MASSACHUSETTS

FLOWER GROWERS ASSOCIATION

Bulletin 43 | WILLIAM L. IVES - Editor | September, 1957

M. F. G. A. FALL MEETING

STUDENT UNION BUILDING

UNIVERSITY of MASSACHUSETTS, - AMHERST, MASSACHUSETTS

TUESDAY, OCTOBER 15, 1957

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THE EFFECT OF NITROGEN FROM TWO SOURCES, URAMITE AND AMMONIUM NITRATE, ON PLANT GROWTH AND FLOWERING OF CARNATIONS*

Harold E. White and George B. Goddard
Floriculture Department
University of Massachusetts
Amherst, Mass.

The results of earlier studies (1,2,3,4,5) on the use of urea-formaldehyde nitrogen compounds in the form of Uramite have shown that this type of nitrogen fertilizer is a satisfactory source of nitrogen for a number of greenhouse flowering pot plants. Moreover, when this type of nitrogen compound was applied in liberal amounts to plants no foliage burn or injury was observed. Studies have shown that when the material was incorporated in the soil, nitrogen was slowly liberated in sufficient quantity to sustain good plant growth for a period of four to five months.

Observations and results of one year's study are reported here on the use of Uramite as a source of nitrogen in comparison with ammonium nitrate for culture of carnations. The purpose of the experiment was to determine: (1) how long Uramite would continue to supply adequate nitrogen for plant growth when applied in different amounts to bench soil; (2) whether the application of a more readily soluble nitrogen material, such as ammonium nitrate applied at frequent intervals over the growing season, would be more effective than Uramite; (3) how the two nitrogen materials would effect growth of plants when a mixture of soil-peat-sand was used in comparison with soil only; (4) what would be the residual effects of the two sources of nitrogen on soil and soil mixtures.

Experimental Methods

The varieties of carnation used were Pink Sim and White Sim. Rooted cuttings were potted May 23, 1956, given the first pinch or topping on June 13, and planted in the experimental bench on July 19.

The bench was divided into an equal number of plots, each filled with a mixture of composted soil, peat and sand or composted soil only. One inch of sand and one inch layer of peat were thoroughly mixed with five inches of soil. One-half of the total number of plots of soil or soil mixtures was steamed and the other half was not steamed.

Prior to planting 20 percent superphosphate was applied to all plots at the rate of 2-1/2 lbs. per 100 sq. ft., limestone at rate of 2-1/2 lbs. and muriate potash, 60 percent, at rate of 1 lb. per 100 square feet.

Uramite was applied at rates of two and four lbs. per 100 sq. ft., being incorporated in the soil prior to planting. Ammonium nitrate, 33.50 percent, was applied at the rate of 2-1/2 lbs. per 100 sq. ft., the total amount being divided into four applications spaced one month apart. The treatments were replicated three times with 32 plants to each treatment. Each replicate contained 16 White Sim and 16 Pink Sim. Soil tests were made monthly throughout the experimental period.

All flowers cut from the experimental plots

* Acknowledgement is made to S. Arthur Peterson of Lexington, for the rocted carnation cuttings used in this experiment and to E. I. DuPont de Nemours and Company for financial support.
Contribution No. 1121 of the University of Massachusetts College of Agriculture Experiment Station, Amherst, Massachusetts.

MASSACHUSETTS FLOWER GROWERS' ASSOCIATION

President . . . . John Duffy Jr.
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Secretary . . . . Harold E. White
French Hall
Univ. of Mass.
Amherst, Mass.

Editor . . . . William L. Ives
256 Lafayette St.
Salem, Mass.

were weighed, graded and recorded. At the termination of the experiment in June, 1957 the plants from each experimental plot were cut off at the surface of the soil and the fresh green weight of the plants was recorded.

