and city properties revealed that the main limiting factor for killing was the amount of water applied prior to treatment. This confirmed the past experiences of other investigators. It was found that the dosage could be reduced to two grams of active material per hundred square feet of sprayed area by a prewatering of one inch. Effective dosage in grams per hundred square feet of other commonly used insecticides according to manufacturers recommendation are: Parathion, 10; Diazinon, 8.3; and VC-13, 34.5. Lawns sprayed with a dosage of 4 gr./hundred square feet and no pre-wetting were most often ineffective, while those sprayed at one-half that dosage and pre-wet with one inch of water were always found to be highly effective. For example, a pre-wet lawn showing an average chinch bug count for six plugs of 166 chinch bugs per sq. ft. was reduced to an average count of less than 0.3 per square ft. within eight days after spraying and a count of zero at fifteen days. Another lawn with an average of 102 bugs per square foot was sprayed at the four gram level without pre-wetting. Nine days later, this lawn had an average count of 46 bugs. Several months later this same lawn had a mean count of 48 bugs per square foot. This lawn was then pre-wet and sprayed at the rate of 2 grams per hundred square feet. Four days after spraying the count was reduced to a mean of 3.7 bugs per square foot and at the end of thirteen days the count was less than 0.3 per square foot. The cases mentioned are typical of the results obtained during this study and are presented here as an illustration of typical test results. With almost three years of data compiled, we are now firmly convinced that organotin is the safest effective treatment for chinch bug control. Proper formulation of the organotin is of prime importance as is proper pre-wetting of the treated grass. Killing is not restricted to chinch bugs, but covers a wide range of insect pests.

With the chinch bug phase of our studies almost completed, various other applications are being investigated. Fungus and bacterial diseases of ornamental plants, as well as commercial crops are being considered. Laboratory tests have shown potent action on many bacterial and fungal species including many pathogenic and soil forms. It is our belief that organotin compounds offer a possibility of many applications in the control of plant diseases.

A STUDY OF THE DOWICIDE B GLADIOLUS PRE-PLANT CORM DIP TREATMENT

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A study was made of the relative influence of the concentration, dip time, and dip temperature upon the Dowicide B pre-plant corm dip treatment developed by Magie (1).

Experimental Materials and Procedures

Three plantings were made during the 1958-59 season in either Leon or Immokalee fine sand soil. The usual commercial production cultural procedures were followed in the growth of these three crops. Corms of 2 to 2½ inch diameter of the variety Morning Kiss were planted. This variety was selected as being fairly susceptible to both corm rots and chemical injury. The corms had received the usual commercial pre-storage dusting of a Captan-DDT mixture.

Dowicide B, 85% sodium, 2,4,5 trichlorophenate, was used as the pre-plant corm fungicide. Triton X-100 was employed as the wetting agent at the rate of one pint per 100 gallons. It was not necessary to add sodium hydroxide as a solvent agent as the pH of the water used was above 7.0.

A total of 60 corms were used for each individual treatment. These corms were planted into single replicate plots which were 18 to 20 feet long. The 0 pound rate of the Dowicide B was not included in the G-5 planting.

Yields of commercially acceptable spikes were calculated as total flowers and as mean weight per spike in ounces. The corms were field cured for about three weeks, and all corms under the size of the end of the little finger were discarded. Corm yields were calculated as total number and as mean weight per corm in ounces.

All the crop data were handled statistically by the analyses of variance method. Both the "F" test and the "LSD" test were used to interpret the statistical measurements.

The major cultural dates are listed below:

Planting	Planted	"Full Stand"	Spikes Cut	Corms Dug	Corm Yield
G-5	1 Oct. 58	27 Oct. 58	3-18 Dec. 58	13 Feb. 59	1 Mar. 59
G-13	27 Nov. 58	27 Dec. 58	5 Feb.-1 Mar. 59	25 Apr. 59	14 May 59
G-18	31 Dec. 58	13 Feb. 59	17 Mar.-7 Apr. 59	15 May 59	27 May 59

EXPERIMENTAL VARIABLES

a. Dowicide B concentration at 0, 3, 6, and 12 pounds per 100 gallons.

b. Dip periods at 7½, 15, and 30 minutes.

c. Dip solution temperatures at 70-80, 60-70, and 50-60° F.

