4. Resistant Varieties:—That resistance to the mosaic disease might be available is indicated by the work of Hannibal (5), who found that *Amaryllis rutila* (the type) is resistant whereas the variety *fulgida* and hybrids are not. It appears from the literature, however, that no concerted effort has been made to locate additional *Amaryllis* spp. that are resistant to this virus and to incorporate this resistance, along with other desirable characteristics, into new hybrids which are being developed.

DISCUSSION

Although we now know that CMV can cause the mosaic disease in *Amaryllis*, much still remains to be learned about this disease. Is the *Amaryllis* virus a unique strain of CMV, restricted primarily to members of the *Amaryllidaceae* and other monocotyledonous plants, or are all strains of CMV able to incite mosaic symptoms in *Amaryllis*? If this is a unique strain of CMV, what plant is serving as the source of the infection? Is the virus spread among *Amaryllis* plants by the aphid vector; is it introduced into *Amaryllis* from other ornamental or crop plants by the insect vector; or is it spread merely by contamination and vegetative propagation? Is it possible to heat cure an *Amaryllis* plant as has been reported by Holmes (6) for rose plants infected with mosaic? Perhaps the scale propagation technique reported by Brierley (4) for freeing Easter lilies from CMV might also be successful in freeing *Amaryllis* from CMV. Early detection of the virus, made possible by new serological techniques and sensitive indicator plants, coupled with stringent control measures and improved methods of vegetative propagation may, in the future, help eliminate mosaic as a major disease in Florida-grown *Amaryllis*.

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THE INFLUENCE OF HARVEST SEASONS AND STORAGE TEMPERATURES ON FLORIDA GLADIOLUS CORMS[1]

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Numerous investigations have shown that low temperatures (32° F to 50° F) are essential in breaking dormancy of gladiolus corms uniformly and maintaining corms in a non-vegetative state during long storage periods (3, 5, 6, 7, 8, 9, 11). Also, exposure of corms to 70°-90° F for 1-2 weeks following cold storage stimulates early sprouting.

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Stuart *et al.* (10) reported that more spikes were produced from both Maryland and North Carolina-grown corms stored at 40° F, but they were lighter and of lower quality than those stored at 50° F. Likewise more corms were produced from the 40° F treatment and there was less corm rot than from the 50° F treatment. Cropsey and Young (2) inoculated Oregon-grown corms with Botrytis or Fusarium and stored the corms at 40°, 50°, and 60° F. Corms inoculated with Botrytis had 76, 24, and 54 percent rot at the respective temperatures. Corms inoculated with Fusarium had 27, 86, and 99 percent rot at the respective temperatures. Uninoculated corms had 1, 10, and 16 percent total rot, respectively. They concluded that Oregon-grown bulbs should be stored at near 50° F.

In recent years it has been demonstrated that soil temperature during corm maturation greatly affects the degree of dormancy (1, 4, 8). This explains why corms maturing in the winter months in Florida have a much lower degree of dormancy than those maturing during the warm summer months.

The objective of this investigation was to determine the influence of storage temperature on corms harvested at 3 different seasons (winter, spring, and summer) and on subsequent flower and corm production.

METHODS

Three experiments each containing 10 storage treatments and two varieties (Hopmans Glory and Valeria) were conducted on jumbo gladiolus corms over a two-year period. The storage treatments were composed of exposures to various combinations of 40°, 55°, and 70° F temperatures (Table 1). Treatments 1 through 9 were artificially cured at 80° F and 80 percent humidity for two weeks, and treatment 10 was field cured. The dates and locations of each experiment are shown in Table 1. In experiment I and II a total of 200 uniform corms per treatment for each variety were stored, and in Experiment III 240 corms per treatment were used. Each field plot was replicated 3 times and contained 60 sound corms when available. In some treatments where severe storage rot occurred, it was necessary to use less than 60 corms. All yield data were adjusted to 60 corms per plot.

Table 1. Storage treatments for 3 gladiolus corm experiments

Treat. No.	Temperature combinations: Storage temp. °F	Time in months		Storage temp. °F	Time in months
1	--	--	+	40	5
2	55	5	+	--	--
3	55	4	+	40	1
4	55	2.5	+	40	2.5
5	55	1	+	40	4
6	70	5	+	--	--
7	70	4	+	40	1
8	70	2.5	+	40	2.5
9	70	1	+	40	4
10	--	--	+	40	5

Dates and location of each experiment

Expt. No.	Dug	Stored	Planted	Location
I	Feb. 1961	March 1	August 2	Ft.Myers, Fla. #1
II	Apr. 1961	May 5	October 10	Ft.Myers, Fla. #2
III	June 1962	July 25	January 2	Sun City, Fla.

