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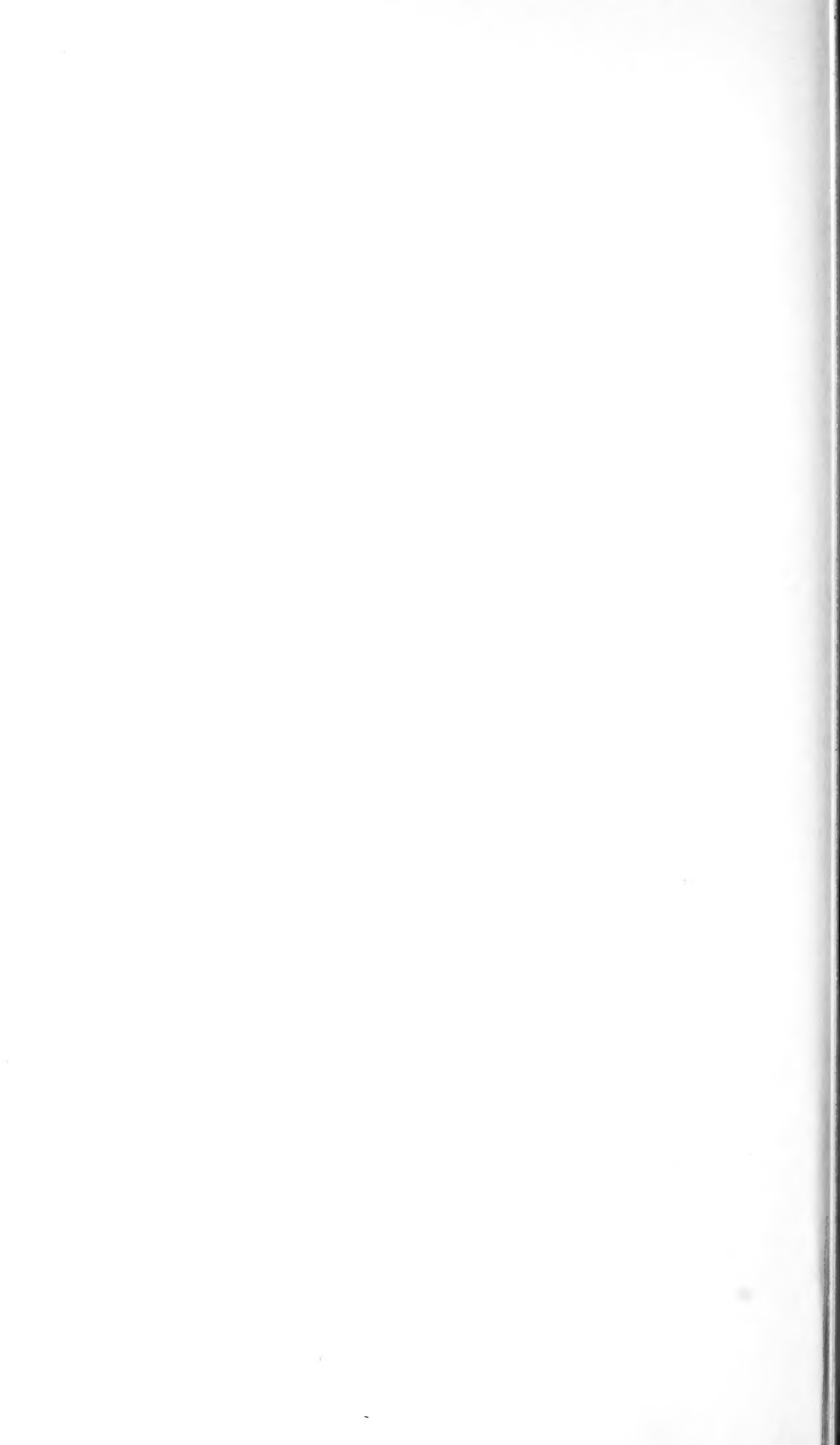
**POISONOUS
and
INJURIOUS PLANTS
of the
U.S. VIRGIN ISLANDS**

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POISONOUS AND INJURIOUS PLANTS OF THE U.S. VIRGIN ISLANDS

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Growth Through Agricultural Progress

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POISONOUS and INJURIOUS PLANTS of the U.S. VIRGIN ISLANDS

By A. J. Oakes and James O. Butcher, Virgin Islands Research and Extension Program¹

In the Virgin Islands a number of livestock die every year from unknown causes. Many of these animals have had free access to pastures, and although the responsible agent is usually unknown, poisoning by plants is frequently suspected and must, in fact, often be the cause. At least 50 of the wild and cultivated plants in the Virgin Islands can be poisonous to livestock. Deaths from plant poisoning can be a heavy financial burden to livestock farmers.

This bulletin brings together available information about livestock poisoning, and complements the forage plant investigations and the weed control program being conducted as a part of the Virgin Islands Agricultural Program.

Livestock farming is of great importance in the Virgin Islands. Beef cattle make up the principal livestock enterprise, especially on St. Croix, which is the largest island of the group and has the most agriculture. Nearly half the land area of St. Croix is devoted to livestock and the gross value of annual production is exceeded only by that of sugarcane (16).² In addition to beef cattle, there is an expanding dairy industry on the islands of St. Croix and St. Thomas. Sheep and goats (both for meat only) and hogs are found on St. Croix, St. John, and St. Thomas, but there are not enough to meet the current demand, so that there is a potential for further expansion. Donkeys, horses, and mules are less important but are kept on all the islands.

Poultry farming, like dairy farming, has expanded rapidly during the past few years. Several small but profitable poultry farms have been started on St. Croix and St. Thomas. In addition to chickens, a few turkeys, guinea fowl, and Muscovy ducks are raised.

Both the government of the Virgin Islands and the Federal Government (through the Virgin Islands Corporation and the Virgin Islands Agricultural Research and Extension Program) are encouraging and aiding Virgin Islanders in their livestock enterprises. The Virgin Islands Corporation is raising beef cattle and riding horses on about 300 acres of land not suited for sugarcane.

LOSSES FROM POISONOUS PLANTS

Some of the poisonous plants in the Virgin Islands are of great importance because of their abundance, high toxicity, wide distribution, and accessibility to stock; others, because they are only slightly

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² Italic numbers in parentheses refer to Literature Cited, p. 91.

poisonous or poisonous only under some circumstances, are of minor importance; still others are merely suspected of being poisonous. Of those included in this study, 48 species are reported in detail. The toxicity of the plants, except those that are generally known to be toxic and are well documented, was determined by feeding trials which were a modification of the standard chick-feeding test (49). These trials were made through the cooperation of the Federal Experiment Station, Mayaguez, P.R.³ Results of the feeding trials were compared with information in the literature.

Most of the plants discussed in detail have poisoned animals in the Virgin Islands, other Caribbean islands, the continental United States, and other parts of the world. Livestock losses due to plant poisoning include not only actual deaths but also losses through failure to reproduce or gain. This bulletin discusses both types of poisoning.

In the Virgin Islands, animals that are tied out are much more liable to poisoning than those that are loose. Free ranging animals are in greatest danger from toxic plants in pastures, less so from ornamentals, and least from poisonous plants in silage or green cut feed. The latter feed is becoming increasingly popular, particularly among dairy farmers. Hay is not made or used at present, but should it be in the future, care should be taken not to include known toxic plants. Although a farmer may faithfully practice preventative measures in livestock management and may control his poisonous plants, it is impossible to escape entirely some danger from them.

LOSSES FROM OTHER CAUSES

Poisonous plants are not the only cause of losses and sickness in livestock, and losses from other causes may be confused with those caused by plant poisoning. Chief among these are nutritional disorders, bloat, infectious diseases, impactions, and poison in feeds or water and from such sources as paints, petroleum products, insecticides, and herbicides.

Although some instances of poisoning resulting from use of the common herbicides 2,4-D and 2,4,5-T have been reported, these chemicals are harmless to farm animals under all ordinary conditions (32).

Losses due to farm animals consuming excessive amounts of salt have been reported in cattle, swine, sheep, and poultry. Sheep and swine are most frequently affected under field conditions. In St. Croix, arsenic (usually obtained by livestock drinking from cattle dips or surrounding puddles) has caused a number of deaths. Moldy or spoiled feed is sometimes responsible for livestock poisoning. The gossypol in cottonseed and cottonseed products may also cause poisoning. (See Cotton.)

Instances of livestock poisoning have been traced to organic poisons in water supplies such as might result from the decomposition of dead fish, or of dead livestock, in farm ponds. Although the probability of losses from such contaminated water in the Virgin Islands is rather low, dead animals should always be removed immediately from any water supply used by livestock. In investigating cases of livestock poisoning, all possible sources of poison should be checked.

³MORRIS, M. P., and WINTERS, H. F. QUARTERLY REPORT, FEDERAL EXPERIMENT STATION (MAYAGUEZ) PUERTO RICO. Jan.-Mar., and Apr.-June, 1954. [Unpublished.]

PLANT IDENTIFICATION

A general knowledge of all the vegetation on the farm is useful in identifying poisonous plants. In addition, the stockman must know (A) what poisonous plants, if any, are on his land; (B) where they grow; (C) which part or parts of the plant are toxic, and the time of the year each is dangerous; (D) classes of livestock endangered; and (E) the symptoms each plant can cause. When poisoning occurs, the steps in identifying the plant responsible are (A) to determine by inspection which of the suspected plants have actually been grazed (sometimes they can be identified in the paunch of a dead animal), and (B) to match the suspected plant with the symptoms of the poisoned animal or animals.

Usually the least likely plants can be progressively eliminated until the choice narrows down to one or a few possibilities. This trial-and-error process of identification is one of piecing all the clues together. Of course, animals may be poisoned by eating two or more poisonous plants at the same time, but this is probably a very rare occurrence.

The stockman should not depend entirely on local beliefs about poisonous plants or about the symptoms produced in the animals that eat them, even though they are often correct, because he may give the wrong treatment and incur unnecessary losses. Confusion of common names can also hinder correct identification.

Once the stockman has located the plant responsible for poisoning, he can use this bulletin to learn its name and how best to eliminate it.

WAYS TO PREVENT POISONING AND REDUCE LOSSES

Basically, there are just two ways to prevent poisoning: (A) Keep the animals away from the poisonous plants (as by fencing, and by using great care not to tie animals where they can reach any poisonous plants); and (B) keep the poisonous plants away from the animals (as by destroying the plants). Unfortunately, it is frequently impossible to apply either method completely, and it is therefore necessary to use all those indirect control methods which together comprise good livestock and pasture management.

However, livestock can be kept nearly as safe by providing ample nonpoisonous forage. When given a choice, livestock will almost always consume good feed and avoid poisonous plants. Always provide good, healthful feed in adequate amounts. Move the livestock to another paddock before the one they are using becomes overgrazed, and before they are tempted to eat any poisonous plants. This is also good pasture management because it allows the grass to grow back quickly.

Not only is a pasture in good condition less dangerous to livestock, but an animal in good condition is less likely to eat poisonous plants. Very thin animals are almost constantly hungry and, if denied access to good feed, will eat poisonous plants even though many of them are unpalatable. Animals in good condition are not so desperate for feed, and are more likely to avoid poisonous plants. In other words, although it is difficult to get rid of every poisonous plant, or to always keep animals from approaching them, the risk of plant poisoning is reduced if livestock always have access to sufficient healthful, palatable

feed. This point is especially important when animals are moved to unfamiliar surroundings where they may find a poisonous plant that they do not recognize.

TREATMENT OF POISONED ANIMALS

When plant poisoning is suspected, the stockman should make sure that his animals have not been poisoned by arsenic, insecticide, paint, or any other poison, and that they are not suffering from an infectious disease. An animal with an infectious disease usually has a fever and a dry, warm muzzle. An animal with plant poisoning generally has no fever and has a moist, cool muzzle.

Plant poisoning should be strongly suspected when there is a sudden onset of obscure illness without visible cause, especially when a number of animals show acute disorders of the central nervous system or the digestive tract, with prostration or rapid loss of weight. Other indications of plant poisoning are fast heartbeat, stomach and intestinal upsets, depression, and repeated unsuccessful attempts to empty the bowels, and difficulty in breathing. These symptoms are often followed by weakness, coma, and collapse.

Unfortunately, by the time symptoms are apparent many poisoned animals are beyond recovery. Prevention, therefore, is much better than treatment. When trouble strikes, call a veterinarian at once. Place the animal where you can give it adequate care and treatment, protected from the sun, and offer it water and a little good safe feed. Before the veterinarian arrives, try to learn everything you can about the case, such as location and identification of the offending plant and the symptoms of the poisoned animal. The veterinarian will want that information to use as a basis for treatment.

CONTROL OF POISONOUS PLANTS

The most certain method of preventing livestock poisoning is to destroy offending plants, but the cost of destruction must be weighed against the value of the forage that the poisonous plants make dangerous for livestock to use. Frequently the cost of eliminating poisonous plants from extensive and scattered stands is prohibitive: some poisonous plants are low in risk, and their value as forage offsets their poisonous nature. For example, sudangrass becomes poisonous only under exceptional conditions and is normally a valuable forage crop which you are more likely to plant than to control.

Factors that affect costs, such as location, density and extent of stands, land slope, and rockiness, determine what kind of control you should use. Adequate control may require only one method, or a combination of mechanical, biological, or chemical methods.

Mechanical control—use of machinery or handtools to remove undesirable vegetation—has generally met with only partial or temporary success in the Virgin Islands. Methods include cultivation, cutting, mowing, pulling, grubbing, bulldozing, and brushchopping. Except for cultivation followed by replanting, mechanical control has to be repeated constantly, or supplemented by chemical control, where poisonous plants or other weeds are well established. Of course, many poisonous plants, while in the seedling stage, can be killed easily by

normal cultivation practices used in flower and vegetable gardens, provision grounds,⁴ and cultivated fields.

Pulling toxic plants or grubbing with handtools is practicable where small numbers occur in limited areas, especially where inaccessible to machinery or where other plants might be damaged by using herbicides. Clipping or brushchopping pastures, though desirable for other reasons, is not usually practical as the only method for weed control, because so many woody perennials sprout following cutting.

Except where the vegetation is too dense for any other method, use of a bulldozer, even for initial clearing, should be avoided, because of the excessive amount of topsoil removed, and the high cost. Regrowth and seed sprouting occur as with brushchopping.

A single fire is seldom effective in controlling any species of plant, and repeated burning is detrimental to pastures. The danger of fire getting out of hand is also a strong reason for not using it. On the other hand, flame throwers, used when the pasture is too green to burn, might be valuable against certain plants in limited areas.

Biological control is the destruction of plants by disease or insects. It is harder than it sounds to find an insect that will kill the plant you wish to control without damaging other vegetation. Insects have been used for biological control only on a limited scale in the continental United States. However, this type of control has been used very effectively against pricklypear in Australia and Nevis, British West Indies; against St. John's Wort in the continental United States; and against certain woody weeds in Hawaii. Biological weed control in the Virgin Islands is being investigated.

Chemical control of poisonous plants is probably the most generally successful of the three methods, and has become a widespread practice throughout the world since World War II. The selective herbicides such as 2,4-D and 2,4,5-T are practically nontoxic to humans and livestock, noncorrosive, comparatively inexpensive, and easily applied as a spray, and they are effective against many poisonous plants. Chemical control, by low volatile selective herbicides, should be used on weeds, including toxic ones, where they occur in pastures or other areas accessible to livestock, provided necessary precautions against harm to other plants are used. Specific recommendations for some of the common poisonous plants are given under "Management and Control."

Complete eradication is seldom attained with a single application of a herbicide, especially with so-called hard-to-kill species like Maran (*Croton discolor* Willd.), for example. Even susceptible species may need several applications because of plants that may have been missed, regrowth from roots and stumps, and germination of seeds. Poisonous plants are often adequately controlled by regular weed control operations aimed at the commoner, nonpoisonous weeds.

⁴A provision ground is a cane field, or part of one, on which the cane has run out and after being plowed and "banked" is turned over to the Estate's laborers for 1 year before it is replanted to cane. Most of this area goes into root crops, such as true yams (*Dioscorea*), sweetpotatoes, sweet and bitter cassava, tannias, eddoes, or dasheens. There are also field corn, okra, pigeon and cow peas, peanuts, dill, and perhaps other vegetables. The kinds of weeds and other casual plants are determined (1) by the land's having just been in sugarcane; (2) by the high banks and deep furrows; and (3) by the preponderance of root crops and the type of cultivation used for them.

Fortunately, some woody, poisonous plants are easily and cheaply killed by diesel oil or used motor oil applied to the base of the plants. Even though such applications do not give 100-percent kills, retreatment of the few survivors is not much of a problem. These oils usually act more slowly than does 2,4-D and related herbicides. Where these oils alone are inadequate, a small amount of one of the common selective herbicides should be added.

DESCRIPTION OF POISONOUS PLANTS

The descriptions have been simplified insofar as possible by omitting technical terms. Eggers (14), Bailey (3), and Velez (57) were used as guides, and constant reference was made to Britton and Wilson (4). Hume (26, 27) and Winters (62) also were valuable sources of information. The illustrations, which were made from live plants, should be useful even to those whose native language is not English.

In addition to the description, the distribution and habitat are given to aid the stockman in locating the plant. The toxicity is given, and such symptoms as are known, to aid in associating known poisonous plants with losses among various classes of livestock. The toxic part or parts of plants are given, when known, to aid in locating, identifying, and associating specific toxic plants with known symptoms they produce. Once a toxic plant is located, identified, and positively associated with known animal losses the problem of control arises. This problem is discussed under "Management and Control."

Poisonous plants can be classified in any one of several ways. In this study it seemed simplest to list them alphabetically by scientific name. The local common name or names are also given if known.

Leguminosae, or Legume, Family

Abrus precatorius L. (fig. 1)

Jumbee Bead, Crab's Eyes

DESCRIPTION.—This slender vine is woody below, somewhat herbaceous near the tip, and may reach 20 to 30 feet in length. Older parts of the stem are smooth but young parts may be covered with a few hairs. The vines have stipules by which they attach themselves for support. The alternate, compound leaves, which usually have 8 to 15 pairs of leaflets, vary from 2 to 4 inches in length. The thin leaflets, about $\frac{1}{4}$ to $\frac{1}{2}$ inch long, are oblong and rounded at both ends. The small, red to purple flowers are borne along the stem on 1- to 3-inch flowering stems. The oblong pods are beaked, reaching $1\frac{1}{2}$ inches in length and about $\frac{1}{4}$ inch in width. They twist and curl at maturity, and split longitudinally to release many hard, small, smooth, spherical, scarlet seeds, which have a black spot. Jumbee bead blossoms at sporadic intervals throughout the year and reproduces by seeds. The plants shed most of their leaves during extremely dry periods. They are most conspicuous after the pods split open and reveal the seeds.

DISTRIBUTION AND HABITAT.—Jumbee bead is found growing wild throughout the Virgin Islands. It grows in full sun or partial shade, occasionally along roadsides and on waste grounds but more commonly in thickets and wooded areas, twining on brush and trees. The plants

FIGURE 1.—Jumbée Bead (*Abrus precatorius* L.)

BN-13188

occur in the drier areas but are more common in the wet districts.

TOXICITY AND SYMPTOMS.—Jumbée bead seeds contain abrine, a deadly poisonous substance (35, 36). If thoroughly chewed before being swallowed, one seed will kill an adult. Seeds that are swallowed without the hard seedcoat being broken are much less toxic, because only small amounts of the poisonous material pass through the seedcoat. A few ounces of seeds will kill a horse. Cattle and goats are more resistant than horses are. Farm animals suffer severe stomach upset. Symptoms in humans are nausea, vomiting, severe diarrhea, weakness, cold perspiration, and trembling of hands.

MANAGEMENT AND CONTROL.—Very little specific information is available on the control of this plant. Hand methods may be used to remove only a few plants. The plants, when in good leaf, respond to commercial brush killers and to aqueous formulations of 2,4-D, or 2,4,5-T. The plants increase rapidly because of their copious seed production.

Euphorbiaceae, or Spurge, Family
Aleurites fordii Hemsl. (fig. 2)
Tung Tree, Tungoil Tree



FIGURE 2.—Tung Tree (*Aleurites fordii* Hemsl.)

DESCRIPTION.—This fast-growing, spreading tree with smooth gray bark and thick twigs is 20 to 40 feet high. Like many other plants of its family, it has milky sap. Its horizontal branches form a symmetrical crown. The young twigs, branches, flowering stems, and flowerbuds are densely covered with short, straight, whitish hairs. The large, dark-green leaves, borne alternately on long, stout stems, are broadly ovate. The thin leaf blades are about 6 inches wide and 6 to 8 inches long; they are smooth on both surfaces. The flowers, about $\frac{1}{2}$ inch in diameter, are borne in branched clusters at the tips of the twigs. Both male and female flowers occur in the same flower cluster. The petals, about $\frac{1}{2}$ inch long, are hairy on the outside and vary in color from white through different shades of pink. The 2- to 5-celled, spherical fruits are produced on long drooping stems. They are hairy and green when young, and become hard and almost black at maturity. The fruits are 2 to 3 inches in diameter, and contain 3 to 7 large egg-shaped, hard, brown seeds: each seed is about 1 inch long. The trees are deciduous when grown in higher latitudes, but they rarely shed all their leaves in this climate. The trees blossom during the early spring and mature their fruits during the fall. Tung trees are reproduced by seeds.

