1. Children of pre-school age may be satisfactory experimental subjects if suitable taste test methods are employed. The minimum age level of children capable of yielding reliable results is yet to be determined.

2. The modified paired comparison test is a satisfactory test for this age of child for preference determination and inferences as to discrimination. The triple comparison tests for determining discrimination levels directly appear to be unsatisfactory. Possible reasons for their failure may rest in their requirement of memory span and communication, and lack of reward.

3. Children are not homogeneous in their preferences, and preference position of the minority might easily be overlooked if data were analyzed in terms of total group reactions.

4. These children preferred orange to grapefruit juice, although one child showed conclusive evidence of the opposite preference. Their choice appears to be based on the taste difference and not color difference of the juices. Indications are that tangerine holds at least an equal if not a higher preference position among those who decidedly preferred orange to grapefruit. The children tested were not as sensitive to the difference between off-flavored canned Valencia and well-flavored Temple concentrate as they were between orange and grapefruit.

5. Much more work of this type should be carried forward to answer the many questions this initial research brings into focus: Is it the flavor characteristic of the fruit, or is it the sweetness and/or acidity level of the juices which is of greater importance? Are children less sensitive to "tinniness" and "off-flavor" than may be generally presumed? At what age level can children discriminate and make preference judgments between such stimuli, and how is this ability related to chronological development of the child and other physical and mental attributes of the child's personality? What relation if any is there between the child's preference position and that of his siblings and parents, and what is the influence of home juice consumption patterns?

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Ornamental Section

NOTES ON SOME ECTOPARASITIC NEMATODES FOUND ATTACKING LAWNS IN THE TAMPA BAY AREA

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As in other sections of Florida, severe chinch bug infestation has become widespread in the lawns of the Tampa Bay area. The incipient symptom of chinch bug attack is a slight yellowing of the grass blades in spots in St. Augustine grass lawns. This yellowing as it becomes more pronounced may be accompanied by wilting. As the infestation becomes chronic, the yellow areas increase rapidly in size while the grass in the center turns brown and dies. In some examinations of damaged lawns not a single chinch bug was found, yet the grass showed typical infestation symptoms. Regular circular patterns of yellow blades appeared, turned brown, and died. All the symptoms occurred during a period of hot dry weather, but even heavy artificial watering failed to revive the grass. Additions of insecticide, fungicide and fertilizer containing minor elements did

not alleviate the condition. Soil tests in the areas under observation indicated that the pH levels were between pH 6.0 to 6.5. Within this range the minor elements should have been available for absorption into the plants. The suggestion was, therefore, that some condition of the roots was limiting the uptake of nutritional elements and water.

Upon critical examination a type of damage was found on the roots which indicated that nematodes might possibly be associated with the problem. There was a drastic reduction in the size of the root system. The small feeder roots were almost completely absent. The root tips were dead and a proliferation of new roots from behind the injury were in turn usually damaged. This produced a stubby mat of brown roots. Such an injured root system could not itself function properly and as a result of reduction in extent could feed in only a limited area of soil. Either of these two factors may have caused stunting and chlorosis in the above-ground parts of the lawn.

Samples taken in 1951 from a St. Augustine lawn disclosed a typical stubby root condition of the grass roots. This was identified by Dr. J. R. Christie at Sanford, as having been caused by *Trichodorus* sp. A comparison of a stubby-rooted plant with one having normal roots is shown in Fig. 1.

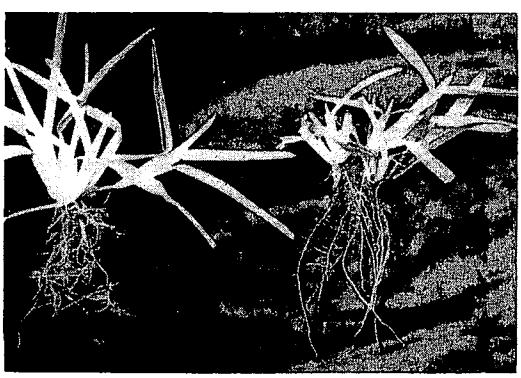

Fig. 1. Stubby root injury to St. Augustine grass.

Samples of turf and the underlying soil in these affected areas underwent laboratory examinations to determine whether or not parasitic nematodes were present. The samples were taken with golf-cup cutters and water extracts were made by a procedure that combined decanting, sieving and the Baermann technique. The extracts contained nematodes of various types. The authors are grateful to Mr. Vernon G. Perry, assistant nematologist at the Central Florida Experiment Station at Sanford, for his cooperation in identifying some of the nematodes.

Other cases of stubby-root infestation were found in 1952 on specimens of a bermuda grass (Everglades No. 3) which showed stubby root injury symptoms (Fig. 2).

