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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from $1.00 to $2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN

FORESTER & AGRICULTURIST

VOL. X. JUNE, 1913. No. 6.

EXCHANGE CHANGES OWNERS.

Among the most valued of our exchanges has always been the Tropical Agriculturist, published at Colombo, Ceylon. Its issue for March last contains an interesting announcement beginning thus: "The Tropical Agriculturist, hitherto the property of Messrs. A. M. & J. Ferguson, has been acquired by the Ceylon Agricultural Society who are now the sole owners of the journal. This is an event on which we think we may congratulate both the society and Messrs. Ferguson; the former on having become the owner of the foremost unofficial journal of tropical agriculture in the world, the latter on having successfully relaunched a great journal upon a career which we hope will be a fitting sequel to its past by achieving yet greater popularity." In further remarks the journal says that, while the affairs of the society owning it must come first, "yet its responsibilities extend far beyond the limits of this island, embracing indeed the whole tropic world and much of the sub-tropic." This view of itself by the Tropical Agriculturist may be conscientiously endorsed by the Hawaiian Forester and Agriculturist, which finds valuable resources of selected matter for its pages in its Ceylon contemporary, as well as noting with pleasure that the latter frequently utilizes the information put forth by experts connected with the territorial and federal agricultural investigations constantly being made in the Hawaiian Islands.

THREE FOREST RESERVES ON OAHU.

On May 31, 1913, the Governor of Hawaii and members of the Board of Commissioners of Agriculture and Forestry held a public hearing to consider the setting apart of three forest reserves in the Waianae District, Island of Oahu. The areas proposed to be reserved consist of the slopes at the heads of the valleys of Nanakuli, Keaau and Makua and of the upper part of the land of Kuaokala. Altogether the area amounts to 6160 acres, of which all but 340 acres is government land.

The object in setting apart these reserves is to bring about the reforestation of the upper portions of the valleys named. with native Hawaiian vegetation—trees, shrubs and other under-

growth. When the old time cover is restored it is believed that the springs and small streams rising on the slopes can be much more depended on than at present. In a district naturally as dry as is Waianae, every possible source of water counts, and is therefore worthy of being carefully protected. The creation of these reserves is a step in this direction.

Following are the reports of the Superintendent of Forestry setting forth the reasons why these areas should be made forest reserves. All three projects have been approved by Committee on Forestry, and its recommendations were adopted by the full Board at the meeting held on March 21, 1913:

REPORTS OF THE SUPERINTENDENT OF FORESTRY.

NANAKULI FOREST RESERVE.

Honolulu, Hawaii, August 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—Following is a report, with recommendations, upon the setting apart as a forest reserve of the mauka portion of the unleased government land of Nanakuli, District of Waianae, Island of Oahu: 1010 acres.

The proposed Nanakuli Forest Reserve joins on the north the Lualualei Forest Reserve, proclaimed November 30, 1906, and on the east a proposed reserve embracing the upper portions of the fee simple land of Honouliuli, which latter project will shortly be brought before the Board for consideration.

Nanakuli is the first from the south end, of the valleys on the western side of the Waianae Hills. In topography it is similar to the other valleys on that side of the range, as far as and including Makua. All present essentially the same problems and in general should be treated more or less alike, although each valley has an individuality that makes separate consideration desirable.

One essential point in common is that all these valleys are on the lee side of Oahu and hence are in a dry district where every source of water, present or prospective, has high value. The forest problems here are to restore, as far as may be practicable, the original conditions of forest cover on the upper slopes, where appear the scanty but highly valuable springs, and to arrange for the extension of the forest, naturally or by artificial planting, on such sections of the lower slopes as cannot to good advantage be devoted to more intensive forms of agriculture.

In Nanakuli the forest line has been drawn around the upper portion of the valley, at the base of the steep slopes. Above this line, in my judgment, the native forest should be assisted to come back and should thereafter be there maintained. If this is done I believe that springs that are now irregular and that flow only

for a short time after rains will be made more steady and dependable. It is not contended that even with a dense forest cover on the slopes—of trees, shrubs and undergrowth—would the flow of these springs be permanent, but it is my belief that were the native forest restored, the regularity and duration of their flow would be sufficiently improved to justify the gathering of water, at any rate for a part of the year, through a pipe system from different sources, into centrally located tanks or reservoirs where the water would be available for use in connection with the lower lands. The first move in such a program is to get the forest back; the initial step is to set the area apart as a forest reserve. The purpose of this report is to recommend such action. The area is 1010 acres.

Nanakuli is a government land on which a grazing lease, held by the Dowsett Company for a considerable term of years, expired last February. The lower lands of Nanakuli are now (August, 1911) being again offered for lease. One of the conditions of the new lease is that a fence shall be built and maintained on specified portions of the forest line, whereby the forest will be protected. The remainder of the forest line, along the lower boundaries, follows natural barriers where fencing is unnecessary. The upper boundary of the proposed reserve is the crest of the main Waianae ridge.

One point about the boundary on its lower side perhaps deserves special mention, the inclusion in the forest reserve of the small lateral valley on the right or east side of Nanakuli Valley. There is now no water in this valley, but while obviously it is of much less moment than the section nearer the head of the valley, it seems to me that it should be included in the reserve. I endeavored to have the fencing provision in the Nanakuli lease include this lateral valley as well as the area further mauka. This was not done. Consequently, while included in the reserve this side valley will not be fenced off. The upper slopes are, however, fairly steep so that to some extent they protect themselves.

At present the forest in Nanakuli, apart from Algaroba on the lower lands and scattering groups of Kukui along some of the stream beds, is limited to groups of native trees well up on the slopes where they have been more or less out of the reach of cattle. With the construction of the fence on the forest line depredations by grazing will be stopped and much young growth, both of trees and undergrowth, ought soon to be in evidence. The ultimate object is to get back on the slopes as dense a cover of native forest as possible—in other words, to restore the jungle.

As well as from grazing the forest in Nanakuli has been subjected to injury by goats. Systematic shooting by Mr. H. M. von Holt above his outing house, "Pa Lehua," has helped to keep the goats away from the ridges at the head of Nanakuli, but a considerable band is said still to infest the crag on the west side of the valley known as Haleakala. One difficulty in arranging

for hunting goats here as a condition of the lease of the lower Nanakuli lands is that the Haleakala ridge is partly in Lualualei. Under the new lease of Nanakuli provision is made, along with clauses covering the exclusion of cattle from the forest area, for some goat hunting, but to exterminate the goats regular hunters will probably have to be employed by the government. This is a matter which ought to receive attention, not only in Nanakuli, but as well in all the valleys along the leeward coast of Oahu.

For the reasons above set forth,—in brief, that by helping the native forest to come back at the head of Nanakuli Valley, the local water supply stands to be improved, I do now recommend that the Board of Agriculture and Forestry approve the setting apart of the area covered by the following technical description prepared by the Government Survey Office, as the Nanakuli Forest Reserve, and I further recommend that the Governor of the Territory of Hawaii be requested to proceed after the customary manner, officially to set this area apart.

[The technical description of boundary is here omitted as it will later be published in the Forester as a part of the proclamation of the Nanakuli Forest Reserve.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

MAKUA-KEAAU FOREST RESERVE.

Honolulu, Hawaii, September 10, 1912.