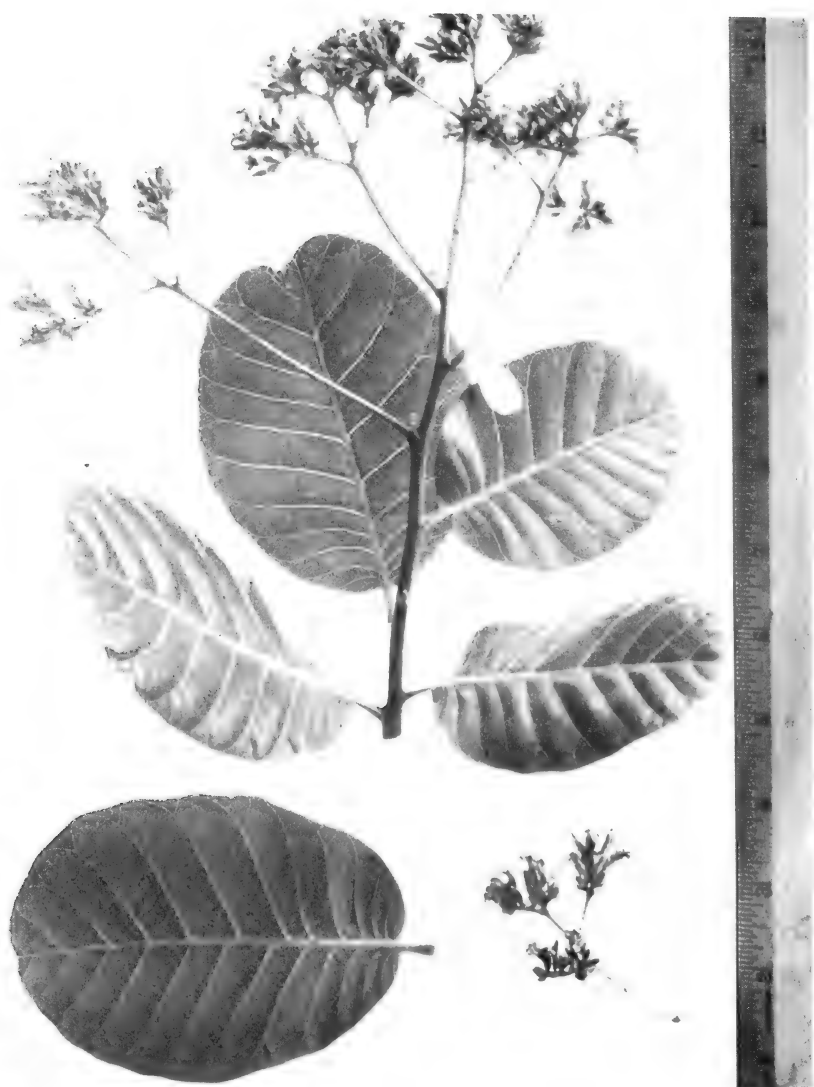
DISTRIBUTION AND HABITAT.—The tung tree is a native of China. It was introduced into the Virgin Islands in 1923 (42). Subsequently, an experimental planting of considerable size was made at Anna's Hope, St. Croix, and a smaller planting was made at Estate Orange-grove.

TOXICITY AND SYMPTOMS.—The leaves, sap, fruit, and commercial tungoil contain a saponin, which is known to be toxic to cattle, horses, chickens, and humans (61). Under normal conditions animals never browse the trees, but they relish leaves from broken or discarded branches. In cattle, acute poisoning results in death in 3 to 4 days, while chronically poisoned animals may linger for 18 to 24 days before dying. Two pounds of leaves will kill a 500-pound steer. Common symptoms are hemorrhagic diarrhea, lack of appetite, listlessness, and depression. Chronic poisoning may produce labored breathing, salivation, and cracking of the skin of the muzzle. When taken internally, tungoil has a severe purgative and emetic effect (20). Humans are frequently poisoned by eating the fruits; a severe gastroenteritis develops, followed by mild or severe purging.

MANAGEMENT AND CONTROL.—The possibility of livestock poisoning from the tungoil tree is negligible because of its restricted distribution. Although most plantings of Tung in the continental United States are made for commercial oil production, the trees are occasionally planted for shade and ornament. Denying livestock access to the trees, both young and mature, is recommended because the foliage, sap, and fruits are all poisonous.

Anacardiaceae, or Sumac, Family
***Anacardium occidentale* L. (fig. 3)**
Cashew

DESCRIPTION.—This tree is 20 to 40 feet high. Its spreading limbs form a symmetrical crown, especially when it grows singly in the open. The rather smooth bark of the trunk is gray; it is lighter on young twigs. The alternate, entire, roundish leaves, which are 3 to



BN-13193

FIGURE 3.—Cashew (*Anacardium occidentale* L.)

4 inches wide and 5 to 6 inches long, are smooth and dark green above, pale beneath, and have strong, lateral, widely spread veins. The thick, leathery leaf blades have smooth margins, and are rounded or occasionally shallow notched at their tips. The small, light-purple flowers are borne in loose clusters on stems that are about twice the length of the leaves. The kidney-shaped "nut," about an inch long, is toxic to many people when raw, but the kernel is safe when roasted and is the cashew nut of commerce. The nut is borne on the end of the handsome and edible cashew apple, which is really the much-

thickened stem. Cashew trees belong to the same group of plants as mango, Christmasbush, and the well-known stateside poison-ivy. The trees usually blossom from January through March; propagation is by seeds or cuttings.

DISTRIBUTION AND HABITAT.—The cashew tree is rare in the Virgin Islands but it is widely distributed; it is planted as a shade tree and for its edible fruit. It is most commonly found in waste grounds around villages, in yards and public parks, and occasionally along roads.

TOXICITY AND SYMPTOMS.—The cashew tree produces a peculiar fruit, which consists of an enlarged stem (cashew apple) and the true fruit (cashew nut). The cashew apple is yellow and edible (45). The cashew nut is composed of the kernel surrounded by the shell. The shell contains cardol (41), which is a severe irritant to the skin, and anacardic acid (54). Cardol is an effective insecticide and is used commercially to protect books, floors, and furniture against certain insects. Cashew nuts are made edible by roasting the unshelled kernel until all the cardol has been evaporated. Fumes from roasting cashew are highly irritating and should not be allowed to come in contact with the skin. After roasting, the kernel is perfectly edible and may be removed from its shell without danger to the remover. Symptoms produced by sap from the raw cashew nut include inflammation and irritation of the skin, blisters, itching, burning, and open sores. In severe cases the infection may be carried by the blood to other parts of the body.

MANAGEMENT AND CONTROL.—The scarcity of cashew trees throughout the Virgin Islands minimizes their potential danger to livestock and control measures are unnecessary. Necessary precautions should be taken to prevent animals from eating the poisonous fruits.

Papaveraceae, or Poppy, Family

***Argemone mexicana* L. (fig. 4)**

Thistleroot, Thistle, Mexican Poppy

DESCRIPTION.—This spiny, annual weed with attractive, large, yellow or orange-yellow flowers is usually 2 to 3 feet high in favorable locations. The plants usually have one central stem; however, occasionally some have a few short branches. The elongated, irregularly lobed, stemless leaves are spiny toothed on the margin and usually spiny on the midvein; they are variegated with white. Some leaves may measure 10 inches in length but most are shorter. They occur alternately on the stem, except that the uppermost leaves are sometimes opposite. When cut or injured, the plant exudes a yellow acrid sap. The cup-shaped flowers, which are about 2 inches across, are borne on short stems at the ends of the branches and have 4 to 6 yellow petals. The oblong, shallow-grooved fruits are fleshy, prickly, inflated capsules. They are 2 to 3 inches long and about 1 inch in diameter, and streaked with dull white. The capsule turns light brown at maturity and opens at the apex to shed numerous small, black, oval seeds, which are scattered by animals and birds. Reproduction is by seeds, and the plants die after producing a seed crop. The prickles on the leaves and fruiting capsules may cause mechanical injury to humans and grazing animals. Although plants blossom and fruit throughout the year, they are more plentiful during the wet season.



FIGURE 4.—Thistleroot (*Argemone mexicana* L.)

BN-13206

DISTRIBUTION AND HABITAT.—Thistleroot grows throughout the Virgin Islands. It thrives in full sun in the drier regions and also where rainfall is moderate. The plants occur in patches along streams and roadsides, around the edges of thickets, in open pastures, and frequently in abundant stands in freshly cultivated fields. This weed

is a nuisance because it occupies large areas where desirable forage species could be grown.

TOXICITY AND SYMPTOMS.—Thistleroot seeds contain two poisonous alkaloids, beberine and protopine (52). Chick-feeding trials show the leaves and roots are also poisonous. However, because of its unpleasant taste and its prickles, animals seldom eat the plant and cases of livestock poisoning are very rare.

MANAGEMENT AND CONTROL.—Control of this pest is difficult because it seeds so copiously. Ordinary cultivation practices kill plants in the seedling stage. Both mechanical and chemical control measures are effective. The stand may be reduced by mowing before the seeds are mature. Ester forms of 2,4-D and 2,4,5-T kill the plant. For complete eradication it is necessary to repeat the treatment for several years at least annually, and preferably 2 or 3 times during the early part of each dry season.

Asclepiadaceae, or Milkweed, Family

***Asclepias curassavica* L. (fig. 5)**

Kittie Mc-Wanie

DESCRIPTION.—This perennial, sparsely branched weed is 2 to 4 feet high. The stems are smooth and green when young and become gray with age. The thin leaves taper to points at both ends; they are up to 5 inches long and 1 to 2 inches wide near the middle. They are borne in pairs along the branches on short leaf stems. The small yellowish-orange, reddish, or bicolor flowers are held erect by short stems. The spindle-shaped green fruits, 3 to 4 inches long, split lengthwise when ripe and release numerous flat, brown seeds, each with a parachute of silky fibers that make them airborne. The plants are ordinarily reproduced by seeds; however, they may be increased by cuttings when used as ornamentals. Although the plants flower throughout the year in the more humid areas, they are most conspicuous during the wet season when they flower most profusely.

DISTRIBUTION AND HABITAT.—Kittie Mc-Wanie, a common weed on all the Virgin Islands, usually grows singly or in small patches. It is practically never found in forest or woodland but may grow almost anywhere else, especially in pastures in the higher rainfall areas, in both full sun and partial shade. The wide distribution of Kittie Mc-Wanie is partly attributable to its windborne seeds.

TOXICITY AND SYMPTOMS.—All parts of Kittie Mc-Wanie contain the glucoside asclepiadin, of which large amounts cause death (45). The plant is not palatable to livestock and only under emergency conditions will animals eat it. Sheep are most often poisoned, but cattle and horses may also suffer poisoning if forced to consume the weed. One pound of the plant is sufficient to kill a sheep. Five to ten pounds may cause fatalities in cattle or horses (38). Poisoned animals become dull and stupid in a few hours. They lose muscular control, stagger, and finally fall to the ground. The pulse becomes rapid and weak, and breathing becomes labored. Death may be rapid when large amounts have been consumed.

MANAGEMENT AND CONTROL.—Livestock should not be allowed access to areas where this species occurs. Although animals will not ordinarily browse on the plants, they are a potential danger in areas



FIGURE 5.—Kittie Mc-Wanie (*Asclepias curassavica* L.)

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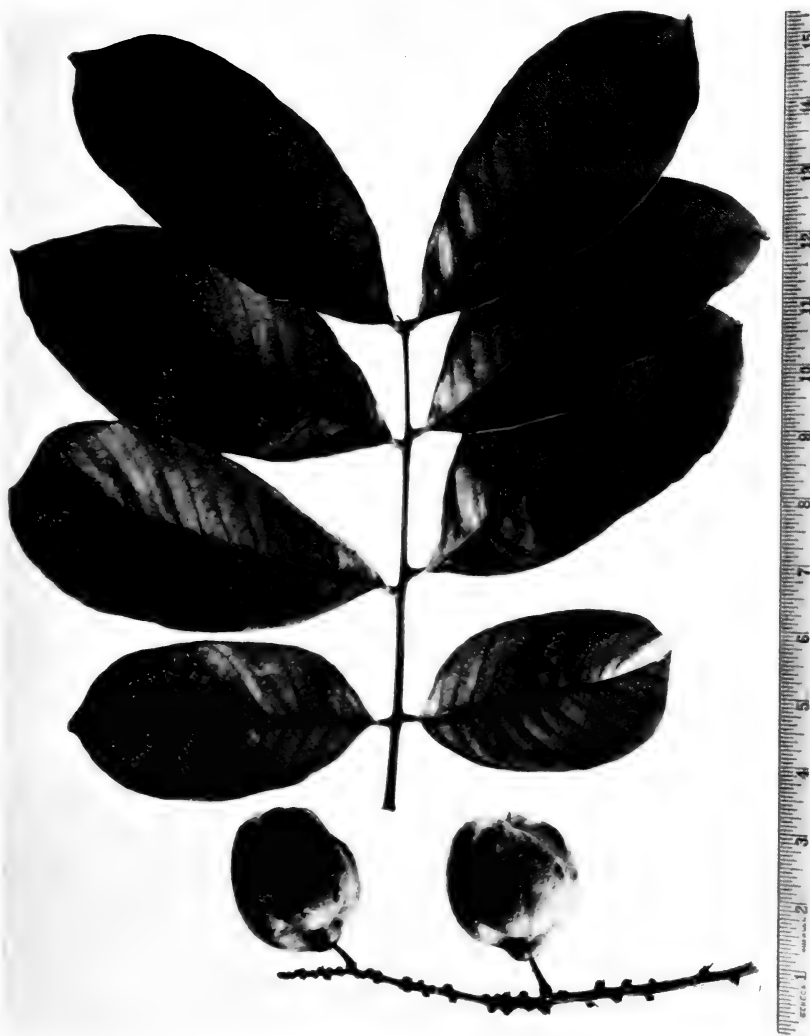
accessible to livestock. Because it is difficult to remove all of the underground parts, which give rise to new growth, grubbing or plowing out Kittie Mc-Wanie has proved infeasible. Chemical control measures are recommended. Killing or cutting the plants before they are allowed to mature seeds aids in preventing their spread by seeds.

Sapindaceae, or Soapberry, Family

***Blighia sapida* Koen. (fig. 6)**

Akee

DESCRIPTION.—This branching tree may reach 30 to 40 feet in height and have a trunk up to 2 feet in diameter. The bark is gray and smooth. The alternate leaves are 6 to 12 inches long; they are dark green and shiny above, dull beneath, and divided into 3 to 5 pairs of oblong leaflets, of which the basal pair is usually the smallest. The leaflets are thin and have prominent midveins from which distinct lateral veins extend. The oblong, smooth-margined leaflets are

FIGURE 6.—Akee (*Blighia sapida* Koen.)

BN-18194

rounded at the base, bluntly pointed at the tips, 3 to 6 inches long, and $1\frac{1}{2}$ to $2\frac{1}{2}$ inches wide. The small, white flowers are borne in the leaf axils on long, pendulous stems. The smooth fruits are bluntly 3-angled; they are $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches thick, and become bright red at maturity. The ripe fruits split open, revealing a bright yellow inner coating, in which are embedded large, black seeds with attached whitish, edible portions called arils.

DISTRIBUTION AND HABITAT.—Akee trees were introduced into the Virgin Islands and are planted as ornamentals and for their fruit. Although the trees are scarce, they are occasionally found near dwellings or in places where livestock might reach them.

TOXICITY AND SYMPTOMS.—Two substances isolated from akee fruits are capable of reducing the amount of sugar in the blood (22). Larson

and coworkers (31) estimated that more than 5,000 people in Jamaica have been fatally poisoned from eating the fruit. They also reported that the seeds of the plant are highly poisonous at all times. The green immature fruits are toxic, whereas the ripe "yawning" fruits are safe for human consumption. Akee fruits should be selected for eating only by those who are thoroughly familiar and experienced with the selection of edible fruits. Even those experienced with the fruit should use extreme caution in its selection. No cases of livestock poisoning by akee have been reported in the Virgin Islands. The most common symptom is severe vomiting. Hemorrhaging occurs in the internal organs. The lungs often become congested with blood and breathing becomes difficult. Many cases of akee poisoning are fatal.

MANAGEMENT AND CONTROL.—The scarcity of akee trees throughout the Virgin Islands renders control measures unnecessary, but livestock should be kept away from them when they are in fruit.

Asclepiadaceae, or Milkweed, Family
***Calotropis procera* (Ait.) R. Br. (fig. 7)**
Giant Milkweed

DESCRIPTION.—This shrub is 5 to 15 feet high. Bark on the young stems is smooth and light green; it becomes light gray with age. The plants contain a milky acrid sap. A few long branches often arise near the base of the plant, giving the appearance of multiple stems; the upper branches are much shorter. The thick, leathery, gray-green leaves are borne in pairs attached directly to the stem. The leaves are borne near the tips of the branches; many of the lower ones fall during each dry season leaving long, bare stems. The leaves are white-felted when young but smooth when old. The blunt-tipped leaves are roundish in outline, 3 to 4 inches wide, and 4 to 6 inches long; they have large, prominent, whitish midveins from which conspicuous lateral veins arise. The clustered small, light-purple flowers are borne on short, cottony flower stems at the ends of the branches. Each flower is about $\frac{3}{4}$ inch across and has 5 purple-tipped petals. The plants blossom throughout the year, but most profusely during the wet season; their fruits mature during the winter months. The smooth, green fruits, which usually occur in pairs, are slightly kidney-shaped, up to $1\frac{1}{2}$ inches thick and 3 to 4 inches long. They turn light tan at maturity, and split longitudinally to release many tufted seeds, which become airborne. The plants are normally propagated by seeds although cuttings grow very readily.

DISTRIBUTION AND HABITAT.—Giant milkweed occurs most frequently throughout the drier districts of the Virgin Islands. It is commonly found in pastures, along roadsides and ditches, and along the landward edge of sandy beaches. Plants occasionally occur in fence rows and in cultivated fields. They rarely occur in the wetter areas or in woodlands. The plants grow singly or in small patches, usually not closely associated with other woody weeds. Its drought tolerance coupled with the attractiveness of the plant make it worthy of consideration as an ornamental.

TOXICITY AND SYMPTOMS.—The juice of giant milkweed, which was used in the deadly arrow guns of certain African tribes, contains



BN-13198

FIGURE 7.—Giant Milkweed (*Calotropis procera* (Ait.) R. Br.)

the extremely toxic glucoside calothropin (59). The drug is an extremely potent, quick-acting heart stimulant; minute amounts are capable of producing death (6, 53). Fortunately, the plant is so undesirable to animals that they eat it only when severe emergency conditions prevail; consequently, cases of giant milkweed poisoning are rare.

MANAGEMENT AND CONTROL.—The copious production of light, air-borne seeds by giant milkweed contributes to its remaining a constant pasture pest. Although thick stands are never found, giant milkweed is distributed over a wide range, and control measures are necessary.

Pulling or digging the plants by hand is recommended where only a few plants are involved. Chemical control is more practical for sparse stands covering large areas. Control measures practiced before the plants mature seeds are most effective. Denying livestock access to the plants lessens the chances of poisoning.

Canellaceae, or Canella, Family

***Canella alba* Murray (fig. 8)**

Wild Cinnamon, Caneel

DESCRIPTION.—This thornless, evergreen tree is usually 30 to 50 feet high, with a trunk up to 1½ feet thick. The leaves are borne alternately or in irregular whorls near the tips of the branches. They are dark green and somewhat shining above but rather dull beneath. The leaves, which are about 4 inches long and 1 inch wide, are narrowed at the base and bluntly rounded at the tips. The veins in the leaf blades are inconspicuous and the leaf margins are entire and smooth. The bark and leaves of this tree have a pleasant aroma. The small, dull-red or purple flowers are borne singly or in small groups at the tips of the branches. They are pretty but not large enough to be showy. Each flower, when in the bud stage, is surrounded almost completely by a green outer covering that exposes only the tips of the petals. The round berries, about ¼ inch in diameter, are green when young, but turn red to nearly black at maturity. The small seeds are black. The trees blossom during the summer and early fall and reproduce by seeds.

DISTRIBUTION AND HABITAT.—Wild cinnamon is found on all of the Virgin Islands. It occurs mostly in the drier areas in open pastures, in thickets, and in woods. It is commonly found around house sites and in villages, where it was undoubtedly planted. Wild cinnamon usually occurs as individual trees, though sparse stands near beaches are not rare. It is found on a variety of soil types and in different rainfall belts.

TOXICITY AND SYMPTOMS.—The bark of wild cinnamon contains the alkaloid canela (29). In the past the powdered bark was used, in very small doses, as a stimulant and as a tonic for stomach upsets, but it is now seldom used in medicine (15, 48). Wild cinnamon leaves have a pleasant aroma and are used by some Virgin Islanders as a spice. Feeding trials show the leaves and stems are toxic to poultry. There is no report of livestock poisoning from wild cinnamon in the Virgin Islands.

MANAGEMENT AND CONTROL.—Wild cinnamon is so scarce throughout the Virgin Islands that it does not constitute a serious danger to livestock; however, it is poisonous and is, therefore, a potential danger. The plants are known to be susceptible to commercial selective herbicides.

Leguminosae, or Legume, Family

***Cassia occidentalis* L. (fig. 9)**

Wild Coffee, Stinkingweed

DESCRIPTION.—Under unfavorable conditions this malodorous shrub acts as an annual, though it is generally a short-lived perennial. It is erect and branching, 2 to 4 feet high, usually smooth throughout,



FIGURE 8.—Wild Cinnamon (*Canella alba* Murray)

BN-13193



BN-13192

FIGURE 9.—Wild Coffee (*Cassia occidentalis* L.)

but occasionally sparingly hairy. The large, alternate, compound leaves may reach 12 inches in length and usually have 4 to 6 pairs of leaflets. The paired leaflets increase in size from the base of the leaf. The short-stemmed, thin leaflets are rounded at the base, taper to a point at the tip, and may attain $2\frac{1}{2}$ inches in length. The yellow flowers, which fade to dull white, are almost an inch long and occur singly or in groups of 2 to 4 short-branched clusters. The individual flowers are attached by very short stems. The flat pods are about $\frac{1}{4}$ inch wide and 5 inches long; they have thickened margins. The flat, dull-brown, compressed seeds are separated from one another in the pod; they are about $\frac{1}{8}$ inch long. The plants blossom in summer

and fall; reproduction is by seeds. In the Virgin Islands most of the plants die after producing one seed crop.