RESULTS AND DISCUSSION

Corm Recovery—In general a larger percentage of sound corms was recovered from the lower storage temperature treatments (Trts. 1, 5, 9, 10) than from the higher temperature treatments; however, considerable variation occurred among locations (Table 2). Deterioration of corms in storage, especially at the higher storage temperatures, was attributed primarily to Fusarium. Valeria was affected much more severely than Hopmans Glory. Cropsey and Young (2) reported that corm rot in storage increased from 1 to 16% as the temperature increased from 40° to 70° F.

It was apparent during this investigation that both curing and storage conditions greatly influenced corm recovery. The corms in Expt. I which were dug in February were in excellent condition after curing, and the relatively poor recovery from storage, especially of Valeria, was attributed partically to excessively high relative humidity during cold storage. In Expt. II which was harvested in April better humidity control was obtained in cold storage; consequently, the percentage of corms recovered was greater. The corms from Expt. III were dug under wet con-

Table 2. Percentage of sound corms recovered at end of cold storage treatments

Treat. No.	Hopmans Glory Location: Ft. Myers #1	Ft. Myers #2	Sun City	Valeria Location: Ft. Myers #1	Ft. Myers #2	Sun City
1	98	100	88	97	100	87
2	98	100	75	59	97	74
3	90	100	82	60	100	58
4	100	100	87	78	100	70
5	100	100	87	98	100	92
6	95	98	65	61	86	53
7	95	100	64	58	93	43
8	97	100	60	77	91	47
9	100	100	82	88	96	77
10	--	--	92	--	--	90

ditions in June and the curing process did not dry the corms sufficiently; therefore, severe rot occurred in storage especially at the higher temperatures.

The root and shoot development at termination of storage was considered as an index of the state of dormancy. Expt. I, dug in February, had excessive root and shoot development in treatments 2, 3, 6, and 7. Expt. II, dug in April, had obvious root and shoot development in treatments 3 and 7. Expt. III, harvested in June, had relatively little shoot and root growth. Corms harvested in February had an average of 87% early germination, April had 69%, and June had 50%. In general Hopmans Glory had more root and shoot development than Valeria. These results are in agreement with Apte (1) and Ryan (8) who demonstrated that corms grown in cool soil had much less dormancy than those grown in warm soil.

In general, corms stored for relatively long periods at the higher temperatures were slow in emerging, and flowering dates were delayed up to 14 days. It was apparent that when corms were stored initially at relatively high temperatures, subsequent storage at 40° F was beneficial as far as earliness and uniformity of flowering were concerned.

Flower Production—Yield data indicated that the lower temperatures produced more spikes (Table 3), but they were lighter in average weight (Table 4). Similar results were reported by Stuart *et al.* (10). The interactions of temperature, location, and varieties on the number and average weight of spike resulted from several factors including (1) condition of corms after curing, (2) relative humidity in storage, and (3) seasonal variations during the growing periods. For example, the relatively low yield of Expt. I was attributed to high relative humidity in stor-

Table 3. Influence of storage temperatures and location on number of spikes produced from 60 Hopmans Glory or Valeria corms

Treat. No.	Location: Ft. Myers #1	Location: Ft. Myers #2	Location: Sun City	Hopmans Glory Means	Location: Ft. Myers #1	Location: Ft. Myers #2	Location: Sun City	Valeria Means
	(Hopmans Glory)				(Valeria)			
1	79	88	50	72	39	68	52	53
2	62	77	40	60	25	63	34	41
3	65	77	42	61	46	64	38	49
4	76	85	55	72	35	69	38	47
5	73	85	46	68	27	68	44	46
6	56	67	42	55	36	58	42	45
7	52	73	48	58	31	61	62	51
8	73	73	48	65	32	68	61	54
9	83	84	41	69	31	68	45	48
10	86	74	64	75	40	57	62	53

Variety means: Hopmans Glory = 65, Valeria = 49
Location means: Ft. Myers #1 = 52, Ft. Myers #2 = 71, Sun City = 48

Significant effects:	Level
Location	*
Varieties	*
Loc. x Var.	**
Temperature	*
Temp. x Loc.	*
Temp. x Loc. x Var.	**

Table 4. Influence of temperatures and locations on average weight per spike (lbs.) of Hopmans Glory and Valeria spikes

