IN COOPERATION WITH COLORADO A & M
Secretary, Ray App
Bulletin 36 4434 Lowell Blvd., Denver, Colo. October, 1952

Thursday, October 9, the program will be arranged for growers of Carnations and Miscellaneous Crops. A program for Rose Growers is being arranged for Thursday, October 23.

CARNATION AND MISCELLANEOUS GROWER'S DAY -- October 9.

10:00 AM until noon--Inspection of research in progress at the Research Greenhouses on West Lake Street.
12:30 PM -- Lunch at the Student Union Cafeteria
1:30 PM.-- Afternoon session in the Large Ballroom, second floor of the Student Union
Soil Texture Studies -- by William Sauer
Carnation Nutrition and Liquid Feeding -- by W. D. Holley
2:15 PM -- Disease Control Report -- by Dr. W. D. Thomas, Jr.
Improvements in Culturing Carnation Mother Stock -- by Dr. Jess L. Fults, Plant Physiologist for Colo. Agr. Exp. Sta.
The Behavior of Different Races of Fusarium Wilt -- by Lester Dickens
3:30 PM -- Production Timing on Carnations -- by W. D. Holley
4:15-5:00 PM -- General Discussion Period

Although no organized tour is being arranged, growers are welcome at the Botany and Plant Pathology Building and greenhouses and at the Laurel Street Greenhouses behind the Horticulture Building. We have at the latter range a fine group of early pompons just beginning to bloom. There are some fifty 7- and 8-week varieties under trial for early flowering without black cloth treatment. Some of these look very good for use as early catch crops. Yoder Bros. have generously supplied the plants for this trial.

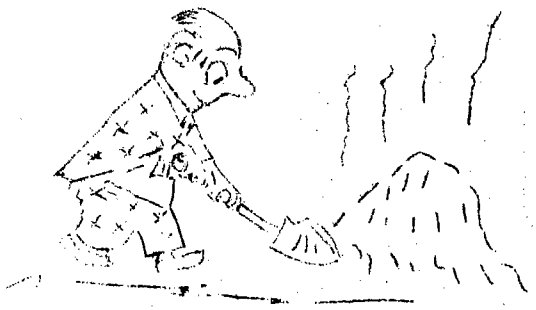
IN THIS ISSUE
*****

ROSE GROWER'S DAY -- October 23.

The morning session will be at the Research Greenhouses and Dutch Lunch will be arranged. The afternoon session will be in the Student Union--room to be announced. The program will be an informal group meeting with discussion on everything from developing young plants to pruning, production regulation, varieties, clonal selection, cutting and marketing. Rose Growers, let's make this one hundred percent.

A Physical Survey of Forty Colorado Greenhouse Soils

by N. C.. Gomness and W. D. Holley



Little work has been done on the physical phase of greenhouse soils. Most of the soil handling practices in use are based on trial and error or upon information adapted from research on field soils. In an attempt to further our knowledge of the physical characteristics of greenhouse soils, this survey was designed and completed.

General Procedure

In this investigation a ten-foot section of a bench of the carnation variety William Sim was selected in each of 40 commercial greenhouses. Special effort was made to select a section in each house that was representative of the type of growth in that house. This section was thoroughly soaked with water and allowed to drain for one hour. Measurements were made at the end of the hour to determine the air content of the soil. Ten samples were taken at random within the section of bench, their air content measured by means of an air picnometer, and their average air content was taken as representative of that section.

All normal flowers at approximately the same stage of maturity in each test section were cut and the quality of growth determined. Each flower was cut to its point of origin and measured in inches. Side growths were removed and the flowers were weighed on a dietary scale in grams. The weight in grams divided by the length in inches was found to be an accurate indicator of quality, hence is used in this report as a quality index.

After removal of loose mulch or litter, ten complete cores of soil were taken at random with a sampling tube and mixed to give a composite sample of each test section. The samples were air dried and screened through a 0.5 mm. sieve. The Bouyoucos method for determining percentage of sand, silt and clay in the soil was used. The Walkley-Black method was used for determining organic matter content. The percentage recovery by this method for the majority of agricultural soils is between 75 and 80 percent so the actual organic matter in all the soils tested was approximately 30 percent greater than that shown in the tables to follow.

