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NEWSLETTER

of the

Hawaiian Botanical Society



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PRINCIPAL PAPERS

K O A - M O N A R C H O F H A W A I I A N F O R E S T S

Paul G. Scowcroft ^{1/}

The largest endemic tree in the islands, Acacia koa Gray is also the second most common tree, surpassed only by Ohia lehua (Metrosideros polymorpha Guad.). Koa forms 25 percent or more of the forest cover on about 525,000 acres, much of this area being found on the island of Hawaii.

Several bands of the koa forest type are found on the slopes of Mauna Loa and Mauna Kea between the elevations of 5,000 feet and 6,500 feet. The largest koas grow in these bands.

Between 3,600 and 5,000 feet, just below the koa belts, are the ohia-koa forest types. Both species predominate, each comprising 25 percent or more of the stands. Individual trees are less stately for growing conditions are below optimum.

Even in the ohia forest type, scattered koa trees do occur, but they are generally small and scrubby. While this type reaches almost to sea level, koa is rarely found below 1,000 feet.

Most of the koa forest on the other islands has no commercial value. There is little expectation that this situation will change, except perhaps on Maui. Koa is scattered throughout these forests, but it is of such poor form that its value is mainly for watershed and wildlife habitat rather than timber.

On the island of Hawaii, koa reaches its maximum size, some but not all individuals growing straight and tall. The largest known koa has a circumference of 37 feet 4 inches

^{1/} Paper presented March 1, 1971. The author is a silviculturist, Institute of Pacific Islands Forestry, U. S. Forest Service, Honolulu, Hawaii

at a point $4\frac{1}{2}$ feet above the ground. Its height is 140 feet and it has a crown spread of 148 feet. L. W. Bryan discovered this champion in 1969 in the Keahoa area.

The immature leaves of koa are bipinnate, each pinna consisting of 12 to 24 pairs of leaflets. As the tree reaches the age of six months, the mature foliage begins to appear in the form of flattened phyllodes. It is not uncommon, particularly in times of stress, to find leaves which are part phyllode and part true leaf. The significance of the change in leaf structure in terms of physiology is not known.

The inflorescence of koa is an axillary raceme of pale yellow heads, each composed of many individual flowers. Two or more seed pods frequently develop from each raceme, or should I say will theoretically develop from each raceme. A phenology study conducted by the U. S. Forest Service in 1964 indicated that losses of flowers and developing pods can be high. Almost one-third of the flower heads that had begun to develop never reached maturity. And only 6 percent of the pods which had begun to develop reached maturity. Selfing, insect predation or disease may have caused these losses.

The seeds of koa, as with most acacias, have a hard, waxy seed coat. Viability is retained for many years. The standard hot water treatment to dissolve the wax was used to break seed coat dormancy. The mechanisms for breaking dormancy in nature are not fully understood. Research in this area is needed.

I want to turn attention briefly to the commercial side of koa. I am sure everyone has seen or perhaps owns one of the koa coffee tables, such as those carried in the Waikiki shops. Top prices, ranging from \$100 to several thousand dollars, are asked for these items. Furniture, veneer, and craft pieces are all outlets for koa wood.

Large logs, rich in color and grain, are cut into 16 to 20 inch square cants, and then sent to Japan where slicing plants produce veneer for wall panels and furniture facing.

In all, about \$1,300,000 is introduced into Hawaii's economy annually by the koa industry. This figure is based on an annual cut of 2 million board feet. If this rate of cutting were to continue with no replacement of the trees, the available commercial koa supply could be exhausted in 20 to 25 years.

Why isn't there more koa? There are many reasons, the most important being the impact of cattle.

Before discussing the impact of cattle, let us go back in time. Before man came, extensive stands of large koa could be found on Hawaii and to a lesser extent on Maui and the other islands. Evidence of these remains today in the form of tree molds.

Then came the Hawaiians. They used koa to make their canoes, some of which were 50 to 75 feet long. Calabashes, surfboards and other items were also made from koa. But more important than their direct utilization of the forest, was their importation of the pig. This animal spread from sea level to timber line. Its effect on koa can only be surmised. The direct effect is the uprooting of seedlings and ingestion of tender sprouts and shoots. Indirectly pigs contributed to the spread of noxious plants, mainly exotics, and possibly plant pathogens.

