Progress Report on Growing Pot Plants and Bedding Plants in Artificial Media

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The ever increasing scarcity, and the high cost of good top soil, when it is available, has prompted more and more pot plant growers to seek some artificial media for producing their crops. Mixtures of sand and peat or peat and perlite in various proportions have been used by some growers with good success. Other growers have had either fair or very poor success with such media.

Quite frequently, a grower will change the media that he is using without changing his cultural program or his thinking of the methods that he uses. Herein usually lies the cause for the troubles that follow a switch to a new growing media.

A preliminary investigation of some artificial media for growing pot plants was begun in the spring of 1959. Sixteen different soil mixes were used to grow six pot plant crops.

The soil mixes used were:

1.	Coarse grain quartz sand	25%	German peat moss	75%
2.	" " " "	50%	" " "	50%
3.	" " " "	75%	" " "	25%
4.	Fine grade quartz sand	25%	" " "	75%
5.	" " " "	50%	" " "	50%
6.	" " " "	75%	" " "	25%
7.	Sterilite-a medium grade perlite material	25%	" " "	75%
8.	" " " "	50%	" " "	50%
9.	" " " "	75%	" " "	25%
10.	Pa 100 — a fine grade perlite material	25%	" " "	75%
11.	" " " "	50%	" " "	50%
12.	" " " "	75%	" " "	25%
13.	Pa 6 — a coarse grade perlite material	25%	" " "	75%
14.	" " " "	50%	" " "	50%
15.	" " " "	75%	" " "	25%
16.	Soil, sand and peat 1:1:1 by volume, as a control medium			

The following crop plants were grown in 4–inch clay pots:

1. African violet
2. Begonia Semperflorens
3. Chrysanthemum, Yellow Chris Columbus
4. Geranium
5. Impatiens
6. Petunia

(*Continued on page 2*)

Artificial Media

(*Continued from page 1*)

Methods of Fertilization

Since the above mixtures, other than number 16, contain little or no nutrients, it was necessary to add fertilizers prior to planting. This was done in accordance with the recommendations of the U C Manual. The fertilizer used was a modified 1-C and had the following composition.

Potassium nitrate	4 oz./cubic yard
Potassium sulfate	4 oz./cubic yard
20% Superphosphate	2½ lbs./cubic yard
Calcium Carbonate	2½ lbs./cubic yard

Dolomitic limestone is recommended at the rate of 7½ lbs./cubic yard. Since dolomitic lime is not readily available in New York State, magnesium sulphate was used in conjunction with a liquid feeding program at the rate of 8 oz./100 gallons of water applied every two weeks.

The U C Manual recommends that feeding begin ten days after potting. Ammonium nitrate and Potassium chloride were used at the rate of 16 oz. of each material/100 gallons of water every two weeks. To test the effect of a more frequent application of fertilizer, one-half of these amounts was applied weekly to one-half the crops grown. This meant that all the plants received the same total amount of fertilizer, but one-half of them received it in two half-strength applications, whereas, the other half received all its fertilizer at one time.

Since it was known that the water holding capacities of the materials used would vary a great deal, it was decided that a uniform quantity of water would be added daily to each pot. The fact that some pots would be overwatered and others not watered enough was considered, but the addition of a uniform quantity of water per pot was felt to be of greater importance. Seventy-five milliliters of water were added to each pot daily. This same volume was used when the plants were fertilized. During some exceptionally bright, warm, spring days, this amount of water was not sufficient to keep the plants in the low volume peat and high volume coarse particle size materials from wilting.

RESULTS

The results of this preliminary study can best be explained on an individual crop basis.

African Violets

Two-inch plants of the variety White Spray, that had been growing in soil, were potted March 2, 1959, in the various mixtures previously described. The plants were grown at minimum temperatures of 70°F under reduced light intensity conditions. The plants were grown on until June 4, at which time they were harvested. Each plant was cut off at the soil level and individually weighed to obtain the fresh weight in grams. Figure 1, shows the fresh weight in grams for the different soil mixes. Each figure is the average of four pot weights.

