

by any congress in this country for this work was the great sum of \$1,000. It was in 1839 and was for the collection and introduction of useful seeds and plants from abroad.

So men have gone into the far corners of the world, trying to bring those things that make for a better and more useful life, profitable in a com-

mercial sense, but more profitable in a greater sense.

Here at the end of the trail, we look to Florida for the creation of this sort of thing for all garden-lovers and plant-lovers to come and enjoy the best things the plant world has to give you.

ORIENTAL PLANT EXCHANGE, WITH SPECIAL REFERENCE TO LITCHI AND CITRUS

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The address we have just heard by Dr. Rolfs, in which he has so interestingly recorded the influence of the lives of some well known men in the development of the horticulture of your state, reminds me of a debt of gratitude we, on the other side of the world, owe to some of these same men, particularly those of the federal government service. I am sure it will interest you to know that just as these pioneers in plant introduction in our own country have played a large part in the plant improvement of your state, so their influence is being felt in other parts of the world. I refer particularly to Dr. David Fairchild, who is with us tonight; to Dr. Walter Swingle who is America's outstanding Sinologue in the plant field; to Dr. Frederick V. Coville, Dr. O. F. Cook, and others who have been great friends of China and keen students of her flora and agricultural problems. As these men have inspired and helped you, so they have stimulated those of us who are in foreign service.

The subject first assigned to me this evening was Horticulture in the Orient. The Orient, or even a small portion of it such as China, is far too large a geographical unit for the constructive thought of a short sketch such as this. Within the scope of that which I shall say to you tonight I can only hope to leave with you in outline: (1) the intense interest of the Orient in horticultural pursuit; (2) the genera in which China's chief subtropical fruit interests lie; and

(3) something of the cultural methods and problems which the Orient has experienced in fruit production.

The primary subject of my remarks, however, is that of Oriental Plant Exchange, especially as related to China. The pictures which I shall later show are associated with this subject of plant exchange between China and the West as we of Lingnan University, representing both Chinese and American interests, are related to it. The object of my present sojourn in Florida is entirely connected with a study of your plant resources, particularly fruit and nut crops, with a view to the acquisition, suitable propagation, and transshipment of species and varieties desirable for introduction into South China. On the other hand I would assure you that in spite of all that has been done in plant exploration in China the areas of southeastern Asia have been barely scratched for new plants, and they contain numerous forms you still need to enrich the horticulture of your verdant and productive state.

The Chinese people intuitively believe that "all within the four seas are brothers," particularly when it comes to the arts of peace, and of which horticulture is one of their most highly developed. We believe there is no field in which more lasting friendships can be established, within the state, within the nation, and within the world at large than in this field of plant interest and plant exchange. Here then is opportunity for reciprocal

relationships of immense import to both East and West: one contributing to the other not only in the actual transfer of living plant materials, but also in a study of ancient cultural methods, and in benefits which may be derived through modern scientific research.

I am aware that here in Florida of the present day when the average promotional plantsman thinks of China he first thinks of Wood or Tung Oil trees. This is truly one of China's great modern plant contributions to America, but there are many others, and there will be many more. My remarks this evening will be largely confined to this immensely fascinating subject of Oriental plant exchange as it is related especially to Lychee and Citrus, with also a little regarding Bamboo, in all three fields of which we of Lingnan University are peculiarly fitted to make small measure of contribution to future world development; and for the culture of all of which the state of Florida seems well fitted in soil and climatic requirements.

In order to fully acquaint you with the regions of Asia from which our pictures are largely drawn, and in which our present interests largely lie, I should explain that China in area is larger than the United States; and has as diverse soil and climatic variations as we experience here in America. No doubt many of you have read the fascinating travels of Marco Polo. His land of Cathay has become popularly known in the West as all China. But this was not the concept of Marco Polo. He differentiated clearly between Cathay and Manzi, both lands of immense scenic beauty, but of vast contrasts. Marco Polo's Cathay extended from the cold, wind-swept desert expanse of northwest China, with its camels and caravan trains, well into the lower Yangtze teeming with life. With this area the Florida horticulturist has little in common. But Marco Polo's

Manzi is the summer monsoon-favored hills of present-day China and Indo-China, covered with grains, grasses, and bamboo, and extends into the citrus and lychee fruit laden areas of the frostless coast of southern China. This land of Manzi, then, is the China we picture tonight. With the plant lore of this fascinating area you

should be most thoroughly acquainted for the further advance of your own horticultural interests.