Chemical tests were made for potassium, calcium, and sodium with all soil samples. The differences between the soils in content of these nutrients were small and inconsistent with quality of growth. Some correlations were found to exist between potassium and certain other factors and will be listed in the summary of this article.

The results of tests made on the 40 soils are arrayed according to quality of growth and follow in Table 1.

Table 1. The quality index of carnations growing in 40 greenhouse soils in Colorado with some physical characteristics of those soils

Soil No.	Quality Index 1/	Non-cap. porosity percent 2/	Organic matter percent 3/	Sand percent	Silt percent	Clay percent	Age of soil in years
1	1.305	19	2.56	69	25	6	20
2	1.143	10	2.60	68	23	8	15
3	1.128	13	2.66	71	21	8	3
4	1.110	21	2.68	49	36	15	3
5	1.062	14	2.73	61	29	10	2
6	1.062	12	2.04	53	41	6	2
7	1.053	15	2.58	73	20	7	5
8	1.045	17	2.69	60	22	18	3
9	1.043	14	3.19	62	27	11	24
10	1.036	20	2.86	69	22	9	2
11	1.034	20	2.36	79	15	6	3
12	1.014	18	2.62	71	23	6	10
13	1.011	38	2.87	76	18	6	3
14	1.008	17	3.20	42	37	21	2
15	1.008	18	2.35	81	13	6	3
16	.996	12	2.62	68	21	11	4
17	.982	11	2.23	78	13	9	5
18	.961	8	2.40	59	40	1	1
19	.945	8	1.84	84	14	2	5
20	.939	5	2.74	64	24	12	-
21	.936	17	3.13	46	28	26	3
22	.931	14	2.32	60	26	14	-
23	.929	36	2.23	77	15	8	34
24	.924	11	1.96	74	21	5	3
25	.923	9	1.86	72	21	7	2
26	.912	15	2.64	44	34	22	4
27	.912	11	2.16	65	20	15	1
28	.904	6	2.38	48	32	20	-
29	.893	10	1.90	86	10	4	2
30	.883	19	2.73	62	21	17	6
31	.882	19	2.49	66	22	12	13
32	.871	16	1.96	62	32	6	2
33	.869	7	2.56	60	24	16	2
34	.860	22	2.31	58	26	16	12
35	.853	14	2.22	42	39	19	5
36	.786	15	2.07	66	21	13	2
37	.780	29	2.90	50	45	5	old
38	.761	6	2.02	83	12	5	3
39	.758	4	1.23	78	17	5	9
40	.774	17	2.04	62	32	6	2

1/ Average weight in grams per inch of stem
2/ Percentage of air in a water saturated soil.
3/ Walkley-Black values.

In running total correlation-coefficients on the factors in this survey, only organic matter had an effect on quality of growth, this being highly significant statistically. Since many factors influence quality, it is rather difficult to point toany one single factor with a positive statement based on results of a survey of this sort. Most of the factors affecting quality were not under control so the data obtained must be examined for trends.

Dr. Robert Whitney, in presenting some of this material at the Twelfth Colorado Short Course, gave the following analysis:

Table 2. Trends on the influence of soil organic matter content and soil porosity on quality of growth of carnations.

	Number of Soils	Quality Index gms./inch.	Organic Matter %	Non-capillary Porosity %	Sand %	Silt %	Clay %	Textural Grade
Porosity								
Less than 10%	10	0.910	2.2	7	70	22	8	Loamy sand
More than 10%	30	0.970	2.5	18	63	26	11	Sandy loam
Lowest Quality	3	0.754	1.8	9	74	21	5	Loamy sand
Highest Quality	3	1.192	2.6	14	69	23	8	Sandy loam
Lowest O.M.	3	0.865	1.7	7	83	13	4	Loamy sand
Highest O.M.	3	0.996	3.2	16	50	31	19	Sandy loam
Lowest Porosity	3	0.819	2.0	5	75	18	7	Loamy sand
Highest Porosity	3	0.907	2.7	34	68	26	6	Sandy loam

Dr. Whitney grouped the 10 soils with the lowest and the 30 soils with the highest non-capillary porosities and showed a trend toward an increase in average quality of growth with increase in soil air content at saturation. By taking the three lowest and the three highest qualities, he showed the contributions of organic matter content of the soil and porosity. The three soils with highest organic matter and the three soils with lowest organic matter showed the influence of organic matter and porosity to an even greater degree.