The results obtained are inconsistent for any of the factors tested. In most cases, the decrease in proportion of peat used has resulted in a decrease in fresh weight. This varies somewhat in relation to the frequency of fertilization.

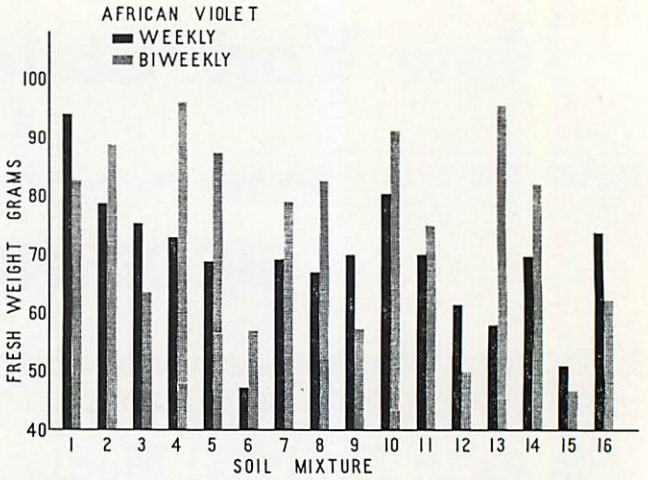

Figure 1. The fresh weight of African Violets harvested from 16 different medias, which were fertilized weekly and biweekly.

The best growth was obtained with a bi-weekly feeding in media numbers four and 13. This is a confusing anomaly in that media four was composed of 25% fine quartz sand and 75% peat and media 13 was a mixture of 25% Pa 6—a coarse perlite and 75% peat. Both media contained 75% peat which would seem to be the most important factor. African violets have a fine, fibrous root system which does best in a highly organic mixture.

Begonia Semperflorens

Begonia seed was sown January 20, 1959 and the young seedlings were potted into the various media March 31. These plants were grown on until June 3, 1959 at which time they were harvested and the fresh weights recorded.

The results in Figure 2 show that weekly feedings produced the largest plants in all cases except mixture number one. The heaviest growth was obtained in mixture number four, the 25% fine sand and 75% peat with the weekly feeding. It seems that this mixture was the one that perhaps retained the greatest amount of moisture and still provided good aeration, the result of which was the best growth.

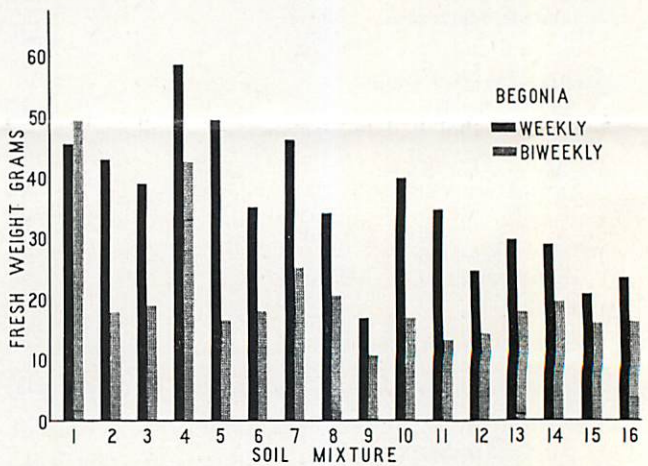

Figure 2. The fresh weight of Begonias harvested from 16 different medias, which were fertilized weekly and biweekly.

From this comparison we may conclude that begonias grow best in a media of 25 – 75, fine sand-peat by vol-

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ume with smaller amounts of fertilizer being applied more frequently than every two weeks.

Chrysanthemums

Rooted cuttings of the garden variety chrysanthemum, Yellow Chris Columbus, were potted one plant per pot and pinched March 5, 1959. No lights and no black cloth were used. The plants flowered and records were taken May 7, 1959.

Figure 3 shows that feeding weekly or biweekly was satisfactory for good growth. However, the best growth was obtained with mixture number 10, 25% Pa 100 and 75% peat. The next best mixture used was number 13, the 25% Pa 6 (coarse grade material) and 75% peat. The poorest growth was obtained with mixtures that contained only 25% peat and 75% inert material, i.e. numbers 3 and 9.