Southern China, of which Canton is the metropolis, was at one time a land of barbarians to the people of China proper, just as Florida was to the average American mind not so many years ago. But today this region is the center of China's hopes and aspirations; a sun-warmed area of ample rainfall where nature is generally kind, and where famines rarely occur. Chinese history records how Su T'ung-po, high official, poet, and essay writer of first rank in eleventh century China, was actually banished to this country, known as "Lingnan" or "South of the Range," because he had spoken disrespectfully of his Emperor. But of the marvelous fruits of this then slightly known area, developed at so early a date as this, Su T'ung po has left us many poems, no less than eight on the Lychee alone. In one of these he remarks, with that sense of humor so characteristic of the Chinese, and in words which heaped coals of fire upon the heads of his enemies (I quote from English translation):

"Beneath these green mountains where spring rules the year,

Where Myrica and Loquat in season appear;
And feasting on Lychee—three hundred a day—
I shouldn't mind staying eternally here."

Horticulture in South China is not for the plantsman alone. Nor is it primarily a money-making proposition. Horticulture in the Orient, particularly in China, relates to the best in life as expressed in the home, in literature, in health, as also in wealth—in commerce. Take for example this most interesting and important fruit of China, the Lychee, the most highly cherished and distinctive fruit of that great nation, which you here in Florida are only beginning to know. Chinese poets and essay writers have sung praises to this fruit for centuries. Chinese officials and gentry of the past and present day encourage the cultivation of these fruits by assembling and protecting parent trees of choice varieties, by disseminating information regarding cultural methods, and by encouraging the description of varieties. The importance of the Lychee in the eyes of the

Chinese is evidenced by the fact that there are more than a score of treatises on this important fruit by very famous Chinese authors, beginning with that of Ts'oi Seung in A. D. 1059, his *Lychee P'u* or Book being the first horticultural monograph extant, and extending to that of Wu Ying K'uei in 1826. Fellowship clubs in China are formed to enjoy and promote the Lychee. Two years ago this summer, in the height of the Lychee season at Canton, I travelled through pouring rain and over almost impassible roads to a famous hill Lychee district fifty miles distant from Canton. Here I sat with the Governor of China's most wealthy province, Kwangtung, with the Commissioner of Education, and the Director of the Bureau of Agriculture and Forestry, all of whom were enjoying a day's outing with the humble villagers of this renowned area, judging plates of Lychee, and eating to the full. These Lychee clubs, as also Lychee parks, have long been known in China. Let me quote briefly from Mr. Michael J. Haggerty's translation of Sung Chio's Lychee Club in the Ming Dynasty.

"The people of leisure in Wu and Yueh (which were two non-lychee producing regions of China) who hear of this fruit can enjoy it only with their ears, though the hearing of it makes them imagine they can see it, and causes their mouths to water so profusely that they wet their feet and are compelled to roll up the skirts of their robes, embarrassing them so that they do not know what to do.

"My friends of the same tastes as myself in the village are few, and their capacity for eating lychee is very small. Many times have I wanted to invite a number of friends to form a club. Accordingly on the 6th day of the 6th month we began to meet in the Tsui family garden, and we agreed to meet once every day until the lychee fruiting season was over. The by-laws of our club consisted of five articles. I was made director of the club. Though this fruit is a wonderful and mysterious thing, yet we are able to value, cherish, and also guard it by forming into a club those who have the same liking for it as ourselves.

"We will meet when the weather is fine. For

a tent we will use the heavy shade. For a bath we will use the cold fountain. For a covering we will use clothing that the breezes blow through. For illumination we will use the cool moonlight. To mix with the lychee we will use dark blue wine. For relief from over eating we will use cold syrup. To verify statements concerning the lychee we will use the old records. To record our business we will use new poems.