The Hawaiian Islands were eventually discovered by Europeans and reports of the explorers soon brought missionaries and traders. As people will do, they brought familiar items with them, including certain foods. Cattle were among the food animals imported.

The first shipment of cattle arrived in the 1790's. Their effect was soon to be seen. One account relates that 50 years after grazing began on the Waimea plains, very few koas could be seen, where before thick forests had stood.

Even at higher elevations, troubles for koa developed. Ranchers were quick to note that favorable range conditions could be created on wetter sites. It happened that these same areas supported the better quality koa. An estimated 100,000 acres of forest have been cleared and seeded to grass in the past 50 years. Only scattered trees remain on such land.

But merely clearing and seeding to grass would not eliminate koa. The cattle themselves are a destructive agent. The tender foliage of seedlings, sprouts, and saplings is one of the favorite foods of cattle. Reproduction does not have a chance for survival where cattle are present.

In addition to eating the young trees, cattle adversely affect larger trees by compacting the soil, thus eliminating pore space for respiration and making infiltration of water difficult. Mechanical injury to stem and surface roots also occurs. I have little doubt that cattle and the cattle industry are primarily responsible for the reduced size of the koa forests.

There are also other factors which have reduced the acreage of koa. Fire is one of these.

The once lush koa forests on the northwest slopes of Haleakala were burned by a wild-fire in the late 1800's. Extreme drought conditions occurred prior to the fire. It was reported to have burned for months uncontrolled, sometimes reburning some areas. Very little remains to indicate the past existence of a forest of any kind, only charcoal in the soil and a few scattered trees.

Logging has also eliminated some of the koa forests. Almost all such logging has occurred on private land, much of it in conjunction with pasture conversion. I might add that after logging a koa stand, reproduction will come in heavily, thus providing natural regeneration of the forest. Only when cattle immediately occupy an area is recovery of koa doomed. Probably less than 10,000 acres have been harvested in the past 60 years; only a few hundred in the past 10 years.

Pests are a threat. These include plants, insects, and diseases.

Most of you are familiar with banana poka (Passiflora mollissima (HBK) Bailey). The fruit is eaten by pigs, a circumstance which is probably highly correlated with the spread of this pest.

Hundreds of acres of the upper Laupahoehoe district of the Hilo Forest Reserve are heavily infested with poka. Dense curtains of vines cover the trees and smother ground and shrub vegetation. These areas are ideal habitats for pigs, and consequently are desirable from the viewpoint of the pig hunter. From botanical and timber production standpoints, however, this forest may be highly undesirable. Need I say that banana poka was introduced?

Recently, a disease new to koa was found infecting seedlings that had become established on a burned site on Oahu. It is a fungus called Cylindrocladium attacking the root crown.

An early symptom of the disease is mottling of the leaves. The orange and yellow foliage of infected trees is very noticeable. Advanced stages are easily recognized by the presence of red fruiting bodies on the stem just above the ground. These red organs

have been observed 6 to 10 feet above the ground on the bark of dead koa trees. Dissemination of the spores by the prevailing tradewinds is enhanced by this aerial position. Dr. Laemmlen, pathologist at the University of Hawaii, will be conducting pathogenicity studies this coming year.

Other diseases include Armillaria mellea, Uromyces koae, and Korthalsella complanata. The latter two probably do not adversely affect koa, but this is only a guess since no research has been conducted on the subject. A. mellea, a root rot, weakens and kills trees.

Insects also cause damage to this species. All above ground parts are attacked by one or more kinds of insects. Over 40 native as well as introduced parasites attack koa.

Koa has suffered greatly in the past. But because it is valuable and unique, land managers, ecologists, and nature lovers want it perpetuated. The Hawaii Division of Forestry has requested that the U. S. Forest Service, Pacific Southwest Forest and Range Experiment Station provide research support. Its local representative is the Institute of Pacific Islands Forestry.

In 1963, a number of problems relating to koa were identified and studies begun. One concern was how to get koa to reproduce. Two selected stands on the big island were cleared of all vegetation except large koa trees. Seven months after clearing, an average of 100,000 seedling per acre could be counted, some as tall as 5 feet. Four years later the average height was 20.5 feet with an average diameter of 2.8 inches. Observations will be continued.