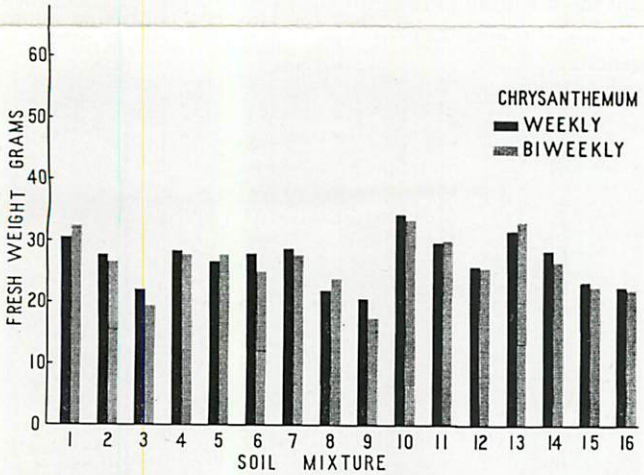

Figure 3. The fresh weight of Chrysanthemums harvested from 16 different medias, which were fertilized weekly and biweekly.

Although the weight differences are large in some cases, visual observations of these plants did not show any striking differences among plants in the various media that could be easily seen.

Geraniums

Geraniums that had been growing in soil in 2½-inch pots had the roots washed free of soil and were planted in the various media on March 2, 1959. The damage caused by washing and the necessary development of a root system functioning under different environmental conditions resulted in a severe set-back to the plants. However, at the time of harvest May 21, the plants were in good condition.

The results of the experiment (Figure 4) show that mixture number 14, 50% Pa 6 and 50% peat, fed biweekly resulted in the best growth. Mixture number 13, 25% Pa 6 and 75% peat, fed weekly was the second best media used.

Of all the media used, Pa 6, coarse grade perlite resulted in the loosest and driest mixture. This mixture produced a plant environment that was similar to that found in the general practice of running geraniums dry and producing good crops.

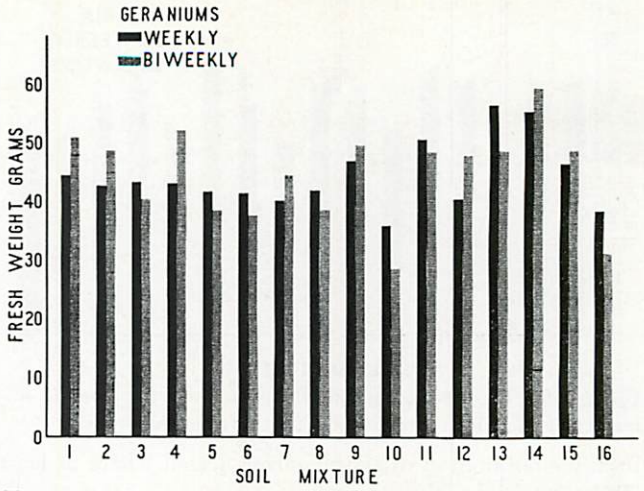

Figure 4. The fresh weight of Geraniums harvested from 16 different medias, which were fertilized weekly and biweekly.

Impatiens

Seed of Impatiens was sown February 2, 1959, potted March 5, and the plants were harvested May 28, 1959. A wide variation in the fresh weight was obtained (Figure 5); the best growth and the poorest growth was produced in perlite mixtures. The best growth obtained in mixture number 9, 75% sterilite and 25% peat while the poorest growth was obtained with 25% Pa 100 and 75% peat.

This was the first indication that a 75% inert material 25% peat combination was superior to all others used. A 50 – 50 mixture of coarse perlite, Pa 6 and peat moss was a close second for best growth. From these results it would seem that Impatiens has a high soil aeration requirement. Fertilizing lightly on a weekly basis was slightly better than using a heavier application every two weeks.