DISTRIBUTION AND HABITAT.—Wild coffee occurs as a weed throughout the Virgin Islands in waste grounds, around house sites, and along ditchbanks and roadsides. It is commonly found as a pasture weed in the wetter areas. Its copious seed production and competitive ability often make it a serious pasture weed where the soil has just been cultivated or otherwise disturbed. The plants thrive equally well in full sun and partial shade and grow on a number of soil types. Dense stands often occur on pond margins and other wet areas, but sparse stands or individual plants are occasionally found in the drier areas. The plants do not occur in the driest districts.

TOXICITY AND SYMPTOMS.—Raw wild coffee seeds contain the toxic material chrysarobin, which is destroyed by roasting the seeds (5). Roasted seeds are frequently used as a substitute for coffee, and the drink is said to be an excellent tonic for stomach disorders (7). Certain medicinal properties are ascribed to the roots, leaves, and stems of the plant (24). However, chick-feeding trials show these plant parts are toxic in large amounts, and their use as therapeutical agents is considered inadvisable. Livestock rarely eat the plant because of its unpleasant odor and taste.

MANAGEMENT AND CONTROL.—All classes of livestock have been observed to browse on wild coffee but rather sparingly, and no known cases of livestock poisoning have been reported in the Virgin Islands. Denying livestock access to the plant is not practicable because of its widespread occurrence. Where plants occur singly or in sparse stands they should be pulled up or grubbed out before they produce seeds. Chemical control measures are recommended for plants scattered over large areas or where they occur in dense stands. The plants are easily killed by herbicides containing 2,4-D or 2,4,5-T. These herbicides may be applied by spot-spraying individual plants with knapsack sprayers or by using boom power sprayers where more extensive areas are to be covered.

Leguminosae, or Legume, Family *Cassia siamea* Lam. (fig. 10)

DESCRIPTION.—This yellow-flowering tree is used as a windbreak, and for shade and ornament. It grows rapidly and may attain a height of 50 feet with a trunk 1 foot in diameter. The bark is smooth and green on the young twigs, and becomes rough and gray with age. The large, opposite, compound leaves have 6 to 10 pairs of oblong leaflets. The leaves are dark green above and pale beneath; they are smooth throughout. The pretty, yellow flowers are borne in large clusters on long, flowering stems in the leaf axils. The flowering stems are often longer than the leaves. The fruiting pods are narrow, flat, and elongated; they become 8 inches long and about $\frac{1}{2}$ inch wide. The seeds are arranged transversely in the slightly curved pods with distinct separations between them. The pods turn brown and split along the edges at maturity releasing many flat, brown seeds, which are about $\frac{1}{8}$ inch wide and $\frac{1}{4}$ inch long. The trees reproduce by seeds.

DISTRIBUTION AND HABITAT.—This fast-growing tree was introduced into the Virgin Islands and is found on all of the islands. It is

FIGURE 10.—*Cassia siamea* Lam.

BN-13189

perhaps the commonest windbreak species, especially on St. Croix. It occurs as a yard tree and as an ornamental along the streets and highways, and in parks and other public places. It thrives best on well-drained soils in moderate or high rainfall areas, and is not found on shallow soils in the drier districts. The trees prefer full sunlight. Although the tree is reproduced by seeds, it has not spread widely. The possibility of its becoming a serious pest is negligible, in part because it is so easy to eradicate.

TOXICITY AND SYMPTOMS.—The leaves, stems, and seeds of *Cassia siamea* contain an alkaloid that causes death to hogs very quickly after being consumed (1). In Puerto Rico, farmers have suffered severe losses of hogs from *Cassia siamea* poisoning. Hogs relish the leaves of the plant and readily consume any within reach. Although cattle and sheep are apparently not affected (1), it is advisable to take precautionary measures to prevent them from eating portions of the plant.

MANAGEMENT AND CONTROL.—This ornamental tree is not a pest at present in the Virgin Islands. Livestock have not been observed to browse on the foliage, but the pods and seeds, particularly the latter, are very toxic, and are a constant threat to swine. This danger is much increased when trees are blown over by storms or hurricanes. Livestock, especially swine, should not be allowed access to mature trees. Where only a few plants are involved, they may be either pulled up or grumped out. Young plants are susceptible to basal or foliar applications of 2,4-D or related herbicides.

Menispermaceae, or Moonseed, Family
Cissampelos pareira L. (fig. 11)
Velvetleaf



FIGURE 11.—Velvetleaf (*Cissampelos pareira* L.)

BN-13209

DESCRIPTION.—This perennial slender, twining, high-climbing vine, which usually attains 30 feet or more in length, has occasional lateral shoots. The entire plant is covered with straight, soft, white hairs, which are probably the reason for its common name, velvetleaf. The

hairs are more dense on new young stems than on older stems. The alternate, entire leaves are borne along the stem at 4- to 5-inch intervals on stout 2-inch leaf stems. The leaf blades are conspicuously palmately veined, dark green and sparsely hairy above, light green and densely hairy beneath. They are almost round to heart-shaped, being about $3\frac{1}{2}$ inches long and the same distance across. The small, greenish, male flowers are borne in clusters in the leaf axils on short, hairy flower stems. The female flowers occur in small, compact clusters along a long, stemlike structure. They develop into compressed round fruits about $\frac{1}{4}$ inch in diameter. The vines are easily distinguished by their leaf shape and by the copious soft, white hairs on the undersurface of the leaves. Plants blossom most profusely during the wet season and the fruits mature at the onset of the dry season. In the wettest districts some plants blossom sporadically throughout the year. The plant is propagated by seeds which are spread by deer, livestock, and birds.

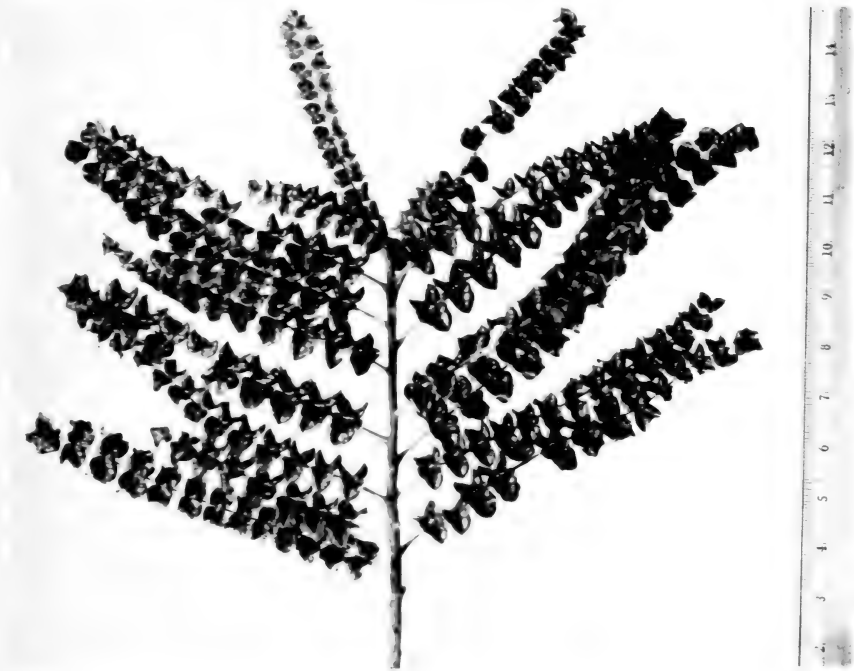
DISTRIBUTION AND HABITAT.—This twining vine grows in thickets and woods in the higher rainfall belts of all the Virgin Islands. It is usually associated with other climbers and is supported by trees or smaller undergrowth. Velvetleaf grows equally well in full sun and partial shade. The vines seldom grow prostrate on the ground, or in the driest, windblown districts.

TOXICITY AND SYMPTOMS.—The bitter alkaloid cissampeline is found in roots and stems of velvetleaf (29). It has been used medicinally as a tonic and stimulant (45). Although no cases of livestock poisoning have been reported in the Virgin Islands, velvetleaf should be considered as potentially dangerous to livestock.

MANAGEMENT AND CONTROL.—Although this vine occurs in pastures and other locations accessible to livestock, its growth habit minimizes, to some extent, its potential danger to them. Manual and chemical measures are impractical for controlling velvetleaf because of the difficulty and cost. Preventative measures in the management of livestock are recommended. The best preventative measure is to deny livestock access to areas where velvetleaf commonly occurs. However, this is not always practical because of its growth habit and wide distribution. There is little likelihood that livestock will be poisoned by velvetleaf provided enough good grass is available.

Anacardiaceae, or Sumac, Family
***Comocladia dodonaea* (L.) Urban (fig. 12).**
Christmasbush

DESCRIPTION.—This large, sparsely branching shrub or small tree is 10 to 20 feet high. Its twigs and leaf stems are densely covered with long, brownish hairs. The light-gray bark on the older, lower portions of the stem is smooth or slightly fissured; it becomes greenish near the tip. The alternate leaves are 4 to 12 inches long and are once divided into 11 to 21 leaflets. The paired leaflets and terminal one are almost round, about $\frac{1}{2}$ inch across, and attached directly to the leaf rachis. The smooth, thin leaflets are dark green above, pale beneath, and may show bright red with age; each is bordered by 2 to 5 short, straight spines at the ends of prominent leaf veins. The small, purple flowers are borne in clusters on stems usually shorter than the leaves. The



BN-13197

FIGURE 12.—Christmasbush (*Comocladia dodonaca* (L.) Urban)

roundish fruits are about $1\frac{1}{4}$ inch long. The sap of this species is poisonous and can cause severe skin lesions, as can scratches by the spiny leaves. In addition to being poisonous, the plant can cause mechanical injury to humans and livestock. Christmasbush belongs to the same group of plants as mango, cashew, and the well-known poison-ivy.

DISTRIBUTION AND HABITAT.—This noxious weed is common to all the Virgin Islands; it occurs from near sea level to the highest elevations in the driest and the wettest areas. The plants occur singly or in small patches; they are most common on rocky hillsides, in fence rows, along roadsides, and in thickets. They are also found in waste and dumping grounds, around house sites, and along streams. They are less common as undershrub in woods, because they are not very tolerant of shade. On rare occasions the plant is grown as an ornamental around the home.

TOXICITY AND SYMPTOMS.—Christmasbush is highly irritating to the skin of susceptible persons (10, 57). The exact nature of the poison is not known to the authors. The severity of Christmasbush poisoning ranges from a slight irritation of the skin to open oozing and crusting sores. Severe itching and burning are common, and the open sores are subject to secondary infection. The irritating agent is sometimes absorbed into the bloodstream and carried to other parts of the body where new sores or blisters may occur. Christmasbush should be avoided if at all possible, and particularly by persons known to suffer from allergy of any kind.

MANAGEMENT AND CONTROL.—Livestock usually avoid this plant in their search for forage; neither domestic livestock nor deer have been

observed to browse on it. Control is recommended because the plant is capable of causing mechanical and physiological injury to humans and livestock, and because it competes with other more desirable species. Manual methods of eradication may be employed where only a few plants are involved. Chemical control is effective and should be used where needed.

Leguminosae, or Legume, Family

Crotalaria incana L. (fig. 13)



FIGURE 13.—*Crotalaria incana* L.

BN-13281

DESCRIPTION.—This annual or biennial, herbaceous, erect weed has stout, ascending branches and attains 4 feet in height. The entire plant is covered with short, fine hairs. The alternate leaves, which are borne on stems longer than the leaves, are once divided into three, equal-sized leaflets which arise from a central point. The leaflets are

1 to 1½ inches long and 1 inch wide, narrowed at the base and rounded at the apex, but they often have a short bristle; they are more or less smooth above, hairy beneath. The conspicuous, pea-shaped flowers are borne vertically along a long, terminal flowering stem. The petals are ¼ to 1½ inch long and vary from greenish-yellow to yellow. The drooping, hairy, inflated pods, about ½ inch thick and 1 inch long, are light green when young; they become light brown when ripe and split lengthwise. The small, kidney-shaped seeds are hard and shiny. In the Virgin Islands, the seeds usually germinate at the onset of the wet season, and produce plants that blossom and fruit during the fall and winter months of the same year, though they may not flower until the second year. In the Virgin Islands, the plants usually die after making one crop of seeds. The seeds are scattered by wind and water; animals and birds apparently refrain from eating the seeds.

RELATED SPECIES.—Three closely related species—*Crotalaria spectabilis* Roth. (61), *C. striata* DC (41), and *C. sagittalis* L. (21)—have been reported to be toxic. These species do not occur naturally in the Virgin Islands, and it is recommended that they not be grown here for any purpose.

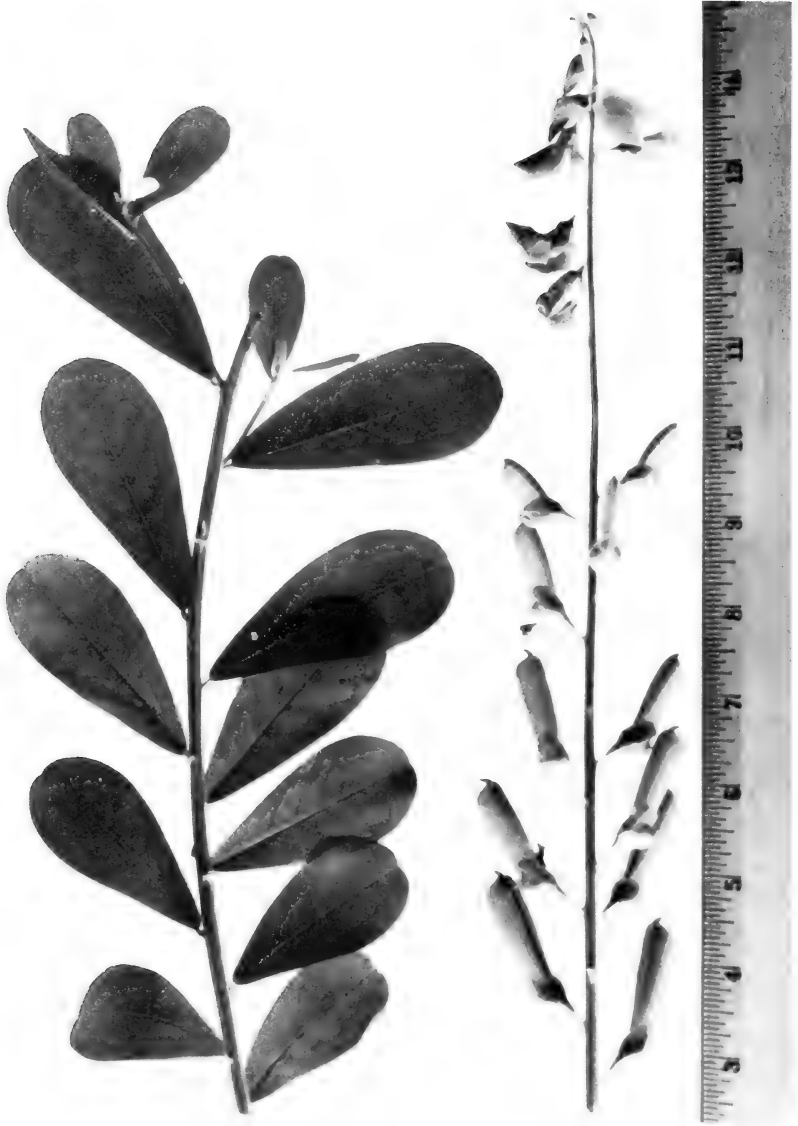
DISTRIBUTION AND HABITAT.—This species is scarce in the drier regions but is found in full sun or partially shaded areas in moist districts on St. Croix and St. Thomas. (It has not been reported from St. John.) It grows more commonly in the central and northwestern portion of St. Croix. This species is somewhat alkali tolerant though it becomes partially chlorotic in certain areas. It prefers a well-drained soil but also grows on the heaviest clays with a moderate amount of rainfall. It is found in small patches along roadsides, in waste places, cultivated fields, and pastures.

TOXICITY AND SYMPTOMS.—Results of chick-feeding trials indicate *Crotalaria incana* L. has toxic properties similar to those of *C. retusa* L. (See *Crotalaria retusa* L.)

MANAGEMENT AND CONTROL.—The plants are a constant potential danger to livestock in that they are eaten from the seedling stage through maturity. Destruction of the plants requires constantly recurring treatments. Where stands are scarce, manual control measures may be practiced. Where stands are abundant, mechanical and chemical control measures have proved to be more economical. Clipping pastures before the plants mature seed is partially effective; however, this does not remove the entire plant. The most economical control measure for abundant stands is with herbicides, of which the ester forms of 2,4-D and 2,4,5-T are effective. Once the seeds are scattered on the ground, many years are required to exterminate the plants as some seeds lie in the soil for years before sprouting. Planting infested areas in cultivated crops greatly assists in eliminating the plant.

Leguminosae, or Legume, Family *Crotalaria retusa* L. (fig. 14)

DESCRIPTION.—This herbaceous pasture weed is an annual: it usually grows to a height of 1 to 2 feet but occasionally, to 4 feet or more. Its ascending ribbed branches are covered with short, flat-lying hairs and are green in the younger parts. The simple leaves are mostly alternate but occasionally opposite, and are borne on short stems with two small stipules. The club-shaped leaf blades are 1 to 3 inches

FIGURE 14.—*Crotalaria retusa* L.

BN-13190

long and $\frac{1}{2}$ inch wide with a prominent midvein, smooth and shiny above, hairy and dull beneath. The pea-shaped flowers, borne vertically along long, terminal flower stems, are about 1 inch wide and yellow streaked or blotched with purple. The smooth, short-beaked, inflated pods are about 1 inch long and $\frac{1}{4}$ inch thick and contain many small, kidney-shaped, hard, shiny seeds. The seeds usually germinate at the onset of the rainy season and produce plants that

blossom and mature seeds in late winter or early spring after which the plants die.

DISTRIBUTION AND HABITAT.—This species occurs more commonly in the drier areas of all the Virgin Islands. The plants thrive best in full sun but are shade tolerant. They are found in cultivated fields, along roadsides and ditchbanks, and in open pastures. The plants prefer a well-drained soil and are somewhat alkali tolerant. They are most conspicuous during the winter and early spring when in blossom and fruit.

TOXICITY AND SYMPTOMS.—The stems, leaves, and roots of *Crotalaria retusa* contain the very toxic alkaloid monocrotaline (2). The plant is toxic to cattle, sheep, goats, horses, mules, chickens, and turkeys (61). Acute poisoning sometimes occurs in cattle and swine, though chronic poisoning is more common. In acute cases, cattle have loss of appetite, bloody feces, nasal discharge, diarrhea, general weakness, and yellow discoloration of the mucus membrane; death occurs in 5 to 10 days. Nine pounds of the plant is enough to kill a 300-pound steer. Acutely poisoned hogs often die suddenly of gastric hemorrhage: 6 or 8 seeds will kill a 50-pound pig in a week. In chronic poisoning, animals may die 2 to 9 months after eating the plant. Often no symptoms appear until 7 to 14 days before death. Hogs are unthrifty, weak, and occasionally anemic. Symptoms in sheep and goats are similar to those in cattle (61). Horses and mules show extreme listlessness, weakness, stumbling, and a profuse diarrhea (9). In the majority of cases, horses and mules appear sleepy and walk aimlessly during the late stages (17). The chief symptoms shown by affected chickens include discolored combs, loss of appetite, and a sleepy, depressed appearance (43).

MANAGEMENT AND CONTROL.—This species is a potential danger to livestock, since it is eaten in small amounts from the seedling stage through maturity. Denying livestock, especially horses, access to infested areas should be practiced because once symptoms are apparent, poisoned animals seldom recover. Destruction of the plants requires continuous or recurring treatment, as the seeds germinate sporadically over long periods. Manual control is recommended for sparse stands. Mechanical and chemical control measures are more economical where stands are abundant. Clipping pastures before the plants have seeded is often partially effective, but does not remove the entire plant. The most effective control measures are with herbicides, of which the ester forms of 2,4-D and 2,4,5-T are known to be highly toxic.

Leguminosae, or Legume, Family

Crotalaria verrucosa L. (fig. 15)

DESCRIPTION.—This annual weed is 1 to 4 feet high and has angled, zigzag branches, which are sparsely covered with fine hairs. The simple leaves are borne alternately along the stem on short leaf stems; they are rounded at the apex and narrowed at the base. The thin leaf blades are nearly smooth above, sparingly hairy beneath, 2 to 3 inches long and about 2 inches wide. The conspicuous rounded leaf-like structures, called stipules, borne at the base of the leaf stems, may reach $\frac{1}{2}$ inch in length. The light-blue, pea-shaped flowers, about

FIGURE 15.—*Crotalaria verrucosa* L.

BN-13186

1 inch across, are borne vertically in a loose arrangement along a long, terminal flowering stem. The inflated, oblong, beaked pods are hairy; they are $1\frac{1}{2}$ inches in length and about $\frac{1}{2}$ inch in diameter and contain many small, shiny, kidney-shaped seeds. This species, like its relatives, is reproduced by seeds. The seeds usually germinate in the fall and mature pods in the early spring. The plants die after producing a seed crop.