"Although we are living in a foul, dusty world, still we are able to view the borders of the capital of the genii, and while our bodies dwell within a fiery city, our spirits roam throughout the cool vallies. Not only those people of leisure living in Wu and Yueh cannot gratify these longings, but that even famous historical personages (their names being given) could not compete with us is clear."

Thereafter follow the five by-laws of the Club, three and four of which I cannot refrain from quoting:

"(3) The club will meet in the morning and adjourn in the evening. At noon we will eat some vegetable congee and in the evening supplement this with several cups of clear broth. There will be no large vessels of strong rank meats to mar the refinement of our gatherings.

"(4) When about to separate each member must select a theme and a rhyme, and at the following meeting he must present his poem. If it is not finished he is punished by having three thousand fruits taken from him. At meeting time members will devote themselves to eating and drinking and not occupy themselves with poems and songs, but each following his own inclination may either take the tripod for warming tea, play chess, recline upon a pillow or mat, enjoy fragrant incense, chat, laugh, and not bother about anything else."

That is a digression from the subject of plant exchange, but I believe these few remarks relative to the all important fruit of China, the Lychee, leaves you with a feeling of that intense interest in horticultural pursuit which is a part of the lives of so many active officials, gentry, scholars, and business men of China. This intelligent concept is one of the three outstanding

features of Oriental horticulture I said I hope to give you in passing.

Let us return again to the subject of plant introduction and international plant exchange. Horticulture, we believe, is an important agent of civilization. The love of plants, and their intensive culture, attaches men and women to their homes, and makes of them more stable citizens. Accordingly, rich and poor of every clime should be able to easily obtain, under the proper quarantine regulations to restrict insect and disease pests, all the seeds and plants they need to beautify their homes, and to build those important plant industries which will contribute to their happiness and welfare. It was a great day when primitive man first scratched the soil, and gathering a few seeds or plants in the wild, planted and cultivated them near his home. Later he built a wall around his garden to protect the most precious of these plant treasures, and henceforth we had gardening within the enclosure, called horticulture. But it was an equally great day when man travelling to new climes tucked away on his person, or in his baggage, a few seeds or plants to take with him. Travellers and explorers, ambassadors and statesmen, Buddhist and Taoist priests and Church fathers, have all played an important role in plant immigration. In this modern day, when laws restricting such efforts of the individual are current, it behooves the higher organizations of government and learning to pick up the torch and continue the trail.

In the world's development of cultivated plants China, with her "Farmers of Forty Centuries," the "Mother of Gardens," to quote the titles of two outstanding works on these subjects by the late F. H. King and E. H. Wilson respectively, is particularly deserving of attention. China, and neighboring countries of the Orient have given to the world many valuable plants, both cultivated and wild. Tonight you shall hear in slight detail of some Citrus fruits, the most striking botanical species of which first came from China, though these are now more highly cultured, selected, and hybridized in this and other parts of the world. I might dwell at length upon rice, soya bean, Lespedeza, sugar cane, the tea plant, the peach, disease resistant pears and chestnuts,

the jujube, the persimmon, and more recently the wood oil tree, all of which have been a direct contribution from China to the world.

In China at this time we are particularly interested in the fact that species and varieties of plants sent from one country to another are often highly improved in the new country by selection, and by breeding with similar species from other parts of the world. These may later come back to the parent country in an improved state. Roses offer an excellent illustration of this, as your rose exhibit discloses. Of the hundreds of species of roses distributed throughout the northern hemisphere, there are about a dozen important British species, a dozen or more North American ones, and a similar number Chinese. Rose fanciers of Europe and America have crossed and recrossed these in hybridization, and from the results have selected and described an endless number of cultured forms which are being propagated true to type by cuttings and by grafts. *Rosa Indica* L., the fine red monthly rose of China, has been of unusual influence in this development, as have several other Chinese species. Today we are introducing into China, and are grafting into native stocks, these improved strains of roses from all parts of the world.