Another attempt at obtaining regeneration involved planting seeds. Both spot and broadcast methods were tried. Both proved unsatisfactory, although the seedspot method was less so.

Planting seedlings has also been tried, but it too has met with only limited success. Most planted koa trees on all islands are very branchy, worthless for timber. This is not to say, however, that they have no value. They are obviously providing watershed cover and wildlife habitat, as well as pleasing scenery.

Based on these and other findings, landclearing seems to be the most successful method except for fire to stimulate koa regeneration.

Whenever fire burns under a stand of koa in seed-bearing condition, reproduction will be dense. One month after the Kipapa fire of March 1970 on Oahu, over 30,000 seedlings per acre could be found on portions of the burn. Heavy stands were noted elsewhere.

At present we are studying the growth and survival of individual seedlings in order to improve understanding of the early life of koa. Several hundred one foot square plots have been established and each seedling within numbered. Periodically, height and survival data are collected.

Future research includes selection and preservation of superior phenotypes, ecological changes accompanying forest conversion practices, seed physiology studies, reclamation of land converted from koa to pasture, and application of cultural techniques to young and older koa stands. These of course are only a few of the topics needing attention.

The task ahead is formidable. The Forest Service can do only some of the work. Other organizations will have to contribute to the overall effort if knowledge about koa is to be increased. Only then can intelligent and presumably rational decisions be made concerning the question, what to do with the koa resource.

P O S T S C R I P T S A N D N O T E SA B O U T A C A C I A O N L A N A I

Otto & Isa Degener

Dr. Lamoureux's interesting report regarding "Some Observations on Koa", appearing in the February, 1971 issue of NEWSLETTER, prompts our postscript to this article.

In 1940-41 one of us and a few years ago both of us noted that what looks very much like a koa certainly gets around from island to island in the Fiji Archipelago. There we observed and collected an acacia which was a not uncommon element in the strand flora. In "Naturalist's South Pacific Expedition: Fiji", published in 1949, the author on page 69 wrote about it as follows: "Within a stone's throw of the water I collected a smallish acacia (A. simplicifolia) with yellow flower clusters and with leathery phyllodes. ---Being a strand plant with seeds or pods probably adapted for distribution by ocean currents, this plant grows from Fiji and Samoa west to the New Hebrides and New Caledonia, and may well be the ancestral type of the koa of Hawaii." We are gratified that Dr. Lamoureux came not to the identical but certainly to a similar conclusion in his observations about twenty-two years later.

While botanizing for six months on Lanai we became familiar with a beautiful grove of what we consider to be a true koaia, a group with phyllodes and pods narrower than those in the koa group, and with the tendency to have differently positioned seeds. Hence we should like to amend the occurrence of Acacia koaia s.l., to include Lanai with his listed "Molokai, Maui, Hawaii".

When we informed the late Mr. George Campbell Munro that we planned botanizing on Lanai, he graciously lent us his voluminous notes about the island's flora for transcription. These he had written about 1930. From our copy, we find the following, the numbers referring to those of Munro or perhaps even of C. N. Forbes or Harold L. Lyon. Some words are illegible to us and these we have noted with [?].

"302 Acacia longifolia mucronata Willd?, small longish oval leaves, Lalakoa Ap. 13/28 flowering, planted 1911. 313 A. decurrens mollis Lindl.? like black wattle, more upright, planted in 1911."

Further in his notes he states: "44 Acacia koa Gray, Palawai June 3/27, flowers no seed, pods. Only found on Hoahai [?] patch near Palawai evidently planted by natives. 45 A. koaia Hbd. nat. Koaia. Palawai June 3/27, flowers only. A few - - - [?] Palawai by koa patch, 1 patch of plants above Konaili [?] , 1 near Manaki [?] road, others on east side of Hoahai [?] ."