Experimental Results and Discussion

The different rates of Dowicide B had the greatest influence upon the growth of the gladiolus plants. Use of the 12 pound rate caused serious retardation in the germination rate of the corms and in the early growth of the young plants. Even the 6 pound rate caused slight early growth reduction. The 3 pound rate permitted early growth of the plants comparable to the 0 pound rate. Apparently rates higher than 3 pounds had varying degrees of phytotoxicity to the gladiolus plant.

The 12 pound rate of the Dowicide caused the flower cutting to be delayed almost a week in every crop. The early slightly phytotoxic action of the 6 pound rate was not enough to carry-over this far into the crop life to affect the flower cutting date.

The spike number yields, Table 1, were the maximum when the 3 pound rate of the Dowicide B was used in the pre-plant corm dip. Flower yields were reduced progressively as the rate of the Dowicide B was raised through 6 to 12 pounds. This drop was slight at the 6 pound rate, while it was severe at the 12 pound rate. Use of the 0 pound rate retarded spike yields. The reduction in spike numbers by the Dowicide B at the 6 and 12 pound rates was probably a response of phytotoxicity upon the treated corms and upon the early growth of the current vegetative growth. Lack of the Dowicide B; that is, the 0 pound rate, may have caused lower yields as a result of inadequate disease control on the planted corms and on the current vegetative growth.

The mean spike weights, Table 2, were similar at the Dowicide B rates of 0, 3, and 6 pounds. Only the 12 pound rate was sufficiently toxic to reduce significantly the spike grade.

From a practical viewpoint the corm number yields, Table 3, were essentially similar when the Dowicide B was used at the rates of 12, 6, and 3 pounds, although the 3 pound rate produced a slightly lower yield here. Use of the 0 pound rate reduced definitely the corm numbers yield. Apparently, the early phytotoxic activity of the higher rates of the Dowicide B upon the vegetative growth and upon the flower production did not affect corm production. Probably the lower flower yields caused by the higher Dowicide B concentrations were responsible in part for the greater corm growth. Since a lower corm yield developed when the fungicidal dip was not used, disease control was probably inadequate.

Corm weights or corm grade, Table 4, were not different from a practical sense between the several rates of Dowicide B in the corm dip. But, the 3 and 0 pound rates did produce the greater corm weights.

The length of time for the several Dowicide B pre-planting corm dips had some effect upon the early plant growth. Although the differences were somewhat less than noted for the Dowicide B concentration effects, a progressive and slight decrease in early plant growth occurred as the dip time was increased. However, this was the most pronounced with the 12 pound rate of the Dowicide B. Thus, the degree of phytotoxicity upon the treated corms was a combination response of Dowicide B concentration and dip time.

The flower cutting dates were not changed by the different dip periods. Therefore, the delay mentioned above was purely a function of concentration of the fungicide.

The number of spikes cut was practically the same for all the dip period treatments. Although no significant interaction was present between Dowicide B rate and dip minutes, it was strongly suggestive. The major observation here, Table 1, was that the treatment with the Dowicide B at the 12 pound rate for the 30 minute dip produced only about one-half the number of spikes as did the treatment with the Dowicide B at the 3 pound rate for the 7½ minute dip. Here again was evidence that the phytotoxic action was at least an accumulative function of Dowicide B concentration and dip time.

