Not since February, 1917, has Lee County, Florida, experienced so damaging a cold spell as that of last December 11th and 12th, which resembled the freeze of 1917, both in duration and intensity, though somewhat more erratic in performance than its predecessor. Thermometer reading at sunrise in Estero on Wednesday, Dec. 12th, showed an average low of 29°, and 27° on the morning of Thursday, Dec. 13th. In an exposed location another thermometer, hung on a stake near the ground level, recorded temperatures of 26° and 22° respectively.

Though the cold of Tuesday night seemed more intense and penetrating, little damage was evident the following morning, owing to the high wind that prevailed which prevented frost from settling, though some traces of ice were seen. Wednesday night the weather was still and cold, leaves of tender trees and shrubs were drooping, like flags at half mast, and the air was redolent with the pungent odor of withering vegetation. It was withal a discouraging spectacle.

There are a great variety of rare and little known tropical fruits to be found in South Florida, but as a rule, these are scattered over a wide area as individual dooryard plants, so that the average individual has no opportunity of familiarizing himself with them. For some years past it has been the ambition of the speaker, and associates, to establish in the extensive park grounds of The Koreshan Unity at Estero a complete collection of little known and worthwhile tropical fruiting plants which may prove adapted to soil and climate conditions of this region.

The site of this experimental planting comprises a large acreage of high hammock land, with yellow subsoil, and underlaid with clay and limestone. It is situated on the banks of Estero River, a tidewater stream, with an elevation of twelve to fifteen feet above the water level, thus insuring adequate drainage during the rainy season.

It is a well known fact that high hammock land is usually colder than the flatwoods. Sites on the islands or bordering the coast, with water protection to the northward, offer greater immunity from frost, but as a rule they have insufficient elevation to insure adequate drainage in times of excessive rainfall or of tidal overflow. Many tropical fruiting plants primarily require drainage, lacking which they soon wither and die. Lack of drainage is therefore an insurmountable handicap. Freezing temperature, on the other hand, is rarely experienced in Lee County, and to a limited extent may be guarded against. Also as trees grow larger they become more resistant to cold.

Enumerated herewith are thirty-seven different kinds of tropical fruiting plants, other than citrus, to be found on the grounds of The Koreshan Unity at Estero. Many were small plants of recent introduction and only about half the number had reached bearing age prior to the December freeze. The smaller plants, for the most part, were in a slat shed which insured some degree of protection, larger specimens being set in the open ground.

I have referred to the December freeze as freakish in character. For instance, a large bearing Guava tree would be killed to the ground while one of equal size standing nearby would be frozen back to main branches only. Large bearing Mango and Avocado trees were killed back to main limbs and in only one instance do I recall a large Avocado deadened to the ground. The White Sapota in degree of cold resistance proved one of the big surprises, as a tree of some fifteen feet in height was practically uninjured. Small ones, of course, were killed to the ground.

Exposed bushes in our large Surinam Cherry thicket were badly frozen, while protected ones inside the patch were comparatively uninjured. Though the blooming season has arrived, these have so far shown no sign of fruiting. Large
bushes of the Ceylon Gooseberry (Dovyalis hebe-
carpa), though fairly hardy, were frozen to the
ground. This is a slightly tart fruit about the
size of a small marble and is wonderfully fine
for jelly and preserves.

An old bearing Tamarind tree was frozen back
to the main branches. A bearing size Otaheite
Gooseberry met with a similar fate. A bearing
size tree each of Mountain Sour Sop, Eggfruit,
Litchee, Para Guava, Jatropha curcas and Sugar
Apple were killed to the ground. A number of
young trees of Governor's Plum were also frozen.
It is encouraging to note, however, that practi-
cally all of these frozen plants, whether large or
small, are sprouting again from the root, so that
little may be counted as a total loss. List of
these tropical fruiting plants now growing at
Estero on the premises of The Koreshan Unit
is as follows:
Akee (Cupania sapida); Avocado (Persea
americana); Annona muricata—Mountain Sour
Sop; Annona (unknown variety); Banana; Bael
Fruit; Barbados Cherry (malpighia glabra);
Carambola (Averrhoa carambola); Carissa (Am-
atungula); Chrysophyllum—native of lower East
Coast Hammocks; Dillenia indica; Eggfruit (Lu-
cuma nervosa); Feijoa sellowiana; Governor's
Plum; Golden Sapota; Green Sapota; Cattley
Guava; Common Guava; Jatropha curcas; Jambos
(Eugenia jambos); Jujube (Zizyphus); Kaffir Bean;
Litchee; Mango; Mexican Fig; Natal Plum; Otaheite Gooseberry; Pistacio
Nut; Para Guava; Sapodilla; Sugar Apple; Sur-
inam Cherry; Tamarind and White Sapota.