Sugar cane, though introduced into China proper, extended in its primitive range from India to Cochin-China. From southern Asia it spread into Africa, and then into the Americas. Improved strains of sugar cane are now being introduced into China from Cuba, Porto Rico, Hawaii, Java, and the Philippines.

Citrus is of chief interest here in Florida, as it is with us in southern China. Today many specific and varietal forms are recognized in botanical and horticultural literature. But ancient Chinese literature recorded but two main groups of Citrus fruits: the "Yau" or Pummelo, and the "Kwat" which was some kind of loose-skin orange, and from which the name Kumquat is derived. Later the sweet and sour orange began to appear in the literature, as also the lemon and citron. China is full of interesting Citrus forms, many of which are natural hybrids. But from the point of view of our present discussion I believe it will interest you to know that as a result

of our co-operative undertakings with the United States Department of Agriculture, we are now assembling for shipment to China, at Orlando, the better varieties of Tangelo. These are in reality man-made crosses between two modern forms of two ancient types of Citrus, represented by what we now know botanically as *Citrus grandis* Osbeck and *Citrus nobilis* Lour. I consider some of the varieties of these Tangelo, comparatively recent creations of the United States Department of Agriculture, some of the finest Citrus fruits in all the world. Possibly they are excelled by the better forms of Siamese pummelo, and which in reality are little more than glorified Tangelo, a Citrus fruit for a family breakfast table rather than for the individuals breakfast plate. Thus while we continue to bring from the Orient Citrus forms worthy of consideration for stock and disease resistance studies, as here and there a cultivated form worthy of our markets, we are likewise returning to China the more improved forms brought about through scientific hybridization.

Plant history in China is a fascinating study. The Chinese people have always maintained a liberal, broad-minded policy in plant exchange, not only carrying to other lands plants from their own, but making many useful foreign plants tributary to themselves, and amalgamating them with their system of agriculture. China, with her wide range of climate and soil, and with a people living in all parts of the world, presents the most striking example of a nation in which most of the more useful plants known to civilization are cultivated. The introduction and absorption of these foreign plants into China has been a slow process, but considerable of the record has been preserved by historians.

The Hwangho basin in North China is generally considered the cradle of the Chinese nation. It is therefore not surprising that the earliest historical plant records in China refer to indigenous North China plants, for even at the time when Confucius compiled the classics in the fifth century, B. C., South China was a country of barbarians of which little was known. The Han dynasty Emperor, Wu Ti, 140-86 B. C., finally conquered this country, and thereafter records of South China plants, such as Lychee and Or-

anges, began to appear in Chinese literature. Some of these early northern Emperors were greatly concerned with the introduction of southern plants to their own areas. Many interesting stories are told of their failures, as in the case with the Lychee, when "several tens" of gardeners were killed because they could not grow these plants in the national arboretum at Cheung On, then the capital of the Empire.

The introduction of strictly foreign plants into China also began at about this time, for Chang Kien, one of the officers of Emperor Wu Ti, sent to the peoples dwelling on the northwestern frontiers of China is the first credited in Chinese history with the work of foreign plant introduction. It was at this time that the great Asiatic movement of cultivated plants in the hands of man was initiated, and it continued steadily until the fourteenth century and thereafter. From western Asia and Europe there came into China throughout this period a long line of flowers, vegetables, and fruits, including the Pistacia, Pomegranate, and cultivated Walnut; Cabbage and Cauliflower, garden Bean and Pea, Spinach, Sugar beet, Carrot, Lettuce, Cucumber, Watermelon, and numerous other vegetables. Poppy, yielding opium, the curse of China, is wild on the shores of the Mediterranean, and in culture it spread first into India and then into China.

In the sixteenth and seventeenth centuries, A. D., another stage of this great economic conquest began, when species from the Americas were first introduced into China and acclimatized. These include the Peanut, Tomato, Irish Potato, and Sweet potato. Corn or Maize when introduced, probably by the overland routes, spread both rapidly and widely throughout China. Dr. Walter T. Swingle has quite recently found some most interesting and important early records concerning corn in Chinese literature, as recorded in his reports of the Oriental Division of the Library of Congress. Of fruits, Papaya, Pineapple, Custard Apple, and more recently the Avocado, are all from Central or South America.