DISTRIBUTION AND HABITAT.—Although this species is more widely distributed in the Virgin Islands than is *Crotalaria incana* L. or *C. retusa* L., it occurs more commonly in the drier areas. The plants thrive best in full sun though they are shade tolerant. They grow in open pastures and along roadsides and ditchbanks. Apparently the seeds remain viable for long periods, as plants may be found in freshly plowed fields or pastures. This species tolerates a hard compact soil that is not well drained, and is often found in rocky soils. The plants are most conspicuous during the winter and early spring months when they are in blossom and fruit.

TOXICITY AND SYMPTOMS.—*Crotalaria verrucosa* L. has toxic properties similar to those of *C. retusa* L. (41). (See *Crotalaria retusa* L.)

MANAGEMENT AND CONTROL.—This species of crotalaria constitutes a potential danger to livestock in open pastures as the plants are eaten from the seedling stage through maturity. Livestock should be kept from infested areas. Because of their copious production of highly viable seeds capable of prolonged dormancy, the plants require constantly recurring control measures. Manual control is practical for sparse stands. Chemical control with selective herbicides is recommended where stands are abundant. Ester forms of both 2,4-D and 2,4,5-T are effective. Young, small plants are easily killed by ordinary cultivation practices.

Euphorbiaceae, or Spurge, Family

Croton astroites Dryand (fig. 16)

Maran

DESCRIPTION.—This branching shrub is usually 6 to 8 feet high. The young branches, leaf stems and blades, flower stems and flowers are covered with starlike, light-brown hairs. The bark on older stems is smooth and gray. The thick leaves, which are $2\frac{1}{2}$ inches wide and 4 to 5 inches long, are light green above and dull white beneath. The alternate leaves are heart shaped at the base and taper to slender points at the apex. The under surface of the leaves is more densely covered with hairs than is the upper surface. The leaf margins are smooth on young leaves, but become slightly serrated as the leaves grow older. The small flowers occur at the tips of the branches; they are borne along flowering stems that are 1 to 3 inches long. Both male and female flowers are borne on the same flowering stem; the female flowers occur below the male flowers. The small, nearly spherical capsules usually contain 3 seeds. This species, like all other types of maran, is reproduced by seeds. Plants flower and fruit throughout the year. The plants often go into a semidormant state by shedding their leaves and rolling them up, especially during extreme drought or where they occur in the driest areas.



BN-13172

FIGURE 16.—Maran (*Croton astroites* Dryand)

DISTRIBUTION AND HABITAT.—Most, but not all, species of croton are commonly known as maran in the Virgin Islands. This noxious weed occurs on all the Virgin Islands, particularly in the drier areas. It occurs in pure and mixed stands in thickets on rocky hillsides of the driest windward sections. The plants constitute a significant portion of the low-growing thickets common to these areas. Sparse stands may be found along roadsides and ditchbanks. The plants occur spontaneously in newly plowed fields and in waste grounds around

house sites. This type of maran contributes significantly to the noxious woody pasture weeds common to all pastures in the Virgin Islands, even though it is less abundant and more restricted in its distribution than is *Croton discolor* Willd., white maran, and *C. rigidus* (Muell. Arg.) Britton. The plants thrive equally well on poor, shallow, rocky soils and on deep, fertile soils. A few plants occur in the moderate rainfall belts, but none occur in the forests of the highest rainfall areas. They thrive almost equally well in full sun or partial shade.

TOXICITY AND SYMPTOMS.—Several species of croton that are related to maran, and occur elsewhere yield the toxic material croton oil, a powerful purgative when taken internally (35, 45). Quisumbing has reported that 10 drops of croton oil taken internally will kill a dog (45). The oil also causes blistering and irritation of the skin when applied externally. Although croton oil is concentrated in the seeds, it also occurs in the stems and leaves. Maran species that occur in the Virgin Islands possess toxic properties similar to those reported for croton oil. It is suspected that the toxic material in maran is either croton oil or chemically related to it. The plants taste so unpleasant that animals eat them only under emergency conditions, so that cases of poisoning are very uncommon.

MANAGEMENT AND CONTROL.—*Croton astroites* Dryand, like the other types of croton, forms regrowth following cutting or brush-chopping. Grubbing out the weed is recommended where only a few plants are involved. Chemical control measures are recommended for dense stands or plants scattered over large areas. Denying livestock access to the plants is impractical because of their wide distribution and abundance. Goats and deer browse on the plants, but horses and cattle do not ordinarily eat it. The seeds are scattered by wild animals, birds, livestock, and water. Their ability to remain dormant for long periods before germination makes it necessary to repeat control measures at intervals. Effective control is obtained by applying selective herbicides at regular intervals.

Euphorbiaceae, or Spurge, Family

Croton betulinus Vahl (fig. 17)

Broombush

DESCRIPTION.—This many-branched shrub is 3 to 10 feet high. The very slender twigs and the leaf stems and blades, as well as the leaflike structures surrounding the flowers, are all covered with short, starlike hairs. The smooth bark of the stems is almost black. The small, ovate leaves, borne alternately along the stem on short leaf stems, are $\frac{1}{4}$ to $\frac{1}{2}$ inch wide and $\frac{1}{2}$ to $\frac{3}{4}$ inch long. They are rounded at the base, and narrow to a blunt point at their tips. The leaf margins are rough or serrated. The starlike hairs are fewer and shorter on the upper surface of the leaves than on the lower surface, which makes the leaves appear darker green above. The very small flowers are borne along short flower stems, which occur at the tips of the slender branches. The small, hairy fruiting capsules contain 1 to 5 seeds, with 3 being the usual number. The plants are reproduced by seeds.

FIGURE 17.—Broombush (*Croton betulinus* Vahl)

BN-13171

DISTRIBUTION AND HABITAT.—Broombush is common to all of the Virgin Islands. It grows in the most extreme rainfall belts on a variety of soil types. It is most prevalent in thickets surrounding wooded areas and occurs as scattered plants throughout the forests. Broombush thrives equally well in full sunlight and rather deep shade. It is an uncommon weed in waste grounds and in areas surrounding cultivated fields. The plants are more common in the intermediate rainfall areas.

TOXICITY AND SYMPTOMS.—Results of chick-feeding trials indicate that broombush has toxic properties similar to those of *Croton astroites* Dryand. (See *Croton astroites* Dryand.)

MANAGEMENT AND CONTROL.—The perenniality and copious seed production of all the species of croton included in this study make mechanical control measures largely ineffective. Unlike the other species of croton, broombush can often be pulled out by the roots by hand, and this method is effective where plants are not too abundant. Where the plants occur in thick stands chemical control measures are recommended. Repeated applications of selective herbicides are necessary for complete eradication and maintenance of weed-free areas. It is impractical to deny all classes of livestock access to broombush because of its abundance and widespread distribution.

Euphorbiaceae, or Spurge, Family

***Croton discolor* Willd. (fig. 18)**

Maran, White Maran

DESCRIPTION.—This semierect, or erect, perennial shrub is usually 4 to 6 feet high. The light-gray bark is fissured. The twigs, flowers, and leaf stems are densely covered with short, white, starlike hairs. The oblong, alternate leaves, borne on 1-inch stems are $\frac{3}{4}$ to $1\frac{1}{2}$ inches long and $\frac{1}{2}$ inch wide. The leaf blades have rounded bases and tips; they are dark green and smooth above, light green and hairy beneath. The small, male flowers are borne on slender flower stems at the tips of the branches. The larger, female flowers are usually borne on separate stems. Male and female flowers are usually borne on separate plants but not always. The flower stems are usually longer than the leaves. The spherical capsules, which are densely covered with hairs, contain 3 seeds and are about $\frac{1}{4}$ inch in diameter. Reproduction is by seeds.

DISTRIBUTION AND HABITAT.—This type of maran is found on all the Virgin Islands, especially in the drier parts. It withstands wind and salt spray, and is often found growing near the sea. It occurs in thick stands on the dry eastern and southern coasts of St. Croix. Maran thrives equally well on deep, moist soils and on shallow, dry soils. It thrives best in full sunlight but is shade tolerant. Dense stands are often found in pastures, waste grounds, and along roadsides and ditchbanks. Maran is a noxious weed in both pastures and cultivated fields.

TOXICITY AND SYMPTOMS.—Results of chick-feeding trials indicate that this species of maran has toxic properties similar to those of *Croton astroites*. (See *Croton astroites* Dryand.)

MANAGEMENT AND CONTROL.—This noxious weed occurs in dense stands in pastures, where it competes with pasture grasses. Mechanical control measures are less effective than chemical, since stumps resprout if cut or brushchopped. Grubbing is the most effective control for a few or isolated plants. Even though maran is abundant in pastures, cattle and horses ignore it unless tethered or otherwise denied other forage, but goats and deer browse on it. Its perenniality, copious seed production, and the prolonged dormancy and sporadic germination of the seeds make repeated control measures necessary to eradicate the weed and maintain weedfree areas. Experiments show that two applications of 2,4-D and 2,4,5-T in water, applied

FIGURE 18.—Maran (*Croton discolor* Willd.)

BN-13282

as a foliar spray, are necessary to kill a majority of the plants. Thick stands may be controlled effectively by applying the spray with a boom sprayer. Repeated applications are necessary to kill regrowth and new seedlings. The seeds of maran are spread by birds, wild animals, water, and livestock.

Euphorbiaceae, or Spurge, Family
Croton rigidus (Muell. Arg.) Britton (fig. 19)
 Maran



FIGURE 19.—Maran (*Croton rigidus* (Muell. Arg.) Britton)

BN-13185

DESCRIPTION.—This perennial branching, erect, fragrant shrub is 4 to 12 feet high. It is easily distinguished from *Croton discolor* Willd., by the size and shape of its alternate leaves and the yellow, star-shaped hairs that cover the young twigs, fruiting stems, fruits, and leaves. Furthermore, the occurrence of three or more branches from the same point on the stem is much more common than in *C.*

discolor Willd. The leaves vary in size, but are usually 1 to 4 inches long and 1 to 2 inches wide with long, tapering tips. They are dark green, with fewer hairs on the upper surface than on the lower. The small, greenish flowers are surrounded by short structures, called sepals, which are densely covered with star-shaped hairs. Both male and female flowers are borne on the same flowering stem, which is about as long as the leaves. The female flowers are borne on the lower portion of the stem. The fruiting capsules, which usually contain 3 seeds, are about $\frac{1}{8}$ inch long and are densely covered with hairs. This species consists of several races, and there is evidence that some hybridization occurs between it and *C. discolor* Willd. where they grow together. The plants are reproduced by seeds.

DISTRIBUTION AND HABITAT.—This shrub occurs on all of the Virgin Islands. It is often found in pure, dense stands as well as in mixed stands. It occurs occasionally around watering troughs, along lanes, and under shade trees, but is most common in pastures, waste grounds, along roadsides and ditches, and around house sites. Maran grows on poor, shallow, poorly drained soils in the driest areas but is more prevalent where there is more moisture. The plants thrive best in full sunlight but are shade tolerant. Thick stands often occur following the plowing of fields that have lain idle for many years.

TOXICITY AND SYMPTOMS.—Results of chick-feeding trials indicate that this species of maran has toxic properties similar to those of *Croton astroites* Dryand. (See *Croton astroites* Dryand.)

MANAGEMENT AND CONTROL.—This shrub is perhaps the most widespread and prevalent species of maran in pastures and cultivated fields throughout the Virgin Islands. It constitutes a major pasture pest on St. Croix. Its perenniality, competitive ability, and copious production of highly viable seeds capable of prolonged dormancy make maran very difficult to control. Mechanical control, except for cultivation, is ineffective; regrowth from plants that have been cut or brush chopped makes chemical control necessary. The plants are killed by a single application of an aqueous solution of 2,4-D and 2,4,5-T applied as a foliar spray. Treatments must be repeated at intervals to insure adequate control because of its copious seed production and continually germinating seeds. Cattle and horses do not feed on this maran, but goats and deer browse on the plants.

Asclepiadaceae, or Milkweed, Family
***Cryptostegia grandiflora* R. Br. (fig. 20)**
Purple Allamanda

DESCRIPTION.—This perennial ornamental is a stout woody vine or semi-erect shrub. Its opposite leaves are dark green and shiny above, showing conspicuous white leaf veins. The oblong leaves are borne on short stems and are 1 to 2 inches wide and about 3 inches long. The leaf blades are thick and brittle; their margins are smooth. The tubular, purple flowers, borne in clusters at the ends of the branches, are twisted in the bud. The mature flowers are about 2 inches long and $1\frac{1}{2}$ inches across at the top. The boat-shaped fruits are usually borne in pairs; they are smooth and green when young, become rough and grayish at maturity, and attain 5 inches in length. The plants blossom most profusely during the wet season; however, blossoms may be found occasionally throughout the year. In the climate of the Virgin



BN-13198

FIGURE 20.—Purple Allamanda (*Cryptostegia grandiflora* R. Br.)

Islands the plants set fruits, which usually mature during the winter months. The plant contains an acrid, sticky, milky sap that is irritating to the skin. Propagation is by cuttings or seeds, usually the former.

DISTRIBUTION AND HABITAT.—This handsome ornamental, which is drought tolerant, is planted throughout the Virgin Islands. It may be trained to grow as an erect shrub or as a vine on a trellis. It is usually planted in border plantings where intermediate to high plants are desired. Plants occasionally survive on abandoned house sites.

TOXICITY AND SYMPTOMS.—The milky sap of purple allamanda is a drastic irritant to the skin. When taken internally, 5 to 7 drops produce severe diarrhea (47). The leaves, stems, and roots of the plant are poisonous. Decoctions of powdered leaves mixed with water have caused death to humans (45).

MANAGEMENT AND CONTROL.—Gloves should be worn when pruning or working with the plants. Sap that accidentally gets on the skin should be washed off immediately with soap and water. Although livestock ordinarily do not browse on this plant, they may eat it when tethered or confined in accessible areas or where other forage is not available. Therefore, they should not be allowed access to the plants. Individual plants are best eradicated by grubbing. If herbicides are used, special care should be taken, or other plants nearby may be killed or injured.

Solanaceae, or Nightshade, Family
Datura metel L. (fig. 21)
 Pricklybur



FIGURE 21.—Pricklybur (*Datura metel* L.)

BN-13181

DESCRIPTION.—This annual branching, coarse weed is 3 to 6 feet high. The entire plant is distinctly purplish in color and is covered with long, fine hairs. Its branches are usually more profuse and widespread than those of jimsonweed. The large, alternate leaves are broadly ovate, usually rounded at the base, and 6 to 12 inches long. The leaf blades are thin with entire margins, and both leaf surfaces are hairy. The large, white flowers, borne singly in the leaf axils, are funnel shaped and consist of 5 petals 6 to 10 inches long, which are

united most of their length but spreading at the top. A thick, light-green, leaflike structure in the form of a tube encloses the lower half of the flower. The round, nodding fruits are 1 to 2 inches in diameter and are covered with long prickles. The fruits dry and turn brown at maturity; they split into 4 sections to release many small, flat, shiny, black seeds. Pricklybur reproduces by seeds, and the plants die after producing a seed crop. The plants are most conspicuous during the wet season when they are in flower and fruit. Pricklybur can be easily distinguished from jimsonweed by its color, the shape of its leaves, and its hanging fruits with longer prickles.

DISTRIBUTION AND HABITAT.—Pricklybur occurs throughout the Virgin Islands. The plants are found in thick stands in cultivated fields. They also occur in waste grounds, along roads, fence rows, ditches, and in open pastures. It is a common weed in vegetable gardens and provision grounds. The plants thrive best in full sun and are seldom found growing in shade. They grow equally well over a wide range of rainfall belts on different soils. Although the plants are more abundant during the wet season, some can be found throughout the year.

TOXICITY AND SYMPTOMS.—Because of their close relationship, pricklybur and jimsonweed have similar poisonous properties and affect animals similarly (18). (See Jimsonweed, *Datura stramonium* L.)

MANAGEMENT AND CONTROL.—Pricklybur is seldom eaten by browsing animals. Like many other toxic plants, it may be eaten when more desirable forage is unavailable. Preventative measures of denying livestock access to the plant, particularly during the dry season, should be taken since livestock will feed on the plants only when hungry or confined to small areas. The plants therefore are a potential danger, and it is recommended that they not be allowed to grow in any accessible areas. Grubbing or cutting the plants by hand before they reach maturity is feasible for plants occurring in sparse stands in small areas. For thick stands in large areas chemical control measures are recommended. Mowing or bushcropping is an unsatisfactory method of control, as many plants will form regrowth. Selective herbicides, to which the plants are quite sensitive, may be used for control of large areas; repeated applications may be necessary to kill successive crops of seedlings. Ordinary cultivation practices will kill the plants when in the seedling stage. Care should be taken not to include the weed in silage.

Solanaceae, or Nightshade, Family

Datura stramonium L. (fig. 22)

Jimsonweed, Stinkingweed

DESCRIPTION.—This annual malodorous, coarse, woody weed is 2 to 5 feet high with widespreading, ascending branches near the top of the stem. The plant is smooth throughout. The main stem and branches are light green, often covered with thin, white bloom or powder. The large, alternate leaves are light green and are borne on short, stout stems. The thin leaf blades are 3 to 8 inches long, 2 to 4 inches wide, pointed at both ends, and have irregular shallow, sharp-



FIGURE 22.—Jimsonweed (*Datura stramonium* L.)

BN-13184

pointed lobes along the margins. The large, white, trumpet-shaped flowers are borne singly in the leaf axils on short, stout stems; they are 6 to 8 inches long and 2 to 4 inches across the top. The base of the flower is surrounded by a funnel-shaped, leaflike structure. The erect, egg-shaped fruits, borne on stout stems, are green when young but become dry, hard, and pale tan at maturity. They are covered with hard, sharp prickles; the lower prickles are usually shorter than the upper ones. The mature, dry fruit, usually 2 inches long, splits into 4 sections and releases many small, black, shiny seeds. The seeds of jimsonweed are scattered by wind and water. This fast-growing weed is propagated by seeds that germinate at the onset of the wet season and produce plants that blossom and mature fruits during the ensuing dry season. The plants die after producing a seed crop. The plant color, odor, lack of hairs, and leaf shape make jimsonweed easily distinguishable from pricklybur.

DISTRIBUTION AND HABITAT.—Jimsonweed occurs throughout the Virgin Islands, but is rather scarce on St. Croix. It is commonly found in waste grounds around house sites. It occurs spontaneously in pastures, cultivated fields, along stream and ditchbanks and roadsides, in refuse heaps, fence rows and feeding lots, and around cattle dips. It grows best in full sun but is shade tolerant. The plants can grow in dry areas, but they are usually larger when grown on fertile soils in the higher rainfall belts. The plants are most conspicuous when in flower and fruit. Rainfall appears to influence its distribution more than does soil type, as is the case with many other plants in the Tropics. Jimsonweed grows singly or more commonly in small patches; seldom in thick stands covering entire fields.

TOXICITY AND SYMPTOMS.—Jimsonweed contains three very poisonous alkaloids—hyoscyamine, atropine, and scopolamine (61). All parts of the plant are poisonous, but the seeds are particularly dangerous. One pound of the green plant is sufficient to kill a cow. However, because of its strong odor and unpleasant taste, animals rarely eat enough of the plant to be poisoned. Children are sometimes poisoned by chewing the flowers. Of farm animals, cattle most frequently are poisoned. Rare cases of hogs being poisoned have been reported (28). In cattle, rapid pulse and respiration and either frequent urination or retention of urine are common symptoms. Diarrhea, dilation of the pupils of the eyes, and stiffness occur. As death nears, respiration becomes slow, weak, and irregular. Poisoned hogs frequently go into a state of convulsive twitching.

MANAGEMENT AND CONTROL.—The plant is a more-or-less permanent pest due to its copious production of seeds that remain viable in the soil for long periods. Probably because of its disagreeable odor and strong taste, this plant is seldom eaten by browsing animals and is not usually regarded as being dangerous to farm livestock. But livestock will feed on the plant when starving or confined to small areas, and it is a potential danger to livestock. Care should be taken not to include this weed in hay or silage. Getting rid of the plants by cutting, pulling, or grubbing them out before they mature seed is practical. Ordinary cultivation practices kill young plants. Use of commercial selective herbicides is an effective chemical control measure.

Araceae, or Arum, Family
Dieffenbachia picta Schott (fig. 23)
Dumbcane



FIGURE 23.—Dumbcane (*Dieffenbachia picta* Schott)

DESCRIPTION.—This perennial herb has thick, fleshy, prostrate to erect stems, which may be 3 to 6 feet high in cultivated forms; the entire plant is smooth. The large, oblong or elliptical, long-stemmed leaves develop near the top of the stem. In cultivated forms they may be almost entirely green or variegated, with varying numbers of white dots or blotches. The leaves are 3 to 6 inches wide and 8 to 14 inches long, slightly narrowed at the base with blunt-pointed tips; they have a prominent midvein from which 9 to 17 pairs of side veins arise. Dumbcane contains a milky sap, which is irritating to the skin and highly inflammatory to the tongue. The plants, which rarely blossom in the warm climate of the Virgin Islands, produce blossoms mostly during the winter months. The small, dull-white flowers are borne on an elongated stem called a spike. The fruits consist of a cluster of scarlet berries. Dumbcane is commonly grown for its foliage, and the plants are normally propagated by cuttings, though it can be reproduced by seeds.

DISTRIBUTION AND HABITAT.—The cultivated form of this plant is found in Virgin Islands gardens or, more frequently, as potted house plants. It grows wild in moist, shaded places, often in shallow water. Dumbcane will grow in full sun if it has a constant and ample supply of moisture, but it does better in partial or full shade. The plant has a wide tolerance to soil pH but does not do well on shallow, dry soils nor on sites exposed to the wind.