Committee on Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—I have the honor to submit as follows a report recommending the creation of a forest reserve and the setting apart as portions thereof of parts of the government lands of Makua, Kahanahaiki and Keaau in the District of Waianae, Island of Oahu. Included in the proposed reserve is also a small portion of the privately owned land of Ohikilolo, belonging to Mr. L. L. McCandless; (340 acres). The lower portions of the two government lands first named are under lease to Mr. McCandless for a ten-year period, until February 21, 1920. The lease (No. 730) contains the provision that a fence shall be built on the forest reserve boundary within one year after the date of the creation of the forest reserve. The total area of the proposed reserve, which I suggest be called the Makua Forest Reserve, is 4716 acres.

The object of the proposed Makua Forest Reserve is to control the slopes at the heads of the several important valleys on the leeward side of the Waianae Range. The idea is, eventually, to replace on these slopes a dense cover of forest—Hawaiian trees, shrubs and undergrowth—in the expectation that thereby the

local sources of water may be protected and the flow from them made more dependable, if indeed in some cases it cannot be increased.

The problem presented in these valleys is one common to all the lands on the lee side of the Waianae Range. This is naturally a dry district, with only a few permanent sources of water. Most of what there are are at best intermittent. But in view of the great need for water hereabout it is highly important that all possible sources of supply should be conserved and developed. As I have recently argued this point in a report on Nanakuli (dated August 9, 1912) it is unnecessary further to enlarge upon it here.

Unfortunately the native forest on the slopes at the upper ends of Makua and Keaau Valleys has suffered severely in the past both from stock grazing from below and from the ravages of wild goats from above. Through these agencies the former native forest was opened up and the undergrowth destroyed. In many places the old forest has now wholly disappeared.

The natural consequence is that the springs have dried up or have become very irregular in flow. With the restoration, as far as is now possible, of the original forest conditions it seems to me reasonable to expect an improvement in the local water situation.

Naturally the first step in such a program is to clear the slopes of cattle and to get rid of the goats. A start has been made in the latter particular by the hunting that has gone on at intervals at Makua. Systematically followed up it ought now to be possible at reasonable expense practically to exterminate the goats in this section.

With the construction of several comparatively short stretches of fence between natural barriers across several of the lateral valleys cattle can be excluded from the mauka section. It is not necessary that the whole forest line be fenced; certain portions only will be sufficient.

Where there are still groups of trees left to furnish seed, the native forest ought gradually to come back naturally. It goes without saying that could the process be assisted results could be hoped for much earlier than where nature is left to take her own course. On the lower slopes of all the valleys the Algaroba is spreading rapidly. It will soon form a cover, at any rate up to an elevation of from 800 to 1000 feet. The principal purpose of this Forest Reserve is to help in getting back the native Hawaiian forest at the heads of the valleys where are most of the water heads.

The forest line across these lands was first laid out some five years ago. This last spring the section across Makua was slightly modified to facilitate fencing. As has already been said the lease of Makua carries a fencing clause. The lower part of Keaau has been cut up and sold as homesteads. It is required that the mauka

line of the top lots be fenced. Up to a few months ago no fencing had been made, but the time is not up for another year.

The Makua Forest Reserve project has been pending for a considerable time, one reason for the delay in getting final action on it being that it was expected to include all the forest lands on the Waianae hills in one reserve, and Makua was held up awaiting action on other tracts. It has lately been decided to set apart several smaller forest reserves, separately.

Based on the reasons herein set forth, I do now recommend that the Board approve as the Makua-Keaau Forest Reserve the area covered by the technical description which accompanies this report, and that the Governor of the Territory be called upon to hold the required hearing and thereafter to create this reserve and set apart as portions of it the government lands within its bounds.

[The technical description of boundary, prepared as C. S. F. No. 2396 by the Territorial Survey Office, is here omitted, as it will be published later in the Forester as a part of the proclamation of the Makua-Keaau Forest Reserve.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

KUAOKALA FOREST RESERVE.

September 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—The following report recomending the setting apart as a forest reserve of a portion of the government land of Kaena, Kuaokala Mountain, District of Waialua, Island of Oahu, is respectfully submitted for your consideration.

The area proposed to be set apart is situated on the upland plateau mauka of Kaena Point at the western extremity of the Waianae Range It includes part of the government lands of Kuaokala, District of Waialua and Kaawaula (government), District of Waianae. Both lands are now under lease to Mr. L. L. McCandless, respectively Leases No. 739 (expiring Jan. 1, 1916) and 730 (expiring February 21, 1920). The total area of the proposed Kuaokala Forest Reserve is 434 acres.

Kuaokala consists of a gently sloping upland, much cut up by lateral valleys, most of which run toward the north. It is cut off from the low lands along the shore by a steep pali and is only accessible over rough trails. The approximate elevation of the mauka part of the upland is from 1400 to 1500 feet. The land has been used for a long time for grazing cattle. Of late years, at any rate, it has been but comparatively lightly stocked.

The purpose in proposing the reservation of a part of Kuaokala for forestry is to secure protection for a water head that locally

is of high importance, near the upper end of one of the main branches of Manini Gulch. Here, a little above a dairy house built by the late Sam Andrews, a tunnel has been dug from which a comparatively small but constant flow is secured. When I was there in February last it was estimated that the flow was about 2000 gallons.

In the valley above the tunnel is a fair stand of Kukui trees. Further mauka, on the ridge between the head of this valley and the small basin at the head of Keekee Gulch, "Malokea," there is Ohia Lehua, with other trees and native vegetation. In the adjoining Kaluakauila Gulch, that runs to the south, is a fairly heavy stand of forest.

The slopes of the small valleys on Kuaokala are not steep enough to serve as natural barriers; neither are they first class grazing land. While the area of the reserve is 434 acres, I should say that all but about 100 acres could be spared from the grazing area without material inconvenience.

A number of the ridges between the gulches named show the results of goat work, which has started erosion. Goats are said now to have been pretty well driven off Kuaokala through continued hunting.

The main trouble at Kuaokala is the cost of fencing, and to be effective this forest reserve must be fenced. It is a difficult place to which to bring material. There are no posts to be cut locally. The expense will necessarily be high. About 10,000 feet of fence would be required, from the corner of the boundary fence near Puu Hakakoa, along the north side of the proposed reserve and across the Manini Gulch at the tunnel above Andrews' old house. The boundary on the south side follows an old fence line on which the posts are for the most part still available for use and some of the wire. This old fence runs to a pali beyond which, to the east, except perhaps for one short stretch, the boundary follows a ridge where fencing is unnecessary. I understand that there are a good many more posts along the line of this old fence for a way toward Kaena point, that might be utilized in building the fence line along the proposed forest reserve. Under the provisions of Lease 739 a fence must be built on the forest reserve line within one year from the date of the proclamation of the reserve.

Based on the contention that the water on Kuaokala is of sufficient importance to warrant that somewhat expensive measures be taken to safeguard its apparent source, I do now recommend that the Board approve as the Kuaokala Forest Reserve the area described in the following paragraphs, and that the Governor be requested, after the required hearing has been held, so as to set apart the land, in accordance with law.

[The Survey Department's description (C. B. F. Number 2364)

is here omitted as it will later be published in the Forester as a part of the proclamation of this Reserve.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, June 4, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

SIR:—I have the honor to report on the work of this Division for the month of May, 1913, as follows:

Honolulu Quarantine Station.

All of the pens and enclosures have now been finished so that they may be said to be in perfect order and it is believed much stronger than they ever were before.

The sanding of all parts of posts, gates and plates that are at all exposed from the teeth of horses and mules has proven absolutely effective in preventing the animals from biting them.

A gate has been cut in the solid board fence leading into the glanders division and an alleyway built from this gate to the testing chute so that animals arriving and leaving may be taken through this chute to have halters removed or replaced without, as hitherto, having taken them out on the road and risking their escape.