The mean weight of the spikes, or grade, was similar for all three dip periods. Thus, the

TABLE 1 - SPIKE NUMBERS

Planting Dow B	Concn. lbs. 12	6	3	Plant $\bar{x}$	Concn. lbs. 12	6	3	0	Plant $\bar{x}$
G-5	47	59	67	57					
G-13	56	69	69	64	55	68	68	60	63
G-18	25	42	53	40	25	42	53	52	43
Dow B $\bar{x}$	42	56	63	54	40	55	61	56	53
Dip° F									
70-80	39	58	64	53	38	57	64	56	53
60-70	43	55	64	54	39	53	62	55	52
50-60	46	56	61	54	45	56	57	59	54
Dow B $\bar{x}$	42	56	63	54	40	55	61	56	53
Dip Min.									
7½	48	60	64	57	46	58	62	55	55
15	44	55	63	54	44	56	61	59	54
30	36	54	62	50	31	52	60	58	50
Dow B $\bar{x}$	42	56	63	54	40	55	61	56	53

Stat. Analysis

Variables	F Test Value	Sign	LSD Test 5%	1%	F Test Value	Sign	LSD Test 5%	1%
Dow B	61.91	HS	4	6	32.42	HS	5	7
Planting	89.40	HS	4	6	159.11	HS	3	5
Dip° F	0.17	NS	4	6	0.64	NS	4	6
Dip Min.	5.91	S	4	6	3.75	S	4	6
Dow B $\bar{x}$ Plant	3.40	S	7	10	11.71	HS	7	10

possible phytotoxic activity of the time factor was secondary to the concentration factor of the Dowicide B in the pre-plant corm dip. That is, the time factor merely intensified any plant tissue damage if the concentration was sufficiently high enough.

Corm number yields were practically the same with all corm dip periods. The same held for the mean corm weights or corm grade.

The temperature of the pre-plant corm dip with the Dowicide B had no influence upon the germination of the corms and upon the early plant growth. Also, the flower cutting dates were not altered.

The spike number harvest was similar for all three dip temperatures. However, there did appear to be a trend toward slight reduction in the spike yields when the Dowicide B was

TABLE 2 - MEAN SPIKE WEIGHT IN OUNCES

Planting Dow B	Concn. lbs.			Plant	Concn. lbs.				Plant
	12	6	3	$\bar{x}$	12	6	3	0	$\bar{x}$
G-5	2.5	2.5	2.6	2.5					
G-13	3.2	3.5	3.6	3.4	3.1	3.5	3.6	3.3	3.4
G-18	2.8	3.0	3.0	2.9	2.8	3.0	3.0	3.1	3.0
Dow B $\bar{x}$	2.8	3.0	3.0	2.9	3.0	3.2	3.3	3.2	3.2
Dip° F									
70-80	2.8	2.9	3.0	2.9	2.9	3.2	3.2	3.1	3.1
60-70	2.8	3.1	3.2	3.0	2.9	3.3	3.5	3.4	3.2
50-60	2.9	2.9	3.1	2.9	3.1	3.3	3.3	3.4	3.2
Dow B $\bar{x}$	2.8	3.0	3.0	2.9	3.0	3.2	3.3	3.2	3.2
Dip Min.									
7½	2.9	3.1	3.2	3.0	3.0	3.3	3.4	3.3	3.2
15	2.8	3.0	3.1	2.9	2.9	3.2	3.4	3.2	3.2
30	2.8	2.9	3.0	2.9	3.0	3.3	3.2	3.2	3.1
Dow B $\bar{x}$	2.8	3.0	3.0	2.9	3.0	3.2	3.3	3.2	3.2

Stat. Analysis

Variables	F Test Value	F Test Sign	LSD Test 5%	LSD Test 1%	F Test Value	F Test Sign.	LSD Test 5%	LSD Test 1%
Dow B	13.50	HS	0.1	0.2	7.00	HS	1.8	2.5
Planting	142.50	HS	0.1	0.2	47.33	HS	0.1	0.2
Dip° F	1.75	NS	0.1	0.2	4.33	S	0.2	0.2
Dip Min.	2.00	NS	0.1	0.2	1.00	NS	0.2	0.2

used at the 12 pound rate, Table 1, at the 70-80° F temperature range. Conversely, the Dowicide B rate of 12 pounds seemed to be slightly less toxic at the 50-60° F temperature range.

