greenhouse to keep the bracts developing. Reducing the temperature late in the season if the plants get ahead is easier, and cheaper, than trying to speed up development so as not to miss Christmas. Therefore, push the crop early and keep records as to rate of development so you can tell where you are from year to year. An easy way to keep track is to take a "polaroid" picture each week and write on the picture the heating/cooling set points and any other unique climatic conditions.

If plant growth was uneven, either inadequate, incorrect growth regulator application, or insufficient vegetative growth prior to floral initiation was a problem. Since each cultivar, plant size and planting date has a unique growth regulator requirement, thorough records are a must to reproduce the same consistent quality crop each year.

Growers who produced plants "taller than we like", usually missed or did not adequately anticipate growth regulator needs of the crop. Any time you change planting/pinching dates your growth regulator needs also change.

When the planting and pinching dates are later than normal, long days are essential to get some vegetative growth. The problem with insufficient vegetative growth prior to reproductive growth is often seen as runt lateral shoots and a clubby plant. A sign of too rapid floral initiation is only a few leaves below the bracts. If too few or too many leaves (requiring excess growth retardant) is a problem, consider rethinking your timing of floral initiation to optimize overall plant quality.

The final problem area of this year's poinsettia crop deals with nutrition. Optimum nutrition levels for growing conditions must be maintained from planting to finish. Excess feed or failure to feed early, results in reduced leaf area while skimping on the feed late in the season may reduce bract quality. As growers, we should know what is going into the hose, coming out of the hose, and what the weekly fertilizer level is in the soil. Without these pieces of information optimizing growth in those conditions is at best difficult.

[1] Assistant Professor, Colorado State University.

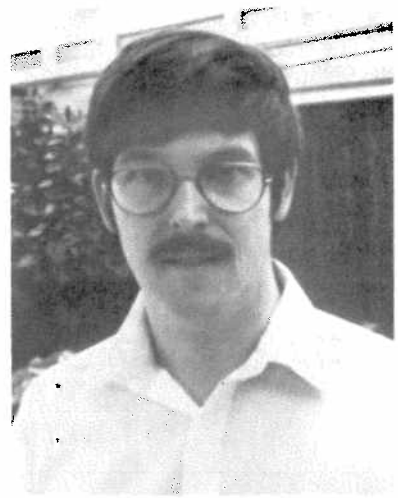
NEW HALF-TIME EXTENSION SPECIALIST ON-BOARD

William Healy took over the floriculture extension specialist position on November 1, that was vacated by Dave Hartley.

Will was born in St. Paul, Minn. on October 28, 1954, and recently completed his Ph.D. at Minnesota where he also earned his B.S. and M.S. degrees. While working on his degrees, Will worked full-time as Harold Wilkins' technician. Will's research on carnations (Ph.D. dissertation), alstroemeria (MS thesis), roses and lilies should benefit Colorado growers. Besides these crops, Will has been involved with lateral branching research on several crops along with freesia and azalea dormancy studies.

Will is responsible for the statewide floriculture extension program and will be contacting growers in the coming months to discuss their problems and needs.

We wish Will, his wife Louise and son Willie a hearty welcome and many happy years in Colorado.



William Healy

A PACKING PROCEDURE FOR GREENHOUSE POTTING MEDIA

Gregory P. Kerr

We often must determine a growing medium's physical properties, preparing the mix in a consistent and reproducible manner. A problem arises, however, when each person has their own pet techniques. Without a standard procedure for packing soil columns for physical analysis, one cannot compare information from different experiments. This short study was to determine a reproducible, standard greenhouse soil packing method. This requires an appropriate moisture content and a system to compact the substrate.

Soils can be compacted by several methods. One is to apply a weight to the surface of the medium. This technique does not simulate settling of the substrate in the pot. In some research papers, the packing procedure, if mentioned at all, is simply "tapped firmly". The reproducibility of such a procedure is questionable. The method we chose is to drop the soil column one inch (2.5 cm) onto a hard surface. This simulates the compaction which occurs when one taps a pot on a bench, while at the same time it is reproducible. The number of times required to drop the column was determined.

