

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

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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

color. The arrangement of the florets and the odor are almost identical.

Further down the color scale there is the *Hedychium gardnerianum* with its startling scape of deep yellow flowers with bright orange-red stamens. The panicles of this variety are much larger and more heavily flowered than either of the other two but the individual florets are somewhat smaller. They possess the same delightful aroma. Blooms of this plant have never failed to be popular in our garden.

Last in the scale is the low growing *Hedychium coccineum*. We have this growing but to date we have never succeeded in getting it to flower. The nursery from which we secured our plants says that it has never flowered there either, but that many of their customers have been more successful. This one was very slow in getting established but now has excellent growth and we have hopes of bloom next year.

This group of plants is exceptionally easy of culture, and seems to grow well with the roots wet. Except for the red, they grow to a height of about six feet.

Another rhizome that is gaining in popularity but which seems to have suffered somewhat from being naturalized is the native, or Louisiana iris. These are to be found in shades of blue and purple in many parts of the country and all over the state.

Much work has been done in the bayou country of Louisiana where the plants have formed natural hybrids between *Iris fulva*, *I. foliosa*, *I. virginica* and other species, in many cases of great beauty. In addition to the natural crosses some of the collectors have produced some outstanding plants from careful hybridizing. These run from red to pure white, shades of yellow, blue and purple.

Blooming season for these plants, both wild and under cultivation is earlier here than in Louisiana where most of the work with them has been done. Smaller than the German, or bearded iris so popular further north, and lacking the characteristic "beard," they are none the less a worthy while subject for Florida gardeners. They are well suited to our Central Florida growing conditions as they prefer to be flooded after the blooming season is past and our wet summers supply this.

Another plant in the Iris family which seems to have had little consideration in Florida is *Acidanthera bicolor*. This is a bulb na-

tive to Africa and is much grown on the west coast of this country. The blooms rise on a stalk to a height of about two and a half feet above low sword-like foliage. Blooms are approximately the size of a medium glad and are a pale cream with a dark purple center eye.

Blooming time is late summer when flowers are not plentiful in our garden and they have proved to be an outstanding subject for the middle of the beds. Their perfume makes them a favorite with all who claim that "flowers should smell sweet."

Bulbs are treated as we treat glads and the vegetative reproduction has been quite satisfactory. To date, no seed have been tried.

Another genus in the Iris family, well known to old fashioned gardens seems to be making a comeback these days—the *Watsonias*. These, grown under conditions identical to glads (which they closely resemble), we have found most rewarding.

The flowers, ranging in size between the small and miniature glads, have a quite similar arrangement on the stalk. In color the species and varieties range from white through fuchsia, pink and lavender shades to a copper-bronze. Simpler in cultivation than glads, the plants seem to be much less subject to disease and it is not necessary to take up the bulbs until crowding makes this advisable.

Vegetative reproduction has been quite satisfactory and while all varieties except those of the copper-bronze set seed, we have made no experiments with these. The copper-bronze variety sets bulblets all down the stem where the flowers occurred.

Few of the true lilies, with the exception of the Easter lilies, *Lilium longiflorum* and its varieties, seem to thrive well in the central part of the state, but there is one outstanding exception to this and that is the *Lilium philippense* or Philippine lily. This stately subject thrives well and is of the easiest culture, coming true from seed which it sets abundantly. The seedlings bloom the first year after planting.

We have grown specimens from three year, or older bulbs, that have reached a height of eight feet and had as many as twenty-two blossoms on a single stalk.

Somewhat larger than the Easter lily, they resemble this quite closely. Under normal conditions with us they start to bloom as early as mid-July and we have had blossoms as late as Christmas Day. They are very erratic in

their time of bloom and bulbs of the same age, growing side by side, have bloomed months apart.

They are easy of culture and we have never found it necessary to take the bulbs up during their dormant season. They seem to thrive quite well under this treatment. They do not multiply rapidly vegetatively, but the fact that they bloom the first year from seed makes this of less importance than it might otherwise be.

Among the more easily grown amarylids are the so called rain or witch lilies in the genus *Zephyranthes*. These range in color from a pure white through pink to a rosy red with a much smaller variety in a medium yellow.

With their tendency to bloom several times a year after a period of drying off, followed by a good soaking, they make a most attractive border subject. The Florida Sanitarium, in Orlando, has made exceptional use of these plants and have borders in full bloom almost every day of the year.

Lesser grown and larger in their flowers but otherwise quite similar are the several species in the genus *Habranthus*. The flower of one variety is white with a rosy tip to the petals and is quite striking.

Another amarylid that is rapidly becoming popular in the state is *Agapanthus africanus* or blue lily of the Nile. Except for the fact that the varieties are not all blue, they are not lilies, and they are not native to the Nile, since they come from the Cape of Good Hope, the name is quite acceptable.

This flower has been exceptionally popular in California both as a garden subject and for corsages by florists. To date the supply in Florida seems to have been very limited as several growers have reported difficulty in raising plants from seed. Seed have done well in our garden sown directly in the ground under high oak shade in a mixture of compost and sand.

These flowers come in varying shades from a very dark blue to an almost pure white and range in height from about three feet for the tallest to not more than fourteen inches for the hybrid *Peter Pan*.