Extensive Mango groves on Pine Island were
uninjured by the December freeze and the trees
are now setting a heavy crop of fruit, but this
section enjoys unusual protection from the waters
of Boca Grande Pass and Charlotte Harbor to the
north and west. The same is largely true of the
Tona section of the mainland bordering the lower
Caloosahatchee River. In Fort Myers the protec-
tion of this broad river to the northward is very
marked for several blocks distant. But even on
the water front there are occasional Mango and
other large tropical trees that were severely
nipped by that freakish freezing temperature.
Farther inland the cold damage was much more
severe than near the coast.

We are accustomed to think of cold tempera-
ture moderating in proportion as one travels
south, but the December freeze seemed to have
broken all records in unusual performance.
Shortly after this destructive visitation I motored
over to West Palm Beach and was surprised to
find comparatively little resulting damage. At
Miami frosted vegetation was more in evidence.
Coral Gables looked much the worse for the ex-
perience, but Homestead appeared to have been
hit hardest of all. Some weeks later, Walter M.
Buswell, botanist with the University of Miami,
motored way down to Cape Sable and reported
that frost damage there was the worst he had seen
anywhere, even the Buttonwood trees being badly
frozen.

There is little that one can do in the way of
first aid to frozen trees. If the seared leaves
drop readily from twigs and branches you may
be encouraged to know that the wood is not
dead, sap is circulating normally and new buds
are pushing to take the place of the old dead fo-
lage. If the dead brown leaves fail to drop,
adhering tightly to the branches, you will know
that the said branches are dead. In such a case
it is better to keep hands off for awhile. In
course of time Nature will indicate by the push-
ing buds just how far the living wood extends and
where to cut away the dead wood. Many a tree
has been needlessly ruined by precipitate action in
cutting away large portions before it was definitely
determined just how far back it was injured.

Fertilization and plentiful watering immedi-
ately following a freeze are also hazardous, inas-
much as they tend to stimulate rank new growth
which is liable to be frosted again before the
winter season is over. The best that I can sug-
gest in the treatment of frozen trees is to pursue
a watchful waiting policy. It may be hard to do
at times, but it is the safest in the long run, for
Nature will ultimately indicate just how far to
cut them back. Then, when danger of frost is
fully over, water and fertilizer may be applied
without fear of damage to them.
Mr. Brooks: The damage to mangoes was very freakish. Frosts are always freakish. We found that even in the same grove, with the same care and apparently the same conditions, mango trees were variously injured. We found, rather to our surprise, that when the Hadens were badly frozen back the blossoms would come out from those stubs. Whether or not that fruit will hold, we don't know, but the bloom is coming out. I think that is about all I have to say. Thank you very much.

Next speaker was Waldo E. Sexton, Vero Beach, on the same subject.

Mr. Sexton: I got the impression that the information you wanted was in previous years and the freezes of 1895 and damage done at that time and plants that came through and I had hoped to have here today a group of men who lived here for fifty or sixty years, to report, but they have all fallen down and not shown up. I had one man here 35 years who left.

But I have talked to these men and since you are covering this year's freeze, I am going to report for the Indian River area in previous freezes. Information from old growers is that in this immediate vicinity there were very few groves in 1895. Those groves were unhurt. These same old groves were not hurt in 1917 and were not hurt in the last freeze.

The West Indian avocado, in some areas, were hurt and some killed to the ground. The avocados I have been playing with, some of the bottom leaves were hurt, but most were undamaged and are setting wonderful crops of fruit. Some mangoes were killed, some not. My impression is that back in the early freeze of 1895 there were very few mangoes or avocados or any fruit of that character here to observe. I am sorry these men are not here and that is about all the information I can give you.

Mr. Andrews: I might add I first came to Lee County about 40 years ago and was there during the 1895 freeze and that was the very impetus given to citrus growing in the county, when growers came from up the state and marveled to see trees of bearing size still alive. Fruit was shipped from Lee County after that freeze and grapefruit brought $12 a box at that time, I am told. There were a lot of seedling mangoes and avocados and the avocados were tender and so far as I know they were killed to the ground.

Mr. E. G. Wilkinson, Naples: I can enlighten you somewhat on your local conditions. Fifty-two years ago the last orange grove on the south was at Sebastian. What went wrong with these groves I don't know—when I looked for them in 1912 they were not there.