The concrete work in the dog division is well under way, though work has had to be temporarily suspended on account of the rainy weather.

Hilo Quarantine Station.

Dr. Elliot reports that work on this Station has been started, and he requests that the caretaker be appointed at the earliest possible date in order that he may put him to work on the macadamizing in the shelter sheds, which it became necessary to cut out of the specifications for lack of funds. He states that there is plenty of rock available which this man can gather and use as a foundation on which small crushed rock can later be placed.

Cerebro Spinal Meningitis.

As was expected this disease has made its appearance following the recent rains, and it is possible that severe losses will occur

in the sections where this disease is known to recur annually. It has already been reported from both Molokai and Maui, and a new outbreak among the Government mules at Fort Shafter indicates that the disease may even be looked for from places where it has never been known to occur before. Four fine mules were taken with the disease during the middle and latter part of last week, and in the course of four or five days every one was dead in spite of the efforts of the military veterinarians as well as myself to relieve their suffering.

The true nature of this disease is absolutely unknown even though no other epidemic has been given so much attention as this one during the past year when it is estimated that the loss in the United States amounted to between 50,000 to 60,000 head during the month of August and September alone. The disease is supposed by some investigators to be caused by a molded or musty feed, while others are inclined to consider it as an infectious disease.

Hog Cholera.

This disease, which has hitherto occurred in these Islands only in an extremely mild form, seems of late to have gained in virulence, and considerable losses have been reported, especially in this city and vicinity. It is estimated that more than 1,000 hogs have died and the disease seems to be spreading steadily. The latest form of treatment for this disease consists in the hypodermic injection of blood serum taken from animals which have recovered from the disease, but this treatment is both expensive and difficult to apply. The price of treatment for a full grown hog ranges from $1.50 to $2.00, while smaller animals may be treated for from 50 cents to $1.00. A detailed statement of what has been done in this line will be found in the appended report of the Assistant Territorial Veterinarian.

Tuberculosis Control Work.

The regular annual test of all dairy cattle in the County has now been started. As authorized by the Board the services of Mr. Joe Richards, formerly City Milk Inspector, have been secured and the work is now being systematized in such a way that all herds may be tested with as little inconvenience to the owners as possible.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 4, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

SIR:—I hereby submit the following report for the month of May, 1913:

Tuberculosis Control.

No testing has been done this past month due to the lack of transportation and an assistant. The services of Mr. Joseph Richards, one time City and County Milk Inspector, have been obtained for this Division by the Board of Commissioners, and in a day or two the necessary repairs to the machine will be completed when we can again start on this important work. The test this year, which is the fourth general test of the dairies in the City and County, should total close to 6,000 head of cattle.

Hog Cholera.

Several outbreaks of Hog Cholera have occurred during the past month in which the disease has assumed a greater virulence than has been experienced before in this Territory, and the resultant loss has been very heavy in some districts. Until recently Hog Cholera has never taken a prominent place in the list of diseases affecting live stock in this Territory. Assuming a very mild type it has been easily controlled by strict sanitation and prophylactic measures in the diet and care of the animals. Now, however, such measures seem to be of little avail and in order to control and entirely eradicate this disease an entirely different line of treatment has been inaugurated.

The treatment now being followed consists of subcutaneous injections of anti-hog cholera serum. This produces a passive immunity lasting from five to six months and enables the animals to successfully pass through an outbreak of the disease. We feel confident that we can by this means materially reduce the losses from this disease and keep it under control.

On the 22nd of May a valuable herd of twenty-seven (27) hogs owned by the College of Hawaii were given subcutaneous injections of anti-hog cholera serum varying in amounts from 10 to 50 cc. according to the size of the animals. A short time before the treatment was applied it had been reported at this office that hog cholera had broken out in this herd with the loss of two animals. Serum was immediately cabled for and upon arrival the remaining animals were at once treated. Since then no deaths have occurred and temporary immunity to the disease has been established.

Great care is necessary to prevent abscess formation at the point of injection. Thorough disinfection and clean surface are absolute requirements; 5 per cent. carbolic acid or a strong solution

of creoline or chloronaptholeum; scrubbing brush and sponge are all that is needed to prepare the site for the inoculation. The point of injection is usually the inner surface of the thigh, the one exception to this being sows heavy in pig and which have to be handled with great care to prevent abortion. In such animals the serum is injected behind the ear.

Importations of Live Stock.

The following steamers have been boarded and the following live stock inspected and admitted to the Territory during the past month. Nineteen steamers have been boarded, nine of which were found carrying live stock as follows:

May 6—S. S. Lurline, San Francisco 26 mules, Schuman Carriage Company.

May 9—S. S. Mongolia, San Francisco: 1 crate chickens, 1 crate (2) Angora cats, A. W. Pavo.

May 12—S. S. Ventura, San Francisco: 2 crates chickens.

May 13—S. S. Hilonian, Seattle: 6 Angus bulls, Maui Agricultural Company.

May 13—S. S. Wilhelmina, San Francisco: 11 crates poultry; 1 dog, Capt. Winne.

May 19—S. S. Honolulan, San Francisco: 21 mules, Schuman Carriage Co.; 13 horses, Hawaiian Dredging Company; 2 horses, Capt. Holbrook; 1 dog, T. A. Montgomery; 23 crates poultry.

May 26—S. S. Sierra, San Francisco: 30 crates poultry; 1 dog, A. B. Camp.

May 26—S. S. Mexican, Seattle: 24 horses, Chas. Bellina.

May 26—S. S. Siberia, Orient: 1 dog, J. B. Reutiers.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, May 31, 1913.

Board of Commissioners of Agriculture and Forestry, Honolulu.

GENTLEMEN:—I respectfully submit my report of the work of the Division of Entomology for the month of May, as follows:

During the month 40 vessels arrived at the Port of Honolulu of which 24 carried vegetable matter and 1 moulding sand.

Disposal	*Lots*	*Parcels*
Passed as free from pests	677	13,222
Fumigated	9	424
Burned	48	65
Returned	1	1
Total inspected	735	13,712

Of these shipments 13,274 packages came as freight, 117 packages in the U. S. mail and 321 packages in baggage of passengers.

Rice.

During the month the following shipments of rice arrived:
From Japan 19, 704 bags.
From China, 1.400 bags, 500 mats.
Of this lot 300 bags of rice were found infested with the rice moth (*Paralepia modesta*). We compelled the consignee to fumigate the shipment under our supervision and at his own expense. All the other shipments were found free from pests and were allowed to be delivered.

Pests Intercepted.

Thirty-eight packages of fruit and 24 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. These were all seized and destroyed.

In a shipment of seeds from Manila we found two seed weevils (*Araeocerus species* and *Cryptorhynchus species*). The latter species would no doubt cause considerable damage to large seed pods in the Territory as it is closely allied to the Mango weevil (*Cryptorphynchus mangiferae*) which attacks the seeds of the mango and causes decay and premature dropping of the fruit.

On a shipment of Orchids we found Mealybugs (*Pseudococcus citri*) and the Purple scale (*Lepidosaphes beckii*); also the larvae of the Orchid borer (*Acytheopeus aterrimus*). After fumigation each orchid was gone over carefully and all those infested were rejected.

In soil from Japan we found the pupa and larva of a large fly (Ptecticus species). This insect is closely allied to one of our decay flies so commonly found in over ripe bananas and vegetables.

Hilo Inspection.

