Historical Outline of Agriculture In Hawaii

In the matter of land occupation the Hawaiian Islands have passed through a long history of development which may be divided into three distinct periods.

First, there was a very long period during which there was no human occupation of the land. A limited number of species of trees and smaller plants had by chance become established on these remotely isolated islands and multiplied to form a more or less dense forest cover wherever there was sufficient soil and moisture to support it. Of animal life there were several kinds of birds, a good many species of insects and lower forms, but no large beasts; the largest mammal was a small rat. Thus for untold thousands of years were these islands occupied, until the first human beings arrived.

The second period began with the arrival of these first humans, a small band of Polynesians, probably about 1500 or 1800 years ago. As they multiplied in numbers, they found it necessary to change the manner of occupation of the land, clearing much of the shore plain area for their cultivated crops, and changing the nature of the lowland forests somewhat by the introduction of additional plants of economic value, such as banana, coconut, breadfruit, etc. The animal life of the islands was materially changed by the introduction of pigs, dogs and chickens, some of which went wild, and by the depletion of the bird population as a result of the incessant hunting for them to obtain feathers for ceremonial capes and cloaks. In this second period the land occupation was definitely of an agricultural type, but with relatively few crops really cultivated (mainly taro and sweet potatoes) and no industrialization of agriculture. Because there was no winter to require the laying up of reserve provisions, no intercourse with the outside world to upset their economy, and no apparent
desire for greater diversity of food than the simple diet with which they had long been familiar, the Hawaiian people were able to maintain successfully for fifteen or twenty centuries their occupation of these islands and doubtless could have continued much longer if they had been left undisturbed.

The third period began in 1778 when Captain Cook opened the way for western civilization to enter and to change again the nature of the occupation of the land by using the arable areas much more extensively and intensively for commercial purposes rather than for simple subsistence.

**Diversification**

This third period is one essentially of diversification. In the preceding period the land was required to yield only enough of a few staples to satisfy the simple wants of the people who occupied it, but now there began an era in which the wants and desires of the whole world influenced the uses to which the land was put.

This began with the desires of the crews of merchant and whaling ships which put in at the Hawaiian ports to replenish their dwindling stores of food. Since their tastes and desires were somewhat different from and more varied than those of the Hawaiians, there began to be felt an urge to diversify the agriculture of these islands. Taro from then on gradually declined from its position of predominance among cultivated crops, for it was not in great demand in the outside world, while certain other products and potential crops were much in demand.

From 1800 to about 1855 agriculture in the Hawaiian Islands was not only diversified; it was very miscellaneous, without much order or organization, for the economy of the preceding period was being swept aside by invading forces and the new economy which was soon to establish itself had not yet made itself clear. Many new plants and animals were introduced in an unorganized way by individual effort, without regard to potential harm which might follow; while many of these introductions proved to be useful, a few became more a nuisance than a benefit. Many crops were given more or less of a trial in a groping
effort to find those that would best fit the situation. Sugar cane, coffee, rice, cotton, silk, wheat, rubber, tobacco, vanilla, sisal hemp, several leguminous crops, avocado, banana, orange, beef cattle and poultry stand out as conspicuous among the scores which were given some attention as possibilities. Of some of these early experiments only scant records were kept, and of some none at all, so that our knowledge of many of them is comparatively meagre; of a few, such as sugar and coffee, the early record is fairly complete.

With the invention in 1851 of a centrifugal machine for separating sugar crystals from molasses, sugar production received a great stimulus in Hawaii and within the next few years it emerged definitely as the leading industry.

From 1855 to 1882 the agriculture of these Islands was almost completely dominated by the sugar industry. Efforts and suggestions to foster the development of other large industries were given but scant encouragement, and Hawaii again, as in the long period of Polynesian occupation, became virtually a one-crop country, sugar cane having taken the place of taro in this preeminence.

Actually, of course, this predominance of the sugar industry did not cause the complete elimination of other crops. There were beef cattle ranches, and a small production of coffee, bananas and many other minor things. There was a significance in the persistence with which a few people continued to experiment with other crops and to lift their voices in favor of diversification, even though they did seem to be little more than voices "crying in the wilderness."

In the early 1880's there was a minor panic in the United States which caused a drop in the price of sugar, the injurious results of which in Hawaii were greatly accentuated by the almost complete dependence of everybody on the sugar industry.