Many pages beyond, Mr. Munro records, a bit repetitiously: "Acacia koa lanaiensis Rock. Not common. A patch probably planted by the natives growing on the hillside south east side of Palawai basin, and more in the scrubby forest near Kalama. A. koa, Asa Gray. Young trees from Oahu seed have made a very good growth. A. koaia, Hillebr. A small patch of trees in the south east corner of Palawai basin, a few on ridges on east side one seen near Maunalei road and one bush mauka of Kahui on the north east side. Acacia delarbata. Growing around Koele planted a long time ago, forms thickets from suckers, does not seed here. A tree suckering from the roots at Koele evidently an acacia which also does not seed has leaves like koa. Acacia todalytiaefolia, A. spectabilis, planted at Waiakeakua and doing well. A. pendula, A. adunca, A. buxifolia, not doing so well. A. catechu and A. melanoxylon still in nursery."

From the above acacia records for Lanai, we believe two taxa were native to the island. Critical study of the Munro sheets deposited in the Bishop Museum's Marie C. Neal

Herbarium and in the "British Museum, Sydney, Australia" (letter dated Oct. 14, 1950) may solve the mystery as to the precise ones.

Mr. George Richmond, a research forester with the U. S. Forest Service, who planned monographing the endemic Acaciae, came to be our Lanai house guest. We showed him "our" colony of A. koaia s.l., from which we had collected ample material September 5 for wide distribution to museums. We likewise showed him every other Hawaiian acacia stand we had noted during our residence. We at that time explained that the original geographic distribution of our few native species, many varieties and multitudinous forms must be based almost solely on old specimens deposited in herbaria of the World and on living trees forty or more years old. Younger trees on Kauai or Lanai, for instance, could have come from Maui or from Oahu. The reason for this apparent phenomenon we here record for the ultimate monographer of the group to ponder:

The various islands had their various resident foresters, most of them considering the koa a very desirable tree for reforestation. For the sake of efficiency during the latter part of the '20s or early '30s, Charles Sheldon Judd (1881-1939), who used to shoot flowering branches from the highest trees for the kane writer to gather for his herbarium, placed advertisements in the local newspapers, offering to pay for koa seeds. Countless barefoot urchins on probably every inhabited island, except Niihau, had a lark picnicking in their nearest koa groves to collect these lucrative seeds. Reaching the Territorial Board of Agriculture and Forestry office on Keeaumoku and King Streets, Honolulu, all such seeds, no matter their source, were tossed into a common bin. Whenever any one on an "outside" island wrote for koa seed, the proper amount of such randomly mixed seed was removed with a scoup from the bin to send to him.

Should a forty year old Oahu koa be found growing along the windward coast of East Maui, don't blame some Pseudonestor for flying it there. Blame the postman and the good ship "Kilauea" or one of her sisters.

EVENTS

Wau Ecology Institute 1/

The Bishop Museum New Guinea Field Station, established in 1961, is to be superseded and incorporated as a local non-profit corporation under the name of WAU ECOLOGY INSTITUTE. It will receive a subsidy plus grant funds from Bishop Museum (Honolulu).

The Institute will develop a free zoo and associated gardens, and operate some agricultural land and rent houses to visiting scientists for partial basic support such as salaries of manager and local staff. It will also invite advanced classes in the Territory and research fellows from elsewhere for courses in ecology and for research. Studies commenced include: Ecology and biogeography of Nothofagus insects; Epizoic symbiosis; Ectoparasite/mosquito/host studies. Michael Robinson and party have been spending a year there studying behavior of spiders, stick insects and predatory mammals.

The Institute is located at 1200 meters altitude in northeastern New Guinea. A substation on the top of Mt. Kaindi (2350 m) can be reached in less than an hour; this is the only mountain in New Guinea with a road to the summit. An elevation of 2800 m (9000 ft) and sea level at Lae can be reached in about four hours by road. The road system into the Eastern, Western, and Southern Highlands is joined at Lae. The Institute can be reached within 24 hours by plane from Honolulu, and within 4 hours from Brisbane.

1/ From information supplied by J. Linsley Gressitt, Bishop Museum, Honolulu.

To help found the corporation and initiate research and education, the Institute solicits individuals and organizations to become shareholders of WAU ECOLOGY INSTITUTE by contributing sums of A\$1.00 ^{2/} or more. The money will be used primarily for construction of cages and a small museum for the zoo, expanding the arboretum, and student and research fellowships or may be designated for a specific purpose. Those wishing to make a contribution that is tax-deductible in the United States may do so by sending their checks to the Bishop Museum (Ecology Fund). A separate account will be maintained to supplement the support of the Institute by the Bishop Museum.

