

The Growth of Carnations in Artificial Media

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Considerable interest has been shown in artificial media for growing greenhouse crops. Various gravel aggregates have been used successfully at several experiment stations, especially Ohio State, Purdue and Colorado A&M. Gravel culture has been used with varying degrees of success in a number of commercial greenhouses throughout the country, but almost invariably growers who try this media eventually go back to growing in soil. Several reasons may be found for this failure of gravel culture to measure up to soil in commercial ranges. Usually these reasons involve the degree of safety. In other words, commercial growers feel that it is too easy to lose a crop in gravel culture.

A mixture of sand and peat has been used as a growing medium in some commercial greenhouses with varying degrees of success. Frank McFarland of Libertyville, Illinois, has been using this medium for several years. Using sand and peat he is able to pump liquid fertilizer solutions on and keep an accurate control over the nutrition of his plants.

After work with additions of clay and peat the two soil types (Colo. Flw. Gro. Bul. 50), the next step was to test clay and peat additions to sand. The following media were mixed in randomized plots in a greenhouse bench in December 1952. Each treatment was replicated three times:

1. Good greenhouse soil.
2. A mixture of 50 per cent sand and 50 per cent peat.

3. Fifty per cent peat, 45 per cent sand and 5 per cent clay.
4. Fifty per cent peat, 40 per cent sand and 10 per cent clay.
5. Fifty per cent peat, 35 per cent sand and 15 per cent clay.

The peat used was a good grade of Colorado peat containing approximately 60 per cent organic matter. The sand was ordinary washed river bottom sand with no particles larger than $\frac{1}{4}$ " mesh. Clay used was a relatively pure calcium saturated bentonite. The pH of the mixture was near neutral and remained so during the experiment.

The mixtures were pasteurized with steam and planted with rooted cuttings of White Sim carnations on December 9, 1952. After 5 to 6 weeks the plants were pinched. One-half the breaks from the first pinch were pinched a second time.

Treble superphosphate and gypsum were added to the media before planting. Muriate of potash was applied as needed to maintain 20-30 ppm of potash by Spurway test. Ammonium nitrate was applied in the irrigation water each time the plants were watered.

A Lark tensiometer was placed in each plot and each plot was watered when the moisture tension reached 30 to 50 cm. of mercury. Records were kept on frequency of irrigation beginning in March.

Heavy production began June 10 and continued until December 26, when the experiment was terminated. All flowers

Table 1. Production, quality and number of irrigations required by carnations in various media

Media	Split	Short	Standard	Fancy	Q.I.*	Total Prod.	Prod. per ft. ²	Number Irrigations
1. Good Soil	1	14	245	155	4.33	415	29.6	53.5
2. Sand 50%-peat 50%	4	17	282	143	4.27	446	31.9	46.7
3. Sand 45%-peat 50%-clay 5%	1	17	262	198	4.37	486	34.1	54.0
4. Sand 40%-peat 50%-clay 10%	2	10	232	201	4.42	445	31.8	63.0
5. Sand 35%-peat 50%-clay 15%	3	16	265	184	4.35	468	33.4	60.6

*Minimum difference required for significance in mean quality index = 0.07 odds of 19:1
Q.I. derived by averaging all grades.

were graded by a combination of weight and length into short, standard and fancy grades. Fancy carnations weighed a minimum of 25 grams with stems 22 to 26 inches in length. Table 1 shows the production by grade for each medium, as well as the average number of irrigations required during a 9½ month period. Production figures are totals for 3 plots of 14 plants each.

Although there is a trend toward higher total production from the plots containing 5 per cent clay, none of the differences in production were great enough to be statistically significant. The differences in quality were significant with all media containing clay distinctly superior to the sand and peat medium. The media containing 10 per cent clay produced the best average quality, the difference being significant over all other media except the one containing 5 per cent clay.

The sand and peat media required fewer irrigations followed by soil, the 5 per cent clay medium and the 15 and 10 per cent clay media in that order.

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Summary:

The addition of clay to a mixture of sand and peat did not significantly affect total production of White Sim carnations, but it increased the average quality and the percentage of fancy blooms. Additions of clay also increased the frequency of irrigation. Clay increased the water holding capacity of a soil but also increased the bound water not available to plants. The increased quality produced by additions of clay may be entirely nutritional.

Clay can act as a storehouse for plant nutrients, absorbing them when they are plentiful and giving them up to plants when a shortage occurs. A small percentage of clay in an artificial medium, probably 10 per cent, helps to buffer the mixture against quick changes.

Your editor,

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