The potting materials examined were 1:1:1 (equal volumes) Canadian peat, horticultural grade perlite, Ft. Collins clay loam (PM-P-S), 1:1 peat, perlite (PM-P), 1:1:1 shredded rockwool, perlite, grade 3 vermiculite (RW-R-V), and a commercial mix (VSP Peat-Lite Mix) of peat, perlite and vermiculite (PM-P-V).

These mixes had a variety of particle size distributions (Fig. 1). PM-P had most of its weight in one particle size range (0.2 mm sieve). This could be attributed to the uniformity of the perlite. PM-P-S, on the other hand, had a wide range of particle sizes.

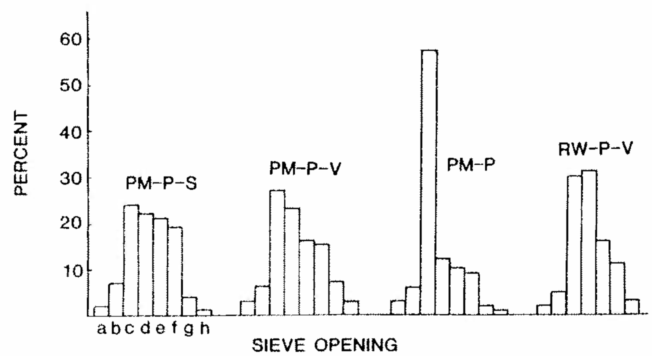


Figure 1: Particle size distributions of the 4 potting media expressed as % by weight of sample retained by sieves ranging in mesh size from 7.925 millimeters to 75 micrometers.
PM-P-S = Peatmoss, perlite and soil (1:1:1)
PM-P-V = VSP peat-lite mix
PM-P = Peatmoss and perlite (1:1)
RW-P-V = Rockwool, perlite and vermiculite (1:1:1)

The first experiment varied the moisture content and the amount of compaction. The moisture content was varied by adding 0, 500 or 1000 milliliters (ml) water to 1/3 ft^3 (9.43 liters) of oven dried material. The soil columns, each 2-inch (5.1 cm) diameter PVC plastic pipe, were filled to a 6-inch depth. This depth was chosen because it is fairly common in greenhouse practice. Compaction was varied by dropping the columns one inch, 0, 5, 10, 20 or 40 times using the device in Fig. 2. After each drop, enough was added to the column to restore the 6-inch (16 cm) depth. The medium was then dried and density determined. Bulk density was measured in these columns because of its ease of determination, and the fact that changes in this property, would reflect changes in other physical properties of the medium.

Bulk density (Table 1) decreased with increasing moisture content in the mixes containing peat (PM-P-S, PM-P, PM-P-V). This was probably due to the swelling of peat as water was added. In contrast, RW-P-V showed a trend of increasing bulk density with increasing moisture content. This indicated the importance of a standard moisture content for determining physical properties of media. Also, after dropping the column 5 times, there was little change in bulk density (Table 1).

To compare the amounts of compaction obtained in the 4 mixes at the 3 moisture contents, we calculated the degree of compaction (Dc) (Table 2), as the percent change in bulk density caused by compaction. PM-P was, over the three moisture contents, least compactable of the 4 mixes, probably due to its uniform particle size (Fig. 1) and its low bulk density. PM-P-S, on the other hand, having a wider distribution of particle sizes and a higher bulk density, was most compactable. The greater the variation in the size and structure of the mixed particles, the greater the combined volume could be reduced.