Brother M. Newell reports the arrival of eight steamers and two sailing vessels. Five of the steamers brought vegetable matter consisting of 115 lots and 2381 packages. After all celery, carrots and beets had been washed they were allowed to be delivered. One sailing vessel had soil as ballast which was dumped at sea.

Beneficial Insects.

Owing to the abundance of the Japanese beetle many parties have brought live beetles for inoculation and 26 lots of inoculated beetles have been sent out during the month.

Inter-Island Inspection.

During the month of May 68 steamers were attended to and the following shipments were passed:

Plants	65	packages
Taro	738	bags
Fruit	16	packages
Sugar cane (plants)	400	cases
Lily root	12	packages
Cocoanuts (sprouting)	10	
Total passed	1241	packages

The following packages were refused shipment:

Fruit	16	packages
Plants, rejected on account of soil	21	"
Vegetables, rejected on account of soil	4	"
Total refused shipment	41	packages

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, May 31, 1913.

The Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows the routine report of the Division of Forestry for May, 1913:

Forest Reserve Matters.

During the month I made an inspection trip of five days to the Island of Kauai to look into questions of fence building on forest reserve boundaries above Lihue, Kealia and Moloaa. Earlier in the month, in company with the Governor, the Land Commissioner and the Surveyor, I visited the land of Hauula in reference to the forest boundary across that land, and on another day made an inspection of certain water developments in the Pupukea Forest Reserve.

Not a little of my time during May was spent in attending to details in regard to two proposed forest reserves on the Island

of Hawaii and one on Oahu. As soon as the official descriptions are received these projects will be submitted to the Board.

On May 31, the Governor and members of the Board held a public hearing at the Government Nursery to consider setting apart three tracts, mainly of Government land, in the Waianae District, Oahu, as forest reserves. The lands are the upper portions of the valleys of Makua-Keaau 4716 acres, Nanakuli 1010 acres, and the Makua part of the land of Kuaokala 434 acres. In all 6160 acres, of which only 340 acres (a fee simple land in Keaau valley) is in private ownership. No one appeared at the hearing in opposition to the creation of these reserves.

Forest Fire.

While on Kauai I learned of a small grass and brush fire that had occurred on or about May 20, on land immediately above the mauka Kapaa homesteads. The fire got away from a homesteader who was clearing land, but fortunately did not spread far. Ten to fifteen acres were estimated to have been burned over.

Improvements at Government Nursery.

Within the past few weeks a number of changes have been made in the arrangement of the stable sheds at the Government Nursery and in the shifting of location of the insectaries and other smaller buildings. When completed these modifications will add much to the convenience and usefulness of the service buildings.

Federal Assistance in Experimental Tree Planting.

The Federal Forest Service has informed me that for the fiscal year beginning July 1, 1913, the sum of $200 will be allotted to Hawaii for use in continuing experimental forest planting work now in progress. This money will be used in getting the plantation of Eucalyptus in Nuuanu Valley well established and in planting out on Haleakala and Mauna Kea seedling trees now being held in Ranch Nurseries on those mountains.

Nursery Report.

As usual the report of the Forest Nurseryman is transmitted herewith.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, May 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is a report of the work done during the month of May, 1913:

Nursery.

Distribution of Plants.

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold	....	150	112	262
Gratis	3000	...	881	3881
	3000	150	993	4143

Collections.

Collections on account of plants sold amounted to	$ 3.75
Rent of building, nursery grounds	35.00
Total	$38.75

The men at the Nursery have been assisting the carpenters and plumbers in the work of repairing and making additions to the buildings.

Coöperating by request of the Outdoor Circle of the Kilohana Art League, a commencement has been made to plant the center plat of Kalakaua Avenue with Mahogany trees. The seed from which the trees were raised was sent to us by Mr. Gerrit P. Wilder when on a tour about two years ago. The trees were propagated at our Makiki station.

Plantation Companies and Other Corporations.

The distribution of trees during the month amounted to 16,000 in seed boxes and 1000 in transplant boxes. Total, 17,000.

Orders have been received for 4000 transplants to be delivered when ready.

Experimental Garden, Makiki.

The new soil sterilizer has been delivered and we expect to have it running in a few days. Other work done has been the regular routine work, potting and transplanting trees.

U. S. Experiment Planting, Nuuanu Valley.

The man has been transplanting new varieties of Eucalyptus into tin cans and hoeing around the small trees that still require a little attention.

Very truly yours,

DAVID HAUGHS,
Forest Nurseryman.

THE COÖPERATIVE CREDIT MOVEMENT.

(*The Tropical Agriculturist.*)

PROGRESS IN NATAL.

The more we come to study the rural conditions of Natal the more we are struck with the enterprise, the energy and the intelligence of the farmers of this province. Take, for instance, the extraordianry progress of the Agricultural Coöperative Union. It stands a splendid example of self-help and sturdy self-reliance of a society which scorns State aid. The name of the secretary, James Erskine Duff, seems to remind us of a Scottish Covenanter resurrected in the twentieth century to stir the dry bones of those colonists who live in this dream-like, lotus land. The Co-operative Union was started three years ago. It was formed by the amalgamation of the Wattle Bark Union and the Mealie Union. The membership is now over 900, and the annual turnover a quarter of a million sterling. To become a member the farmer must take up £5 shares either in one amount or at the rate of 10s. per annum spread over ten years. The idea is a limited liability company. The president of the union is Sir Thomas Hyslop, and there are three committees—for wattles, for mealies, for live stock. Take the matter of commercial manures, such as superphosphate, bonedust, basic slag and mealie fertilizer, all of which are largely used in Natal. The secretary calls for tenders, say, 4000 tons per annum. Naturally, such a quantity can be bought at a much cheaper rate than a small amount by a single individual. At the commencement of the season superphosphate was sold at £4 per ton to the ordinary farmer, whereas the Union member only paid £3 7s. 6d, per ton. The ordinary man pays 13s. to 14s. per bag of seed oats (150 lb); the Union member can get it for 12s. Formerly the cost of arsenite of soda used for dipping was £3 5s. per cwt. Through the efforts of this society it can now be purchased from the merchant at £1 5s. per cwt. The terms of the Union are cash on delivery, but there is also a system called the credit association. This means

that three or four members can club together and guarantee their own accounts if approved by the committee, up to twelve months' credit at 8 per cent. interest. This is the buying side of the business. Now as to the selling. The Union has sold this year 60,000 bags of mealies for members at prices ranging from 10s. to 20s. per bag. The members are under no compulsion to buy or sell with the Union. But they realize that the Union saves them much time and trouble and obtains the highest prices. To the up-country farmer the Union is of special value. Take the case of wattle bark. The Union has agents in London and Hamburg, makes contracts and ships direct. The other day a member received £1 per ton above the local market price in Durban. A form is sent out to all the members. They guarantee to supply a stated quantity of bark per month. With this knowledge the Union committee can watch the market and so secure the best price. The individual dealer in Durban does not know what quantity of bark he may have on hand month by month, and, consequently, he cannot offer as favorable terms. The Union also imports pedigreed stock, purchases fencing material, publishes a weekly agricultural gazette which is issued free of charge to every member, and now proposes to insure live stock of every description. It is another illustration of the advantage of friendly coöperation in modern farming. The day of isolation, suspicion and farm secrets is dead. The success of a nation is not measured by the fortunes of a few, but by the prosperity of every citizen.—*The Agricultural Journal of the Union of South Africa.*

IN THE PUNJAB.

