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SUNDAY MORNING SESSION

August 12, 1973

VICE-PRESIDENT OKI: Our session this morning will be chaired by our able program committee member from Hawaii, Bob Warner. Bob, will you take over now?

MODERATOR WARNER: Our first speaker this morning is Donald Watson. He is Professor of Horticulture at the University of Hawaii and is working in Urban Horticulture. He has been doing a lot to bring the beauty and freshness of living plants to the city dwellers. He has had a local newspaper column for over a year and has a television program every other week. His topic is "Plants are for People." He has written a book with this title that was published just a couple of months ago. It is a great deal of pleasure to introduce my associate, Don Watson:

PLANTS ARE FOR PEOPLE¹

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About a thousand years ago when the Polynesians first settled in Hawaii they were greeted with a forbidding shoreline, a blue ocean, and attractive beaches, but absolutely no plants. There was just no vegetation whatsoever. Anything that is growing on these islands has been brought in since. When they arrived in their outrigger canoes they gradually climbed into the areas where they might be able to grow things and they brought with them quite a number of the plants to which they were accustomed. In some areas there was so little rainfall that it was practically impossible to grow anything and in other areas there was so much rainfall that it was an absolute paradise that would later grow into a jungle.

Now the most common and perhaps the most necessary plant as far as the Polynesians were concerned was the taro [*Calocasia*

¹ Ed Note This paper was given extemporaneously and transcribed on tape and supplemented with 160 Kodachrome slides

esculenta]. Taro was basic in their diet. They had to have a good source of carbohydrate and today at the Lyon Arboretum there is a collection of many, many kinds of taro. Hawaiians had names for each clone and some of them were quite attractive. Some had a white root, some an orange root, and some quite red. They boiled the taro root, then pounded it into a paste. It is often misrepresented today at a luau because people get the idea that they are supposed to sit there and eat taro and that is not exactly true. The taro is primarily used as we might use mustard, for instance, as a seasoning to eat with your food. Today it has become extremely expensive because there is not enough to supply the demand. It is being used by dietary manufacturers and baby food manufacturers to a large extent because it is a good source of carbohydrate and it is not made from wheat flour.

The second and perhaps equally important plant was the coconut [*Cocos nucifera*]. The coconut — to tropical and subtropical islands — is an absolute necessity because it is used as food. Most of our coconut meat comes from Fiji or Samoa or somewhere else. The coconut in Hawaii is primarily ornamental — in two kinds, a dwarf one and the tall one. From a landscape point of view, the dwarf one, called locally the Samoan coconut is useful. It is called Samoan because the ship that brought the original seeds apparently stopped at one of those islands on the way here. The coconut yields very heavily; with each new leaf, in the axil, there is one inflorescence and that inflorescence gives rise to quite a number of fruit. Of course, in many places it is still a source of income, but I think the most valuable part of the plant, as far as we are concerned, is the view that you get as you look down through the leaves toward the beach. It grows well along the beach in sandy soil as long as the salt water is filtered before it gets to the roots. The leaves have many functions. The webbing that has been made by the Fijians is commonly used to decorate stages or walls of houses. They are also made into coconut hats. At Christmas, the brim of the coconut is often used as a wreath and for a local Christmas decoration there isn't anything more simple or effective than a coconut leaf wreath with three red anthuriums on it.

Another plant which was extremely important to Polynesians is the breadfruit [*Artocarpus communis*]. Breadfruit is a common food of people who are not able to get wheat or rice. The fruit itself, when mature, is creamy colored inside; all that is done is to wrap the fruit itself in aluminum foil and bake it. It is used as a good source of carbohydrate and is a basic food of those who are brought up on it.

The next plant, which was one of the early Polynesian introductions, is the hala or pandanus [*Pandanus odoratissimus*]. Hala is still quite a common ornamental; it has both male and female

flowers on the same plants. The roots are attractive in that they have a prominent prop-like structure which holds the tree firmly in the tradewinds. Mats are woven from leaves of the hala. They wear very well, and there are still quite a few of them being made. Many woven leaves are being sold as place mats. The early Polynesians used them as floormats; they put them on pebbles so that the air would come up through them. They would keep cool and dry and make a very good floor. The fruit itself is often called the "tourist pineapple" because it does resemble a pineapple. The little individual sections, if they are pulled apart, when ripe become quite orange in color and make attractive leis.