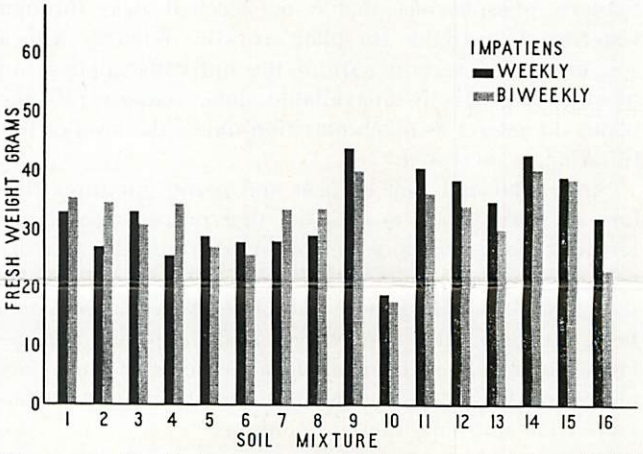

Figure 5. The fresh weight of Impatiens harvested from 16 different medias, which were fertilized weekly and biweekly.

Petunia

Petunia seed were sown February 2, and potted March 5, into the various media. The plants were harvested and fresh weights recorded May 15, 1959. From Figure 6, it may be seen that mixtures 1, 2, 4, 5, 7, 8, 10, 11, 13 and 14 all produced plants that were fairly equal in fresh weight regardless of the frequency of feeding. Mixtures low in the proportion of peat to inert material performed the poorest. These results show that petunias will do well

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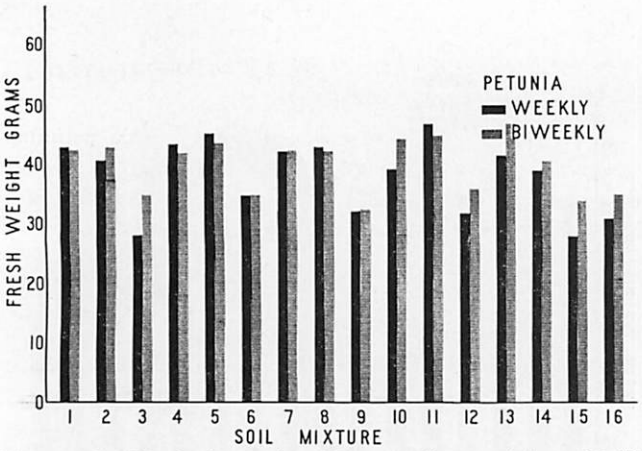

Figure 6. The fresh weight of Petunias harvested from 16 different medias, which were fertilized weekly and biweekly.

in any combination of the materials tested where at least 50% peat is included.

DISCUSSION

The results of this preliminary study of various growing media showed that no one specific mixture was good for all of the crops grown. Moisture requirements, aeration and feeding capacity of each of the crops grown varied sufficiently that no one mixture satisfied these requirements better than others. One exception was petunias which did well in any mixture that contained at least 50% peat moss by volume.

In no case did the 1:1:1 soil mixture perform as well as the other artificial mixtures. Part of this poor performance may be attributed to the failure to include superphosphate in the soil prior to planting.

Another factor is the part played by the soil colloid itself in tieing up nutrients so that they are relatively unavailable to the plants. Subsequent studies with peat and perlite mixtures showed that all the fertilizer applied, particularly phosphorous, that is not leached away through watering, is available for plant growth. Whereas with a soil mixture a certain part of the nutrients applied are fixed in a relatively unavailable state, consequently the plants do not get as much nutrition unless the level of fertilization is increased.

Since sand and peat or peat and perlite mixtures contain no nutrients, it is essential that proper amounts of fertilizer components be incorporated into the mixture prior to planting. Failure to do so results in a set-back to the plants from which they do not recover. Where native peats are substituted for german peat moss, this requirement may not be so critical. If native peats or mucks are to be used, it is recommended that they be tested to determine what nutrients they do contain.

Summary

African Violets, Begonia Semperflorens, Chrysanthemums, Geraniums, Impatiens and Petunias were grown in 16 different media the spring of 1959. The plants were fed equal amounts of fertilizer on a weekly and biweekly basis. No single growing media was best for all the crops grown. Petunias produced excellent growth in any of the media where at least 50% peat moss was used. The addition of fertilizer components prior to planting is emphasized as an important factor for successful crop production in artificial media.

Further studies of the mixtures used are planned.