We recently directed attention to the inestimable benefits conferred upon the agriculturists of the Punjab by the extension of the coöperative credit system in that province. There has just been issued from the government press a statement which shows how rapid has been the growth of this beneficent movement throughout India. In the five years from 1906-07 to 1911-12 the number of societies, central, urban and rural, rose from 843 to 8177 and the total membership from 90,844 to 403,318. The increase in the financial resources of the societies was even more marked. In the first of the years named the capital available, including loans from private persons and from other societies, share capital deposits by members, and State aid aggregated Rs. 23¾ lakhs. By 1910-11 the total had gone up to Rs. 230½ lakhs, while at the end of the past financial year it had still further increased to Rs. 337¾ lakhs.—*Indian Agriculturist.*

CO-OPERATION IN DENMARK.

The November issue of "Denmark Abroad," a monthly review, contains a lengthy article on the Danish Credit Societies by M. P.

Blem, President of the Credit Society of Estate Owners in the Danish Island Diocese-Districts. The principle works, as will be known, on the coöperative system.

A society of land-owners formed by debtors with the object of borrowing money jointly. It mints its own money according to the daily requirements, in the shape of treasury bonds, on which interest and instalments are to be paid with mortgage security in fixed property—under unlimited responsibility and with a reserve fund as an auxiliary support.

Sixty to seventy years ago there was an upward tendency in the financial condition, but money was scarce. It was almost impossible to procure mortgages, especially on farming properties, and many private persons possessing money dared not lend it out, even against the finest mortgage security. It is gratifying to know that credit societies, which act as a link between borrower and lender, remedied this disagreement. Their treasury bonds became the means of transaction, the means of credit and the substitute for missing money.

PLANTING COCOA.

The following notes have been contributed by Mr. A. H. Hoare to the *Journal of the Jamaica Agricultural Society* of December, 1912:

The young cocoa plants will succeed best if planted out through bananas, as they must have a certain amount of shade from the hot sun when young and the banana will answer satisfactorily for that purpose and enable the cocoa to be grown economically. Moreover, if the bananas have been properly cultivated the land will be already in good condition and will need no further preparation before planting. See that the land is properly drained, especially if it is inclined to be wet or if it is of a stiff clayey texture, otherwise the soil becomes in wet weather sodden and sour, and cocoa trees will not thrive when the soil is water-logged and sour. Choose land that has a good soil, deep because the trees send down a tap-root which although not assisting to feed the tree to any great extent, will greatly affect its health if it comes into contact with an impenetrable bed of marl or rock.

Avoid bleak, windy situations, for cocoa trees love shelter and suffer greatly from the effects of strong winds which cause defoliation and also injury to the tender young shoots. Valleys sheltered by hills and rocks, and stretches of land protected by good belts of timber are ideal situations if in a good rainfall.

Do not follow the examples of others and plant too close, for cocoa trees need light and air in abundance, and will never pay for over-crowding. On good rich land I would advise planting 12 to 14 feet apart in the rows and on poorer soils or on hillsides

where the trees will not grow so big 11 to 12 feet apart will not be too close. At these distances the trees should almost touch when fully grown and there will be ample space for the free circulation of light and air so needful for healthy growth of the trees and full crops of pods. In addition, the trees will shade the ground nicely, keeping it cool and moist and also preventing an excessive growth of weeds. Of course, the distance between the rows will depend on what distance the bananas are planted, as the row of cocoa trees will run between each row of bananas.

First, line out the rows methodically, and place a peg where each hole is to be dug. Large holes should always be dug to receive the plants, and I strongly urge the digging of them about not less than a fortnight to three weeks before planting. Good holes are important. They should be made at least two feet square and eighteen inches deep and the soil must be well turned out so as to expose both soil and hole to the beneficial action of sun and air. Then, just a few days before planting, fill in the hole with good surface soil, making its surface a little higher than the surrounding land to allow for sinkage. Unless this precaution is taken, when the ground sinks there will be a depression round the plant in which water will settle and cause the stem to rot away.

TRANSPLANTING.

When putting out plants grown in bamboo pots, great care must be used so that the plant shall receive as slight a check as possible in transplanting. Take care to see that the soil in the pot is well soaked before removing the plants. I advise placing them for a few minutes in a pail of water to soak and standing them aside to drain. When actually planting, the pot should be taken into the hand and carefully split open by making a cut at each side with a cutlass. Next, neatly reverse the two halves of the pot, make a good hole in the loosened soil with the hand and insert both pot and plant carefully. Do not plant too deep or too shallow, but sink the pot until its top is level with the surface, pressing in the soil around it. Then gently withdraw the two reversed halves of the pot, making everything quite firm and tidy afterwards.

The great advantage of preparing a good deep hole and careful planting is very soon apparent, for the plant makes a good start in the sweet loosened soil and grows away at a vigorous rate. One cannot too heartily condemn the slip-shod method often adopted of simply chopping a hole with the hoe, pushing in the plant with perhaps all the soil shaken off its roots, and then leaving it to take its chance. It is hardly to be wondered at that most of the plants, instead of progressing, gradually die out until the cultivator who put out a hundred plants eventually finds that he has only a dozen or so growing plants left. By following this

simple but very safe method, every plant should grow and in a few years form a uniform and profitable plantation.

In conclusion, I might mention the time-saving plan of always keeping back a few plants in pots so that in the event of any dying out, they can be renewed at once.

MANURING TREES.

It may seem a simple thing to manure a tree, yet the great majority of people who take to the idea of helping their trees with some manure, dump a heap against the trees. The majority, of course, do not manure their trees except by accident, expecting the soil to give crops out of good nature without asssitance. Bananas are commonly treated thus, but the effect on such, being herbaceous plants, is to bring out roots high up, which when the heap of manure decays down are left dry and so are wasted. But on many trees, like orange and cocoa, the effect of a heap of manure placed against them is injurious. The most vital parts of such trees is the neck, that part where the roots start from the stem. The manure softens and tends to rot the bark there, encourage insects and grubs to attack the bark, while manure there can do no possible good. Trees take up their food material from all those little fine roots that start off from the large roots, and which are especially plentiful at the very end of the roots. And it is where these fine roots are that the manure should be placed, preferably in light open soils by spreading it as a mulch, and in heavy clay soils by digging the manure in and mixing it with the soil.

In mulching also, which is only a form of manuring, the mulch should not be put close to the banana, cocoa, coffee or coconut tree root; a clear circle should be left close to the stem.—*The Tropical Agriculturist.*

DRY ROT OF THE IRISH POTATO.

The Nebraska Experiment Station has just issued Bulletin 134, on "A Dry Rot of the Irish Potato Tuber."

For several years the department of Agricultural Botany has been engaged in a study of Irish potato diseases in Nebraska. Among these the dry rot of the tuber is one of the most important. Buyers and commission men have reported losses, during storage, of from 20 to 60 per cent. due to this dry rot. In fact, the most important feature of this dry rot is the fact that it forces the immediate sale of the crop as soon as dug. This tends to demoralize the market and places the grower at the mercy of the buyers, since he is himself afraid to store his crop and wait for better prices.

SYMPTOMS.

The dry rot here described is a strict tuber rot affecting mature tubers only. Neither the stems nor the young tubers are ordinarily in the least affected. Natural infection is known to occur solely through wounds produced in the process of digging or subsequent handling. In many cases this rot secured a foothold through wounds produced by scab-producing animals of certain sorts and perhaps even through scab spots due to fungus parasitism, though the latter method is certainly very rare if we may judge from the laboratory experiments.

The rotting is rather slow, and in general within four to six weeks from one-third to three-fourths of the tuber is destroyed. The epidermis of the rotted portion becomes slightly wrinkled and usually has a characteristic bluish color. On account of the rapid destruction of the underlying tissues the surface over these areas soon becomes distinctly depressed.