Question: You say there were no orange groves here in 1912?

Mr. Wilkinson: As far as I know.

From Floor: There are five seedling trees on the Walker place. He tells me they were growing when the 1895 freeze came and they still are today.

Mr. Wilkinson: I would not say there wasn't an orange tree back in the country, for all our travel was by boat, but there were none in fruit.

Mr. Gifford: Vero Beach reports they had a grove at that time and it was unhurt in 1895 and they state that the West grove on the ridge was growing at that time.

Mr. Wilkinson: Understand, I am talking about '82 and '83.

Mr. Sexton: Well, that's beyond me.

Mr. Ward: Mr. Chairman and Gentlemen: I am not going to be long, but I will say that the experience in the Avon Park section has been similar to other areas of the state. It did not get as cold in my particular section and grove as in some sections. We only had one thermometer register 26 degrees. Most of them registered 29 degrees. Several years ago in the '27 freeze, I reported to the Society that in some small Taylor and Lulu avocado trees there seemed to be no difference, if any, in favor of the Taylor. I think they doubted my word. However, this last winter has clearly demonstrated in every place in the state where they had the two varieties. The older trees are not hurt except for a few limbs on the majority of the varieties. One West Indian variety of avocado that almost kills itself bearing originated near Fort Myers. It was badly injured at a temperature of 28 degrees. We had two or three other varieties—the Queen showed no effects of the cold, but as far as fruit is concerned, I
would just as soon not have any trees. It may turn out to be good for root stock. It did not have a leaf turned on it, showing how much cold it could stand.

Itzamnas stood cold well and proved to be very fair bearers in the ridge section, with the exception of two trees out of about fifty or sixty that bear well. It is possible, by selection, we might have something worth while. I noticed in all varieties some trees will bear quite heavily in consecutive years. Those are the trees from which we will select bud and graft wood, trying to get improvement in varieties. So far as standing cold, the Taylor was best and the Lulu second and a little behind that was the Winslow. You remember the Winslows were severely criticized here two years ago, however, it is possible that those men who have Winslow trees may yet come out right if our truck trade to Georgia and Carolina holds out. Quite a few are bought to take up with early oranges. They ship well and the Georgia and Carolina people were very well pleased. Many of those people feel the bigger the fruit the better it is and as long as they feel that way there is an outlet for this fruit.

Of the comparison between the bearing qualities of the Winslow and the Collinson, the Winslow has borne, I am sure, from fifty to one hundred per cent. more than the Collinson. It is a beautiful fruit. There are some undesirable trees you can keep away from in our section and in mine it is the Queene and the Fuerte. The latter won't bear shipping. It ripens too quickly for common production.

Sugar maple trees several years old did not have the leaves turned this year. There has nothing been said concerning the treatment of trees following the cold. What has been said is correct as to leaving them alone till you find out just how much damage is done. Limbs that look dead will put out a good growth afterwards. However, I believe every man when he cuts them back should whitewash the rough trunks and main part of the trees thoroughly, using either the government formula or the W. H. formula. It will save sunburn. We have found definitely how severe that sunburn can be to big old trees fifteen or sixteen years old—three hours in the afternoon will blister many a tree with bark half an inch thick.

Taylor is the most profitable variety we have. We have kept records of sales for the last five or six years. Lulu is a close second. Professor Stevens has been doing splendid work in getting up spray mixtures for mangoes and avocados. We are carrying out the schedule as outlined by him in our grove this year and we will finish our second spraying of Bordeaux. Probably three more sprayings to eliminate black spot on those varieties will be required. I think that covers the remarks from the ridge section.

SYMPOSIUM ON COLD INJURY TO AVOCADOS, MANGOS AND OTHER SUB-TROPICAL FRUITS AND THEIR CARE

Chas. H. Steffani, Homestead

Weather conditions that cause temperatures of a freezing nature in South Florida offer a wide field for study. When freezing weather prevails in the temperate zones, all crops and tender plants are frozen and nothing seems to be missed by Jack Frost, the term generally used for such conditions.

In South Florida, conditions seem to be different. I have had occasion to observe frost conditions in Dade County in the freeze of February 6, 1917, and the recent freeze of December 14, 1934, and I have observed so many freakish things that nature has played that I am perfectly willing to leave it to others to draw their own conclusions.

How is anyone to draw any definite conclusions on how hardy or tender a plant may be when upon investigation you observe a planting of street