A Resolution About Goats in the National Parks

In view of the increasing numbers of feral goats in the Hawaii National Parks, now approaching 14,000 in the Volcanoes Park alone, and because of the damage these animals are causing in the form of girdled young trees and overgrazed vegetation, some of which contains endangered species, and thereby causing accelerated erosion, and further, since the program of deputizing hunters has proven to be inadequate for even stopping the increase of the goat population, and since there are areas outside of the National Parks being managed specifically for the purpose of hunting, and, finally, since the expressed purpose of the National Parks is to preserve and protect the native Hawaiian flora and fauna, the Hawaiian Botanical Society at this meeting being held jointly with the Hawaiian Botanical Gardens Foundation, hereby resolves and requests that the Park Service administrators institute an effective program of the feral goat eradication.

It is further resolved that copies of this letter be transmitted to the news media.

April 5, 1971

First International Congress of Systematic and Evolutionary Biology

The Society of Systematic Zoology and the International Association for Plant Taxonomy have joined in sponsoring a major mid-term Congress of a botanical/zoological interaction at the international level. Thus, the First International Congress of Systematic and Evolutionary Biology will be held at the University of Colorado, Boulder, Colorado, U. S. A., in August 4-11, 1973.

In order to make biologists aware of the Congress at this early date, the Steering Committee calls attention to its first announcement which was released in TAXON in December, 1970.

Program plans at this point encompass interdisciplinary symposia and contributed paper sessions. In the next few months the outline of the program and other activities will begin to take form. All suggestions will be gratefully received, carefully considered, and as many adopted as practical or feasible. Correspondence may be addressed to any member of the Steering Committee but preferably to the Secretary: Dr. James L. Reveal, Department of Botany, University of Maryland, College Park, Maryland 20740.

From Friends of Foster Garden

Mr. Ron Hurov, President
Hawaiian Botanical Society

Since 1850 when Dr. William Hillebrand planted his first importations from the new and old worlds in what later became Foster Garden, Hawaii's Plantsmen have added immensely

^{2/} A\$1.00 = US\$1.12. Payments may be made direct to the Bishop Museum at Wau, Box 77, Terr. of Papua and New Guinea, or through Bishop Museum, P. O. Box 6037, Honolulu, Hawaii 96818.

to his list of collections. Dr. Harold Lyon, Dr. Joseph Rock, the Drs. Degener, Dr. Harold St. John, Marie Neal, Goodale Moir, students, laymen and botanists have contributed plants, seeds, bulbs and cuttings which now total over 32,000 accessions in Foster Garden's records. A number of these were sent on to the outer islands for growing at higher elevations or for reforestation projects; many failed to survive. Some were duplications of earlier receipts. But the list adds up to Hawaii's most significant sustained importation effort.

The problem is that imports raced ahead of staff capability to follow through with complete up-to-date recordation. It was impossible to keep track of what survived and where.

This letter is a request for financial assistance from the Hawaiian Botanical Society for the purpose of establishing an inventory of living materials resulting from these past 120 years of import efforts.

The first phase of this project, toward which this letter is focused, is to establish an inventory of living plants in Foster Botanic Garden, Wahiawa Botanic Garden, Koko Crater Botanic Garden and Sandy Beach Botanic Garden. Toward this end we are extremely fortunate in having available the services of Dr. Earl Bishop during the summer of 1971. We need \$3,000 to operate for the three-month period.

The Friends of Foster Garden is supporting this effort in several ways; may we invite the Hawaiian Botanical Society to join in this effort. The Hawaiian Botanical Gardens Foundation and the Garden Club of Honolulu are receiving this same request.

The long-range objective of this project may be expressed in terms of its parts: phase one, the inventory noted above; phase two, correlation with plant inventories of other botanical institutions throughout the State (Lyon Arboretum, Pacific Tropical Botanical Garden, the Arboreta of the State's Forestry Division and key private collections); phase three, placing the state-wide inventory into the computerized world-wide plant inventory system sponsored by the International Association of Botanical Gardens. Phase one, Honolulu Botanic Gardens' inventory, has ramifications: Dr. Bishop's task will be severalfold. In addition to the recording of established materials, it will be necessary to make identifications of a considerable quantity of undetermined species. This is a large task in itself. Obviously, a three-month period may not be sufficient for the completion of phase one. Out of it, however, will develop an estimate of the total time required and an understanding of the magnitude of the task. Additional funds for this may be requested of local foundations and the Stanley Smith Horticultural Trust. The important thing is to get started.