The rot may make its appearance at any point on the surface of the tuber, though more commonly perhaps at the bud end of the tuber. There is no watery degeneration of the tuber unless other organisms gain entrance, so that this is in fact a dry rot.

CAUSE.

Numerous inoculation experiments have shown that this dry rot is caused by a parasitic fungus, not previously described, for which we have proposed the name *Fusarium tuberivorum*. At the same time it has also been demonstrated that this dry rot fungus does not cause the injury to the leaves and stems often referred to as "blight" or "wilt." In other words, the present dry rot of the tuber is not connected in any manner with diseased conditions of other parts of the plant.

METHODS OF CONTROL.

Extensive experiments have been conducted to learn if any treatment might be applied before the potatoes were stored that would reduce the amount of this rotting.

These experiments have clearly demonstrated that dry rot may be held in check through treatment of the tubers before being placed in the storage cellars. For this purpose the best results were secured through the use of either formalin dip, formalin vapor, or the lime-sulphur wash. Not only did the tubers in these lots show a very small percentage of dry rot, but they were in excellent condition otherwise when removed in April. The storage time, it should be remembered, employed in this experiment is longer than would ordinarily be employed by the average farmer and this gave the treatments a severe test. Under ordinary farm conditions the development of the formalin vapors is

not easily secured, and therefore we would particularly recommend the use of the formalin dip as the easiest method to employ and one that should give excellent results in practice.

Anyone directly or indirectly interested in potato growing should make it a point to read this bulletin. It may be had free of cost by the residents of Nebraska on application to the Nebraska Experiment Station, Lincoln, Nebraska.

E. A. BURNETT,
Director.

THE DAIRY COW.

A cow requires food whether she is milking or not. The amount of food necessary to maintain a dry cow in fair condition, so that she will neither lose nor gain in weight, represents what is called her "maintenance requirement." The maintenance requirement of healthy cows of similar weight does not vary much. If a cow is milking, however, she must consume and digest food in excess of her maintenance requirement. Otherwise she will lose in weight. The food consumed by a cow yielding milk is thus utilized for two different purposes. One part is required for maintenance, and this may be set down as working expenses. The other part is utilized to fill the milk-pail—it is the raw material from which milk is produced. What is a good cow? It is one which can digest and assimilate for milk production an amount of food which largely exceeds her maintenance requirement. But cows vary widely in this respect. From the University of Missouri there comes an interesting discussion of this topic in *Experimental Station Bulletin No. 2.* During two years the herd-testing at the station showed No. 27 cow to be a good milker, and her half-sister, No. 62, a bad one. They were registered Jerseys. In the third year it was decided to compare the food requirements of these cows, and for this purpose both were calved, as it happened, the same week. During the lactation period the food to each was regulated so that the live-weights remained constant, and the amounts of milk and butter fat were then compared with the amounts of food consumed by each cow. In the results it was found that the good milker was consuming about 2½ times as much food, after deducting her maintenance requirements, as did the bad cow, and she also produced about 2½ times as much milk. Altogether, with the good cow, 35 per cent. of the ration went for maintenance and 65 for milk; with the bad one the figures were 56 and 44. Ten bad cows may yield as much milk as five good ones, but they will require twice as much food for maintenance purposes. As it is only the food utilized in excess of maintenance that leaves a

profit, the benefits of herd-testing are hereby emphasized.—Victoria (Australia) *Journal of Agriculture.*

NEW WEED EXTERMINATOR.

Wild garlic (*Allium vinale*) has for many years been a serious pest in that belt of territory which extends from Maryland to Missouri. Besides having the usual competitive action of a perennial weed, the plant is harmful in that the bulbils on the stem frequently get intermixed with wheat grain and create an objectionable flavor in the flour. As a weed with fodder crops, this plant may have an effect in causing the tainting of milk.

Considerable attention, therefore, has been directed by the Botanical Department of the Indiana Experiment Station, towards methods for eradicating this noxious weed. A letter in *Science,* for January 3, 1913, states that remarkable results have been obtained by the use of orchard-heating oil as supplied by the Standard Oil Company. It was found that when the oil was distributed over the field in a fine spray by a sufficiently powerful spraying machine, practically all vegetation was killed, not only above ground but below ground as well. It destroyed the bulbs of the wild garlic below ground and the bulbils at the top of the stalks. One or two plants with very large horizontal rootstocks survived, since these required a rather larger dose of oil than was generally applied.

The application of the oil appeared to have no lasting effects on the soil; the new growth from seeds already present in the soil and from subsequently sown cereals possessed the usual vigor.

In considering the trial of this method in the West Indies for exterminating perennial weeds like Devil's grass (*Cynodon Dactylon*) and Nut grass (*Cyperus* sp.) the following questions arise: (1) Will the oil actually kill the hardy rhizomes and tubers of these weeds? (2) Does the oil possess any injurious effect regarding the physical and biological characters of the soil? and (3) What would be the cost per acre?—*Agricultural News.*

PAPER FROM BAMBOO.

Paper from the bamboo cane will soon, says the *Standard,* be of the usual order of thing.s Scottish engineers are mainly responsible for bringing about this new departure. Not long ago an Edinburgh firm, who specialize in the making of plant for producing paper from bamboo, sent out two complete factory equipments to the Far East—one to convert cane into pulp, and the other to transform that pulp into fine white paper.

On a site near Kagi (Japan) a factory is being installed with every requisite to deal in the first place with only 300 tons of pulp per month, but with room for any development. In this case, however, the pulp will be treated in Formosa, and shipped in rolls or sheets to the paper mills at Kobe; just in the same way as the wood pulp of Norway, Sweden, Russia and Finland is shipped to the United Kingdom to feed the British paper mills. Esparto grass gives way to wood pulp in this country for paper-making purposes, and it is hoped that in the Far East bamboo pulp will enable Eastern mills to compete with the British and American imported paper of the finer qualities. One thing has to be borne in mind—that the process of manufacture from bamboo is a more expensive one than that from wood. Meantime, at any rate, experiments may cheapen the process, and the supply of the cane is practically inexhaustible.

Furthermore, the bamboo is a plant that can readily be cultivated. If any particular species of bamboo is considered the best for paper-making purposes it can easily be grown in any quantity. Asia, Africa, America, and Oceania all have forests of that plant, and a very interesting process is the manufacture of the cane into paper. It is cut up into small pieces of one or two inches, then boiled with sulphate of lime, bleached by electricity, washed, machine rolled, and pressed into tissue form and dried by steam. When wound into rolls or sheets it has a pleasing appearance, and makes an excellent quality of paper.—*L. and C. Express.*

GOATS.

The goat industry is little known in the United States, but there is no sound reason why it should be so. On fifteen thousand square miles, Switzerland raises annually eight million dollars' worth of goats and goat products. America has all the essential conditions of Switzerland in her mountainous regions. In Bavaria, the number of centenarians among the people is noteworthy, and is credited to the fact that there is a large use of goat milk. This milk is very rich and highly digestible, and is recommended for invalids and babies. The goat, itself, is immune from tuberculosis, which is a mighty point in its favor. With millions of acres of brush land lying idle in this country, and with millions of babies clamoring for proper food, the milk-goat industry could doubtless assume monstrous proportions, if a love for the goat could be instilled into our people, especially in those living in mountainous regions.—*The Farmer's Guide.*

ANCESTORS OF POLYPHEMUS.