1The idea of a centrifugal machine for sugar was borrowed from the textile industry where it had been used for a number of years for drying fabrics. While there were some early efforts made in the 1840's to use the principle in the sugar industry, it did not affect Hawaii until 1851, when David M. Weston made a small centrifugal machine on Maui. The next year he made several larger machines. See N. Deerr, "Cane Sugar," p. 372; J. G. McIntosh, "Technology of Sugar," pp. 256-257.
To add to the distress of this situation there developed a fear lest the new beet sugar industry in California would grow to such large proportions as to ruin the Hawaiian producers. Some believed that the best protection would be the development of other agricultural industries upon which Hawaii could fall back if sugar should fail. The Planters Monthly, organ of the sugar industry, expressed itself editorially as being in favor of such a course, declaring on one occasion, for example, that "several months ago this journal urged the importance of turning attention to some other industries besides sugar. The present decline in the price of sugar is not temporary."² The policy of "sitting down with our hands folded," while the California beet industry "cuts our throat,"³ was severely criticized. Several promising crops were mentioned as alternatives for sugar. As another means toward diversification Sanford Dole and others offered a plan for making land available to small farmers, a scheme which found favor with the Planters Monthly on the ground that it would enable Hawaii to "raise some of the things consumed here instead of importing them."⁴

It cannot be said, however, that this was the view of all. In spite of the current difficulties most of the leaders of the sugar industry remained strong in the belief that Hawaii's best policy was to continue "carrying all her eggs in one basket" and to watch the basket with the utmost care. They vigorously opposed suggestions made in those days of depression that agriculture should be diversified for the sake of economic safety, for they saw the difficulties of rival industries competing for the limited supplies of capital and labor, not to mention land and irrigation water. In the late 1880's recovery of prices and a brighter outlook seemed to have justified this policy, but not for long.

In the early 1890's, a more severe depression began in Hawaii, as a result of the McKinley Tariff Act of 1890, and was greatly accentuated by the American Panic of 1893. This seems to have marked the beginning of a new phase in Hawaii's industrial development, for the down swing of sugar prices again caused much economic trouble

³Vol. VI, p. 390, 1887.
and those who urged diversification of agriculture began
to have a better hearing. There was less opposition than
formerly and more of the leaders of the sugar industry
were sympathetic with that view and cooperated in efforts
to develop new industries. In the Planters Monthly\(^5\) one
reads that “encouraging reports come in from the Ameri­
can colony at Wahiawa,” where 53 homesteaders were
trying to make a living by the production of fruits:
oranges, bananas, pineapples, figs, olives, mangoes,
peaches, etc. Again, one finds evidence of this interest in
new crops in the list of the names of directors of a new
company\(^6\) organized for the production of coffee and tea
in Kona: H. P. Baldwin, Chas. M. Cooke, G. N. Wilcox,
and several other leaders of note.

The possibilities which were considered in the 1890’s to
be most promising for large development were coffee,
pineapple, ramie fiber, and vegetable oils, especially coo­
cnut oil.\(^7\) It is interesting to note that one of these, the
pineapple, actually did become the basis of a major in­
dustry; coffee subsequently had a boom but not for long,
while neither of the other two developed much at all.

Homesteading

In 1895 there came a new stimulus to diversification
when the newly established Republic passed a land act\(^8\)
making it possible for farmers to acquire small land hold­
ings either by purchase or long\(^9\) lease. A beginning at
homesteading had been made in 1884 by King Kalakaua
when he offered many small farm lots for sale,\(^10\) two to
twenty acres each. The conditions imposed by the King
included occupation and cultivation of the land during a
period of five years. Although 557 of the lots were “taken
up,” only 256 were actually deeded to the homesteaders,\(^11\)

\(^5\)Vol. XX, p. 297, 1901.
\(^6\)The Hawaiian Coffee and Tea Co. The Planters Record, Vol. X (1891)
devotes ten pages (77-87) to a prospectus of this company.
\(^7\)Thrum’s Annual 1893, p. 105.
\(^8\)Act 26, Session Laws of 1895.
\(^9\)999 years.
\(^10\)Session Laws 1884, p. 86.
the rest remaining the property of the government because of failure of those who took them up to fulfill their contracts. Those who did obtain their farms do not seem to have done much with them, for their farming operations were not sufficiently successful to attract others to follow their lead.