After the hala comes the ti. Ti seems to be quite a controversial plant. We think of all of the tis, the variegated or colored types or the green one, which is the more common, as *Cordyline terminalis*. I know that in Florida they call some of draecena's, ti, and there is confusion in the naming but actually it is based on the flower structure and as far as I can tell the bulk of all of the tis are *Cordyline terminalis*. They are used for the hula skirts, a relatively new custom. There are, nearly as I can tell, some 70 different clones of ti that are being grown, although not more than five are being grown commercially. There is quite a demand right now for cut ti leaves on the mainland, especially during winter months. More and more of this foliage is being shipped out of Hawaii. The fruit on the ti is attractive; it looks like a small red grape. Ti is a member of the lily family and it can be grown from seed; this is why we get so much variation.

The kukui [*Aleurites moluccana*] is the Hawaiian state tree; it produces nuts which are polished and made into necklaces. I am sure that you have seen a lot of these around. The flower looks a little like a lilac and the fruit a little like a walnut before it has the husk taken off. But if you take off the husk and start to polish them and work for at least a day on each nut you can get it highly polished and it will always remain shiny due to the oil in it. The name kukui comes from the fact that originally Polynesians strung them on coconut straws then used them as candles; they set fire to them to burn the oil to produce light.

Here are more introductions which I selected because they are some of the most common and, I think, most attractive. The hybrid "showers" are certainly at the top of the list. The pink shower [*Cassia javanica*] is one of the parents and the golden shower [*Cassia fistula*] is the other parent of the "rainbow shower tree." These hybrids vary, all the way from cream-colored to almost watermelon-colored. They are certainly one of the most prominent trees in Hawaii.

The lychee [*Litchi chinensis*] which, of course, is very popular with the Chinese has a delectable fruit; it is one which we do not export but it is grown quite widely.

The African tulip [*Spathodea campanulata*] is a good tree, because it flowers every month of the year. It has a huge inflorescence with many buds behind the flowers. It not only is an attractive flower but it also produces a very good pod.

Brassaia, the octopus tree, is grown a great deal in Hawaii. It is not only a good tree in the garden but also a good plant for decoration when grown in containers.

The sausage tree [*Kigelia pinnanta*], the flower of which has a vile odor, is popular because it is so unusual, with its big sausage fruit hanging down.

The monkey pod [*Samanea saman*] is one of our best shade trees. There are not many that get to be as large as they could because they are grown so often in the city where they don't have enough root space. The wood is popular; it is used a great deal for carving and making dishes, bowls, and ornamental objects. Some are carved in the Philippines and shipped in here but others are done locally.

A more recent introduction is the mussaenda [*Mussaenda erythrophylla*]. I don't know whether this is being grown much on the mainland but it was brought in here from the Philippines. I have a feeling that if it were properly grown, it could be used as a pot plant on the mainland and perhaps could become very popular, because the bracts adhere for a long time and it is certainly attractive.

Another plant which I think is interesting is the norantea [*Norantea guianensis*]. I don't know where the name came from but I always think of noren, which the Japanese use on an entrance to give an indication of just what is going on in the building or in the store. I think of it as having some relation to this noren because these little flowers hang down like a noren. We had just one norantea plant on the campus and everytime you went past you would see that someone had an air layer here or there. That was about eight years ago and now there are two or three other plants on the campus and I notice occasionally you see one turning up in someone's yard. It is not common, but it is different and I think quite attractive. It is quite vinelike in habit.

The next one is the desert rose [*Adenium obesum*]. It is closely related to plumeria; I wondered if, perhaps it might be crossed with plumeria. I don't know. It varies from pale pink and white to a deep rose. It is quite woody and requires a hot dry location.

More common is the shell ginger [*Alpina nutans*]. Frequently the torch ginger [*Phaeomeria magnifica*] is mixed with the red ginger. The torch ginger is attractive but it is awfully heavy and isn't used a great deal to ship out of Hawaii because of its weight — and it doesn't keep too long.