With the founding of the Pacific Tropical Botanical Garden on its first garden site at Lawai, Hawaii has come of age botanically. As this system grows, Hawaii will become one of the world's great repositories of botanical material and knowledge. Honolulu Botanic Gardens needs to be an affiliate of this state-wide system; we want to participate, support, cooperate. May we solicit your help in enabling us to make the first step in that direction.

Sincerely,

RICHARD LOWE, President
Friends of Foster Garden

Flora Observed on Kahoolawe, June 1970 and April 1971 ^{1/}

Botanical Name	Common Name	Distribution ^{2/}	
		H	L
GRASSES			
<u>Andropogon pertusus</u>	Pitted beardgrass	X	
<u>Andropogon nodosus</u>	Wildergress		X
<u>Cenchrus achinatus</u>	Sandbur	X	X
<u>Chloris inflata</u>	Swollen fingergrass		X
<u>Chloris virgata</u>	Feather fingergrass	X	X
<u>Cynodon dactylon</u>	Bermudagrass	X	X
<u>Dactyloctenium aegyptium</u>	Beach wiregrass		X
<u>Digitaria sp.</u>	Crabgrass	X	X
<u>Eragrostis sp.</u>	Lovegrass		X
<u>Heteropogon contortus</u>	Piligrass		X
<u>Panicum torridum</u>	Kakonakona		X
<u>Setaria verticillata</u>	Bristly foxtail		X
TREES			
<u>Casuarina sp.</u>	Ironwood	X	
<u>Erythrina sandwicensis</u>	Wiliwili	X	
<u>Eucalyptus sp.</u>		X	
<u>Prosopis pallida</u>	Kiawe	X	X
SHRUBS			
<u>Acacia farnesiana</u>	Klu	X	X
<u>Desmanthus virgatus</u>	Desmanthus		X
<u>Indigofera suffrutitosa</u>	Indigo	X	
<u>Lantana camara</u>	Lantana	X	
<u>Leucaena leucocephala</u>	Koa haole	X	
<u>Nicotiana glauca</u>	Tree tobacco	X	
<u>Sida fallax</u>	Ilima	X	X
<u>Waltheria americana</u>	Uhaloa		X
HERBS			
<u>Atriplex semibeccata</u>	Australian saltbush	X	X
<u>Bidens pilosa</u>	Spanish needle		X
<u>Desmodium triflorum</u>	Three-flowered beggarweed	X	
<u>Emilia sonchifolia</u>	Flora's paintbrush	X	X
<u>Euphorbia hypericifolia</u>	Graceful spurge		X
<u>Euphorbia hirta</u>	Garden spurge		X
<u>Euphorbia prostrata</u>	Prostrate spurge		X
<u>Phaseolus lathyroides</u>	Wild peabean		X
<u>Salsola pestifer</u>	Russian thistle		X
<u>Solanum nodiflorum</u>	Popolo		X
<u>Sonchus oleraceus</u>	Sow thistle		X
<u>Verbesina enelioides</u>	Golden crownbeard		X
<u>Xanthium strumarium</u>	Cocklebur	X	X
<u>Zinnia pauciflora</u>	Zinnia		X

^{1/} Herbert K. Yanamura, Hawaii Department of Land and Natural Resources.^{2/} H = higher, approximately above 600 feet elevation; L = lower elevation.

Botanical Name	Common Name	Distribution	
		H	L
VINES			
<u>Ipomoea cairica</u>	Hairy morning-glory		X
<u>Licopersicon pinellifolium</u>	Wild tomato		X
SUCCULENTS			
Agave sisalana	Sisal	X	
Batis maritima	Pickleweed		X

Awards

Dr. Kepernt introduced Miss Kate Fukuki, winner of the Botanical Society's award, "The Senior Most Likely to Reflect Credit Upon Botany", at the June meeting. Miss Fukuki's name will be engraved upon a plaque and she will receive twenty-five dollars.