President Dole's effort was more successful, perhaps because popular sentiment had meanwhile undergone some change and had become more favorable to diversification. Some 521 small land holdings were acquired under the 1895 Act, among them being some in the Wahiawa (Oahu) region where the pineapple industry had its birth. When the Republic became the Territory of Hawaii a few years later the provisions of that Act were continued in force by the Organic Act.

In spite of the fact that homesteading laws in Hawaii have certain weaknesses and have attracted many speculators, nevertheless they have exerted a definite influence toward the diversification of agriculture. Figures compiled in 1928\(^2\) show that by that time over 4000 lots had been taken up. Many of them, it is true, were used for producing sugar cane, but a great many were devoted to other crops in a groping effort to be free from the regimentation of the sugar industry.\(^3\)

**Hawaii Experiment Station**

At the turn of the century, annexation to the United States introduced another influence toward agricultural diversification: the establishment of an experiment station which was to be devoted principally to the objective of developing new crops for Hawaii. When Hawaii became a part of the United States the federal Department of

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\(^{3}\)Homesteading in Hawaii has led to the development of a considerable amount of small farming, the chief incentive for which has been this desire on the part of some individuals to free themselves from the regimentation of big business. The reader who is interested in knowing something of the situation in which the average small farmer or homesteader lives and works is referred to F. E. Armstrong's "A Survey of Small Farming in Hawaii," published by the University of Hawaii in 1937 as Research Publication No. 14; also, to D. L. Crawford's "Paradox in Hawaii," Chapter VII (Stratford, 1933).
Agriculture noted the excessive preeminence of the sugar industry here and, mindful of the unfortunate results of over-specialization in the cotton belt of the southern states, advocated very strongly the diversification of agriculture in these Islands. In accordance with this attitude an agricultural experiment station was established by the federal government in 1901, on the outskirts of Honolulu, which devoted itself to the investigation of potential new crops and industries for this newly annexed Territory. While a large number of possibilities were explored during the ensuing years, chief emphasis was placed on a few which seemed to offer the best promise, notably tobacco, rice, rubber and starch;\textsuperscript{14} also, several fruits received a good deal of attention, especially the orange, avocado, pineapple, mango, banana and papaya; and several vegetable crops.

The work of this Station undoubtedly contributed materially to the successful establishment of the pineapple industry, for, although pineapple production was definitely on the way to becoming an industry before the Station was able to give it any material assistance, it was the discovery of the iron sulfate treatment that enabled the new industry to occupy large land areas theretofore unavailable because of too much manganese in the soil.\textsuperscript{15}

A new force was introduced into the situation in 1907 by the establishment of a territorial institution of higher learning,\textsuperscript{16} which in addition to offering agricultural instruction also conducted some researches in the field of general agriculture. Such federal aid as it received was available only for instructional functions, however, and therefore its agricultural research work had to depend upon territorial appropriations for its support. This disparity with the mainland states was remedied some years later, in 1928, by an act of Congress making available to

\textsuperscript{14}For a summary statement of these efforts refer in this volume to “Tobacco,” “Rubber,” and “Starch” and the other items mentioned here.

\textsuperscript{15}The pineapple industry had not at that time established its own experiment station (see “Pineapple”).

\textsuperscript{16}This was established by the 1907 Legislature as the College of Agriculture and Mechanic Arts, with federal aid from the “land grant college” act of Congress; the name was changed in 1909 to “College of Hawaii,” and in 1919 to “University of Hawaii.”
Hawaii a share of all the federal aid funds\textsuperscript{17} appropriated for agricultural research in the land grant colleges. At the same time an agreement between the U. S. Department of Agriculture and the University of Hawaii was effected for the amalgamation of the federally controlled Hawaii Experiment Station and the University’s research station. During a transition period of several years\textsuperscript{18} it was provided that the fusion station should be controlled jointly by the Territory and the U. S. Department of Agriculture, and thereafter by the Territory alone, with the same cooperative relations with the Department of Agriculture as obtain in the states.

Thus, there finally emerged here an agricultural experiment station with financial support enough to make it an important factor in the diversification of industry in these Islands, and capable of meeting the crisis which was presented by the recent depression.

\textit{Cooperative Extension Service}

Before considering this depression and its effects on Hawaii’s agriculture, however, it is necessary that we turn our attention for a moment to the work of that governmental agency which is widely known as the “Extension Service.”