Treat. No.	Location Ft. Myers #1	Ft. Myers #2	Sun City	Hopmans Glory Means	Location Ft. Myers #1	Ft. Myers #2	Sun City	Val-eria means
1	(Hopmans Glory)				(Valeria)			
1	.13	.21	.21	.18	.22	.33	.32	.29
2	.14	.20	.20	.18	.19	.32	.36	.29
3	.14	.22	.23	.20	.19	.33	.32	.28
4	.14	.22	.22	.19	.21	.35	.37	.31
5	.14	.20	.22	.19	.20	.31	.33	.28
6	.15	.23	.25	.21	.21	.36	.34	.30
7	.16	.24	.24	.21	.23	.34	.36	.31
8	.14	.24	.25	.21	.22	.35	.35	.31
9	.14	.21	.25	.20	.21	.31	.35	.29
10	.14	.22	.21	.19	.20	.32	.26	.26

Variety means Hopmans Glory = .20, Valeria = .29

Location means Ft. Myers #1 = .18, Ft. Myers #2 = .28, Sun City = .28

Significant effects:	Level
Location	*
Varieties	*
Loc. x Var.	**
Temperature	**
Temp. x Loc. x Var.	*

age, excessive temperature and rainfall during the growing season.

In Expt. III the percentage of multiple sprouting was calculated and found to be greater in the 40° and 55° F treatments than in the 70° F treatments.

Corm Production—Corm data from Expt. I and II were not available. In Expt. III, the 70° F treatments generally produced more corms than the 55° F treatments (Table 5). This may be partially explained on the basis that many of the corms from the 55° treatments rotted after planting, whereas the weak corms in the 70° treatments rotted in storage and were never planted. When the corms were field-cured, (Treatment 10) more corms were produced than when they were cured artificially (Treatments 1-9). This was attributed to poor ventilation in the curing room.

SUMMARY

The effects of 3 harvest dates and 10 storage treatments (various combinations of 40°, 55°,

Table 5. Influence of storage temperature on number of corms harvested per 60 corms planted at Sun City - 1963

Treat-ment	Varieties Hopmans Glory	Valeria	Temp. Means
1	51	55	53.0
2	47	39	43.0
3	48	41	44.5
4	51	63	57.0
5	50	45	47.5
6	60	54	57.0
7	53	59	56.0
8	58	65	61.5
9	46	52	49.0
10	70	79	74.5
Mean	53.4	55.2	

LSD for temperature means - 11.7

and 70° F) on stored Hopmans Glory and Valeria jumbo corms and subsequent flower and corm production were investigated.

Both harvest dates and varieties greatly affected the percentage of corms recovered from storage as well as subsequent flower production. In general the most satisfactory storage treatments were (1) 40° F for 5 months, (2) 55° F for 1 month plus 40° F for 4 months or (3) 70° F for 1 month plus 40° F for 4 months

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CHEMICAL GROWTH SUBSTANCES AS SUBSTITUTES FOR HIGH LIGHT INTENSITIES ON 'TIFGREEN' BERMUDAGRASS

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The problems in growing turf grasses in shady locations are well known to golf course superintendents and other workers in turf management. Difficulties arise because grasses grow abnormally tall and density is decreased under low light intensities or in light with certain spectral portions removed. Continued mowing and wear cause the grass to decline and die. Growth of plants in the shade after treatment with 2-chloroethyltrimethyl ammonium chloride (CCC) and 2,4-dichlorobenzyltributyl phosphonium chloride (Phosfon) is similar in appearance to growth in full sunlight (1). Cabler (1) showed that CCC and Phosfon will slow down the growth rate of *Cynodon dactylon* 'Tifgreen' and 'Ormond' bermudagrasses without injury to the plants. The morphological growth response of treated grasses was similar to that of high light intensity, i.e., reduction of internodal elongation, increase in stem diameter and development of dark-green leaf color.

Purpose of this experiment was to determine if Phosfon, CCC and B995 (N-dimcthylamino succinamic acid) could substitute for high light intensity and increase shade tolerance of 'Tifgreen' bermudagrass.

MATERIAL AND METHODS

A factorial experiment in split plot design was started November 4, 1962 and continued for 16 weeks to test effect of 4 light intensities and 3 growth regulator chemicals on growth of 'Tifgreen' bermudagrass. Whole plot treatments consisted of 4 light intensities—100, 80, 60 and 20 percent full sunlight. Sub-plot treatments were check and growth regulator chemicals CCC, Phosfon and B995. There were 3 replications with 8 pots of grass in main plots with 2 pots given each sub-plot treatment.

This experiment was conducted in a clear glass greenhouse with shade covers that reduced light intensity to 80, 60 and 20 percent of full sunlight constructed from saran cloth. The grass obtained from University of Florida turf research area had been maintained under high