I promised to mention the genera in which South China's present subtropical fruit interests

largely lie, in order that you may judge in passing which may be of importance to you.

Within the family *Rutaceae* in addition to the members of the genus *Citrus*, we have a number of *Fortunella* species, both cultivated and wild. You seem to have received a good start in these Kumquats. We have several very interesting *Citrus* relatives under observation as possible stock plants, i. e., within the genera *Severinia* and *Atalantia*. To date neither of these have proven worthy except as most attractive ornamentals. Another *Citrus* relative of far greater importance, and which you should certainly begin to know more intimately, is the "Wongpei" or "Yellow-skin," belonging to the genus *Clausena*. Numerous species of this genus are scattered from Africa and Australia through Malaya to Southern Asia. The Chinese, without the background of that which today we call the science of fruit ecology, still seem to have developed on the northern range of culture the most outstanding edible fruit species of the genus, *Clausena lansium* (Lour.) Skeels. That this species can be grown in Florida has been demonstrated by a fruiting tree on the Federal Government Station at Orlando. Doubtless it has fruited also at other places.

Burseraceae yields two fruits in South China which apparently you have not yet introduced and do not know. I refer to two species of *Canarium*, that known as the White Chinese Olive, *Canarium album* (Lour.) Raenck, and the Black Chinese Olive, *Canarium pimela* Koen. These are related to the famous Peelee nut of the Philippines, another member of the genus. The genus is rich in the tropics, but is known in China by only these two species which have also been developed by the Chinese on the northern range of culture, into these two important species of which there are many cultivated varieties. I am doubtful to what extent they could be made commercial here in the United States, but you should certainly have them as ornamentals, or as possible oil-bearing trees.

Oxalidaceae also yields two most interesting sub-tropical fruits which are widely grown in the Canton area. These are two species of *Averrhoa*, the one a sweet form, *Averrhoa carambola* L.,

of which there are a number of varieties, and *Averrhoa bilimbi* L., a sour form used as stock upon which to graft the former species. The Carambola is a summer fruit wonderfully refreshing. I am sure they can be grown on your hammock lands, and I understand they have already been introduced.

Anacardiaceae includes the Mango group, in which you here in Florida are rightly so much interested. But I fear you shall have to look farther south than Canton in Asia for the better varieites. However, Kwangtung and Kwangsi both have many interesting cold-resistant varieties which you should certainly have for breeding purposes. There is one most striking economic ornamental belonging to this family, *Dracontomelon dao* (Blanco) Merr. & Rolfe, a most attractive, immense, and long-lived tree which bears small, edible fruits highly prized in Chinese confectionery. The economic members of the family are inadequately studied in Southern Asia.

Within *Sapindaceae* is the Lychee, *Litchi chinensis* Sonn. which I have already mentioned. The more cold-resistant brother of the Lychee is the Lungan of the genus *Euphoria*, *E. longana* Lam. The genus *Nephelium* yields two highly prized but more tender species, *N. lappaceum* L., the Rambutan, and *N. mutabile* Blume, the Pulassan. The genus *Litchi* contains but two species, *Euphoria* eight or ten, and *Nephelium* several score. Work should be begun at once in the study and hybridization of the numerous members of the family surrounding the genus *Nephelium*.

The finest fruit in the world is said to be the Mangosteen belonging to the family *Guttiferae*. The genus *Garcinia*, to which the Mangosteen, *G. mangostana* L. belongs, is quite tropical in its range. But in Kwangtung we have at least one cold-resistant member, *Garcinia oblongifolia* Champ., and there are more in Indo-China. Here also is an interesting field for the breeder.

In passing I must also hastily mention *Perispermum*, Papaya, Loquats, *Myrica* species, the *Eugenia*s, and the *Artocarpus* group. We have one native *Artocarpus*, found on the Island of Honan opposite Canton where our University is located, which has very attractive red, edible fruits, the size of a peach or larger. This has

recently been described and is now known to science as *Artocarpus lingnanensis* Merr.