Extension service began early in the current century as an effort on the part of several state universities and agricultural colleges to extend themselves into rural communities a little more effectively than they had been do-

\textsuperscript{17}The Hatch Act (1887) appropriated $15,000 per year to each land grant college for agricultural research; the Adams Act (1906) added another $15,000 by several annual increments; the Purnell Act (1925) provided an additional $60,000 to each state, also, by annual increments, the first year $20,000 being given and each year thereafter an increase of $10,000 until the maximum of $60,000 had been reached. Hawaii’s participation in these funds was put on the same basis by an act of 1928, beginning with $15,000 in 1929, then increasing to $20,000 the next year and further increasing by $2000 more each successive year for five years until the annual total became $30,000 in 1935; then the increase was to be to $50,000 in 1936 and annual increments of $10,000 each thereafter, until in 1940 the total amount available from the three acts would be $90,000 per year. Meanwhile, the support which had been given by the U. S. Department of Agriculture to its station here (about $42,000 per year) was to be reduced each successive year by the same amount as provided by the Hatch, Adams and Purnell Acts.

\textsuperscript{18}This was the time required (1929 to 1937) for the annual increments to equalize the $42,000 theretofore provided by the Department of Agriculture without reference to the above mentioned federal aid acts.
ing through the medium of bulletins and leaflets. These scattered efforts led to the passage of an act by the United States Congress in 1914, the Smith-Lever Act, providing funds for a nation-wide system of agricultural advisers, or county agents, and to operate in connection with not only the state “land grant” colleges of agriculture but also the U. S. Department of Agriculture; because of this dual arrangement the new program is called the “Cooperative Extension Service in Agriculture and Home Economics.”

Hawaii’s participation in the provisions of this Smith-Lever Act prior to 1928 was indirect and far from complete. The Hawaii Experiment Station, which then was wholly under federal control, was given a small fund annually to cover the expense not of a system of county agents as in the states but only of one agricultural agent in one county (Hawaii) and one home demonstration agent in another county (Honolulu).

In 1917 the World War obstructed the normal movement of commercial shipping to Hawaii and threatened her with a possible food shortage. The situation was met by the establishment of a territorial system of county agents who assisted farmers in the emergency production of food crops. The system was discontinued, however, soon after the war ended.

In 1919 the University undertook to develop, without federal aid, a program of extension service which, though very limited in scope at first, in a few years grew to considerable proportions and became the basis of a successful appeal to Congress in 1927 for inclusion of Hawaii in the provisions of the Smith-Lever Act.

This took effect in 1928 and resulted in a large expansion of the extension service, with farm advisers and home demonstration agents in each county and several technical specialists in the Honolulu office at the University to serve the entire Territory. While this service was directed toward the general objective of helping all rural folk in their efforts to make a living, its most useful function has been the building up of our minor farm

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19 The federal aid appropriation amounted to something over $50,000, with an additional $20,000 of territorial money required as “offset.” This has subsequently been increased to a total (both federal and territorial) of nearly $140,000 per year.
industries and the fostering of new industries, all aimed at the greater diversification of Hawaii’s agriculture.

Large Movement Now Under Way

The recent depression has served as a powerful stimulus to Hawaii to diversify her agriculture. Fortunately, her experiment station and extension service had been developed to the point where they could assist materially in reacting to that stimulus. It was equally fortunate that there had been a definite trend toward diversification since the 1890’s, for even though it was not a strong trend and had elicited only lukewarm support from most of our industrial leaders, nevertheless the ground had been prepared and there was need only for some major stimulus to furnish an impulse toward important developments.

The impulse came first from the pineapple industry. The depression had by 1931 so seriously reduced the purchasing power of the American people that the normal demand for canned pineapple declined to a very low point and left the producers here with an enormous surplus of goods on hand. Being highly organized, the industry was able effectively to curtail its production to fit the situation, but that caused large land areas to be thrown out of use and immediately a search began for substitute crops to keep the lands busy.

Shortly thereafter the sugar industry of the entire world found itself in a similar difficulty, but since Hawaii was only a small factor in the situation it was not possible to solve the problem as simply as the pineapple industry was doing. After two years of futile effort by the industry itself to obtain united action among all sugar producers throughout the world, the United States government devised a plan for itself, drastically restricting imports from foreign countries and placing all her own producers on a quota basis. For Hawaii this meant a curtailment of production and, as a result, considerable areas of land were made idle and the owners began to seek other crops to keep them occupied.