The mean spike weights, or spike grade, were similar for all three dip temperature treatments. However, an interaction developed here between dip temperature and planting. The main effect here was the strong tendency for the 70-80° F dip to produce a lower spike yield in the G-18 planting. This may have been related to the strong influence of the 12 pound rate of the Dowicide B upon corm phytotoxicity in the 70-80° F dips (see above). Since these corms were injured more in the

TABLE 3 - CORM NUMBERS

Planting Dow B	Concn. lbs. 12	6	3	Plant $\bar{\bar{x}}$	Concn. lbs. 12	6	3	0	Plant $\bar{\bar{x}}$
G-5	107	103	107	106					
G-13	98	88	86	91	98	89	86	77	88
G-18	89	90	85	88	89	90	85	82	87
Dow B $\bar{\bar{x}}$	98	94	92	95	93	89	85	79	87
Dip° F									
70-80	95	95	86	92	91	91	78	73	83
60-70	97	92	97	95	95	88	91	83	89
50-60	102	94	95	97	95	90	88	82	89
Dow B $\bar{\bar{x}}$	98	94	92	95	93	89	85	79	87
Dip Min.									
7½	96	94	97	96	92	87	93	76	87
15	101	90	86	92	100	90	77	76	85
30	98	98	95	97	89	92	87	87	88
Dow B $\bar{\bar{x}}$	98	94	92	95	93	89	85	79	87

Stat Analysis

	F Test		LSD Test		F Test		LSD Test	
Variables	Value	Sign.	5%	1%	Value	Sign.	5%	1%
Dow B	2.05	NS	6	8	7.31	HS	7	10
Planting	22.06	HS	6	8	0.03	NS	5	7
Dip° F	1.51	NS	6	8	2.67	NS	6	8
Dip Min.	1.39	NS	6	8	0.06	NS	6	8

dip treatment, they suffered more in the cold soil because of the cold weather during the first month of the G-18 planting. In this G-18 planting the plants in the plots which received the 12 pound rate of the Dowicide B dip came up more slowly and more poorly, but with no evidence of any visual physical injury, than did the plants in the G-5 and in the G-13 plantings. This observation threw grave doubt upon the validity of the general recommendation that a stronger corm dip concentration should be used during cold weather. Even if a greater rate may be needed to produce better disease control as far as corm growth is concerned (the above data showed that this slight difference was not significant or practical), the possible greater phytotoxicity may have overshadowed this limited benefit.

TABLE 4 - MEAN CORM WEIGHT IN OUNCES

Planting	Dow B	Concn. lbs.			Plant	Concn. lbs.				Plant
		12	6	3	$\bar{\bar{x}}$	12	6	3	0	$\bar{\bar{x}}$
G-5		1.4	1.4	1.5	1.4					
G-13		1.3	1.4	1.6	1.4	1.3	1.4	1.6	1.6	1.5
G-18		1.2	1.2	1.3	1.2	1.2	1.2	1.3	1.3	1.3
Dow B $\bar{\bar{x}}$		1.3	1.3	1.4	1.3	1.2	1.3	1.4	1.5	1.4
Dip° F										
70-80		1.2	1.3	1.5	1.3	1.2	1.3	1.5	1.4	1.4
60-70		1.3	1.3	1.4	1.3	1.2	1.3	1.4	1.6	1.4
50-60		1.3	1.4	1.4	1.4	1.3	1.3	1.5	1.5	1.4
Dow B $\bar{\bar{x}}$		1.3	1.4	1.4	1.4	1.2	1.3	1.4	1.5	1.4
Dip Min.										
7½		1.3	1.3	1.4	1.3	1.3	1.3	1.4	1.5	1.4
15		1.2	1.4	1.5	1.4	1.2	1.4	1.5	1.5	1.4
30		1.2	1.3	1.4	1.3	1.2	1.3	1.5	1.5	1.4
Dow B $\bar{\bar{x}}$		1.3	1.3	1.4	1.3	1.2	1.3	1.4	1.5	1.4