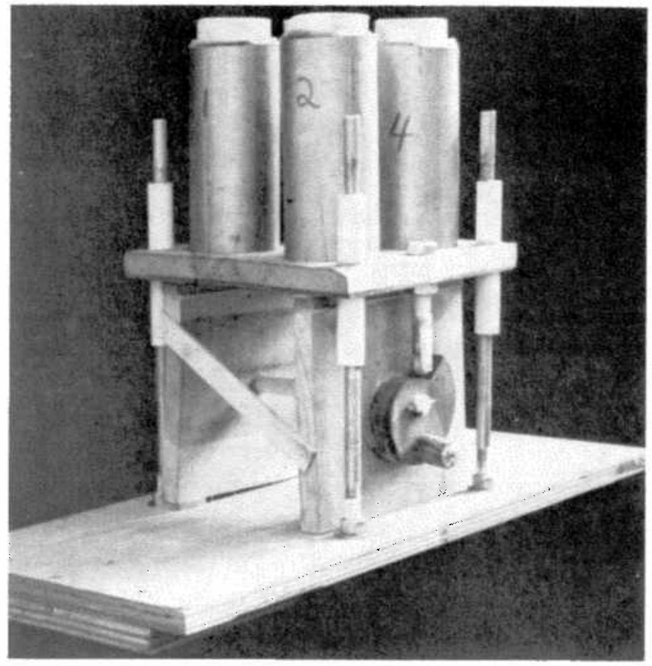


Figure 2: Device used for dropping 4 soil columns 1 inch.

Table 1. Bulk density (grams per cubic centimeter) of 4 media at 3 moisture contents and 5 levels of compaction.

Medium	Water added (milliliters)	Compaction No. of times 6-inch column dropped 1-inch				
		0X	5X	10X	20X	40X
PM-P-S	0	.45	.57	.59	.60	.59
Peatmoss, perlite,	500	.42	.50	.49	.50	.49
soil (1:1:1)	1000	.40	.46	.47	.46	.50
				HSD = .079[a]		
PM-P-V	0	.15	.18	.18	.17	.18
VSP peat-lite	500	.13	.15	.15	.15	.15
mix	1000	.11	.14	.13	.13	.13
				HSD = .011		
RW-P-V	0	.12	.13	.14	.14	.14
Rockwool, perlite,	500	.12	.15	.15	.15	.16
vermiculite (1:1:1)	1000	.12	.14	.15	.16	.15
				HSD = .008		
PM-P	0	.08	.09	.10	.10	.10
Peatmoss,	500	.08	.09	.09	.09	.09
perlite (1:1)	1000	.07	.08	.09	.09	.09
				HSD = .008		

[a]HSD = honestly significant difference

Table 2. The % degree of compaction (D_c) obtained after dropping the column 1-inch, 5 times, at 3 moisture contents.

$D_c = \frac{BD_c - BD_o}{BD_o} 100$, where BD_c = bulk density after compaction, BD_o = bulk density before compaction at the same moisture content (HSD = 7.9).

Medium	Water added (ml) 0	500	1000
PM-P-S	26	19	14
PM-P-V	15	11	20
RW-P-V	13	18	19
PM-P	13	13	17

To summarize, the standard procedure proposed for packing soil columns for physical analysis of potting media is:

1. Dry at 70 C (160 F)
2. Mix 1 liter water (about 1 quart) per 1/3 ft^3 medium
3. Fill column to 6-inch depth
4. Drop column 1-inch 5 times, maintaining a 6-inch depth

The first two steps are a simple means of ensuring a standard moisture content. The 1000 ml level was chosen because it was a good moisture content for potting. We felt difficulties would be encountered in working with higher moisture contents.

CGGA TOURS CSU

October 20, 1982

We were proud to have the Colorado Greenhouse Growers' visit us for the first time since the major research facilities were renovated three years ago. It was like "old times" to have such an interested and large group make us sit up. These visits impress students and give us a chance to renew old friendships, as, with Will Healy on half-time extension, some of us do not get out to "look at the crop" the way we used to. There were a number of new faces looking at us, and it was a pleasure to make new acquaintances and encourage them to visit us again in the near future.

Figure 1: Here they come! From left, David Fassen, Charlene Pazar, Glen Montague, Cloro Sanchez, Alex Gerace and others in the group. They are all headed to another tour stop. Note the condensate on "Heat House 1" in the background.