TOXICITY AND SYMPTOMS.—Although the poisonous nature of dumbcane is still unknown, its leaves were toxic to chicks in feeding trials. Humans are sometimes poisoned by dumbcane, but it is of little danger to livestock. Juice from dumbcane is highly irritating to the skin (10). If chewed and swallowed, the plant causes temporary swelling of the throat and loss of speech, hence the name, dumbcane (57).

MANAGEMENT AND CONTROL.—Dumbcane is used throughout the Virgin Islands as an ornamental. Livestock will not eat the plant ordinarily because of its acrid juice. Since the plants are a potential danger to livestock, it is desirable to get rid of those not wanted for ornament. Grubbing out the plants is effective provided all the roots and stems are removed. New plants start readily from the tops and stem sections of old plants left lying in shaded, moist places.

Euphorbiaceae, or Spurge, Family
***Euphorbia pulcherrima* Willd. (fig. 24)**
Poinsettia

DESCRIPTION.—This well-known, ornamental shrub may attain a height of 12 feet. The stems are smooth and green in the younger parts. The alternate leaves vary in size, shape, and color. The bright-colored floral leaves at the stem tips appear to have a whorled arrangement, and may vary from white through pink to red. The true flowers are small, orange structures borne in terminal, compact clusters. The 3-celled fruiting pod is shallowly grooved; it is about $\frac{1}{2}$ inch long and wide and contains 3 oblong, smooth, tan seeds. The entire plant contains a milky, acrid sap. The plants blossom from November to March. They are usually grown from cuttings, but they may be air layered. There are several horticultural varieties of poinsettia.

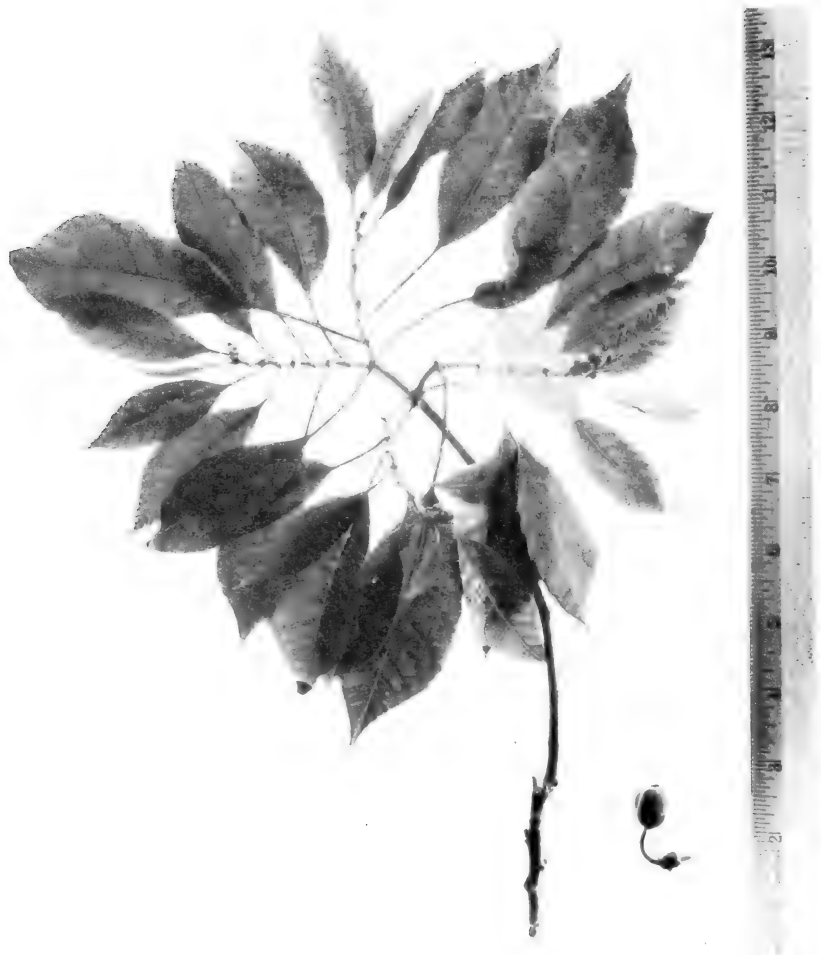


FIGURE 24.—Poinsettia (*Euphorbia pulcherrima* Willd.)

BN-13283

DISTRIBUTION AND HABITAT.—Poinsettia is common to all the Virgin Islands where it is widely grown as an ornamental. The plants thrive best when grown in partial shade on deep, fertile soils in wet areas. Attempts to establish plants on shallow, rocky, dry soils in full sun on windblown sites have met with only partial success. Poinsettia is grown occasionally as a house plant. Plants are usually found only where they have been planted.

TOXICITY AND SYMPTOMS.—The sap of poinsettia is highly irritating to the skin of susceptible persons (46). Many people have been severely poisoned while cutting and handling the plant. The powerful sap has been used to remove unwanted hair (60). Poinsettia poisoning causes a severe itching and burning of the skin; sometimes open sores occur that are subject to secondary infection. Children have been fatally poisoned from eating stems and leaves of the plant. When eaten by livestock, the plant causes severe stomach upset.

MANAGEMENT AND CONTROL.—Control is unnecessary because of the scarcity of poinsettia except in gardens. Livestock should not be allowed access to plants grown as ornamentals. Unwanted plants may be either grubbed out, or killed with herbicides where there is no danger to surrounding vegetation.

Euphorbiaceae, or Spurge, Family
***Euphorbia tirucalli* L. (fig. 25)**
Pencil Euphorbia, Milkbush

DESCRIPTION.—This large shrub, or small tree, is 15 to 30 feet high; it usually has a single trunk but its many branches form a dense crown. The bark is gray and fissured on older portions of the stem but dull green and smooth on the remainder of the plant. The young, cylindrical branches are fleshy, smooth, and green. The fleshy, cylindrical



FIGURE 25.—Pencil Euphorbia (*Euphorbia tirucalli* L.)

BN-13284

twigs vary from 4 to 6 inches in length and $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter; they occur in whorled clusters near the ends of the branches. The small, oval leaves, usually less than an inch long, are produced at the ends of the twigs but they soon fall off. The very small, greenish flowers, borne with the leaves at the tips of the twigs, are inconspicuous. The entire plant is smooth throughout and contains an acrid, milky sap. The plant is propagated easily by cuttings, but does not spread by natural means.

DISTRIBUTION AND HABITAT.—This introduced shrub is commonly planted as an ornamental throughout the Virgin Islands. It is found in villages near dwellings, in parks and cemeteries, and in other public places. The plants thrive equally well on all soils in all but the driest areas. The ease of establishment, drought tolerance, and attractiveness of the plant make pencil euphorbia popular as an ornamental.

TOXICITY AND SYMPTOMS.—The roots and stem of pencil euphorbia are reported to be highly toxic (30, 60). The sap of the plant is very irritating to the skin and eyes of susceptible humans. Although animals are unlikely to eat the plant because of its irritating sap and unpleasant taste, cases of pencil euphorbia poisoning have occurred in the Virgin Islands.

MANAGEMENT AND CONTROL.—Livestock will not ordinarily browse on pencil euphorbia, but one case of a tied horse being poisoned by it has been reported from St. Croix. As it is occasionally found in accessible places, care should be taken to keep livestock away from this plant. Animals should not be tethered where they can reach it. Undesired plants may be grubbed out or killed with selective herbicides where there is no danger to surrounding vegetation.

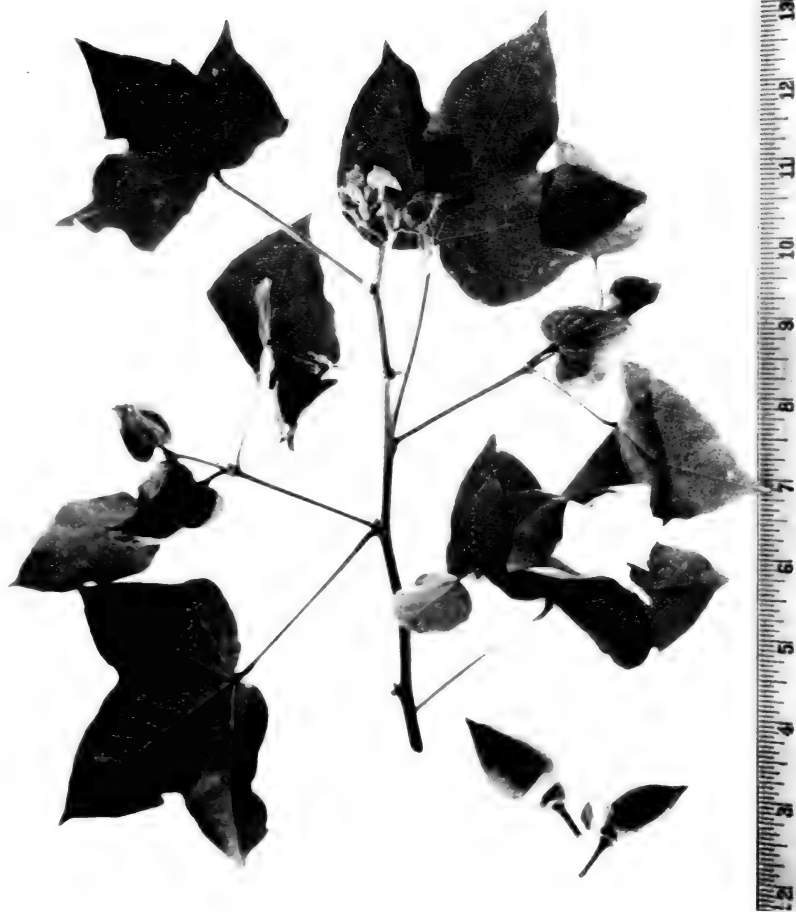
Malvaceae, or Mallow, Family

Gossypium sp. (fig. 26)

Cotton

DESCRIPTION.—This perennial, branching shrub is 10 to 15 feet high. The large alternate leaves have 3 to 5 short lobes. The leaf blades, which are 3 to 4 inches wide and 4 to 6 inches long, are dark green, smooth, and rather shiny above, dull and hairy beneath. The flower buds or "squares" appear singly in the leaf axils, and are surrounded by 3 serrated, persistent, leaf-type growths called bracts. The 5 petals are usually light yellow or white, with or without a basal petal spot; they are about 1 inch in length and $\frac{3}{4}$ inch in width. The smooth, green, egg-shaped, young fruits (bolls) have pointed tips, contain 3 to 5 sections (locks), and reach 1 to $1\frac{1}{2}$ inches in length. They turn brown and open lengthwise at maturity exposing the whitish cotton fiber. Each lock of the fruit contains 6 to 8 small, black or grayish, egg-shaped seeds, which are about $\frac{1}{4}$ inch long, rounded at the base, and pointed at the apex. The seeds are covered by short grayish fibers called fuzz, and by longer white fibers called lint. Most cotton plants blossom at the beginning of the wet season and the bolls begin to open at the onset of the dry season. Plants growing in the more moist districts produce blossoms occasionally throughout the year, but rarely set fruit. Cotton is ordinarily propagated by seeds.

DISTRIBUTION AND HABITAT.—Cotton has escaped cultivation in the Virgin Islands; it is most common in St. Croix. Cotton commonly

FIGURE 26.—Cotton (*Gossypium* sp.)

BN-13208

occurs in waste grounds, along roadsides and streams, and less often in cultivated fields, provision grounds, and flower gardens. The seeds are distributed by animals, birds, wind, water, and by man. Cotton thrives best in full sun, but is shade tolerant. Plants are found on all soils and at all elevations including the wettest and driest areas; they are most common in the latter. Occasionally, cotton is planted as an ornamental. The plants are perhaps most conspicuous when fully mature with open bolls.

TOXICITY AND SYMPTOMS.—Raw cottonseeds contain appreciable amounts of gossypol, a substance that, in large amounts, is toxic to all classes of farm animals (13, 34). Mature cows and sheep can tolerate more gossypol than can other farm animals, and can safely consume small quantities of raw cottonseeds. Although appreciable amounts of gossypol are destroyed in the preparation of cottonseed meal, it contains enough of the material to make it toxic to certain animals. Calves up to 3 to 4 months of age, swine, and poultry are

susceptible to gossypol poisoning by cottonseed meal (34). Horses, mules, and donkeys should be fed cottonseed meal cautiously, and never in large amounts. Mature cattle and sheep that have sufficient pasture are seldom affected. Symptoms of cottonseed meal poisoning appear only after susceptible animals have consumed the material for 1 to 2 months. Concentrates fed to calves under 3 to 4 months of age should not contain as much as 20 percent of cottonseed meal. Horses and mules should not be fed more than 1 to 1.5 pounds per day. Cottonseed meal or cake alone should never be fed to swine. Gossypol causes congestion of the lungs, liver, kidneys, and spleen. An outstanding symptom is difficult and labored breathing. Hogs show progressive weakness and emaciation in spite of good appetites. The bark of the cotton root is reported to induce abortion in sows (19).

MANAGEMENT AND CONTROL.—The scarcity of cotton plants throughout the Virgin Islands makes the probability of livestock eating the seeds negligible. Control measures are not usually needed or practical. However, cotton plants are found in many areas that are accessible to livestock, and denying livestock access to the plants is recommended.

Euphorbiaceae, or Spurge, Family
***Hippomane mancinella* L. (fig. 27)**
Manchioneel

DESCRIPTION.—This tree is 10 to 50 feet high with a trunk 1 to 2 feet in diameter. Its rather smooth bark is dull gray, but becomes



FIGURE 27.—Manchioneel (*Hippomane mancinella* L.)

light with age. Given sufficient space, its long, spreading branches form an attractive, symmetrical crown. All parts of the plant contain a milky sap, which is acrid and poisonous. The alternate, smooth, thin leaves are borne on long, stout leaf stems. The oblong leaves are 3 to 5 inches long, 2 to 3 inches wide, rounded at the base, pointed at the tips, and have prominent midveins; they are dark green and shiny above, dull beneath. The small male and female flowers occur in clusters at the tips of the branches. The female flowers develop into spherical, smooth, green fruits about an inch in diameter, which have a strong odor of apples. They turn yellow and fall at maturity, having become hard and woody. The small, brown seeds are elongated and flattened. The trees blossom during the fall and mature their fruits during the dry season; they are not deciduous, but they shed many of their leaves during the dry season. Propagation is by seeds.

DISTRIBUTION AND HABITAT.—Manchioneel is found on all the Virgin Islands, but is much more common on St. Croix than on the others. The trees commonly grow in coastal woods and thickets, and on rocky cliffs near the sea around the entire periphery of the islands in the wettest and driest areas. They occur singly, but more commonly in groves associated with other seaside plants. They are less common inland, but do occur along streams, roadsides, fences, and ditchbanks. Occasional trees are found in pastures, waste grounds, and around house sites.

TOXICITY AND SYMPTOMS.—The milky sap of manchioneel is a powerful irritant (35). Although many persons are susceptible to the irritant, some are not. Cattle that come into contact with the plant often suffer severe skin irritation. Smoke from burning manchioneel branches is very irritating to eyes, lungs, and even to the skin of susceptible persons. Hogs have been poisoned from eating the fruits. Early Spanish explorers, believing the fruit to be crab-apples, ate them—sometimes with fatal results (35). The sap of manchioneel may cause a severe inflammation of the skin, similar to that from poison-oak or poison-ivy, but often worse. If the juice comes into contact with the eyes, a severe irritation sets in that may lead to temporary or even permanent blindness (58). The irritation always is accompanied by severe pain.

MANAGEMENT AND CONTROL.—Manchioneel trees occur in many locations that are accessible to livestock. Preventative measures should be stressed in the management of livestock, especially swine. Livestock should not be allowed access to nor be tethered or otherwise confined in areas containing manchioneel. Piggpens and cow lots should not be built to use manchioneel as shade, since rain falling through the trees can cause skin irritations to livestock. Even though livestock ordinarily do not browse on manchioneel, they may be poisoned by eating the leaves or fruits if they are tethered or confined where the trees occur.

Individual trees may be grubbed out when young. Tree poisoning is recommended for thick stands or for trees that occur over wide areas. Mature trees are hard to kill with the common herbicides.

Euphorbiaceae, or Spurge, Family
Hura crepitans L. (fig. 28)
Sandbox Tree, Monkey-pistol

DESCRIPTION.—This large, handsome tree often reaches a height of 60 feet in favorable locations. Its branches form a symmetrical crown when given sufficient space. The light-gray bark on the trunk of young trees is often covered with stout, fleshy, sharp-pointed spines,



FIGURE 28.—Sandbox Tree (*Hura crepitans* L.)

which occasionally persist until the tree is mature. The large, thin, heart-shaped, hairy leaves are borne alternately along the stem on leaf stems that are longer than the leaf blades; the leaves are 2 to 4 inches wide with dull, abruptly-pointed tips. The trees are not completely deciduous, though they shed many of their leaves during the dry season. The small, reddish flowers are borne on terminal spikes during the fall months. The fleshy fruits, borne on stout stems, contain 10 to 14 sections; each section contains a round, compressed, gray seed, almost 1 inch in diameter. The fruits are about 3 inches in diameter, $1\frac{1}{2}$ inches thick, and concave at both ends. They are green and smooth when young and become brown, hard, and woody at maturity, from April to June, when they noisily split open into many moon-shaped, one-seeded sections. The plants contain an acrid, milky sap. Propagation is by seeds or cuttings.

DISTRIBUTION AND HABITAT.—This tree is found on all of the Virgin Islands, most commonly in the wetter districts. Trees grow singly or in small patches, along streams, in wooded areas, and in open pastures. They are commonly found in fence rows, serving as living fence posts and shade. Occasionally they are planted in villages near dwellings for use as shade trees. The trees do not occur near the sea nor in the driest windblown areas. Their copious seed production and unique method of dissemination enhances the distribution and survival of the plants.

TOXICITY AND SYMPTOMS.—The sap of sandbox causes severe irritation to the skin (10). Its ripe fruits are dangerous to handle because they explode violently, scattering seeds in every direction. Livestock have been injured by its spines and exploding pods. The seeds have poisonous properties similar to those of castorbean and jumble bead (36), and are toxic to all classes of livestock and humans. Sandbox poisoning produces nausea, vomiting, gastric pain, bloody diarrhea, rapid pulse, and dullness of vision. Large amounts may lead to death in convulsions or exhaustion.

MANAGEMENT AND CONTROL.—The use of sandbox for shade and living fence posts and the occurrence of plants in pastures and other accessible locations create a control problem. Livestock, especially hogs, should be denied access, especially to the seeds, which are the most poisonous part of the plant. Livestock do not ordinarily browse on the plants, and should never be tethered or confined where they have access to sandbox. Trees should not be allowed to grow in pigpens or hog pastures. Undesirable plants must be grubbed out or killed with selective herbicides; young plants form regrowth following cutting or brushchopping.

Leguminosae, or Legume, Family
***Indigofera suffruticosa* Mill. (fig. 29)**

DESCRIPTION.—This erect shrub, usually 4 to 6 feet high has slender branches. The young branches and usually the leaves are covered with short, whitish hairs. The alternate, compound leaves are dark green above and pale beneath; they are 2 to 5 inches long and bear 9 to 17 leaflets, which are paired except for a single leaflet at the tip. The oblong leaflets are about 1 inch long, narrowed at the base, and rounded at the tip. The small, light-blue flowers are borne in short-

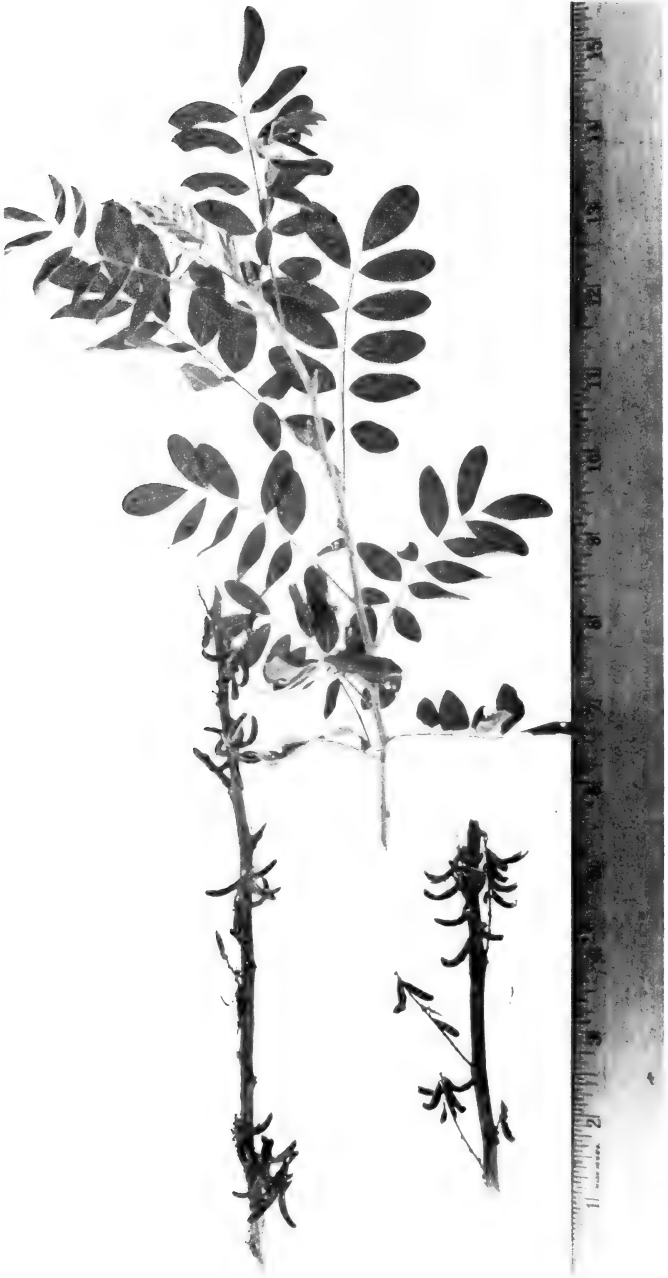


FIGURE 29.—*Indigofera suffruticosa* Mill.

branched flower clusters in the leaf axils: each cluster contains several to many flowers. The pods, which vary from $\frac{1}{4}$ to $\frac{1}{2}$ inch in length, are strongly curved, with the outer end pointing upwards. They are only about $\frac{1}{8}$ inch thick, contain 4 to 8 small black seeds, and are hairy when young but become smooth with age. The seeds are separated from one another in the pods. The appearance of the curved pods makes the plants easily distinguished from other indigo species.