Observations and Results

At the end of six to eight weeks from planting the plants fed with Uramite and ammonium nitrate made noticeably much more rapid growth in steamed soil than in soil not steamed. This difference in plant growth response was observed in peat-sand-soil mixtures as well as in the composted soil. Such differences in rates of plant growth are reflected in fresh plant weights recorded at termination of the experiment (Table I). While the differences do not appear significant, there is an observed trend toward a decrease in plant weight in all unsteamed plots, the decrease being more in the steamed soil-peat-sand plots.

In steamed soil the greatest difference in production of flowers was one bloom per plant (Table I) in favor of Uramite at the higher rate of application as compared with ammonium nitrate. In steamed soil-peat-sand mixtures the difference in flower production was two flowers per plant greater for Uramite as compared with ammonium nitrate. Flower production per plant was depressed more in the peat-sand-soil mixture when ammonium nitrate was used than in steamed composed soil.

Flower production was slightly reduced when Uramite was applied to unsteamed, composted soil. Whereas, with ammonium nitrate, production was lowered as much as one flower per plant. Flower production with Uramite in the unsteamed peat-sand-soil mixture showed variable differences as related to nitrogen levels. With the use of ammonium nitrate decreases in production per plant varied from about one-half a flower to as much as two when compared with steamed soil treatments.

In the original design of the experiment, applications of two and four pounds of Uramite were intended to give a nitrogen ratio equivalent to and twice the ratio of nitrogen from the two and a half pound application of ammonium nitrate. Unfortunately the results of monthly quick soil tests were taken as a guide for maintenance of nitrogen levels; consequently in January, five months from the start of the experiment, the soil nitrogen level dropped to a very low point as indicated by the tests. Therefore, additional applications of two and four pounds of Uramite were made in January as a surface feed. Another reason why this was done was that reports on the use of Uramite by other workers indicated that five to six months covered the maximum nitrogen supply period for Uramite. The writer is of the opinion that the original two and four pound applications of Uramite would have been sufficient and probably differences in flower production would not have been greatly changed. Experimental work this year should prove or disprove the writer's theory on this particular point.

Data in Table 2 shows the effect of the two sources of nitrogen on changes in soil acidity over the experimental period. The acidity readings are the averages for the total plot replicates of each treatment over the indicated periods.

It will be noted that, as one might expect, the soil acidity tests became lower as time progressed and in relation to the rate of application of the nitrogen materials. It is interesting to observe that acidity changes were not great but were gradual in rather small units monthly. There are not great differences in soil acidity responses between steamed and unsteamed soil treatments but there are greater differences in the peat-sand-soil mixtures in comparison with composted soil. The extreme degree of change in soil acidity was approximately one and one-half units for the nitrogen materials in the composted soil treatments and the same for peat-sand-soil mixtures except for Uramite at the highest level, where the change was about two units.

The soluble salt content of composted soil and the sand-peat-soil mixtures did not increase to high concentration levels in any of the treatments. As shown in Table 3 the highest peak in conductivity levels as indicated by Solu-Bridge readings occurres one month after treatments were made. The highest reading of 40 is well below what is commonly regarded as a danger zone. Uramite tended to give higher soluble salt readings in the composted soil. There appears to be no correlation of flower production, flower weight or fresh plant weight with either the soil acidity levels or soluble salts.

Discussion of Results

The experimental data presented show that under soil conditions which existed here, urea-formaldehyde nitrogen as Uramite proved to be a satisfactory source of nitrogen for carnations. No injury was observed when the material was used

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MASSACHUSETTS FLOWER GROWERS' ASSOCIATION

FALL MEETING

Tuesday, October 15, 1957 — **Student Union Building**
University of Massachusetts — **Amherst, Massachusetts**

PROGRAM

Tuesday Morning Session

9:00 Registration - - Student Union Building

10:00 Welcome Addresses:
Pres. John Duffy, Jr.
Prof. Alfred W. Boicourt

10:15 Foliar Analysis in Relation to Nutrition of Carnations
A. P. Chan - - Senior Horticulturist
Central Experimental Farms, Ottawa, Ontario

11:00 Development and Production of New Varieties of Annual Flowers
George A. Cotton - - N. E. Representative,
Joseph Harris Seed Co., Inc., Lexington, Mass.