Source of Original Soil

The majority of soils used in the Denver area seem to group around two sources--Table Mountain and East of Denver. The former is slightly acid and gray or black while the latter is a wind-blown prairie soil with a fine sandy texture. An average analysis of each of these two soil types is given in Table 3. Included are all soils from this survey which can be placed in either type.

Table 3. Quality of growth of carnations and mechanical analyses on Table Mountain and East of Denver soils.

Source	No.soils in ave.	Quality index	Organic matter percent	Sand percent	Silt percent	Clay percent	Non-capillary porosity percent
Table Mountain	16	.929	2.5	56.1	29.5	14.4	13.6
East of Denver	9	.944	2.2	78.8	14.2	5.5	15.5

Other soils in this survey were either so old as to have lost their identity or were represented by too few individual samples.

Age of Soil

Another interesting feature of these results comes out when the analyses of the soils are grouped according to the time the soils have been in use.

Table 4. Average quality of growth and mechanical analyses as affected by time soil has been in use.

Age of soil	Quality index	Non-cap. porosity percent	Sand percent	Silt percent	Clay percent	Organic matter percent	No. of soils
1-2 yrs.	.927	13.2	63.1	27.7	9.1	2.3	12
3 yrs.	.988	17.3	68.0	21.2	10.8	2.5	10
4-5 yrs.	.957	12.7	64.9	23.6	11.5	2.4	6
6-34 yrs.	.960	19.1	66.4	24.5	9.1	2.5	10

On the average, quality was slightly better after the soil had been used two years but quality was not significantly different as soils were used longer than three years. Only seven soils had been in use longer than 10 years. There was a tendency for non-capillary porosity to increase with length of time in use. No particular trends can be noted in sand, silt and clay content. All soil types were included in each age group. The average organic matter content remained fairly constant especially after the second year.

Summary

Organic matter correlated closely with quality of growth, non-capillary porosity and potassium level in the soil. A positive correlation was also obtained between silt and organic matter.

Therewas a positive correlation between silt and potassium level.

Negative correlations were obtained between sand and organic matter and between sand and potassium.

Since calcium levels were high in almost all soils, it was not possible to correlate this nutrient with any other factor.

*****

Cut Flowers Keep Longer
by George Beach

J. R. Kamp of the University of Illinois reported at the recent American Society for Horticultural Science meeting at Ithaca, New York on "The Importance of pH in the Keeping of Cut Flowers." He compared keeping in tap water which he adjusted to pH's ranging from pH 2.0 to pH 9.0 and found that several different kinds of the common cut flowers kept best in water of pH 4.0. The difference, according to Kamp, was striking and far superior with his tap water to the addition of flower preservatives such as Floralife, Bloomlife and Aladdin. The pH was lowered slightly by the use of these preservatives in his tap water, but not enough to reach the desirable point of pH 4. However, he found keeping was still further improved by the preservatives when they were acidified in solution to bring them to pH 4.

Possibly flowers being conditioned for shipment would be similarly benefitted. Kamp's tests were made through a temperature range from 35° to 80° F. Through the entire range of temperatures, he found pH 4 the ideal acidity.

Of course the pH of tap water varies at different places. Also the amount of acid necessary to adjust to pH 4 will be different with one water source than with another even of the same original pH. Tap water at Fort Collins is commonly a little over pH 7. We can bring this water to pH 4 by adding 1.7 ml. of dilute sulphuric acid in a liter (approx. 1 quart) of our water. The dilute acid mentioned above is 1% sulphuric, i.e., 99 ml. of water is added to 1 ml of concentrated sulphuric to make a dilute sulphuric stock solution. (Caution: don't add concentrated sulphuric acid to water--it will spatter and burn you.)

****

Your editor,

W. D. Holley

COLORADO STATE FLOWER GROWERS ASSOCIATION
OFFICE OF EDITOR
W. D. HOLLEY
COLORADO A & M COLLEGE
Fort Collins, Colorado

FIRST CLASS