RELATED SPECIES.—Trailing indigo, *Indigofera endecaphylla* Jacq., a closely related form, has been reported to be toxic (8, 33, 37). Trailing indigo does not occur naturally in the Virgin Islands although it has been grown there and in many other tropical areas. Its use as a forage crop is discouraged because of its toxicity.

DISTRIBUTION AND HABITAT.—This shrub is common throughout the Virgin Islands. It occurs most frequently in mixed stands of thickets around the periphery of wooded areas in the higher rainfall belts. It is found along roadbanks and in fence rows. The plants occasionally occur in pastures, cultivated fields, and waste grounds. They thrive equally well in full sun and partial shade, and on almost all soil types. Plants growing in the drier regions are usually smaller.

TOXICITY AND SYMPTOMS.—Results of chick-feeding trials show the stems of indigo to be toxic. To the knowledge of the authors no cases of poisoning from this plant have occurred in the Virgin Islands, but it is considered potentially harmful to livestock.

MANAGEMENT AND CONTROL.—This shrub is commonly found in areas that are accessible to livestock. Livestock have not been observed browsing on this legume, although it is apparently sampled by deer. Its unpalatability to livestock enhances its ability to survive and compete with more desirable forage plants. Small numbers of plants can be easily grubbed out. The plants are easily killed by applications of either 2,4-D or 2,4,5-T, or both, and these should be used where the infested area is large.

Euphorbiaceae, or Spurge, Family

Jatropha curcas L. (fig. 30)

Physicnut

DESCRIPTION.—This branching shrub, or small tree, is usually 12 to 20 feet high; the entire plant is smooth throughout. The bark on young twigs is smooth and light green, but turns gray with age. The alternate, heart-shaped leaves, borne on 1- to 3-inch leaf stems, have 3 to 5 roundish lobes and are 2 to 4 inches across. The small flowers are borne on short stems in clusters of 4 to 7 at the ends of the branches. Each flower is surrounded by 5 green, leaflike structures about half the length of the petals. The 5 yellow petals are united above their middle and have long soft hairs on the inner surface near their base. The fruits are shallowly lobed, slightly fleshy, and 1 to $1\frac{1}{2}$ inches long. The fruits are composed of 3 sections, each containing 1 seed. They are green and smooth when young, and turn yellow and become almost black at maturity when they split open to reveal 3 shiny, black, oval seeds about $\frac{1}{2}$ inch long. Reproduction is by cuttings or seeds, usually the latter.

FIGURE 30.—Physicnut (*Jatropha curcas* L.)

BN-13203

DISTRIBUTION AND HABITAT.—This small tree is found throughout the Virgin Islands. Physicnut is fairly common but is rarely found in areas where it has not been planted. It prefers full sunlight, though it will grow in partial shade. It is found on all soil types and in all rainfall belts except the very driest. Physicnut is sometimes planted as an ornamental around house sites. It is found along roadsides, in

fence rows, and in waste grounds. Small patches of plants are occasionally found in open pastures.

TOXICITY AND SYMPTOMS.—The seeds of physicnut contain a violent purgative, plus the toxalbumen curcin (36). Chick-feeding trials show the leaves, roots, and stems of the plant to be poisonous also. A dose of 1 to 4 seeds is considered a mild purgative (39, 45). Overdoses lead to vomiting, violent purging, and severe inflammation of the mucous membrane of the stomach. Because of the danger of producing severe results, physicnut is an unsafe therapeutic agent. Physicnut poisoning most frequently occurs among humans, particularly among children who consume the seeds out of curiosity.

MANAGEMENT AND CONTROL.—This small tree is planted both as an ornamental and as a growing fence post, which makes it accessible to livestock. Livestock ordinarily do not browse on this plant, but may eat it when tethered or confined where other forage is not available. Caution should be taken in tethering livestock so as not to allow them access to the plants. Unwanted plants must be grubbed out because they form regrowth when cut. Selective herbicides are recommended where the danger to other surrounding vegetation is negligible.

Euphorbiaceae, or Spurge, Family
***Jatropha gossypifolia* L. (fig. 31)**
Wild Physicnut

DESCRIPTION.—This perennial shrub is 2 to 4 feet high. Its alternate, long-stemmed leaves are fairly deeply cut into 3 to 5 lobes, which are pointed at the tips. Long, stiff hairs are conspicuous on young new growth, leaf stems, and lower leaf surfaces; the upper surface is more or less smooth. Plants with reddish-tinged leaves occur in varying proportions in localized areas. The small, male flowers are borne on the upper portion of the branching flowering stems at the tips of the branches; the female flowers occur on the lower portion. The separate spreading, small, roundish petals are deep purple. The 3-seeded fruiting capsules are about $\frac{1}{2}$ inch long and abruptly flattened at each end. Wild physicnut is reproduced by seeds, which are mottled grayish in color and about $\frac{1}{4}$ inch long. The plants produce copious seed crops. They live through the dry season but shed most of their leaves, becoming semidormant. Plants may be found in flower and fruit throughout the year.

DISTRIBUTION AND HABITAT.—Wild physicnut occurs in waste grounds, pastures, and cultivated fields throughout the Virgin Islands in all but the lowest rainfall belts. The plants are considered a serious pest in pastures where they occur in thick stands. They thrive equally well in deep, well-drained soils and in shallow, poorly drained soils. The plants grow best in full sunlight but are shade tolerant. Thick stands frequently occur spontaneously along the edges of streams, in waste grounds, and along roadsides, ditchbanks, and fence rows.

TOXICITY AND SYMPTOMS.—Wild physicnut possesses the same toxic properties as physicnut, but is said to be less potent in its action (36). (See Physicnut.)

MANAGEMENT AND CONTROL.—This noxious weed is easily killed in the seedling stage by cultivation or with hand tools. Older plants



FIGURE 31.—Wild Physicnut (*Jatropha gossypifolia* L.)

BN-13204

form regrowth following mowing or brushchopping, which makes mechanical control less effective than chemical control. The plants should not be allowed to form seeds. Grubbing or pulling out plants is practical where few plants are involved or where they occur in sparse stands. The plants are easily killed with ester and amine forms of 2,4-D and 2,4,5-T, and by commercial brush killers; such chemicals should be used on thick stands occurring over large areas. The seeds may remain dormant in the soil for years before germinating, so that periodic control measures are usually necessary. Livestock will not browse on the plants unless tethered or otherwise denied more palatable forage, but the plants constitute a hazard to tethered or very hungry animals.

Euphorbiaceae, or Spurge, Family
Jatropha multifida L. (fig. 32)
Coral Plant

DESCRIPTION.—This fast-growing branched, ornamental shrub reaches 5 to 12 feet in height. Its bark is smooth and gray in the older parts but green in the young new growth. It tends to be a straggling



FIGURE 32.—Coral Plant (*Jatropha multifida* L.)

shrub unless pruned. The large leaves are roundish in outline and are borne on long leaf stems near the tips of the branches. They are deeply lobed into 7 to 11 prominently veined lobes. Each leaf lobe is very narrow and thin; the larger lobes, which may reach 7 inches in length, may also be partially subdivided. Small clusters of long, conspicuous hairs occur on the twigs where the leaf stems arise. The small, bright-red flowers are borne in dense, compact clusters. They do not all open at once, so the cluster looks red for a considerable time. The flowers develop into triangular fruits, which are 1 inch deep and about $1\frac{1}{2}$ inches across. The fruiting capsules are smooth and green when young, turn yellow, and become almost black at maturity; each capsule usually contains 3 oval, brown seeds. The plants blossom and fruit sporadically throughout the year. They reproduce by seeds or by cuttings.

DISTRIBUTION AND HABITAT.—This attractive shrub is found on all of the Virgin Islands, where it is planted as an ornamental. With its attractive foliage and flowers, ease of reproduction, rapidity of growth, and general adaptation, coral plant ought to be more popular among gardeners and homeowners than it now is. The plants thrive equally well in full sun or partial shade: they may be grown successfully on shallow and deep soils, in high and low rainfall belts, and in exposed, windblown sites. The plants thrive on shallow, rocky soils that are high in lime. Volunteer plants occur in refuse heaps, flower gardens, and in waste grounds.

TOXICITY AND SYMPTOMS.—Coral plant is reported to have toxic properties similar to those of physicnut (36). (See *Jatropha curcas* L.)

MANAGEMENT AND CONTROL.—Because of the scarcity of plants, serious control measures are unnecessary; however, livestock should be denied access to the plant. Undesired plants may be easily pulled up by hand when young; older plants must be grubbed out or killed with selective herbicides since they form regrowth following cutting.

Verbenaceae, or Vervain, Family
***Lantana camara* L. (fig. 33)**
Yellow Sage

DESCRIPTION.—This prickly, or sometimes unarmed, branching shrub is 3 to 6 feet high. The 4-sided stems and leaves are thinly covered with short, simple, whitish hairs. The prickles, which occur randomly along the stem, are short, stout, recurved, and have a much-thickened base that makes them appear triangular in outline. The thin, opposite leaves are rounded at the base and pointed at the tips, 1 to 4 inches long and about 1 inch wide; they are rough to the touch, with blunt-toothed margins. The leaves, which are borne on $\frac{1}{2}$ -inch stems, are dark green above, pale beneath. The dense flower heads, each bearing several small, yellow or orange flowers, are $\frac{1}{4}$ to $\frac{1}{2}$ inch across. They are borne on short stems in the leaf axils near the tips of the branches. Individual flowers are small, less than $\frac{1}{8}$ inch across, and crowded together so that many people think of the flower heads as one flower. The small, fleshy, black fruits are almost $\frac{1}{8}$ inch in diameter. Races of this plant differ in size and shape of leaves, in presence or absence of prickles, and in size of flowers. The smaller

FIGURE 33.—Yellow Sage (*Lantana camara* L.)

BN-13202

leaved plants occur mostly in dry districts. The plants grow from seeds, which are disseminated by animals, birds, and water. Yellow sage blossoms most profusely during the winter months but occasionally plants are found in blossom throughout the year.

DISTRIBUTION AND HABITAT.—Yellow sage grows on all of the Virgin Islands from the driest to the wettest areas on almost any soil, in full sun or partial shade. It commonly occurs in thickets with other species, along roadsides and ditchbanks, and around the boundary of wooded areas. It also grows around house sites, in waste places, dumping grounds, and in fence rows. The plants occur as weeds in pastures, gardens, provision grounds, and cultivated fields. It constitutes a rather serious pasture pest; but the size and shape of the shrub with its pretty flowers and dark-green foliage make yellow sage very attractive, and it is occasionally planted as an ornamental in the Tropics.

TOXICITY AND SYMPTOMS.—In addition to being a stomach poison, yellow sage leaves are capable of sensitizing the skin to sunlight, a process called photosensitization (35). Animals that have become photosensitized develop symptoms only if exposure to sunlight follows. One pound of dried mature leaves produces sensitization in a 400-pound steer (51). Cattle and sheep are most frequently affected. Acute poisoning occurs only when large quantities of the plant are consumed. Common symptoms of acute poisoning are sluggishness or extreme weakness, soft, bloody feces, and occasional partial paralysis of the legs, followed by death in 3 to 4 days. Chronic cases of poisoning from yellow sage occur when small amounts of the plant are consumed. Affected animals become constipated in the early stages of poisoning, although later the droppings become soft. Nonpigmented skin without hair shows the first evidence of the disease; pigmented skin covered with black hair may never become involved. The skin of the muzzle, ear, neck, shoulders, legs, or other parts of the body becomes yellow, swollen, hard, cracked, and painful. The skin often peels, leaving large exposed raw areas. Areas of inflammation extend to the adjacent mucous membranes of the mouth and nasal passages. Affected animals refuse food, drool saliva from the mouth, and lose weight. Skin and membranes surrounding the eyes may become affected, as well as the eyeball itself.

MANAGEMENT AND CONTROL.—It is necessary to practice preventative measures with livestock, since yellow sage is found in many accessible locations. The fact that yellow sage occurs in thick patches under many shade trees in pastures indicates that livestock browse on the plants. However, animals will eat yellow sage only to a limited extent unless tethered or otherwise confined where more desirable forage is not available. Manual and chemical methods are used to control the plants. Where there are only a few plants, they may be either pulled up or grubbed out. The usual selective herbicides are effective and practical for thick stands or scattered plants covering large areas.

Verbenaceae, or Vervain, Family

***Lantana involucrata* L. (fig. 34)**

Sage

DESCRIPTION.—This branching shrub is 12 to 15 feet high. It is one of several plants locally known as sage. The nearly round, stiff branches and leaves are, unlike most of its relatives, covered with short, white hairs. The grayish bark is smooth or narrowly fissured. The small, thin, scurfy leaves are mostly opposite but occasionally whorled. The small, ovate leaves are borne on short leaf stems; they are narrowed at the base, bluntly pointed or rounded at the tips, 1 to 1-½ inches long and about ½ inch wide. The leaf blades, which are dark green above and pale beneath, have fine-toothed margins. The small flower heads are borne on flowering stems which occur in the leaf axils near the tips of the branches; each flower head is ¼ to ½ inch across and contains several small flowers. The individual flowers are about ⅛ inch long, and white to violet in color. The small, fleshy, blue to purple, one-seeded fruits are less than ⅛ inch in diameter. This plant is easily distinguished from yellow sage by its smaller leaves and by its blossom color. Flowers are produced most pro-



FIGURE 34.—Sage (*Lantana involucrata* L.)

BN-13288

fusely during the winter months; however, some plants may be found in flower throughout the year. Sage is reproduced by seeds, which are spread by livestock and birds.

DISTRIBUTION AND HABITAT.—This woody weed is widespread throughout the Virgin Islands. It occurs from the coast to the tops of the highest hills in all rainfall belts. The plants are commonly found growing as weeds in provision grounds, pastures and flower and vegetable gardens, and around house sites. They occur in patches along roadsides, in fence rows and waste grounds, and in the shade of trees. This shrub occupies the same general habitat as does its relative, yellow sage. The plants grow in full sunlight or partial shade on deep, fertile soils and on rocky, shallow, infertile soils.

TOXICITY AND SYMPTOMS.—Results of chick-feeding trials show the leaves of sage to be toxic. It is suspected that sage has toxic properties similar to those of yellow sage. (See *Lantana camara* L.)

MANAGEMENT AND CONTROL.—Cattle can eat small amounts of sage without harm. Undigested seeds are spread in the droppings of cattle and probably even more by birds that eat the fruit. It is therefore constantly being introduced into pasture areas. Sage is readily killed by herbicides; therefore, it is not a problem in well-managed pastures. Livestock do not ordinarily eat large amounts of sage if good forage is available, so it is not a grave danger even on unmanaged pastures so long as they are not overgrazed.

Labiatae, or Mint, Family

Leonotis nepetaefolia (L.) R. Br. (fig. 35)

Hollowstalk, Rabbitfood

DESCRIPTION.—This annual, herbaceous weed is 2 to 6 feet high. Its angular, green stems are 4-sided and partially hollow, and contain a spongy, white pith. The large, heart-shaped, opposite leaves are borne on stout leaf stems, which are about as long as the leaf blades. The leaf blades are rounded at the base, pointed at the tip, 1 to 4 inches long, and 1 to 2 inches wide, and have toothed edges; both surfaces are usually covered with soft, short, white hairs. The small, orange flowers are borne in dense spherical clusters. These flower clusters, which reach 2 inches in diameter, are arranged in vertical order along the stem. The size, shape, and arrangement of the flower clusters constitute a distinguishing characteristic that make the plants easily identified. The sharp 3-angled, black seeds are about $\frac{1}{8}$ inch long. The plants blossom during the wet season and mature their seeds during the dry season. The seed heads turn tan or light brown at maturity and the seeds fall to the ground. The plants are propagated by seeds, which are disseminated by water, birds, and rodents. The hard, spiny projections of the dry flower clusters are capable of producing mechanical injury to humans and livestock.

DISTRIBUTION AND HABITAT.—Hollowstalk is a common weed throughout the Virgin Islands. It frequently occurs in cultivated fields and provision grounds. Hollowstalk is commonly found in small patches in waste grounds, along roadsides, ditches, fences, and streams. It is less common in pasture lands and in flower and vegetable gardens around house sites. The plants occur in all but the driest areas and may be found in shallow, poorly drained soils, but



BN-13201

FIGURE 35.—Hollowstalk (*Leonotis nepetaefolia* (L.) R. Br.)

they thrive best in full sun on deep, fertile soils with ample rainfall. Seeds germinate when sufficient moisture is present. The plants compete well with other plants wherever the ground has been disturbed. Seed production is copious.

TOXICITY AND SYMPTOMS.—Hollowstalk leaves have short hairs, which are irritating to the skin of susceptible individuals; contact with the leaves by susceptible persons causes a burning rash to occur (21). Pollen from the plant can induce hay fever and should be avoided by persons who are subject to the disease. The leaves of the plant are used as a food for rabbits in the Virgin Islands. However, feeding trials show the leaves to be toxic to chicks, and the plant should be considered potentially harmful to poultry.

MANAGEMENT AND CONTROL.—Where this weed occurs in fields, gardens, or provision grounds, the most practical control measure is frequent cultivation. The weeds may be easily eradicated either by hand or with mechanical tools. Hand pulling the plants is practical where small patches of plants are involved. Cutting the plants before they mature seeds removes the seed supply but does not kill the plants. Hollowstalk is susceptible to the selective herbicides commonly found on the market.

Leguminosae, or Legume, Family
***Leucaena glauca* (L.) Benth. (fig. 36)**
Tan-Tan, Wild Tamarind

DESCRIPTION.—This fast-growing shrub is usually 6 to 20 feet high; in the higher rainfall areas it may become a small tree. The green bark of the young twigs, covered with short hairs, becomes brown and slightly rough with age. The large, alternate, doubly compound leaves borne on stout stems have 3 to 10 pairs of "arms," each with 10 to 20 pairs of small leaflets. The leaflets, which are light green above and pale beneath, are attached directly to the "arms," and are about $\frac{1}{2}$ inch long and $\frac{1}{8}$ inch wide. The entire leaf may reach 12 inches in length. The flowers are borne in compact, spherical heads about 1 inch in diameter. The flower heads are borne on branching stems; they occur laterally in the leaf axils or at the tips of the branches. Each flower head produces several fruiting pods, which are flat, almost straight, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide, and 5 to 6 inches long. They are green when young and turn brown and split open at the edges at maturity, releasing many flat, brown, shiny seeds. The inner coating of the pods is tan and the seeds are arranged transversely in the pods. Tan-tan is reproduced by seeds, which are scattered by rodents and livestock.

DISTRIBUTION AND HABITAT.—Tan-tan is extremely widespread in all the Virgin Islands. Its whitish flowers and dry pods are seen along roadsides throughout the entire year. Natives are frequently seen cropping the young branches from plants growing along the roadsides for livestock feed, especially during the dry season. Tan-tan occurs as a weed in cultivated fields, vegetable gardens, provision grounds, along streams, around house sites, and in waste grounds. Thickets of the plants are common in pastures and along fence rows. Tan-tan thrives under all combinations of soils and rainfall, but cannot grow in heavy shade.

TOXICITY AND SYMPTOMS.—The leaves and seeds of tan-tan contain mimosine, a material known to be poisonous to horses, mules, donkeys, swine, and rabbits (55). Cattle, sheep, goats, and poultry are not affected. The toxic material is concentrated in the seeds and young leaves. Tan-tan poisoning acts rather slowly and affected animals usually recover shortly after the plant is eliminated from the diet. Poisoned animals lose large patches of hair from their bodies. Horses and mules frequently lose hair from their manes and tails. Prolonged feeding of tan-tan to rabbits may cause death.

MANAGEMENT AND CONTROL.—Its good palatability and high protein content make tan-tan an excellent feed source for ruminants. Its presence in pastures is desirable if it is kept low enough for livestock to



FIGURE 36.—Tan-Tan (*Leucaena glauca* (L.) Benth.)

BN-13182

browse on it, but the plants will grow above the reach of livestock if left uncut. The method of cutting depends on the size of the area, the tools available, and the topography of the land. Tan-tan can hardly be overgrazed, especially where it occurs in pastures. Tan-tan's perenniality, competitive ability, and copious production of highly viable seeds capable of prolonged dormancy are advantageous for its use as a forage crop. These same characteristics make tan-tan very difficult to control where it occurs as a weed. Tan-tan may be eradicated by grubbing or by using chemicals. It can be killed by the application of selective herbicides or brush killers as a foliar or a basal spray, but it is more resistant than most legumes.