12:00 Luncheon in a private dining room of the Student Union Building

Tuesday Afternoon Session

1:30 Disease Control and Production of Disease-Free Propagating Stock of Flower Crops
Prof. Paul E. Nelson - - Ornamental Research Laboratory
Farmingdale, L. I., N. Y.

2:30 The Place of Radiation in the Production of New Varieties of Plants
Dr. G. L. Mehlquist - - University of Connecticut
Storrs, Connecticut

3:15 Use of Artificial Light on Greenhouse Crops and Factors Related to Flower Bud Development in Chrysanthemums
A. P. Chan - - Ottawa, Ontario

4:00 Forum Discussion on Greenhouse Cooling
John Duffy, Jr., Leader

Reservation Information

You will find enclosed, a reservation card and return envelope with the fees and charges printed thereon.

EXPLANATION OF REGISTRATION FEES

The fee of $3.00 which is charged by the Association is to pay for speakers and expenses concerned with the meeting program.

The other fees are charges made by the University which we are required to collect. The University administration this past year put into effect a regulation requiring a payment of a fee of $1.00 per person for the use of campus buildings.

These fees are presumably charged to organizations which require membership dues and or charge a registration fee for their meetings. An additional charge of $15.00 is made for use of the Student Union facilities.

Therefore, a fee charge of $1.25 per person in addition to the Association's fee is necessary in order to pay the University for a meeting place.

The luncheon will be served to you in a dining room reserved for our group on the same floor of the Student Union where we hold our meetings.

Please make your reservation as soon as possible so that the dining hall will know for how many to plan. The deadline for meal reservations is Friday, October 11, 1957.

Let's see you there ! ! ! ! !

at rates of two and four pounds per 100 square feet bench soil area and incorporated into the soil prior to planting from 2-1/4 inch pots. Subsequent applications of Uramite at rates of two and four pounds as a soil surface treatment five months later were not harmful to the plants. It would appear from the records of flower production that adequate nitrogen was available and sufficient since differences in production between a total application of four pounds of Uramite and the eight pound treatments did not increase yield significantly. Likewise, fresh plants weights and flower weights were changed slightly by the additional amount of nitrogen. The 2-1/2 pounds of ammonium nitrate, a more quickly available source of nitrogen, gave better results under steamed composted soil, conditions as compared with peat-sand-soil mixtures, either steamed or unsteamed. Performance of ammonium nitrate was not as good on unsteamed composted soil as on composted steamed soil. Both sources of nitrogen increased the soil acidity.

The flower and stem quality of blooms produced by the Uramite were excellent with few split calyces. The production of 24 to 27 blooms per square foot seems comparable to that of the commercial grower, particularly since the flower production period was for only six months, January through June.

Several local commercial growers have indicated they are having excellent results with Uramite on all-year production of chrysanthemums. One grower reported being very well pleased with response of carnations to this source of nitrogen.

Literature Cited

1. White, Harold E. 1956. Urea-Formaldehyde Fertilizer as a Source of Nitrogen For Potted Plants. DuPont Information Bul. Y-45. E.I. DuPont de Nemours and Company, Inc.

2. ____________ 1956. The Use of Urea-Formaldehyde Nitrogen Fertilizer in the Culture of Potted Croft Lilies. DuPont Information Bul. Y-46. E. I. DuPont de Nemours and Company, Inc.

3. ____________ 1956. Urea-Formaldehyde Fertilizer as a Source of Nitrogen For Potted Plants. Flower Growers' Bul. 34. 3-6

4. ____________ 1956. The Use of Urea-Formaldehyde Nitrogen Fertilizer in the Culture of Potted Croft Lilies. Mass. Flower Growers' Bul. 35. 1-3

5. ____________ 1956. The Effect of Uramite on Growth and Flowering of Geraniums. Mass. Flower Growers' Bul. 38. 1-4.