The *Musa coccinea*, or crimson banana, I think, has a tremendous future but there is so little of it available that it is hard to push as a marketable crop. The plants don't flower too profusely but certainly there is no difficulty selling them for a dollar per stem and they last for almost a month as a cut flower.

A flower that is most representative of Hawaii, because there are so very few other places that it grows, is the silversword [*Argyroxiphium sandwicense*]. The silversword, only grows in the mountains at 7,000 to 10,000 feet and especially in Haleakala, Maui. It belongs to the Compositae and is certainly unique.

I like the Jade vines. They are of Philippine origin. The flower of the green jade vine [*Strongylodon macrobotrys*] has an almost synthetic green color. It is certainly unusual; I don't know of any other plant which produces a flower of this color. It is not legal to take it to the mainland because it may have an insect in the pod. They are woven into leis but this is a little dangerous because the sap within the jade vine, if it hasn't been well dried, will stain a dress or a shirt. There is a red jade vine [*Mucuna bennettii*] which I think is not as attractive because the color isn't as unique; yet it is a very conspicuous plant with a large flower.

Now, a few of the agricultural crops. The most common, and the one which is really the symbol of Hawaii, is the pineapple [*Ananus comosus*]. I doubt whether there is any agricultural crop anywhere that is grown as scientifically and as effectively as the pineapple has been grown in Hawaii. I am not sure how long this will continue because pineapple land is certainly desirable for real estate subdivisions and more and more of it is going in this direction. However, the pineapple is an interesting Bromeliad; it is attractive even when it is a little fruit or when it gets to be a mature size.

The sugar cane [*Saccharum officinarum*] we must place in the same category as pineapple. You will notice as you go through the islands toward higher elevations the pineapple takes over and the sugar cane stops. The sugar cane flower is really attractive. I always thought how interesting it is when you come in by air and look down on the fields of sugar cane. If you are high enough it looks exactly like a golf course, because it is nothing but a field of grass. There has been a lot of criticism lately because of the burning of the sugar cane fields. It doesn't bother me really because as long as the trade winds are blowing off goes the smoke over the ocean. I don't think it is too serious.

Macadamia [*Macadamia integrifolia*], as you know, came primarily from Queensland in Australia but it is being grown here effectively. It has an attractive flower. Not as many fruits set as we would wish; from the long inflorescence we rarely get more than 3 to 5 nuts. Yet it is an excellent crop; practically all

of the processing up to now has been done here. I understand there is a lot of macadamia planting going into Central America and other parts of the world, but as of today most of it is being grown in Hawaii. At Christmas, people even use the macadamia leaves, which have kind of a holly-like look, for decorations.

The wood rose [*Operculina tuberosa*] isn't exactly a commercial agricultural crop. There used to be a lot more wood roses grown than there are today. And when the capsules are almost mature they are cut and hung upside down in a hot, dry place, then they break open exposing seed cases which are usually sprayed with plastic so that they stay shiny. There are not enough being grown to satisfy the market.

Coffee [*Coffea arabica*] has been a big crop, especially on the island of Hawaii, but today there is difficulty in getting labor for harvesting so there is not as much coffee grown as there used to be. It is an attractive fruit when it is ripe. They're working on mechanical harvesting and, with the cost of coffee going up it may increase in production; I am not sure.

Mango [*Mangifera indica*] is a good fruit. The tree is attractive — the fruit is attractive and, of course, it is just delicious. But there are no mangos being shipped out of Hawaii; there is no mango orchard that is big enough to produce enough fruit to make it worthwhile and, of course, there is a restriction because of an insect that may be in the pit. Mangos may be shipped out after being processed but there are just not enough mangos growing to consider them a commercial crop. Someday there may be. I hope so.

Papaya [*Carica papaya*] production has increased tremendously in the last few years and many of them are being shipped out of the state, in both directions.

The anthurium [*Anthurium andreanum*] is one of our biggest flower crops and I think it is of interest, perhaps, to draw your attention to the fact that the spadix, the part that sticks up in the middle, like a pencil, is divided into many hundred little individual flowers. At a certain time, the stamens protrude and the pollen is shed and then later the fruit develops like a little pea on the outside. Anthuriums can be grown from seed but the use of seed is only for plant breeding. To make anthurium flowers keep well it is quite important to hold them at a high humidity. If you enclose the top in a plastic bag and don't even stand the stem in water it is much more likely to last longer than it would if the stem were just in water because you are preventing transpiration from the top.