Clusiaceae, or Clusia, Family
***Mammea americana* L. (fig. 37)**
Mamey, Mammee Apple

DESCRIPTION.—This well-formed, evergreen tree with a maximum height of 80 feet has a trunk up to 4 feet in diameter. The thick, reddish-gray bark is rather smooth. The opposite, thick, leathery, oblong leaves are borne on short, stout stems; they are dark green and shiny above, dull beneath, 4 to 8 inches long and 2 to 4 inches wide with the base obtuse or narrowed and the tip rounded. The leaf blades, which have smooth margins, are covered with many small, black dots; they have a large, prominent midvein from which numerous smaller, side veins arise. The small, white flowers are borne singly or in groups of 2 to 3 on old branches and in the leaf axils of young, stout twigs; they measure $\frac{1}{2}$ to $\frac{3}{4}$ inch across. The flowers develop into large, spherical, woody, edible fruits. The large, fleshy fruit contains 2 to 4 seeds and reaches 3 to 6 inches in diameter; it is covered with a russet-colored, tough skin. The smooth seeds of mamey are about $\frac{1}{2}$ inch thick and 1 to 2 inches long, tapering to thin edges. The fruit pulp is edible. The trees, which are propagated by seeds, blossom during the fall wet season and mature fruits during the summer months.

DISTRIBUTION AND HABITAT.—Mamey is common to all of the Virgin Islands where it is found in woods, pastures, and cultivated fields. It is often planted as a shade tree and for its edible fruit, and its bark is used to some extent as a home tanning agent. The trees occur in all but the drier districts, and grow in full sun or partial shade. The plant is adapted to a wide range of soils. The well-known, edible fruit and dense, dark-green foliage of mamey make it an attractive ornamental tree.

TOXICITY AND SYMPTOMS.—Mamey seeds contain acids that are highly toxic to certain types of insects and to fish (40). Feeding trials show that mamey seeds are also highly toxic to chicks. Ordinarily livestock do not consume the large, woody mamey fruits, which enclose the poisonous seeds. A greater source of danger is presented by dry seeds lying within reach of hungry animals, particularly hungry hogs.

MANAGEMENT AND CONTROL.—The scarcity of mamey trees in the Virgin Islands makes unlikely any serious damage to livestock caused by the plant. Trees in areas that are accessible to livestock do con-



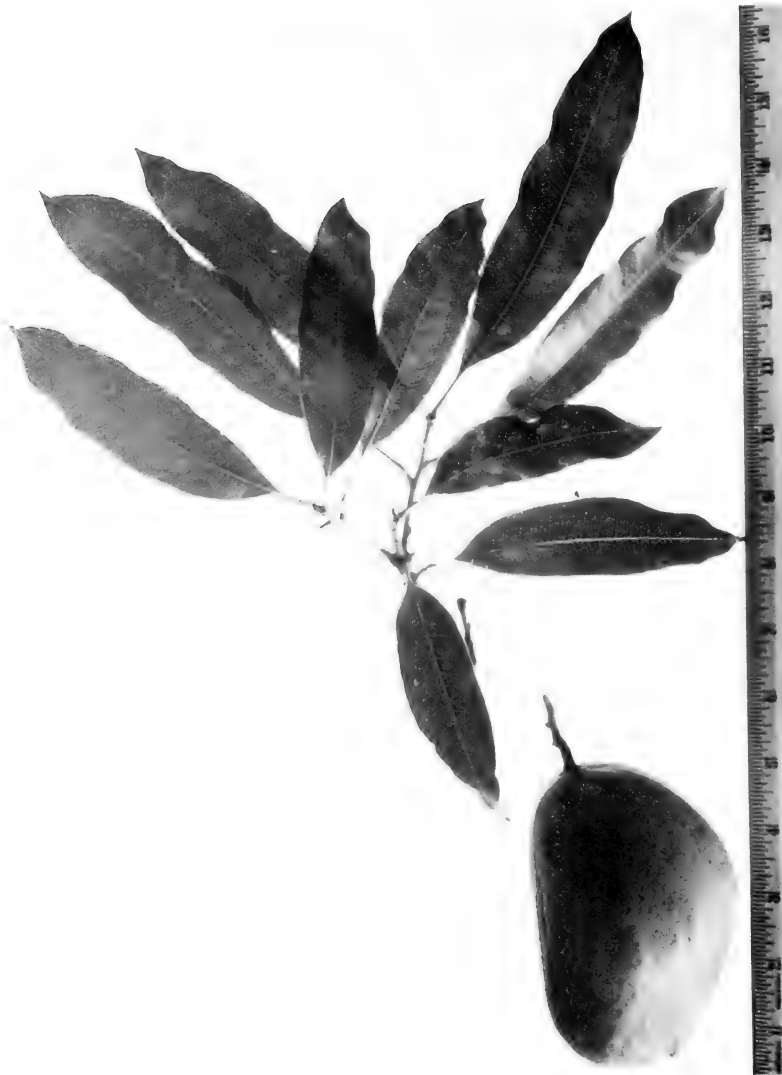
FIGURE 37.—*Mamey (Mammea americana L.)*

BN-13289

stitute a potential hazard. It is recommended that unwanted trees be grubbed out if small and cut down if large. Should any regrowth occur from the stumps it may be killed by the use of selective herbicides.

Anacardiaceae, or Sumac, Family
***Mangifera indica* L. (fig. 38)**
Mango

DESCRIPTION.—This large, many-branched tree attains a height of 30 to 50 feet; its limbs form a symmetrical crown when given sufficient

FIGURE 38.—Mango (*Mangifera indica* L.)

BN-13180

space. The smooth bark is light gray. The smooth, dark-green leaves borne alternately along the stem on short, stout leaf stems are 6 to 16 inches long, and about 2 inches wide near the middle. The leaf blades taper at their bases, are extremely tapered at their tips, and have prominent midveins and distinct lateral veins; they are dark green and shiny above, pale beneath. The numerous small flowers, which are borne at the ends of the branches on long, stout, hairy flower stems, develop into large, fleshy, irregularly shaped, edible fruits. The young, one-seeded fruits are smooth and green with occasional

tiny, black specks: they are about 4 inches long and 2 to 3 inches thick, and become soft and light yellow or red and yellow at maturity. The trees are conspicuous when in a fast state of growth because their young leaves near the ends of the branches are reddish. The rainfall distribution appears to influence blossoming, because the trees blossom at sporadic intervals throughout the year. Mango belongs to the same group of plants as cashew, Christmasbush, and the well-known poison-ivy.

DISTRIBUTION AND HABITAT.—Mango trees are common in the wetter districts of all the Virgin Islands. They occur spontaneously over wide areas and are commonly planted for shade, ornament, and their edible fruit. Individual trees are found in yards, around house sites, in public parks, and along streets and roadsides. Mangos do not occur naturally in the drier districts.

TOXICITY AND SYMPTOMS.—Sap of the mango tree contains an unidentified material that is irritating to the skin of susceptible persons (50). The disease is called mango dermatitis, and causes a rash or irritation around the mouth and face. The rind of all fruits and the flesh of unripe fruits are also poisonous to susceptible persons (45). Though cases of severe poisoning are uncommon, susceptible persons should avoid contact with the sap of the tree or the rind of the fruit.

MANAGEMENT AND CONTROL.—It is not feasible to eradicate mango trees in order to prevent their potential danger to livestock. Preventative measures such as denying livestock access to the plants should be the common practice. Cattle have choked to death on mango seeds.

Meliaceae, or Mahogany, Family

Melia azedarach L. (fig. 39)

Lilac, Chinaberry

DESCRIPTION.—Lilac, as it is called in the Virgin Islands, is a small, sprangly tree, from 20 to 40 feet high. The trunk reaches 1 to 2 feet in diameter and is often divided near the ground into several spreading, slightly drooping branches. The dull-reddish wood is soft and very brittle. The gray, or dark gray-brown bark appears speckled with white: it becomes lighter in color and furrowed with age. The large, alternate leaves are roughly triangular in outline, 8 to 24 inches long, and are twice divided into numerous leaflets. The opposite, thin leaflets have pointed tips, rounded bases, and sharply toothed margins: they are approximately 1 to 2 inches long and $\frac{1}{2}$ inch wide, dark green above, pale beneath. The small, long-stemmed flowers are produced in many-branched clusters in the leaf axils. Each flower, about $\frac{1}{2}$ inch across, is composed of 5 or 6 narrow, slightly purplish petals. The fruit, about $\frac{1}{2}$ inch in diameter, is globular and green when young, and becomes wrinkled and dull yellow when mature. The fruit contains one stone in which there are several small seeds. The trees blossom most profusely during the fall wet season: however, occasional blossoms are found throughout the year. Lilac trees are propagated by seeds.

DISTRIBUTION AND HABITAT.—The seeds of lilac trees are spread by animals, birds, and water. Lilac trees have escaped cultivation since



FIGURE 39.—Lilac (*Melia azedarach* L.)

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their introduction years ago, although they are now commonly planted as ornamentals. They thrive equally well in full sun or partial shade and on many different soil types. The plants, although the leaves fall in dry weather, require a moderate amount of moisture and are uncommon in the drier windblown areas.

TOXICITY AND SYMPTOMS.—No specific toxic substance from the lilac tree has been isolated and purified as yet (36, 61). Pigs are poisoned from eating either green or ripe berries. Goats, chickens, and ducks are less susceptible to lilac poisoning. Although the berries are the most toxic, flowers, leaves, and bark are also poisonous. Pigs show symptoms 3 to 4 hours after consuming berries. Chief symptoms are loss of appetite, stiffness, lack of coordination, and general weakness. Death frequently follows within 24 hours. One-half pound of berries is sufficient to kill a 50-pound pig (61).

MANAGEMENT AND CONTROL.—Preventative measures should be stressed as a livestock management practice, especially with swine, because lilac trees occur in many accessible locations. Individual small plants found growing in undesirable locations should be grubbed out.

Chemical control measures are recommended for larger trees or thick stands as the stumps form regrowth following cutting. Any practice to prevent the production of seeds, such as pruning the tree at regular intervals, would aid in preventing the spread of the plants, and would lessen the danger to animals.

Nyctaginaceae, or Four O'clock, Family

Mirabilis jalapa L. (fig. 40)

Four O'clock



FIGURE 40.—Four O'clock (*Mirabilis jalapa* L.)

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DESCRIPTION.—This erect or sometimes semi-erect, branching perennial is 1 to 2 feet high. The plants appear smooth; however, the flower parts and leaves, particularly their edges, are sparsely covered with short, fine, white hairs. The plants have tuberous roots when grown in the Tropics and the stems are relatively soft. The opposite leaves are borne on short, stout leaf stems, which are about half the length of the leaves. The leaf blades are triangular in shape, 2 to 3 inches long, about 1 inch wide near the base, and gradually taper to sharp-pointed tips. The leaves are dark green above, dull beneath; they have prominent white midveins that extend the entire length of the leaf blades and from which smaller lateral veins extend. The veins are equally conspicuous on both leaf surfaces. The colorful flowers occur singly but appear as clusters in the leaf axils near the ends of the branches. The base of the flower is surrounded by 5 pointed, pale-green, petal-like structures. The trumpet-shaped flowers are 1 to 2 inches long and about $\frac{1}{2}$ inch across the top when open. The showy flowers, which vary in color from white through deep red to purple, open in the afternoon and wither the following day. The small, bladderlike fruits contain tiny, black, flat seeds. The plants blossom most profusely during the wet season; however, some blossoms are found throughout the year.

DISTRIBUTION AND HABITAT.—Four o'clock is commonly cultivated in flower gardens throughout the Virgin Islands but occasionally escape plants are found growing in waste grounds around abandoned house sites. The plants are commonly grown in parks and around public buildings.

TOXICITY AND SYMPTOMS.—The large, tuberous roots of four o'clock produce the alkaloid trigonelline (45), which has laxative properties. The roots have been used in Cuba and Europe for their medicinal properties (23, 45). In Hawaii, the seeds and roots of the plant are reported to be toxic (11). Livestock are not likely to be poisoned by the plant, but scrounging hogs are capable of uprooting and consuming harmful amounts of the tubers.

MANAGEMENT AND CONTROL.—The plants should not be a serious problem in livestock management because livestock rarely have access to them. Precautionary measures should be taken in denying livestock access to the plants where they are grown as ornamentals. Four o'clock is not a good competitor and rarely grows as an escape plant in the Virgin Islands.

Cucurbitaceae, or Gourd, Family
***Momordica charantia* L. (fig. 41)**
Maiden Apple

DESCRIPTION.—This annual branching, trailing vine may reach 20 to 30 feet in length. It has alternate rounded, deeply lobed leaves, each divided into 5 to 7 irregularly shaped lobes. Opposite each leaf is a simple tendril. The thin leaves may be smooth or hairy and vary from 1 to $2\frac{1}{2}$ inches in diameter. The solitary, yellow, 5-parted flowers, 1 to 2 inches across, are borne in the leaf axils. The male flowers are borne on flower stems about 2 inches long, which have a conspicuous round bract near the middle. The female flower stems are shorter. The fleshy fruits, ribbed and covered with dull-pointed spines, are about 1 inch in diameter and $1\frac{1}{2}$ to 5 inches



FIGURE 41.—Maiden Apple (*Momordica charantia* L.)

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in length; they are thick in the middle and have rather pointed ends. The fruits turn yellow at maturity and rupture lengthwise, exposing the yellow or orange pulp in which are flat, brownish or black seeds, about $\frac{1}{4}$ inch long. Reproduction is by seeds, which are scattered by birds and rodents.

DISTRIBUTION AND HABITAT.—This herbaceous vine occurs throughout the Virgin Islands. It is usually found on fences; however, it also occurs on hedges and underbrush in thickets and waste grounds. It commonly occurs around house sites and in cultivated fields. The plants thrive well in full sunlight, but are shade tolerant. Maiden apple grows and fruits throughout the entire year in most areas although it is more commonly found during the wet season. The tender shoots, leaves, and immature fruits are eaten as a vegetable (45) and the plant is reported to have medicinal properties (39, 45).

TOXICITY AND SYMPTOMS.—The leaves of maiden apple contain a substance which is capable of reducing the amount of sugar in the blood. Decoctions of leaves have been used to treat sugar diabetes in humans. The fruit, if given in large doses, is reported to be a drastic purgative and is considered an abortifacient (39). The plant is apparently of no particular hazard to livestock, but humans should use it with caution because large amounts could prove to be very harmful.

MANAGEMENT AND CONTROL.—Maiden apple occurs in pastures and waste grounds where it is available to livestock, thus making it a potential danger. Its widespread distribution increases the probability of its being eaten by livestock, especially during the dry season. Its copious seed production makes repeated control measures necessary. Grubbing out the plants is practical in areas where only a few vines are found. Ordinary cultivation practices will kill the plants when they are young. The plants are especially sensitive to selective herbicides; both ester and amine forms of 2,4-D and 2,4,5-T are effective.

Apocynaceae, or Dogbane, Family

Nerium oleander L. (fig. 42)

Oleander

DESCRIPTION.—Oleander is an ornamental woody shrub. When allowed to grow naturally it produces a large number of stems, which range in height from 5 to 20 feet. If all its lower branches are removed regularly, oleander will form a small tree. All parts of the plant exude a milky, acrid sap when injured or cut. The bark on young stems and twigs is smooth and green, but on older branches it becomes gray and roughened. The numerous smooth, short-stemmed leaves usually occur in whorls of 3 or 4 around the twigs. They are 3 to 10 inches long, about 1 inch wide at their middle, with slender tapered points at both ends; dull dark-green above, light-green beneath. The flowers, which are borne in upright clusters at the tips of the branches, vary from white through pink to deep red; they average about 1 to 2 inches across. Both single and double (many petals) forms are planted as ornamentals; the plants blossom throughout the year, but most profusely during the wet season. The paired straight fruiting pods are cylindrical, and have creases which run

FIGURE 42.—Oleander (*Nerium oleander* L.)

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lengthwise; they are 6 inches long and about $\frac{1}{2}$ inch thick. They turn light tan at maturity, and split lengthwise releasing many small, fuzzy seeds, which become windborne. The plants are highly susceptible to repeated attacks by scale insects. They are propagated by seeds or cuttings, usually the latter.

DISTRIBUTION AND HABITAT.—Oleander is commonly grown as an ornamental shrub throughout the Virgin Islands. The general hardiness of the plants makes them suitable as attractive shrubs under a wide range of environmental conditions. The plants require well-drained but moisture-retentive soils. Their tolerance to alkaline soils is demonstrated by their doing well in dry areas on shallow soils underlain by marl. Oleander is planted in flower gardens, parks, ballparks, and parade grounds, and along highways. It occurs occasionally as a weed in waste grounds and abandoned house sites, and along streambeds. Its attractive foliage and many-colored flowers

make oleander popular in border plantings. It is attractive when grown as a trimmed hedge or when grown as a specimen, either singly or in a group.

TOXICITY AND SYMPTOMS.—All parts of oleander are poisonous to humans and to all classes of farm animals (61). Two extremely poisonous glucosides—nerioside and oleanderoside—have been isolated from the plant (60). One leaf of oleander is sufficient to kill a mature cow or horse. A number of picnickers have suffered severe poisoning after eating frankfurters roasted over a fire of oleander stems. Poisoning in horses, cattle, and sheep causes general weakness, slow pulse, and profuse sweating, followed by death. In humans, symptoms include nausea, vomiting, dizziness, bloody diarrhea, unconsciousness, and death.

MANAGEMENT AND CONTROL.—Because of their toxicity, extreme caution should be constantly exercised in handling the plants. Gloves should be worn when trimming the plants or when making cuttings for propagation. Washing the hands thoroughly with hot soapy water is recommended after handling the plants. The branches and leaves should not be used in a fire for cooking food, nor should the smoke be inhaled when the plant trimmings are burned. The branches and leaves, which must be discarded, should be either burned with proper caution or buried. Plants should never be left where they will be available to livestock, since they are more likely to eat dry, dead plants than green, live ones. Children should not be allowed to play with the plants under any circumstances. They should be warned against chewing the leaves, twigs, flowers, and fruiting pods. They should be cautioned against playing with or around the stumps of freshly cut plants, to prevent their coming in contact with the exuded plant sap.

Removal of plants by grubbing out the roots is a more effective control measure than is cutting because cut plants form regrowth. Oleander is susceptible to selective herbicides. Care should be used in applying herbicides because they are potentially dangerous to other close-growing ornamentals. Herbicides may be applied as a basal spray or by the basal pour method to plants under certain circumstances. Their copious production of seeds, which are windborne, constitutes a constant challenge to adequate control measures. Denying livestock access to the plants is recommended.

Euphorbiaceae, or Spurge, Family

***Pedilanthus latifolius* Millsp. & Britton (fig. 43)**

DESCRIPTION.—This branched, fleshy, ornamental shrub often reaches a height of 4 to 8 feet or more when left unpruned. The young twigs grow in a zigzag manner and bear alternate leaves. The entire plant is green and smooth throughout; its stems are round. The green, fleshy leaves borne on very short, stout stems are rounded at the base and have a small sharp point at their tips; they reach 3 inches in length and 2½ inches in width. The midvein is not flanged beneath as is that of Christmas candle. The small flowers, borne in compact clusters at the tips of the branches, are surrounded by a thick, salmon-red, shoe-shaped tube. The fruiting capsule measures about ¼ inch in length and width and contains several small seeds. All parts of the



FIGURE 43.—*Pedülanthus latifolius* Millsp. & Britton

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plant exude a milky, acrid juice when cut or injured. The plants are propagated by cuttings. This species, like its relative Christmas candle, blossoms at sporadic intervals throughout the year but most profusely during the winter months.

DISTRIBUTION AND HABITAT.—This green, fleshy shrub may be native to the Virgin Islands, but is rare except where planted as an ornamental. It is found on all of the Islands; it grows around dwellings and along streets and highways wherever border plants are desired. The plants often persist on abandoned house sites; they occur spontaneously in waste and dumping grounds or in moist places where trimmings are discarded. The plants thrive well over a wide range of

environmental conditions. They are drought tolerant and are one of the few ornamentals which do well in highly alkaline, compact, shallow soils.

TOXICITY AND SYMPTOMS.—The poisonous properties of *Pedilanthus latifolius* Millsp. & Britton are similar to those of Christmas candle (15).

MANAGEMENT AND CONTROL.—Neither Christmas candle nor this species has become a weed in the Virgin Islands; however, their presence in areas accessible to livestock constitute a potential hazard. Livestock do not browse the plant ordinarily, but they may consume dangerous quantities if tethered or otherwise confined in areas where the plants occur. Gloves should be worn when pruning and handling the plants, and care should be taken not to get any of the milky, acrid juice on the skin or in the eyes. As a precautionary measure the hands should be washed in hot soapy water after handling the plants. Unwanted plants should be grubbed rather than cut, because cut plants form regrowth. Selective herbicides and soil sterilants should be used only when there is no danger to surrounding vegetation.

Euphorbiaceae, or Spurge, Family
***Pedilanthus tithymaloides* (L.) Poit. (fig. 44)**
Christmas Candle

DESCRIPTION.—This perennial branching, fleshy, ornamental shrub reaches a height of 4 to 8 feet. The plant is smooth throughout and contains a milky, acrid sap. Its smooth, round, fleshy stems are light green or dull white. The stemless leaves are sometimes uniformly green but are often variegated in irregular patterns. The alternate, oblong leaves are 4 to 5 inches long, about 2 inches wide, rounded at the base and acute at the apex, and have a midrib that is keeled below. The small flowers are borne in compact clusters at the tips of the branches and are surrounded by a thick, red to purple, boat-shaped tube. The fruiting capsules measure about $\frac{1}{4}$ inch in length and width. The ovate seeds are about $\frac{1}{8}$ inch long. The variegated variety is grown more commonly; it blossoms throughout the year but more profusely during the winter months, when it is an especial favorite of hummingbirds. This species blossoms more profusely in the climate of the Virgin Islands than does *Pedilanthus latifolius* Millsp. and Britton. It is propagated by cuttings.