Table I

The Effect of Two Sources of Nitrogen on Plant Growth and Flower Production of Carnations 1956-57

Nitrogen Source	Total Amount Per 100 sq.ft. lbs.	Total Nitrogen per 100 sq.ft. lbs.	Soil Steamed: No. Flowers per Plant	Soil Steamed: Fresh Wt. per Flower ozs.	Soil Steamed: Fresh Wt. per Plant lbs.	Peat + Sand + Soil - Steamed: No. Flowers per Plant	Peat + Sand + Soil - Steamed: Fresh Wt. per Flower	Peat + Sand + Soil - Steamed: Fresh Wt. per Plant
Uramite 38%	4.00	1.52	8.28	0.747	0.503	8.43	0.703	0.528
"	8.00	3.04	8.98	0.751	0.501	8.18	0.767	0.465
Ammonium Nitrate 33.50%	2.50	0.84	7.89	0.766	0.456	6.15	0.771	0.443
			Soil not Steamed			Peat + Sand + Soil - Not Steamed		
Uramite	4.00	1.52	7.84	0.711	0.465	6.21	0.778	0.403
"	8.00	3.04	7.53	0.804	0.485	7.84	0.752	0.493
Ammonium Nitrate	2.50	0.84	6.43	0.817	0.465	5.90	0.703	0.434

Table 2.

The Effect of the Two Nitrogen Sources on Soil Acidity

Nitrogen Source lbs.	pH at Start of Experiment	Aug.	Sept.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May
		Soil Steamed								
		pH meter tests								
Uramite 4.00	6.4	6.75	5.85	6.50	5.90	6.50	5.85	5.70	5.60	5.50
8.00	"	6.75	5.50	5.80	5.60	5.85	5.60	5.55	5.20	5.50
Ammonium Nitrate 2.50	"	6.50	6.25	6.45	6.10	5.75	5.65	5.70	5.45	5.40
		Not Steamed								
Uramite 4.00	"	6.05	5.85	6.50	5.80	6.50	5.85	5.95	5.60	5.45
8.00	"	5.90	5.65	5.80	5.70	5.75	5.55	5.55	5.25	5.50
Ammonium Nitrate 2.50	"	6.50	6.45	6.50	6.20	5.80	5.65	5.70	5.50	5.60
		Peat + Sand + Soil - Steamed								
		pH meter tests								
Uramite 4.00	6.4	6.40	5.60	5.80	5.60	5.60	5.50	5.70	5.3	5.1
8.00	"	6.60	5.30	5.40	5.50	5.50	5.40	5.2	5.0	4.9
Ammonium Nitrate 2.50	"	6.0	6.1	6.0	5.70	5.60	5.40	5.3	5.2	5.3
		Not Steamed								
Uramite 4.00	"	5.1	5.3	5.7	5.6	5.7	5.5	5.5	5.3	5.2
8.00	"	5.2	5.2	5.4	5.4	5.7	5.4	5.4	5.0	4.7
Ammonium Nitrate 2.50	"	5.9	6.0	6.1	5.8	5.4	5.4	5.3	5.0	5.2

Table 3

Soluble Salt Levels as Indicated by Sol-Bridge Readings on Soil Extracts mhos x 10^5 (Equivalent to 1,000 micromhos)

Nitrogen Source	Soil Steamed: * Peak Conductivity Levels	Soil Steamed: Average Conductivity Levels for 10 months' period	Peat + Sand + Soil - Steamed: Peak Conductivy Levels	Peat + Sand + Soil - Steamed: Average Conductivity Levels for 10 Months' Period
Uramite				
4	22	19.77	21	17.44
8	27	31.21	24	22.11
Ammonium Nitrate 2.50	22	17.88	14	16.11
	Soil not Steamed		Peat + Sand + Soil - Not Steamed	
Uramite				
4	33	23.71	22	17.44
8	40	34.00	40	19.55
Ammonium Nitrate 2.50	23	18.38	11	15.33

* Readings in August one month after treatments were made