Milton Manhoff announced the following awards by the Botanical Society at the Science Fair, April 2, 3, 4, 1971, H.I.C., Honolulu: Michael Yokoyama, Aiea High School, 1st prize, Senior Div. \$25; Larry Inouye, Kahului School, Maui, Intermediate Div. \$15.

Field Day at Waimanalo Experiment Station

Dr. Robert Warner lead a tour of the Plant Sciences Instructional Arboretum, March 7, 1971.

Botanical Tour of Ala Moana Park

Paul Weissich conducted the tour on May 16, 1971.

Annual Summer Foray - July 5

Dr. Sagawa reported plans for a tour of Harold Lyon Arboretum, 9:00 AM to 2:00 PM, weather permitting. Gather first at H.S.P.A. in order to consolidate use of cars. Give advance notice of intention to attend to Hawaiian Botanical Society c/o Botany Dept., U. H.

PROCEEDINGS OF THE SOCIETY

The following are not complete minutes -- only especially significant highlights.

March 1, 1971

- a. Authorized payment of \$40 in awards by the Science Fair Committee, Milton Manhoff and Walter Holt are co-chairman (see "Events").
- b. Authorized payment of dues:
 - To Nature Conservancy, \$10.
 - To Conservation Council, \$5.
 - To Hawaiian Botanical Garden, \$25.
 - To Friends of Foster Garden, \$25.
- c. Dr. Brash showed slides from the dedication of the Pacific Tropical Botanical Garden.

- d. Speaker of the evening, Paul G. Scowcroft, "Koa--Monarch of Hawaiian Forests". (See "Principal Papers" in this issue.)

April 5, 1971

- a. Joint meeting with Hawaii Botanic Gardens Foundation.
- b. See "Events", this issue, concerning resolution about feral goats in parks.
- c. Speaker, Dr. Raymond Fosberg, Special Advisor in Tropical Biology at the Smithsonian Institution, Washington, D. C., subject: Endangered Species in Hawaii.

May 3, 1971

- a. Society membership reported to be composed of 230 individual persons, 8 out-of-state libraries, and 23 local institutions including libraries, newspapers, and others.
- b. Changes in the Constitution, Articles V and VI were adopted as described in the April issue of the NEWSLETTER.
- c. A motion was passed to donate \$350 to the Honolulu Botanic Garden (See "Events" for further details.)
- d. Beatrice Krauss announced that Dr. Harold St. John has completed his list of Hawaiian plants and it will be published by the Pacific Tropical Botanical Garden.
- e. Semi-annual plant exchange.
- f. Speaker of the evening, Mr. Kuswata Kartawinata, topic, "Naturally occurring dry grass communities on Oahu".

June 7, 1971

- a. Awards announced as listed in "Events".
- b. Following the report on Moanalua Valley, a resolution was adopted to oppose the construction of a highway through it.
- c. Speakers of the evening, Paul Weissich, Director of Honolulu Botanical Gardens and Dr. Earl Bishop, topic, "The flora, archeology and land use of Moanalua Valley".

PUBLICATIONS

New Journal

Volume 1, Number 1, of the Bulletin of the Pacific Tropical Botanical Garden was issued in January, 1971.

Recent Literature

- Akamine, Ernest K. 1969
Effects of controlled atmosphere storage of fresh papayas (Carica papaya L. var. Solo) with special reference to shelf-life extension of fumigated fruits. H.A.E.S. Research Bull. 144. 27 pp.
- Burgan, Robert E. 1971
A spacing trial in tropical ash ... an interim report. U.S.D.A. Forest Service, Res. Note PSW-226. 3 pp. illus.



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HAWAIIAN BOTANICAL SOCIETY

c/o Department of Botany, University of Hawaii
3190 Maile Way, Honolulu, Hawaii 96822

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THE HAWAIIAN BOTANICAL SOCIETY was founded in 1924 to "advance the science of Botany in all its applications, encourage research in Botany in all its phases," and "promote the welfare of its members and to develop the spirit of good fellowship and cooperation among them." Any person interested in the plant life of the Hawaiian Islands is eligible for membership in this Society. Dues, regular, \$3.00 per year; college students, \$2.00; students below college level, \$1.00.

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