It is obviously impossible for me to deal herein with the very interesting cultural methods practiced in the South China area. I can only say in passing that while we have much to learn from you in upland fruit culture, I believe you have much to learn from us in lowland culture. Practically all of the commercial Citrus grown in the Delta of Canton, in the lowlands of Indo China, and in the delta of the Menam river in Siam are planted on huge raised beds of bottom land soils, such as you have in this part of your state, with deep trenches of inflowing tidal waters between each bed. Trench and canal mud, rich in organic matter, is periodically smeared over these beds and the trees mounded. Intercropping seems partly associated with shading, and numerous trees of other species are usually found planted with Citrus, sometimes uniformly and sometimes at random in the groves. In the tropics Coconut palm, Betel-nut palm, and Banana are the chief species used. In the subtropics Lychee, Lungan, Carambola, and Canarium are the most common. In certain areas leguminous trees provide shade, increased nitrogen, and humus to the groves. In this country the Citrus industry is still very young, and no doubt you have not yet arrived at the best practices. I have an impression that on your uplands the average grower does not irrigate sufficiently, and on many of your lowlands a satisfactory drainage irrigation system has not been established. I do not believe Citrus growers either here or in China give their trees sufficient humus mulch; and I would like to see experimental work carried out to determine scientifically if species of *Erythrina*, *Albizia*, and other leguminous trees can be worked into Citrus culture with profit.

We are now ready for the pictures. I trust that I have left you with a vivid impression of the aesthetic interest and persistent practices of the Chinese people in their horticultural pursuit, and in their constant efforts in the field of the introduction of new plants. I have mentioned some of the subtropical fruits and cultural methods of the Cantonese in southern China, and these you will do well to study further.

I am first showing you a few pictures of intensive Cantonese gardening. Beds of *Allium*, Chinese garlic, some with pots for bleaching and some without, prove a most profitable crop for market gardeners located near Canton city. Beds of Canton Ginger, the products of which find their way around the world and make the city famous, are commonly seen throughout the hot summer months. The lowland dyked areas, usually with Lychee trees planted along the dykes, are planted to rice, water chestnuts, or *Sagittaria*, and make the appearance of the whole delta area most picturesque.

Vegetable culture in the Canton delta has attained a high degree of development, but opportunities are still great for new introductions from the West. Within recent years we of Lingnan University have successfully introduced the better varieties of Lima beans, Sweet corn, Cauliflower, Tomatoes, and a number of other improved varieties of vegetables from the West. On the other hand we have sent you *Zizania*, Wild Rice, *Eleocharis*, Water chestnuts, Colocasia, Dasheens, and *Sagittaria sagittifolia* L., all of which should be well adapted to Florida conditions.

In passing it will interest you to note the difference in the development of Red peppers and Eggplant in the Orient and in the Occident. The original home of the Red pepper is Brazil. It was introduced into Europe in the sixteenth century, and spread to China. Upon arriving at Canton twenty-five years ago the long, slender types shown in the top of the picture, were those most commonly found. More recently we have introduced the bell shaped peppers from the West. It is interesting that a similar development, as to form, should have taken place with regard to the Egg plant, which is usually credited to the East Indies, and very early spread throughout Asia, Europe, and the Americas. But as to shape man's ideals in China seem to have been toward the elongated type, rather than the egg-shaped form which is more common in Western gardens. The latter is seldom seen in South China except by way of recent introductions.

You will be interested to know of our efforts with flowers. The Sweet peas introduced and growing on the campus of Lingnan University

are an inspiration to view. Many a small Chinese child's heart has been gladdened by this new highly colored flower from the West. Many a Chinese college youth, seeking to be modern, has tried to win fair lady by presenting a bunch of these rarer flowers. And many an aged Chinese lady, critical of most western innovations, will accept this little flower with pleasure. Naturally we take pride in our accomplishments, for we believe we are making a definite contribution to Sweet pea culture in the Orient. Success has been brought about through nearly two score years of effort, with increasing success each year. Hundreds of varieties have been tested in our gardens, and today we recommend only about a dozen varieties to be grown by the lay gardener in the Canton area. The sale of Sweet peas helps finance much other floricultural experimental work of which I could tell you if time was available.

