bear quite as heavily under 10 years of age as
do trees on lemon root but they will eventually
attain about the same size and bear equally as
well as lemon root trees.

The outlook for limes the next 5 years in the
Ridge Area is for slowly increased plantings
with profitable operation of the groves.

STROPHANTHUS SARMENTOSUS, A POSSIBLE NEW
DRUG PLANT FOR SOUTH FLORIDA

H. F. LOOMIS

U. S. Plant Introduction Garden
Coconut Grove

The discovery that the wonder drug, Cortison,
used in relief of arthritis and rheumatism, might be obtained more quickly and at
less expense from certain plants than from
animal products has stimulated an active re-
search for the best botanical sources of the
drug. The earliest and still considered the
most likely possibility is a West African arrow
poison vine with the scientific name of Stroph-
anthus sarmentosus. This and related species
of the same genus have long been known to
medicine as yielding an important heart stim-
ulant, Strophanthin, extracted from seeds
gathered in the native home of the plants. Of
the 50 or more known species of Strophanthus
only one or two from West Africa have been
investigated for Cortisone production and of
those that have, usually only the parts of the
plants used by drug manufacturing companies
for extraction of strophanthin have been avail-
able. Thus many parts of the plants of some
species and all parts of others remain to be
tested for cortisone content. Variations in
yield of cortisone from different samples from
the same species indicate that much is to be
learned as to the proper growing conditions
for the plants and the best time to harvest
and cure the productive part or parts of the
plant. Thus it will be seen that a vast amount
of investigational work must be done before it
can be determined which are the best species
for planting, where these are likely to grow
well, and the methods to effect yields of corti-
sone that may eventually justify commercial
plantings.

The species of the genus Strophanthus, of
the family Apocynaceae, are represented as
trees, shrubs and rank-growing vines occurring
in tropical Africa, Southern Asia, Malaya and
the Philippines. S. sarmentosus is one of the
better-known species and is a tropical liana
or vine climbing to the tops of the trees in
its native home, but under cultivation behav-
ing either as a vine, if given proper support,
or as a sprawling shrub when grown without
support in the open. In full bloom the vine
is very spectacular with innumerable funnel-
shaped, white or pale cream flowers with a
deep purple throat. The petals terminate in
striking, long, pendant streamers. The paired
pods are 6 or 7 inches long containing the
flattened seeds, each of which has a downy
tuft of silky hairs at one end much like the
common milkweed. It is from these seeds
that both strophanthin and cortisone have
been extracted.

Up to the present, the demand for Strop-
hanthus products has not been sufficient to
cause commercial planting of any of the spe-
cies. In fact, with one or more of them this
has been prohibited in parts of Africa because
of misuse of the poisonous parts of the plants
by the natives. Thus only wild plants have
been involved in the drug trade and it has not
always been certain which species were rep-
resented or the exact locality from which
collections may have come.

When it became known that Strophanthus
might be a valuable source of cortisone the
President requested the U. S. Public Health
Service and the U. S. Department of Agri-
culture to study all phases of the problem.
The former agency has been charged with
investigating its chemical aspects while the
Department of Agriculture is fostering the
botanical and cultural research. Early in August of this year the Division of Plant Exploration and Introduction of the Department of Agriculture sent a botanist to West Africa to locate all possible species of the genus, collect seed and plant material for propagation and chemical analysis in this country, and to establish stocks of all species in Liberia from which experimental materials may be drawn. Details of all phases of the plant habits and environment are being observed to assist in establishing the various species in suitable locations here and elsewhere. Results of this work already are appearing.

In this country a search has been under way to locate all the plants of this genus that may be growing here as a result of introductions made in the past. A number of mature plants of *Strophanthus sarmentosus*, developed from seeds collected in French Guinea by Dr. David Fairchild in 1927 have been located in Puerto Rico, the Canal Zone, Cuba and several places here in the United States. Among these latter are the U. S. Plant Introduction Garden and the R. H. Montgomery Estate, Coconut Grove, Fla., and a private collection of a grower at Kendall, Fla. Also known are two plants of *Strophanthus gratus* and two of an unidentified *Strophanthus* species at the U. S. Plant Introduction Garden. Although these two latter species fruited some years ago, they have not done so recently and it has not been possible to determine the cortisone content of their seeds.