In 1953 the highly destructive sting nematode, *Belonolaimus gracilis,* was found in Bradenton in a St. Augustine lawn which developed stunted and chlorotic patches. Microscopic examination of extracts of turf and soil samples from this lawn showed the following nematodes to exist about the roots of the grass: the stubby-root nematode, *Trichodorus* sp.; the

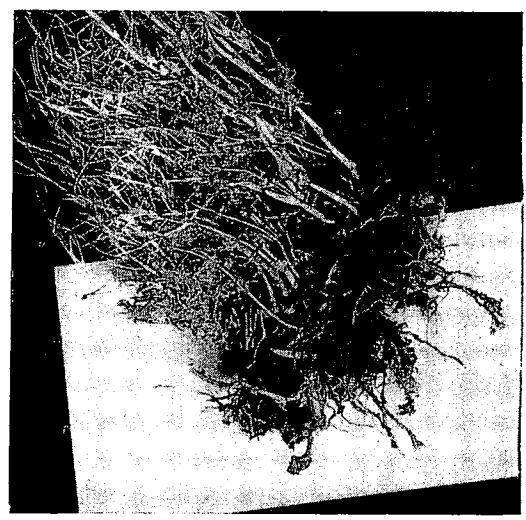

Fig. 2. Stubby root injury to Everglades No. 3 grass.

burrowing nematode, *Radophalus similis;* the ring nematode, *Criconemoides* sp.; the bulb and stem nematode, *Ditylenchus* sp.; and a parasitic nematode having no common name, *Hoplolaimus coronatus.* Also in this same area under a large palm, *Cocos plumosa,* was a spot in which the grass wilted and died rapidly despite heavy artificial watering. This contained the sting nematode and *H. coronatus.*

Turf samples from chlorotic spots in *Zoysia matrella* lawns in St. Petersburg, Florida had many specimens of nematodes in them. Sting nematodes were obtained from mats of the grass with no adhering soil. Also present though not so numerous were the ring nematodes, bulb and stem nematodes and *H. coronatus.* In two locations stubby-root nematodes were found.

Most of the investigations to date have been in St. Augustine lawns. There is only one sure way of determining the presence of an externally-feeding nematode and that is by microscopic examination. However, these findings indicate the desirability of examining the roots of a suspected "sick" grass, for quite often the visual evidence can show that nematode attack has led to the quick decline of the grass in a lawn. Nematodes may not prove to be the causal agent in the death of the plants but the lesions made by ectoparasitic nematodes offer easy avenues of entrance for disease organisms such as the pathogenic fungi, which are present in the soil. In soil where these pathogens flourish, the plant weakened by nematode attack stands even less chance of succeeding. Fungi which may have caused little harm otherwise are capable of tremendous damage as secondary invaders of the root system.

At present we know of no nematocide which may safely be applied on established lawns to control the nematode populations. Work has been initiated in various areas to find such a material, but thus far the only suggestions we are able to make is that the affected area be treated with one of the proven nematocides before resetting the grass. Since evidence indicates that nematodes spread outward from these dead patches into the lawn which does not appear to be affected, it is best to carry the treatment some 3 or 4 feet beyond the margin. This practice is suggested even at the risk of harming the growth there, since chances are that grass in those areas would die anyway in the near future.

EDB (ethylene dibromide) or D-D (a mixture of dichloropropene and dichloropropane) used as directed by the manufacturer, are materials which may be injected into the soil to control nematodes. EDB is more pleasant to handle in small scale operations, but both materials when applied properly are very effective in reducing populations of nematodes. The soil should be prepared as for setting the lawn, with a fairly high moisture level and a loose, porous texture. Applicators are available commercially for injection of the materials. In a small operation, holes made six inches deep with a hoe handle should be placed twelve inches apart in staggered rows. The holes should be covered immediately. The soil surface should then be watered to affect a quarter inch moisture seal in order to delay the escape of the volatile chemicals. Two days after fumigation the soil may be aerated. Care should be taken that tools such as hoes, rakes and cultivators used in the treated area are clean, for recontamination by infested soil clinging to the tools should be avoided. Grass which is used for resetting should not show any root symptoms of nematode attack. Grass set in these treated areas will then be able to establish good root systems without the damage caused by nematodes.

BULBS, TUBERS, AND RHIZOMES FOR CENTRAL FLORIDA

GERALD B. KNIGHT

Apopka

I wish to discuss some of the bulbs, tubers and rhizomes which we are raising at Apopka. I quite well realize that I shall not be able to even scratch the surface of the possibilities in this field so I have selected some of those which have not been presented so often in the past—some of the more unusual ones which we are trying.

The plants which I shall include here are all being raised successfully at our place, or were before the recent flood took over a large part of our area. Our experiences may have differed widely from some of your own, but for better or for worse they are our experiences.

Among the plants which form rhizomes, the Genus Hedychium, in the ginger family, is a group which seems to me to have received far less attention than it deserves.

The well known Ginger lily, Hedychium coronarium, has escaped in some places and has become naturalized around many lakes in Central Florida. This seems to have brought upon the whole tribe a sort of curse. Besides this Hedychium coronarium, or butterfly lily, with white flowers the other species and varieties include pale yellow flowers, deep yellow with red stamens, and red, besides others which we have not grown.

Hedychium flavum sports a blossom of a size quite comparable with its white cousin, a pale creamy yellow with stamens the same