The Vanda orchid 'Miss Joaquim', is perhaps the most common orchid. There are lots of these orchids being grown commercially, yet there are times in the year when you can't begin to

get enough. The individual flower is indeed attractive. It has become so common that I don't think it is as well respected as it should be. It is especially good when the flower is pulled apart and it is made into what is called a Moanaloa lei.

There are quite a few bananas [*Musa* sp.] grown. However, there are a lot of bananas shipped into Hawaii from Central and South America and the West Indies.

The plumeria [*Plumeria* sp.] you might not think of as a commercial crop but it is becoming more and more commercial all the time because so many are being used for making leis. There is a great variety in plumerias — from the yellow to pink and all kinds in between, and the flowers keep well.

There is very little plant breeding or other work going on with the hybrid hibiscus. This seems too bad because the hibiscus grows extremely well in the islands. They are large and colorful, and they are certainly useful for decoration. There are a few growers who do some crossing and there are plenty of plants available but there is not as much breeding going on as there should be.

Now a few of the activities that are going on at the University. The breeding work that Dr. Kamemoto has done with anthurium is beginning to pay dividends. It has been a long, slow breeding program as you can understand. But he has just recently introduced the 'Red Elf' which has two spathes instead of one and it is gaining in popularity, but it takes time to produce enough to get them into the market. Similarly, work he has done with the dendrobium orchids is part of the plant breeding program that has been successful and certainly productive.

Dr. Parvin and I have been working with the introduction of proteas. The silver tree (*Leucodendron argenteum*) has excellent foliage and is coming into demand. Some are grown in Southern California; I think there is more of a future for some of the banksias than for the proteas themselves because they dry so well. I think that proteas, as a dried arrangement, have a great potential.

Dr. Criley has been working with plumerias, not only with breeding but with light intensity and with temperature. He has shown that with slight increase in temperature he can speed up the production of flowers considerably. Work with lettuce, much of which was done some time ago, some of it is still going on, has proven to be extremely valuable for the local market. Some of our introductions of lettuce are the best that I have ever eaten. I hope that you have eaten some of the local lettuce since you have been here because it certainly is delicious. We have a semi-head lettuce which is absolutely delicious and which we can grow extremely well.

Dr. Gilbert's work has influenced tomato production all through the tropics. He has developed new tomato varieties for the tropics. We have to be careful about our day lengths and we have to breed for resistance to nematodes and to disease.

For a number of years Dr. Robert Warner has been developing an arboretum of economic plants at Waimanalo Research Station. The cashew [*Anacardium occidentale*] isn't common in Hawaii but he has cashew trees out there. Here is a picture of the fruit with the nut on the end of it. Also cloves [*Syzygium aromaticum*] can be grown quite easily; they make an excellent clove if they are picked and used fresh. You see, it is nothing but the bud before the flower has opened. It is picked and dried or used fresh.

Now, in conclusion, I want to make it clear that in spite of the fact that our city has turned, like most cities, into high buildings with a lot of concrete, there is still quite a bit of appreciation of plants. The fact that the Hawaiian plants are related to the Hawaiian people is due to a great extent to the Polynesian upbringing and the Polynesian beliefs.

MODERATOR WARNER: Thank you, Don. Now we will have one more presented paper that was not on the program. Bill Barr of Monrovia Nursery will tell us about his experiences in rooting *Pinus radiata* cuttings. Bill:

ROOTING PINUS RADIATA CUTTINGS

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The Monterey pine, *Pinus radiata*, is normally grown from seed. As a result the progeny are quite variable. Monrovia Nursery, in cooperation with Dick Maire of the Los Angeles County Extension Service, Dick Puffer, of the San Bernardino County Extension Service, and Fred Dorman, of Highland, California, have been experimenting with vegetative propagation of this pine. We are also observing these cutting-propagated plants in one and five gallon containers.

Our objective is to find a *Pinus radiata* clone, with good characteristics, that will root in a high percentage. Of major interest is smog resistance, color, shape, and compactness. These vegetatively propagated trees could be very desirable as Christmas trees and as general landscape plants in southern California.