The problem faced by these two major industries in Hawaii, and by the Territory as a whole, was not one that could be solved quickly, for new industries cannot be established in a day. Fortunately, however, a minor feature
of the sugar quota plan provided a means of working out a solution for the problem: a small part of the money to be collected by the federal government as a processing tax on sugar was to be set aside for use in developing other agricultural industries to take up the slack in the sugar industry. For Hawaii this amounted to about $500,000, and was to be spent in accordance with the advice of a special committee created by the federal government, all local men except one representative of the U. S. Department of Agriculture. This committee devised a plan for (1) assisting several minor industries to meet their most serious difficulties and thus be able to expand as much as they might be capable of doing; (2) devising, if possible, new processes for marketing present crops (such as taro, etc.) ; and (3) exploring the field for crops new to Hawaii which might become the basis of important industries. The major portion of this work was assigned to the Hawaii Experiment Station and the Extension Service and got under way in 1935 and 1936.

Although some very important results from this work are beginning already to appear, the most significant feature in the present situation is the cooperative interest being shown by the leaders of both major industries.20 Even though the present crisis has passed for both, there is the general realization, made still more vivid by the shipping strike of 1936-1937, that Hawaii's best economic security lies in a reasonably wide diversity of her agricultural industries, rather than in a concentration of all effort and resources in two major industries.

A movement of major importance to the Territory is under way, out of which there will probably emerge in due course of time one or more new industries of large economic value to Hawaii. Another result should be an increased production of many of the food commodities which are required for local consumption.

Study the Past

At the present stage in this movement toward diversi-

20See, for example, the report of the "Committee on Diversified Agriculture" of the Hawaiian Sugar Planters' Association. In 1935 the H.S.P.A. appointed a committee to study possibilities for effecting greater diversification of industry in Hawaii. The first report of this committee was published by the H.S.P.A. in October, 1936.
fication, when a wide search is being made for those crops and industries which hold the best promise for Hawaii's future, it is well to examine carefully the records of past efforts along the same line. Many kinds of plants and animals have been the object of experimentation here during the past 150 years, some of them having seemed for a time to be so promising that considerable sums of money were invested by interested people in the expectation of developing remunerative industries on them. Examples are rubber, starch, tobacco, banana, coconut, sisal, cotton, etc.

The record of the past reveals, also, that some industries flourished for a time but eventually waned when the commodity on which they were based passed out of vogue or was supplanted by something better or cheaper, or when the natural supply became exhausted as in the case of the sandalwood. Examples of commodities which were supplanted are the pulu (tree fern silk), exported to California for upholstery uses until California cotton took its place; wheat, potatoes and rice shipped to California until production there proved to be cheaper; pepeiau akua, a mushroom growth which was the basis of a flourishing trade for several years; sisal hemp, and several others might be added.

The Present and The Future

Out of the efforts of the past decades two industries of major proportions are now established and thriving well, each yielding economic returns to Hawaii annually of many millions of dollars; also, a goodly number of minor industries are yielding their thousands and hundreds of thousands of dollars of returns and even, in a few instances, a million or more.21 These are worthy of careful study to discover latent possibilities in them for further expansion.

A summary list of these is as follows:

Over $10,000,000 per year:

Sugar cane and its products
Pineapple—canned, fresh and by-products

21In appraising the value of these industries local consumption as well as exports is taken into account.
Over or near $1,000,000 per year:
- Beef cattle
- Dairy cattle
- Poultry (including eggs)
- Coffee
- Swine
- Taro

Over or near $100,000 per year:
- Rice
- Banana
- Papaya
- Potato
- Flowers
- Cabbage
- Coconut
- Avocado

Over or near $50,000 per year:
- Tomato
- Watermelon
- Honey and beeswax
- Sheep (wool)
- Macadamia nut
- Guava
- Truck crops (other than those specifically mentioned)

Considerably under $50,000 per year:
- Citrus fruits
- Sweet potato
- Onion
- Mango
- Strawberry
- Poha
- Asparagus
- Cotton
- Ohelo

Livestock feeds have not been included in the above list because their value is expressed in the beef, pork, dairy and poultry products into which they go. The most valuable of the feeds are pasture grasses, pigeon pea, algaroba, molasses, pineapple bran, etc.