The mature vine of *Strophanthus sarmentosus* at the U. S. Plant Introduction Garden is from the original 1927 introduction and has grown to very large size, each of its two basal stems having a diameter of six inches. It has flowered profusely, in the early Spring for many years and it has produced a few flowers at other seasons but, like most of the other known plants of this species in this hemisphere of which records have been obtained, it has never fruited. Only the plant at the Montgomery Estate in Coconut Grove, Fla., and one at the Atkins Institute, Soledad, Cuba have fruited and these sparingly. From observations made here as well as in Africa, it seems quite likely that fruiting is dependent on insect pollination of the flowers and hand pollination may be necessary to secure a set of fruit where the insects are not present. Various tests, with *Strophanthus sarmentosus* particularly, indicate that vegetative propagation is relatively simple so that multiplication of any desired strains will not be dependent on a long-time breeding program to produce pure lines of seed. With *S. sarmentosus* all types of cuttings from old wood to the most succulent growing tips and even single leaves with attached chips of stem have been rooted in from ten days to three weeks and it is thought that with the coming of cool weather, when differential temperatures may be obtained, better rooting success may be secured with bottom heat in cutting boxes.

The widespread publicity that has been given in popular and scientific magazines and in newspapers to the possibilities of developing supplies of cortisone from plants, naturally has stimulated great interest among many different groups of people. The desire to make experimental or even commercial plantings has been expressed by many, but thus far the lack of sufficient authentic planting material to supply the urgent needs of the agencies officially designated to conduct the initial investigations has not allowed diversion of seeds or cuttings to others. It has been found that the species of Strophanthus being studied in Africa will not produce seeds there for some months and the amounts that may be obtained then are indefinite. Needless to say, distributions of planting material will be made as soon as conditions of knowledge and supplies of seed, seedlings or cuttings justify, but from present prospects this probably cannot take place until the middle or latter part of 1951.

The performance of the few plants of the several species of Strophanthus that have been grown in southern Florida insures much more intensive tests being made throughout this area at the earliest opportunity. One of the many important features that must be learned here will be how to make the mature vines
WOLFENBARGER: MEALYBUG CONTROL

set normal crops of seed unless future studies show that other parts of the plants may yield cortisone more economically. It is upon sat-

isfactory answers to questions such as these, and others that have been indicated, that the future of Strophanthus planting here lies.

DIPPING PINEAPPLE PLANTING STOCK FOR MEALYBUG CONTROL

D. O. WOLFENBARGER
Sub-Tropical Experiment Station
Homestead

Planting stock intended for starting beds of pineapples is likely to be infested with the pineapple mealybug, *Pseudoccus brevipes* (Ckll.). Infested plants produce some fruit, but will grow more rapidly, be more thrifty and productive if the mealybug is controlled. One of two choices may be made in starting pineapple plantings. Stock may be planted with the mealybug infestation present or it may be treated so that it is non- or but lightly-infested.

One method recommended for treating stock used for starting new beds is fumigation by methyl bromide, as reported by Osburn (1945). This method gives apparently perfect control of the mealybug. A gas-tight fumigation chamber, however, is a necessity, requiring the outlay of some money for one that is satisfactory. This expense may be borne readily by those having large plantings, or perhaps by those selling the planting stock. Those having small beds or very small acreages, however, may wish to use some other method, even one that does not give perfect control.

Dipping and spraying the planting stock are other methods that offer possibilities. These methods were tried by Carter (1931) in Hawaii, who tested oil emulsions, rotenone, and nicotine sulfate materials as dips or immersions, and as sprays. Although his two percent oil emulsions gave the best results, they were but partially effective. He reported that there was always some injury or danger of injury to the plants where oil emulsions were used. The advent of DDT and subsequent new insecticides opened new possibilities for pineapple mealybug control. Reports on experiments conducted in Florida in which these materials were tested have been given by Osburn (1949), and Wolfenbarger and Westgate (1947), and Wolfenbarger (1948, 1949). That phase of testing the insecticides at the Sub-Tropical Experiment Station as dips for planting stock\(^1\) is herein reported. The tests are reported in the chronological order in which they were conducted.

*July 1946.* Eighty-eight rather small sucker plants were divided into lots for eight treatment materials, including the check. This gave 12 plants for each of the seven dip treatments, and for the check. The 12 plants were further divided into lots so that there were three lots of four plants each. This provided four plants to be dipped for 0.5 minutes, four for 3.0 and four for 10.0 minutes, in each material. A week after the plants had been treated they were examined to determine treatment effects. The leaves were stripped from each plant to expose any mealybugs present. The results of the treatments, by materials, all 0.5, 3.0 and 10.0 minute immersions included, average number of living mealybugs present per plant, and percentage control are summarized in Table 1.

Effective control was obtained by all of the newer insecticides. Although the plants were sacrificed so that no treatment effects as plant injuries were determinable, later tests disclosed that the concentrations tested were injurious to the plants or were impractical for use.

In order to show the effect of time spent immersed in the dips all data were summarized

---

\(^1\)Acknowledgment is made to the Miami Pineapple Plantations as the source of much of the planting stock used in the various tests.