Who does not know Polyphemus, the one-eyed giant shepherd of whom Homer has something to say in his Odyssey? How many of us take the fable in earnest and do not give Ulysses the lie?

But he did not lie. In the course of construction of a railroad in Asia Minor, in the region where Ulysses had his experiences, Italian engineers found giant human bones that could be the remains of none other than the Polyphemus tribe. If you doubt this, write a postal to Signor Antonio Blanco at Schio, Italy, the man who was in charge of the excavation.

Now a new corroboration comes from the Mayo Plantation, at Mati, Moro Province, P. I. The acting manager of the plantation, Mr. George Kazdaylevich, who recently arrived at Zamboanga, and who, mind you, is a consistent teetotaler, relates that in the Mati forest a tribe of monkeys live, who are in direct line of descent with Polyphemus. They have only one eye, and it is located in the middle of the forehead. The witness, together with four other men, has seen one of them and tried to catch it, unfortunately without success. The monkey keeps strictly to the forest and jumps to the next tree as soon as he sees an enemy. The natives of the East Coast say they frequently see the one-eyed monkeys. Did they all see the same monkey, or are there really many?

Now the question arises: How could Polyphemus stray so far from his old country? Or is it that the Mati monkey has strayed far from Greece? We leave these deep scientific questions to the Bureau of Science.

Another interesting thing that Mr. Kazdaylevich brings with him is the seed of the Rosella (*Hibiscus Sorbifolia*) that he received from Mexico. While in that country he learned from the native Mexicans how to manufacture from this fruit a most delicious beverage that beggars Welsh's grape juice. Mr. Kazdaylevich is willing to supply seed to those desiring them, together with full instruction in the art of making the pleasing beverage.—Mindanao (P. I.) *Herald.*

COMBATING CUTWORMS.

The poison bran mash is fairly effective in holding cutworms in check. Mix one pound of Paris green or London purple with 25 pounds of bran or middlings. Stir a quart or two of cheap molasses into a gallon of water, moisten the bran, stirring thoroughly until it makes a stiff mash. Apply a heaping teaspoonful near each plant or every two or three feet in the row. Keep fowls away. Apply two or three days before plants are set and apply

the mash in the evening so it will be eaten at night while moist.

It is said that garden plants may be protected from cutworms and flea-beetles by dipping the plants in arsenate of lead, three pounds per barrel of water. The plants are dipped in the solution just before they are transplanted.

Where the worms are very bad, sometimes gardeners knock the bottom out of tin cans and place these around such plants as cabbage, tomatoes, etc. A protection may also be made with building paper. The paper is bent into a cylinder and placed in the soil around the stems of the plants.

A plan that has been satisfactory with us is to take a lantern early in the evening, go into the garden and make war upon the worms with barrel stave or "paddle." The cutworms are usually on the surface or busy eating your plants. It does not take long in this way to destroy the pests in such numbers as to have no further trouble.—*Farm and Ranch.*

NEW EGYPTIAN GRASS GOOD FOR CATTLE.

A late Washington despatch says: Sudan grass, a new drought resistant hay plant, promises to become the leading grass for hay production in the United States, according to C. V. Piper of the Department of Agriculture, who has supervised experimental growths.

The grass is a native of Egypt, suited especially to semi-arid land, grows from four to eight feet high and two to three crops a season. It is preferred by cattle, hogs and horses.

Roland McKee of the agricultural experiment station in Chico experimented with the new plant in 1912 and is enthusiastic concerning its value.

"A fine growth was made," he reports, "and without question this is the most promising grass for growing under irrigation in the Sacramento valley that has yet been tried. The number of cuttings of hay was not determined, as with both plantings a seed crop was allowed to mature, but it seems probable three good cuttings of hay can be made."

The seed was planted at Chico May 2 and two months later the grass was in full bloom and from four to six feet high. It was cut for hay July 15, nine weeks after planting. Reports from Texas, Virginia, North and South Dakota are equally encouraging.

BY AUTHORITY.

PROCLAMATION OF FOREST RESERVES IN THE DISTRICTS OF WAIANAE AND WAIALUA, CITY AND COUNTY OF HONOLULU, ISLAND OF OAHU, TERRITORY OF HAWAII.

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I WALTER F. FREAR, Governor of Hawaii, with the approval of a majority of the Board of Commisssioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby recommend and approve as forest reserves to be called respectively the Nanakuli, the Makua-Keaau and the Kuaokala Forest Reserves, those certain pieces of government and privately owned land in the Districts of Waianae and Waialua, Island of Oahu, which may be described roughly as being the upper ends of the valleys bearing those names and the mauka portion of the government land of Kuaokala, and containing respectively areas of 1010 acres, 4716 acres and 434 acres, more or less, in the Districts of Waianae and Waialua, City and County of Honolulu, Island of Oahu, Territory of Hawaii, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked respectively Government Survey Registered Maps No. 2535, "Nanakuli Forest Reserve," No. 2407 "Makua-Keaau Forest Reserve," and No. 2532, "Kuaokala Forest Reserve," and descriptions accompanying the same, numbered respectively C. S. F. Nos. 2366, 2396 and 2364, which said descriptions now on file in the said Survey Department are as follows:

NANAKULI FOREST RESERVE.

Waianae, Oahu.

C. S. F. No. 2366.

Beginning at Government Survey Trig. Station "Manawahua" on the ridge separating the lands of Nanakuli and Honouliuli, as shown on Government Survey Registered Map No. 2535, and running by true azimuths:

1. Along down the ridge separating the lands of Nanakuli and Honouliuli to an iron pipe at the West corner of the proposed Honouliuli Forest Reserve the direct azimuth and distance being 67° 08′ 4420.0 feet;
2. 231° 26′ 30″ 2179.0 feet along Nanakuli pasture land to a forest reserve monument on spur;
3. 202° 46′ 1441.0 feet along Nanakuli pasture land to a pipe on ridge;
4. 144° 20′ 1519.0 feet along Nanakuli pasture land to a forest reserve monument on ridge;
5. 97° 07′ 1970.0 feet along Nanakuli pasture land to a pipe on end of spur;
6. 215° 02′ 30″ 2642.0 feet along Nanakuli pasture land to a pipe on end of spur;
7. 308° 19′ 30″ 1108.5 feet along Nanakuli pasture land to a forest reserve monument on spur;
8. 251° 24′ 1784.7 feet along Nanakuli pasture land to a pipe on small spur;
9. 209° 14′ 30″ 1452.8 feet along Nanakuli pasture land to a pipe on small spur;
10. 224° 59′ 1094.0 feet along Nanakuli pasture land to a forest reserve monument on small spur;

11. 132° 03′ 30″ 1018.0 feet along Nanakuli pasture land to a forest reserve monument on small spur;
12. 92° 49′ 1118.4 feet along Nanakuli pasture land to a forest reserve monument on spur;
13. 145° 39′ 2333.8 feet along Nanakuli pasture land to a pipe on small spur;
14. 85° 50′ 30″ 1263.5 feet along Nanakuli pasture land to a forest reserve monument on small spur;
15. 38° 09′ 30″ 1973.0 feet along Nanakuli pasture land to a forest reserve monument on spur;
16. 66° 43′ 4786.0 feet along Nanakuli pasture land to Haleakala Peak on the ridge separating the lands of Nanakuli and Lualualei, said peak being the south corner of the Lualualei Forest Reserve;
17. Thence up along the ridge separating the lands of Nanakuli and Lualualei, along the Lualualei Forest Reserve, the direct azimuth and distance being 226° 58′ 30″ 6176.4 feet;
18. Thence still up along the ridge separating the lands of Nanakuli and Lualualei, along the Lualualei Forest Reserve, to a peak called Palikea, at the intersection of the ridges forming the boundaries of the lands of Lualualei, Nanakuli and Honouliuli, the direct azimuth and distance being 267° 10′ 6280.0 feet;
19. Thence down along the ridge separating the lands of Nanakuli and Honouliuli, along the proposed Honouliuli forest reserve, the direct azimuth and distance being 350° 25′ 4505.0 feet to a peak called Mauna Kapu;
20. Thence still down along the ridge separating the lands of Nanakuli and Honouliuli, along the proposed Honouliuli Forest Reserve, the direct azimuth and distance being 22° 31′ 6219.0 feet to the point of beginning.