Upon the five hundred acre campus of Lingnan University, once a graveyard, we have introduced many exotic trees and shrubs. Tonight I wish you to consider only the value of Eucalyptus of which we have tested in South China scores of species from Australia. I can recall, when I first landed in China, seeing only one or two trees of this genus growing on the Island of Hongkong. But what is the situation today? We are showing you here a closely planted grove of *Eucalyptus robusta* on our campus. The tree grows as well, or better, on the low-land, dyked areas than on the hills. It provides excellent materials for posts and firewood. It did not take the Chinese peasants living near the college long to discover that the fallen leaves from these trees are an important source of fuel supply. *Eucalyptus tereticornis* which we also introduced are of far greater beauty than the former species, and the timber can be used for building purposes and furniture. After our early success with these two, and a few additional species, we published in 1921 a little bulletin in Chinese, and thereafter public interest in the dissemination of Eucalyptus was greatly intensified. From our own parent trees we are now selling more than thirty pounds of seed each year. And the number of trees that can be grown from a pound of seed is enormous.

We are also selling thousands of nursery seedlings. Recent government surveys estimate more than ten million trees in the province of Kwangtung. And the province to the west, Kwangsi, is pushing the introduction of Eucalyptus through their district forest nurseries. A few successes of this nature repay many fold the small expenditures necessary for work of this kind.

Of introduced fruits Lingnan's reputation is perhaps best known for papaya. The varieties we have introduced are currently known throughout the area as "Lingnan Muk Kwa" or "Lingnan Tree Melons." But in this plant introduction work one should differentiate clearly between the introduction of a species and that of a variety. In 1598 the Dutch traveler, Linschoten, wrote: "There is also a fruit that came out of the Spanish Indies, brought from beyond the Philippines or Luzons to Malacca, and from thence to India * * * and is very like a melon * * * and will not grow but always two together, that is male and female * * * and when they are divided and set apart from one another they do not fruit at all." Linschoten evidently did not know of the perfect flowered papaya, a variety of which we introduced to China from the Hawaiian Islands in 1912. In ripening quality and flavor the fruits from our trees proved far superior to native types, and we have never been able to produce sufficient fruits to meet the demands of the local markets. But the villagers surrounding the college are now growing these selections, and seed has been widely disseminated throughout Kwangtung and adjoining provinces.

Let us now consider again China's greatest fruit, the Lychee, thinking of its movements throughout the world from Florida's point of view. Of all the fruits in the world the Lychee possibly has one of the most narrow climatic ranges. When subjected to light freezes it is killed to the ground; and yet when not provided with sufficient cold weather for winter dormancy, though making fine vegetative growth the trees never fruit. Furthermore the seed of the Lychee is viable for only about a week, making transport in the seed stage impossible except when germination takes place enroute. These are great han-

dicaps to introduction of the Lychee into other areas.

Neither the federal government of the United States, nor the state governments of Florida or California where the Lychee might possibly be grown successfully have ever considered the Lychee industry seriously. Records in the United States Department of Agriculture from 1901 to date show a total of approximately seventy-five different introductions into this country from China, Java, India, and Hawaii. One of the earliest and most successful of these is S. P. I. No. 21204, secured from Fukien province through the courtesy of the Rev. William N. Brewster of Hinghua district. Plants from this introduction were propagated in the greenhouses in Washington and sent to co-operators in both California and Florida. One tree of this introduction fruited in California but was later lost through carelessness of the owner. Florida was more fortunate in that Reasoner Brothers of Oneco protected their tree, and have propagated and distributed trees from it to the present day. We have sent to Washington from the Canton area Mountain Lychee, so important for stock upon which to graft the more highly cultured forms, and such well known varieties as Glutinous Rice, Black Leaf, Cinnamon Flavor, Sweet Cliff, and others. Developments to date with the Lychee here in Florida indicate increasing success in favored areas. As the result of my recent visit to your state I am thoroughly convinced that it is only a question of time until you will see that the American people can have the delicious Lychee to supplement the summer fruits which they now enjoy. Meanwhile, recalling the words of Sung Chio, you can only enjoy this fruit with your ears, though the hearing of it no doubt makes you imagine you see it not only as here in the pictures, but in reality, and causes your mouths to water so profusely that you wet the skirts of your robes, embarrassing you so that you do not know what to do.