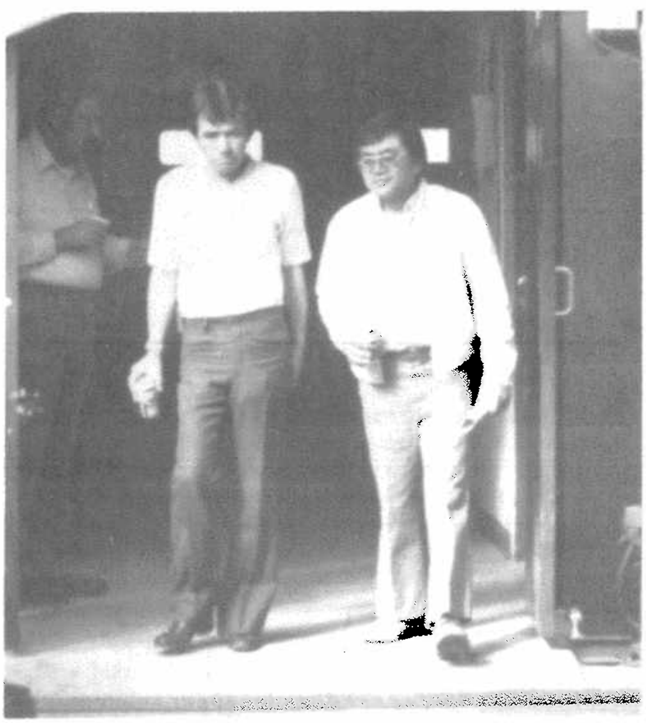


Figure 2: Gene Yoshihara (left) and Ken Tagawa enter majestically to view facilities renovated 3 years ago.

Figure 3: Nick Gaone is apparently making a point to Bob Kretz while Bill Crowley and Gale Hodgkin look on out by "Lite House 7".

Figure 4: Frank Teti, Jr. looking serious, and Nick Klaver, as usual, looking jolly, on the right. Gordon LaMunyon with his wife Doris.

Figure 5: Gale Hodgkin (left) looks like he has received his marching orders, Don Miller and Bill Crowley making comments while Nick Lawlor and Dave Wagner (right) try to decide which way to go.

Figure 6: What is Ray Zacharias looking at that John Rosa has? Can Bill Pfiefer (center) really see behind those glasses? R.J. Schwartz (right) also looking — well. Apparently tour is going okay as Bob (left) is smiling. Some of these people are getting a lot of publicity.

Figure 7. Kenneth Goldsberry shepherding one of the three groups.

FIRST PRACTICUM CLASS AT CSU

As it was noted last year, we have changed the curriculum in Floriculture to a requirement for either 4 credits of actual work at our research and teaching ranges, or 4 credits of internship at some commercial range. We also require a course in computer applications prior to the course on greenhouse management. As an interesting comment on changes in our society, this is the first course in my career (Hanan's) where there are no men. When I was going to school, the reverse was common. We think these young people are a significant addition that will eventually change the industry for the better.

Top, Left: Connie Smith; Right: Lynn Peterson; Bottom, Left: Renee Moses; Right: Rhonda Counts; Carole Mulligan

INTERESTING NOTE FROM *SCIENCE*, 1982, 218:677-680.

Article by Waldman et al.: Chemical composition of acid fog.

Fog water was collected at sites in Los Angeles, Bakersfield, Pasadena and Lennox. A portion of their data is reproduced below:

Location	pH (Minimum)	Na^+	K^+	NH_4^+	Ca^{+2}	Mg^{+2}	NO_3^-	SO_4^{-2}	Cl^-
		(Milliequivalents per liter, maximum levels only)							
Pasadena	2.9	0.5	0.5	2.4	0.5	0.4	3.5	0.9	0.7
Lennox	2.5	0.5	0.2	4.1	4.4	1.3	4.6	2.1	1.1
Bakersfield	2.9	1.2	0.2	10.5	1.3	0.2	5.1	5.0	0.6
Pasadena	2.3	2.2	0.5	7.9	2.1	1.2	12.0	5.1	0.7

Ranges were, in some instances, quite wide, depending largely on what preceeded the fog episode (smog, blowing dust, etc.). However, 12.0 meq/l nitrate (NO_3^-) is the recommended level in good water for that compound in irrigation solutions for carnations. It is equivalent to 744 ppm NO_3^- or 168 ppm nitrogen. The maximum for ammonium (NH_4^+), at Bakersfield was 10.5 meq/l which is equivalent to 189 ppm NH_4^+ or 147 ppm nitrogen. If that ammonium level persisted for a sufficient period, it would be highly toxic to plants. Fortunately, Colorado seldom has fogs of the California type. It is revealing to see that one could make quite a nutrient solution out of fogs to feed plants.

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