As for the future, one can but examine current trends
and point out certain potential possibilities which seem to offer more promise than others for profitable exploitation. There are two important trends which should be kept in mind in looking to the future:

I—The development of one or several new industries for the large markets outside of Hawaii; certainly the following should be given consideration:

**Fiber crops:**
- Banana
- Bowstring hemp
- Pineapple
- Ramie
- Silk
- Sunn hemp

**Fruits and nuts:**
- Banana
- Cashew nut
- Guava
- Litchi
- Macadamia nut
- Mango
- Papaya
- Passion fruits

**Starch crops:**
- Canna
- Cassava
- Sweet potato
- Taro

**Vegetables:**
- Asparagus
- Pigeon pea
- Potato
- Tomato

**Miscellaneous:**
- Soy bean

Among these twenty-odd there are a few which seem to offer especially good possibilities for development on a large scale:

1. **TARO**—Hawaii is both accustomed and adapted to the production of taro; as for marketing, it should not be
very difficult to introduce taro flour and related products in the American market and thus develop an adequate outlet for all that Hawaii could possibly produce.

2. FRUIT BLENDS—Instead of trying to introduce one or several new fruits to the American market, with all the expensive advertising and educational effort which that would require, it is suggested that fruits and fruit juices be combined and offered to the mainland under an already familiar label such as “Hawaiian” or “Tropical,” both of which carry definite sales appeal without any preliminary campaign of education. The proposed plan should be considered under two subheads:

(a) *Hawaiian Fruit Cup*—Since a process is now known for making papaya hold its shape when canned, it is suggested that a combination of diced papaya, mango and pineapple with whole litchi (seeded), be canned under a trade name such as “Hawaiian Fruit Cup.”

(b) *Tropical Punch*—The juice of several fruits, as papaya, passion fruit and perhaps others (guava, pineapple, etc.), could be blended to make a delicious base for fountain drinks, cocktails and other uses.

3. WINTER PRODUCE—The mainland market is relatively very short of certain standard commodities during the winter months and offers a special inducement to Hawaii to develop a seasonal business on a large scale. The best opportunities for this are in the following commodities:

(a) *Potato*—So-called “new” potatoes are very scarce in the mainland markets in the winter and early spring months and Hawaii already has begun to take advantage of the situation. Several hundred acres of this crop are being grown and a profitable industry is developing. It could develop into very large dimensions, especially in combination with such a crop as *Soy Beans*, for which there is an almost unlimited market now.

(b) *Asparagus*—This is another crop which offers great promise for development into a large and profitable seasonal industry, but unlike the potato
it would occupy its land throughout the year and could not be alternated with another crop.

(c) Tomato—If some means can be found to secure a modification of the fruitfly quarantine, a large industry could be developed in the shipping of winter tomatoes to the mainland.

The chief difficulty in all three of these winter produce commodities is that they would be shipped in the fresh state and would, therefore, involve all the risk that lies in the sending of perishables to markets 2000 miles distant. When it is considered, however, that Mexico and the Pacific Coast states ship thousands of carloads of fresh fruit 2000 to 3000 miles to reach the large markets, Hawaii should encounter no insuperable obstacle in the matter of distance. It is believed, moreover, that there are exceptionally attractive possibilities in this seasonal trade.

II—The production of many kinds of fruits, vegetables and other crops on a comparatively small scale, chiefly for consumption within Hawaii. In this category the following (arranged alphabetically) seem to offer good promise:

Avocado
Banana
Beans
Breadfruit
Cabbage
Cauliflower
Citrus fruits
Coconut
Dairy products
Fig
Mango
Melons
Onion
Potato
Poultry
Strawberry
Taro
Tomato
Truck crops
**Crop Parade**

To summarize the wealth of experience of the past century and more, all plants and animals which have been used or tried for economic purposes, are passed in review in the following pages, a parade of crops and agricultural products. For this I have drawn upon many printed records of the past and also on unpublished recollections of several individuals whose experiences in diversified agriculture in Hawaii have been extensive.

For convenience of reference the items are arranged in alphabetical order of the common or trade names, with scientific names in parentheses to make the identity of each more certain. An index of scientific names is included at the end, for added convenience.

Emphatically it should be said that this encyclopedic roll call is not offered as a manual of directions for the commercial producing of the crops reviewed. Those who desire information of this kind are directed to certain published bulletins and books which are cited at the end of the individual statements in the following pages.