DISTRIBUTION AND HABITAT.—This shrub is probably native, and is widely planted as an ornamental throughout the Virgin Islands. It is more commonly planted than is *Pedilanthus latifolius* Millsp. and Britton, especially the variegated form, in part because of its attractive colorful appearance. It is adapted to a wide range of moisture and soil conditions; it thrives equally well on deep, moist soils and shallow, dry, alkaline soils. It is commonly planted as a hedge or border plant around dwellings, in public parks, and occasionally along streets and highways. Christmas candle thrives best in full sun but is shade tolerant. The ability of Christmas candle to grow in hard, compact, shallow soils in dry areas enhances its usefulness for ornamental plantings. The plants require periodic pruning to maintain an attractive appearance.

TOXICITY AND SYMPTOMS.—The stems, leaves, and roots of Christmas candle possess a very caustic, milky juice that is capable of pro-



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FIGURE 44.—Christmas Candle (*Pedilanthus tithymaloides* (L.) Poit.)

ducing severe irritation and inflammation of the skin of susceptible humans (47). The plant has been used for medicinal purposes in Mexico and Jamaica (15, 45). Chick-feeding trials show that large amounts of the plant are very toxic if taken internally. However, because of its irritating sap and unpleasant taste, animals seldom consume toxic amounts.

MANAGEMENT AND CONTROL.—All parts of the plant are toxic to both humans and livestock, although some people are practically immune to poisoning by contact. The milky juice is often injurious to the skin and particularly so to the eyes. Gloves should be worn when pruning or handling the plants. Livestock will not ordinarily browse on the plants provided more desirable forage is available. The plants are a constant hazard in areas accessible to tethered or confined livestock and preventative measures are required. The plants form regrowth if cut, making it necessary to dig them out if complete eradication is desired. Soil sterilants and selective herbicides are effective, but should not be used where they would be hazardous to other vegetation.

Apocynaceae, or Dogbane, Family
***Rauwolfia tetraphylla* L. (fig. 45)**
Bitterash

DESCRIPTION.—This tree has smooth bark and slender twigs; it grows to 60 feet in height. The bark of the young twigs is green, it turns light gray with age. The smooth leaves are about 2 inches wide and 6 inches long, and taper to sharp points at both ends; they have many lateral veins and are dark green and shiny above, light green and dull beneath. The leaves are borne on short stems and usually occur in whorls of 4, sometimes 3, or opposite. The small, white flowers are borne in clusters in the leaf axils near the tips of the slender, slightly drooping branches. The pear-shaped, bluntly grooved fruits, containing 2 seeds, are about $\frac{1}{8}$ inch long, green when young, and become reddish brown at maturity. All parts of the plant contain a milky sap, which is irritating to the skin. The bark and leaves are distinctly bitter to the taste. Trees grown in partial shade appear darker green than those growing in full sun. The trees, which blossom during the wet season, are propagated by seeds. Bitterash is not the species of *Rauwolfia* that is grown for its medicinal properties.

DISTRIBUTION AND HABITAT.—This tree is found in wooded areas, in thickets on hillsides, and along streambeds on all of the Virgin Islands. Bitterash occurs singly or in small groups on a wide range of soil types in moist districts.

TOXICITY AND SYMPTOMS.—Three alkaloids—reserpine, tetraphylline, and tetraphyllicine—have been isolated from the roots of the bitterash tree (12). Chick-feeding trials show that the leaves and bark of the tree are poisonous. Livestock are not likely to browse on the foliage of the tree; however, fallen or discarded branches are a potential hazard because curious animals are capable of consuming toxic amounts of them.

MANAGEMENT AND CONTROL.—Bitterash is not ordinarily eaten by livestock, but its presence in areas that are accessible to livestock constitutes a potential danger, which is lessened by good livestock management. Use of selective herbicides or grubbing is recommended where eradication is desired; cutting is not recommended because cut stumps form regrowth.



FIGURE 45.—Bitterash (*Rauwolfia tetraphylla* L.)

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Euphorbiaceae, or Spurge, Family

***Ricinus communis* L. (fig. 46)**

Castorbean, Castornut

DESCRIPTION.—Castorbean is a robust, fast-growing annual or weak perennial. Escape plants found growing wild attain the size of small trees and become very woody. The strong, often crooked stems are 5 to 30 feet high; green or red to purple, and often covered with a white, waxy bloom when young. The large, alternate, star-shaped leaves are borne on long, strong leaf stems. The thin leaf blades, which have finely toothed margins, measure 4 to 24 inches across



FIGURE 46.—Castorbean (*Ricinus communis* L.)

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and have 5 or more lobes. The leaf stem is attached to the leaf blade some distance from the margin. The flower clusters are borne at the ends of the branches although they appear to be borne laterally because lateral branches grow past them. They appear to occur in the crotch of the branches. The flowers are borne vertically along stiff, upright spikes 6 to 12 inches long. The small flowers, which lack petals, are about $\frac{1}{2}$ inch across and vary from greenish white to reddish brown. The oval fruiting pods are shallow lobed and are borne on short, stout stems. They are erect and green when young, drooping and light brown at maturity and are covered with short, stiff, fleshy spines. Each pod contains 3 smooth, elliptic seeds about $\frac{1}{2}$ inch long, usually mottled with gray, black, brown, and white. Propagation is by seeds, which may remain dormant in the ground until exposed by cultivation or through trampling by livestock.

DISTRIBUTION AND HABITAT.—Castorbeans are native to the Tropics. They are often planted as ornamentals, and are common weeds throughout the Virgin Islands; elsewhere they are planted as a field crop. Due to their copious seed production and adaptability, the plants have become scattered over wide areas. Escape plants appear in cultivated fields, along roadsides and ditches, in vegetable and flower gardens, and in provision and dumping grounds. The plants may be found growing singly, in small patches, or in thick stands. Castorbeans thrive best on rich, deep soils in full sunlight; however, they are shade tolerant. They occur more commonly in moist areas and are less common in drier areas. The seeds germinate where there is sufficient moisture and the plants grow rapidly.

TOXICITY AND SYMPTOMS.—Castorbean contains the toxic material ricin, which is a true protein (60). Chick-feeding trials indicate that all parts of the plant are poisonous but that the seeds are the most poisonous. As few as 6 seeds have killed horses, and as few as 2 have caused the death of children (19). The plant is toxic to all classes of livestock and to humans. The symptoms include nausea, vomiting, gastric pain, bloody diarrhea, thirst, hot skin, rapid pulse, sweat, and dullness of vision. Large doses may lead to death in convulsions or exhaustion. In the case of prolonged illness, muscular tremors, general weakness, and emaciation occur.

MANAGEMENT AND CONTROL.—Castorbeans occur in plentiful numbers throughout the Virgin Islands. The plants occur in many places where they are accessible to livestock, and preventative measures are recommended. Although livestock do not browse on the plants ordinarily, their presence constitutes a potential danger. Young castorbean plants should be eradicated before they are allowed to mature seeds in order to prevent their increase and spread. Thick stands of castorbeans in widespread areas may be eradicated by cultivation or by use of herbicides. Cultivation kills small, young plants, but must be repeated frequently because it exposes buried seeds, which may sprout. Cutting the young plants at ground level usually kills them, but older plants form regrowth when cut.

Poaceae, or Grass, Family

Sorghum vulgare Pers. (Sorghum) (fig. 47)

Sorghum sudanense (Piper) Stapf (Sudangrass)

DESCRIPTION.—The many varieties of sorghum comprise a large group of coarse grasses with erect stems 2 to 15 feet in height with 7 to 18 joints. There may be several lateral shoots at the base. The long, narrow leaves occur alternately along the stem, one at each joint. The leaf blade gradually tapers to a sharp point at the tip; the base forms a sheath which clasps the stem between the joints. Varieties differ considerably in length and width of leaf. The leaves have prominent midribs and finely toothed margins. The small flowers are borne in terminal seed heads. The seed heads are 5 to 18 inches long and may be compact or spreading. The seeds of various sorghums differ in size, shape, and especially in color. Sorghums are divided into three classes according to usage: (A) Grain, (B) forage, and (C) combination grain-forage. Sweet and nonsweet types constitute another arbitrary but important classification.

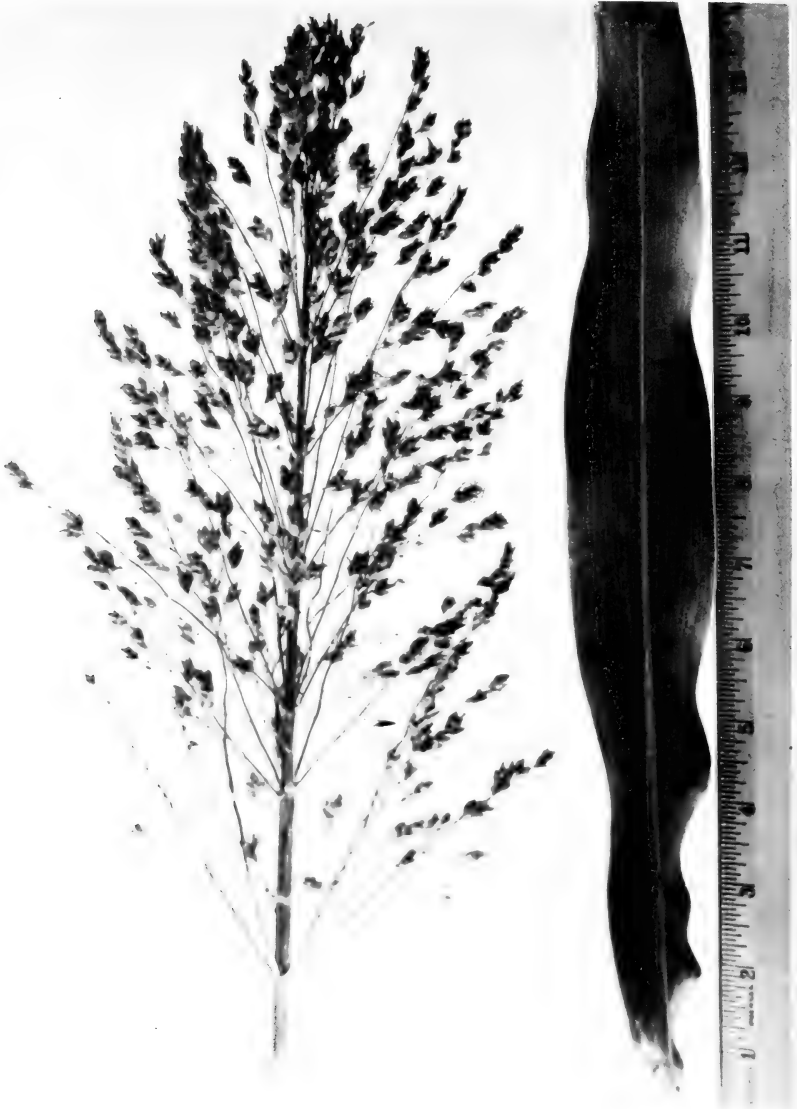


FIGURE 47.—Sorghum (*Sorghum vulgare* Pers.)

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Sorghum sudanense (Piper) Staph, sudangrass, a close relative of sorghum, consists of many varieties that vary in height and leafiness. Sudangrasses differ from sorghums in having smaller stems, generally spreading open seed heads, and smaller seeds, and they stool more profusely. Sorghums and sudangrasses are propagated by seeds; they behave as annuals or occasionally as weak perennials under local conditions.

DISTRIBUTION AND HABITAT.—Sorghum, sudangrass, and related forms are seldom found except where they have been planted, although spilled seeds may occasionally produce plants along lanes and fences, and around the edges of fields and farm buildings. Sorghums and sudangrasses are grown in the Virgin Islands primarily for temporary pasture, silage, and ensilage. Escape plants may be found in abandoned fields, waste grounds, and around farm buildings. Sorghums, in general, are drought tolerant. This characteristic, coupled with their copious seed production and general competitiveness, makes the plants valuable for forage, although they constitute a constant danger to livestock. Sudangrasses have been grown successfully in the Virgin Islands on comparatively shallow, infertile soils in low rainfall belts.

TOXICITY AND SYMPTOMS.—Sorghums grown under adverse conditions often contain the cyanogenetic glucoside dhurrin (25, 56). Dhurrin is broken down in the stomach of animals to release a very deadly material named hydrocyanic acid which ties up the hemoglobin, so the blood cannot carry enough oxygen. Very small quantities of the material produce poisoning. Of our farm animals, cattle are most susceptible, horses and sheep less so, while hogs are seldom affected (19). Lethal amounts cause death to occur suddenly from respiratory paralysis. Smaller doses cause animals to become excited at first and then extremely depressed. Respirations are deep and accelerated at first but become weak and irregular. The eyes become dilated and glassy; the nostrils and mouth are usually filled with foam. Bloating, frequent urination, and defecation may occur. The breath has an almond odor.

MANAGEMENT AND CONTROL.—Although sorghums and sudangrasses are widely grown as feed crops, they may become toxic under certain conditions, among which are the dry periods that occur repeatedly at unpredictable intervals in the Virgin Islands. They act as weak perennials under local conditions, producing several ratoon crops from one planting, which may be beneficial, even though it is rather hazardous to graze or otherwise use ratoon crops produced during extremely dry periods. Plants that have been stunted by drought or other unfavorable conditions should never be fed to livestock.

Euphorbiaceae, or Spurge, Family

***Thevetia peruviana* (Pers.) K. Schum. (fig. 48)**

Luckynut

DESCRIPTION.—This many-branched shrub, or small tree, is 10 to 20 feet high; its crown may be sprangly or dense. The bark on old stems is light gray and slightly fissured, while that on young twigs is green and smooth. The short-stemmed leaves are tapered to sharp points at both ends, 3 to 6 inches long, and less than $\frac{1}{2}$ inch wide, with a strong prominent midvein from which smaller side veins extend: they are dark green and shiny above, dull beneath, and occur alternately or in a whorled arrangement along the stem near the tips of the branches. The bright yellow flowers are produced in small clusters near the tips of the twigs. Each funnellform flower is 2 to 3 inches long and extends out into 5 short, dull-pointed lobes; they are pretty but not very fragrant. The fruits are borne on long, slender stems which are attached to the middle of one side, making them wider than long. The fruits, which contain 2 seeds, are somewhat triangular



BN-13207

FIGURE 48.—Luckynut (*Thevetia peruviana* (Pers.) K. Schum.)

in shape, tapering to thin edges on all sides. They are fleshy and green when young, and turn yellow and finally black at maturity. The plants are smooth throughout and contain an acrid, milky sap; they may be propagated by seeds or cuttings.

DISTRIBUTION AND HABITAT.—Luckynut is commonly planted as an ornamental throughout the Virgin Islands. Though it has gone wild in a few places, it is seldom found except where it has been planted; plants may be found near dwellings, along streets, and in parks and other public places. The plants are drought tolerant and are found on all soils in all but the driest areas. Its feathery foliage, harmony of colors, tolerance to drought, wind, and salt spray, and its ease of establishment make luckynut popular as an ornamental.

TOXICITY AND SYMPTOMS.—All parts of luckynut contain two very deadly heart poisons—thevetin and theveresin (44, 46). The tree is

poisonous to all classes of livestock and humans. Symptoms of lucky-nut poisoning include vomiting, cold clammy skin, sunken eyes, and convulsions, followed by death. Fortunately, all parts of the plant are very unpalatable and not likely to be eaten. Humans, especially children, should be warned against eating parts of the plant out of curiosity.

MANAGEMENT AND CONTROL.—The scarcity of plants and their occurrence in inaccessible places lessens the chances of livestock poisoning and reduces the control measures necessary. Livestock do not browse on lucky-nut ordinarily; however, animals should be denied access to the plants. Undesired plants may be either grubbed out or killed with selective herbicides provided surrounding plants are not endangered by their use.

PLANTS THAT CAUSE MECHANICAL INJURY

Some plants common to the Virgin Islands are hazardous to livestock because they can cause external or internal mechanical injuries. These plants usually possess sharp awns, burs, spines, or thorns, which may cause injury by tearing the flesh, especially around the eyes and mouth, cripple animals by working into their hoofs, or produce ulcers or compactions in the digestive tract. Some of these plants are poisonous also.

The spines on the fruit of burgrass (*Cenchrus echinatus* L.) mahoe (*Triumfetta semitriloba* Jacq.), and on the stems and fruits of nickers (*Caesalpinia* spp.) render these plants dangerous. Stinging nettle (*Urtica dioica* L.) and cowage (*Stizolobium pruriens* (Stickm.) Medic.) vines may cause serious skin irritations to browsing animals, especially around the mouth parts. Other common pasture weeds that cause injury by becoming lodged in the hoofs or other body parts of grazing animals include casha (*Acacia* spp.): so-called century plants (*Agave* spp.) and (*Yucca* spp.): fleshy, attractive ornamental spurges of the genus *Euphorbia*: all of the cactaceous plants: and pingwing (*Bromelia pinguin* L.).

Hairballs of plant origin are caused by the massing together of plant hairs or fibers in the stomachs or intestines of animals to form intestinal blocks which may eventually result in death. Three-awn grass (*Aristida adscensionis* L.) and bedgrass (*Sporobolus* spp.) are known to cause such compactions. The spines on the fruits of burgrass and mahoe may cause ulcers in the digestive tracts of animals.

The leaves of elephant-ear (*Alocasia macrorrhiza* (L.) Schott) contain crystals that are harmful to the mouth parts and tongue of browsing animals. Plants that cause mechanical injury to livestock are listed on page 90.

Many of these plants are also harmful to man. For example, plants that have the contact poisons of (A) stinging hairs such as stinging nettle and (B) irritating acrid sap or juice such as the spurges should be avoided where possible. Serious injury may result from getting thorns or spines into the hands, feet, or other body parts.

LIST OF PLANTS THAT CAUSE MECHANICAL INJURY

<i>Scientific name</i>	<i>Local common name(s)</i>
Acacia spp.....	Casha
Acanthocereus pentagonus (L.) Britton & Rose.....	Centuryplant
Agave spp.....	Elephant-ear
Alocasia macrorrhiza (L.) Schott.....	Catch-and-keep
Anthacanthus spinosus (Jacq.) Nees.....	Thistleroot, Thistle,
Argemone mexicana L.....	Mexican poppy
Aristida adscensionis L.....	Three-awn-grass
Barleria lupulina Lindl.....	
Bromelia pinguin L.....	Pingwing
Cactus intortus Mill.....	Turkshead, Pope's nose
Caesalpinia spp.....	Nickers
Catesbaea melanocarpa Krug & Urban.....	
Cenchrus echinatus L.....	Burggrass
Centrostachys spp.....	
Cephalocereus royeri (L.) Britton & Rose.....	Cactus
Cestrum spp.....	
Clerodendron aculeatum Griseb.....	Crab prickle
Comocladia dodonaea (L.) Urban.....	Christmasbush
Euphorbia spp.....	Spurge
Fleurya aestuans (L.) Gaud.....	
Hura crepitans L.....	Sandbox Tree
Hylocereus trigonus (Haw.) Safford.....	Nightblooming cereus
Malachra alceifolia Jacq.....	Wild okra
Malpighia pallens Small.....	Touch-me-not
Nopalea cochenillifera (L.) Salm-Dyck.....	French pricklypear
Opuntia spp.....	Pricklypear
Parkinsonia aculeata L.....	Jerusalem thorn
Pereskia spp.....	
Pithecellobium unguis-cati (L.) Benth.....	Bread-and-cheese
Selenicereus grandiflorus (L.) Britton & Rose.....	Queen-of-the-night
Solanum spp.....	Turkeyberry, Cachalaka- berry
Sporobolus spp.....	Bedgrass
Stizolobium pruriens (Stickm.) Medic.....	Cowage
Tournefortia hirsutissima L.....	Chiggernit
Tragia volubilis L.....	Stinging nettle
Triumfetta semitriloba Jacq.....	Mahoe
Urera baccifera (L.) Gaud.....	
Yucca spp.....	Yucca, Centuryplant
Zanthoxylum spp.....	Yellow prickle, Black prickle

OTHER PLANTS REPORTED TO BE TOXIC

In addition to those plants discussed in detail, certain other plants in the Virgin Islands are strongly suspected to be toxic. These species are listed on page 91. Some of these plants are also capable of causing mechanical injury, for example, Monkeypuzzle (*Euphorbia lactea* Haw.).

Since many of these species came to the attention of the authors during the later stages of this study, they were not included in the chick-feeding test. Their reported toxicity or their close relationship to plants known to be poisonous, warrant their listing in this study. There are, undoubtedly, still other plants in the Virgin Islands which are toxic but as yet not suspected.

LIST OF OTHER PLANTS REPORTED TO BE TOXIC

<i>Scientific name</i>	<i>Local common name(s)</i>
Allamanda spp.....	Allamanda
Croton lobatus L.....
Ervatamia coronaria Stapf.....	Crapejassmine
Euphorbia heterophylla L.....	Wild poinsettia
Euphorbia lactea Haw.....	Monkeypuzzle
Euphorbia milii Ch. des Moulins.....	Crown-of-thorns
Gloriosa superba L.....	Climbing lily
Ipomoea pes-caprae (L.) Sweet.....	Beach morning glory
Lachnanthes tinctoria (Walt.) Elliott.....	Bloodroot
Manihot esculenta Crantz.....	Bitter cassava
Nicotiana spp.....	Tobacco
Passiflora foetida L.....
Phyllanthus niruri L.....	Creole senna
Sapindus saponaria L.....	Soapberry tree
Solanum nigrum L.....	Black nightshade
Solanum seafortianum Andr.....
Zephyranthes spp.....	Rain lily, Snowdrop

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Wild cinnamon.....	18	Yellow sage.....	60
Wild coffee.....	18	Yucca.....	90
Wild okra.....	90	Yucca spp.....	89, 90
Wild tamarind.....	66		
Wild physienut.....	57	<i>Zanthoxylum</i> spp.....	90
Wild poinsettia.....	91	<i>Zephyranthes</i> spp.....	91