Area 1010 acres.

MAKUA-KEAAU FOREST RESERVE.

District of Waianae, Island of Oahu.

C. S. F. No. 2396.

Beginning at a 1½ inch pipe at the base of pali on the boundary between Keaau and Makaha, the coordinates of said pipe referred to Government Survey Trig. Station "Kepuhi" being 2278.5 feet North and 462.0 feet West, and the true azimuth to a + in coral rock at sea on the boundary between Keaau and Makaha being 69° 58′ distance 1263.7 feet, as shown on Government Survey Registered Map No. 2407, and running by true azimuths:

1. Along the base of the pali to a 1½ inch pipe on rocky ledge, the direct azimuth and distance being 192° 13′ 2926.0 feet;
2. 170° 32′ 1355.5 feet to a 1½ inch pipe on rocky point;
3. 219° 05′ 911.7 feet to a 1½ inch pipe;
4. 173° 32′ 976.7 feet to a 1½ inch pipe on rocky point;
5. 217° 46′ 1314.5 feet to a + on solid rock;
6. 288° 16′ 3693.0 feet to a 1½ inch pipe;
7. 270° 53′ 1831.0 feet to a 1½ inch pipe;
8. 176° 25′ 2766.0 feet across Keaau Valley to a 1½ inch pipe;
9. 115° 40′ 1302.5 feet across the land of Ohikilolo to a 1½ inch pipe;
10. 104° 43′ 2210.0 feet to a 1½ inch pipe on spur;
11. 121° 50′ 3861.0 feet to a 1½ inch pipe at the base of pali;
12. Thence along base of pali crossing Ohikilolo-Makua boundary to a 1½ inch pipe on spur in Makua Valley, the direct azimuth and distance being 196° 42′ 2116.0 feet;
13. 288° 00′ 3931.3 feet to a 1½ inch pipe at small pali at end of fence;

14. Thence along fence and wall, the direct azimuth and distance being 179° 46′ 915.0 feet;
15. 247° 37′ 346.0 feet on spur to a 1½ inch pipe;
16. 274° 46′ 5052.8 feet to a 1½ inch pipe;
17. 259° 46′ 30″ 880.3 feet to a 1½ inch pipe;
18. 202° 26′ 3811.1 feet across Makua Valley to a 1½ inch pipe;
19. 72° 00′ 2237.2 feet to a 1½ inch pipe;
20. 104° 06′ 30″ 5471.3 feet to a 1½ inch pipe on spur, being the boundary between Makua and Kahanahaiki;
21. 204° 00′ 2645.5 feet to a + on large solid rock;
22. 158° 34′ 1788.5 feet to a 1½ inch pipe on small spur;
23. 70° 11′ 30″ 3632.0 feet to a 1½ inch pipe on spur;
24. 70° 50′ 2774.5 feet to a 1½ inch pipe on pali point;
25. Thence across Kahanahaiki along the base of pali to a + on solid rock on the boundary between Keawaula and Kahanahaiki, the direct azimuth and distance being: 135° 33′ 3868.0 feet;
26. Thence up center of ridge along Keawaula, and thence along center of the main Waianae Range along Kuaokala, Kealia, Kawaihapai, and Mokuleia, to the junction of the Makua, Mokuleia, and Makaha boundaries, the direct azimuth and distance being: 295° 00′ 23320.0 feet;
27. Thence down center of ridge dividing Makaha and Keaau to the point of beginning, the direct azimuth and distance being: 55° 12′ 21480.0 feet;

Total area 4716 acres.

KUAOKALA FOREST RESERVE.

Waialua District, Island of Oahu.

C. S. F. No. 2364.
C. S. R. Map No. 2532.

Beginning at Government Survey Trig. Station "Hakakoa" and running by true azimuths:

1. 169° 50′ 711.5 feet along government land to fence corner;
2. 80° 14′ 1927.5 feet along government land;
3. 62° 43′ 30″ 798.8 feet along government land to a 1 inch iron pin;
4. 152° 22′ 30″ 1194.2 feet along government land to a 3 x 3 redwood post;
5. 121° 26′ 1727.4 feet along government land to a 3 x 3 redwood post;
6. 125° 17′ 30″ 2462.2 feet along government land to a 3 x 3 redwood post;
7. 58° 54′ 601.8 feet along government land;
8. 2° 15′ 1209.5 feet along government land to a 1½ inch iron pin;
9. 328° 43′ 40″ .... feet along government land to an iron pin;
10. 307° 23′ 40″ 1623.3 feet along government land;
11. 201° 03′ 40″ 945.1 feet along government land;
12. 295° 00′ 2852.2 feet along government land;
13. 269° 59′ 993.9 feet along government land;
14. 207″ 49′ 1348.0 feet along government land;
15. 173° 00′ 900.0 feet to the point of beginning.

Area 434 acres.

And as provided by law, subject to the existing leases, I do hereby set apart as the Nanakuli Forest Reserve that portion of the Government land of Nanakuli (1010 acres) that lies within the metes and bounds of the above described Nanakuli Forest Reserve; as parts of the Makua-Keaau Forest Reserve those portions of the government lands of Keaau (1850 acres), Makua (1556 acres) and Kahanahaiki (970 acres),

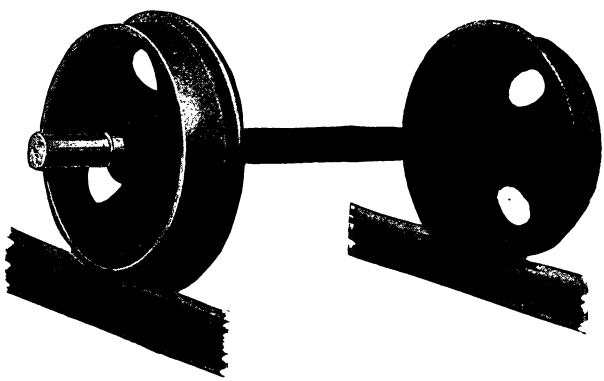
altogether an area of 4376 acres, more or less, that lie within the metes and bounds of the above described Makua-Keaau Forest Reserve; and as the Kuaokala Forest Reserve those portions of the government lands of Kuaokala (Kaena) and Keawaula (434 acres) that lie within the metes and bounds of the Kuaokala Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu, this 4th day of June, A. D. 1913.

W. F. FREAR,
Governor of Hawaii.

By the Governor:
E. A. MOTT-SMITH,
Secretary of Hawaii.



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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp

"Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
"Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price $1 a year.

DIVISION OF FORESTRY.

* "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
* "Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
"An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
"Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
* "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
"Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
"Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
"Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
* Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

"The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
* "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
"A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
"The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

* "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
* "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
* "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
* "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
* "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
"Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
Report of the Division of Animal Industry, for the year ending December 31, 1905 Reprint from Second Report of the Board; 62 pp.
Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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* Out of print.