One hybrid grown directly in the ground last spring produced a bloom head measuring more than eight inches across with a count of two hundred and ten florets although not all of these were open at the same time. Successive opening of florets gave the head a lifetime of about six weeks. This specimen was a medium blue with each petal having two

parallel stripes of darker blue which, while not large, were well proportioned to the rest of the flower.

*Agapanthus* multiplies fairly well vegetatively giving an average of from one to three new plants for each mature root. Some of the seedlings produced as high as six separate plants before reaching blooming size.

Unfortunately for my report of the ultimate success of these seedlings, the recent flood has put about a foot of water over the entire bed and we have little, if any, hopes of a single plant surviving. Seed from our mature plants and some crosses of these are showing excellent progress but it will require at least another year for any definite results.

In a few instances, particularly among the white variety, the seedlings bloomed the first year but this appears to be the exception rather than the rule. In general it may be expected to take two years from seed to blooming plant and an additional year for a really exhibition specimen. Plants seem to prefer full sun and soil well supplied with organic material rather on the damp side.

Amarylids of almost endless variety in color and season of bloom which seem to me to justify far more attention than they have received are found in the genus *Crinum*. *Crinums* are easy to grow varying so widely in their soil and shade requirements and time of bloom as to make some of the varieties practical in almost any situation except that of extreme dryness.

The best known of this family is *Crinum scabrum*, or the milk and wine lily. This has proved so adaptable that it is found in many gardens in southern Georgia and many of the older homesteads in northern Florida. There are a number of variations of this type all of which have the characteristic medium petal of white with a red or rose stripe down the center of each petal.

More popular in the central part of the state is the *Crinum asiaticum* with its very narrow petals of pure white and its huge bulb which in some specimens reaches the weight of thirty pounds. A clump which has remained undisturbed for a number of years would be most easily removed with dynamite or a steam shovel.

The *Crinum asiaticum* blossom has the interesting habit of opening its petals so rapidly that actual movement may be observed. There will be a number of separate blossoms on a

single head, each as much as twelve to fourteen inches across with a delightful fragrance common to all varieties of this plant. The bloom stalks are produced at such frequent intervals as to almost be said to be everblooming.

One of the main objections to this crinum is the large size it attains. Unless used properly it is very apt to grow into rather a monstrosity which would be difficult to remove. It multiplies well vegetatively, and the seed which are formed generously are not at all difficult to propagate.

On the other end of the scale there is the hybrid Ellen or Mrs. Bosenquet, developed at Leesburg. Here the blossom is distinctly lily-form of a burgundy red. This is the darkest of all the crinums we have grown. It flowers but once a year and that is about mid-May or early June.

In between these two is the medium pink J. C. Harvey with wide petals similar to the amaryllis. This type reproduces vegetatively so freely that we have never bothered with seed. The Louis Bosenquet is an even lighter shade than the J. C. Harvey and is quite similar in shape to Ellen Bosenquet. Both prefer a rather moist sunny location.

Another contrast in this interesting family is *Crinum giganteum* with its pure white tulip formed flowers. This type has been known to thrive well with its roots in water. The sun tends to burn the blossoms to such an extent that it must be grown in at least partial shade; I believe it would even tolerate quite deep shade, although I have never grown it under such conditions.

Perhaps the most spectacular of all the crinums growing in our garden is *Crinum amabile*. The bloom stalks are a blood red and the flowers, the largest that we grow, have petals with a rosy outside and a lighter stripe in the middle. Quite an erratic bloomer, it is well worth the waiting when it does perform. It is almost sure that a well established plant will offer a show at least some time during the year. It is most apt to bloom in the middle of the fall, just before cooler weather sets in.

Native to the state and growing in all parts is *Crinum americanum* or Florida swamp lily. This is in many respects similar in its flower to *C. asiaticum* but distinctly smaller and, in most specimens, less fragrant. Growing at rather great depth, these bulbs have been difficult to bring into civilization for us at least.

From a now forgotten source, we acquired a type of crinum very much like the *C. americanum* except for the fact that it has much larger and finer blooms. Whether this is a sport originally, or a hybrid, we have never been able to ascertain. It is an interesting question. For lack of a better designation, one of our grower friends, himself quite an authority on crinums, calls it *C. americanum* variety *robusta*. This crinum has multiplied so well vegetatively that we have never raised any of the seed which it sets readily. It is quite possible that at least some of these have volunteered and have been credited to vegetative reproduction. If this be true, then if it is a hybrid, its characteristics have become so well fixed as to justify its classification as a separate variety.

## STUDIES ON LEAF SCORCH OF GLADIOLUS

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For several years gladiolus plantings in parts of Manatee and Hillsborough Counties have been affected with leaf injury of the tip-burn type. This condition will be referred to as leaf scorch in this report. The symptoms commonly observed in the field are the following: two to three days after a heavy fog, dark water-

soaked areas are found near the tip of the leaf and near the margins. During the following week the whole tip area may begin to turn various shades of brown including light tan. The water-soaked areas also tend to assume a tan color in certain varieties. The severity of leaf scorch varies so that a given variety may in different seasons exhibit scorched areas ranging from one to six inches in length.

Information available in the literature indicates that fluorine as an atmospheric contaminant might possibly be the cause of this leaf scorch. Investigations (1, 2, 3) reported from other states have indicated that the gladiolus plant is unusually sensitive to fumigation in-