Stat. Analysis

	F Test		LSD Test		F Test		LSD Test	
Variables	Value	Sign.	5%	1%	Value	Sign.	5%	1%
Dow B	7.60	HS	0.1	0.1	11.50	HS	0.1	0.1
Planting	10.60	HS	0.1	0.1	42.50	HS	0.1	0.1
Dip° F	0.20	NS	0.1	0.1	0.50	NS	0.1	0.1
Dip Min.	0.60	NS	0.1	0.1	0.25	NS	0.1	0.1

In general the corm number yields were similar for all three dip temperatures. Similarly the mean weight of the corms, or grade, was equivalent in all dip treatments.

Summary

Maximum plant growth occurred with the use of the Dowicide B at the rates of 0 and 3 pounds per 100 gallons in the pre-plant corm dip treatment. The 3 pound rate produced the maximum spike number yields, but spike quality was similar at the 0, 3, and 6 pound rates. Although corm number yields were slightly lower at the 3 pound rate than at the 12 pound rate, the difference was barely significant and and hardly practical. Reduced corm number yield occurred when the 0 pound rate was used. But, the 0 and 3 pound rates produced the largest corms.

The dip time had less influence upon the plant growth than did the Dowicide B concentration. However, the maximum plant growth developed with the 7½ minute time for the pre-plant corm dip. Actually the maximum growth retardation with the 30 minute dip occurred with the 12 pound rate of the Dowicide B. Over-all spike yields were similar for all three dip times of 7½, 15, and 30 minutes. The most striking observation here was that the Dowicide B at the 12 pound rate in the 30 minute dip produced only about one-half the number of spikes as did the 3 pound rate in the 7½ minute dip. Spike quality was similar in all dip periods. Both the corm number and the corm grade were similar in all three dip treatments.

The plant growth was not affected by the temperature of the pre-plant corm dips. Spike number yields were in general similar with all three dip temperature ranges. However, the 12 pound rate of the Dowicide B did appear to be slightly more toxic in the 70-80° F dip than in the 50-60° F dip. Spike quality was somewhat similar with all three dip temperatures. The strong interaction here between dip temperature and planting stressed the inadvisability of using increased concentrations of the Dowicide B, and especially at elevated dip temperatures, during cold weather because of the possible increase in phytotoxicity. Treating with high concentrations at a low temperature range of 50-60° F was safer, but it was not necessary anyhow to use rates higher than the 3 pound rate of the Dowicide B. Both corm numbers and corm quality were similar at all three dip temperatures.

The final recommendation for the Dowicide B pre-plant corm dip treatment, which would fit a wide range of climatic conditions, would be the 3 pound rate for a 7½ minute dip at whatever air temperatures exist at the particular time.

LITERATURE CITED

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CALYCOPHYLLUM SPRUCEANUM, A NEW FLOWERING TREE FOR SOUTH FLORIDA

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Among the recent plant introductions at the Sub-Tropical Experiment Station, one species shows particular promise as an ornamental. Seeds of *Calycophyllum spruceanum* (Benth.) K. Schum. were received from the Atkins Garden and Research Laboratory, Cienfuegos, Cuba, in 1952. Two trees were grown from the seed. These were planted in the field in 1953. One tree has survived and has developed into a beautiful specimen.

Calycophyllum spruceanum is in the family Rubiaceae. MacBride (1) gives the following botanical description of the species: "A tree 15 to 27 meters high, with brown bark; leaves petiolate, the blades oblong to oblong-ovate, acute to obtuse at the base, 9-17 cm. long, minutely puberulent beneath at first but soon glabrate, barbate in the axils of the nerves; cymes dense and many-flowered, the inflorescences at first wholly enclosed by the thin bracts; calyx 6-9 dentate, the lobes all minute; corolla white, 6-7 mm. long, the lobes spreading; hypanthium densely white-pilosulous, capsule oblong, 8-11 mm. long, densely appressed-pilose."

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