It is indeed a surprising fact that among all the varied fruits of the Western Hemisphere one does not find a single species belonging to the family *Sapindaceae*, although the recently introduced Akee fruit, of which there have been some dis-

cussions in these meetings, does belong to this family. For centuries *Sapindaceae* has provided Asia and the East Indies with four of their most distinctive fruits, namely the Lychee, the Lungan, the Pulassam, and the Rambutan. The two latter fruits are quite tropical and rarely appear in South China. You will note particularly the hairy nature of the Rambutan. In some varieties of the Lychee these hairs are reduced to blunt prickles, but in other varieties of the Lychee, and in the Lungan, the surface of the skin is quite smooth.

Most of the remaining pictures this evening deal with Citrus fruits and their relatives, including the acquisition, propagation, and dissemination of these for improved Citrus culture in all parts of the world. It is generally admitted that oranges, particularly the sweet, round ones, and the loose-skin Mandarin group, as also the small Kumquats, are all of distinctly Chinese or Indo-Chinese origin, spreading to other countries centuries ago. Even the Washington Navel Orange, introduced by the United States Department of Agriculture from Bahia, South America, in 1871, doubtless originated from a bud sport of some of our Chinese or Indo-Chinese oranges. As evidence I show you the picture of a basket of the famous Annam, Vinh oranges, budwood of which we secured near Vinh several years ago. One day while in that area we purchased all of the fruits of a particularly attractive fruiting tree, believing them to be typical of the Vinh orange, and no fruits of which on the markets had shown evidence of navel marks. However, after all the fruits had been picked from the tree we found among the lot just one fruit with a distinct navel mark at the pistil end. This was photographed in the field as you see it here. Another very beautiful and well flavored Citrus variety of Indo China is that known as "King of Annam," a very fine Mandarin. It is not the "King" orange as we know it, which also came from this area, its origin in Indo China being somewhat obscure. The whole Mandarin orange group has been generally known as *Citrus nobilis* Lour., the type being described by Lourerio in 1790 from Indo China. Of *Citrus grandis* Osbeck there are many delicious forms in Asia, it

generally being conceded that the best come from Siam. Several of these such as Kao Panne, Kao Phuang, and Thong Dee have been introduced and fruited here. At Orlando I have recently tasted some very acceptable fruits of these varieties; and when suitable cultural areas are found for them they should certainly make very desirable acquisitions to your marketable Citrus fruits. They are particularly good shippers and improve under proper storage facilities. Most of the delicious Tangeloes now appearing on your markets are crosses between the loose-skin oranges and the Grapefruit. Crosses using some of these delicious Pummelo as one of the parents may prove even more desirable fruits to be eaten out of hand or for the breakfast table. The great variation within the genus *Citrus*, and this ready natural crossing of the various species, makes the problem of the systematist difficult; but this change in form and response to culture lend zest to the work of the horticulturist.

When it comes to plant propagation the Chinese have worked out some most unique methods. The marcot box you see here, which is used for both Lychee and Citrus propagation, was devised by Mr. Eugene May of the United States Department of Agriculture, a great improvement over an ancient Chinese method of ringing the branches and then tying mud balls around the injured part. At Canton where beaten brass is so cheap we have made these boxes of thin brass sheeting, and have had excellent results with them. They are more durable than the pasteboard ones. The sun shining upon the metal heats the sphagnum and sand medium and causes earlier rooting. The Chinese methods of inarching Sweet Oranges on Lemon or other stocks are also very unique and well executed. Top grafting old trees is often practiced in China, but budding rarely. You will be interested in this picture of *Citrus ichangensis* Swingle with the strikingly large petiole, inarched on Lemon. In addition to these pictures I am showing some Wongpei fruits, the Citrus relative which I mentioned earlier. You will also be interested in a glimpse of our Citrus parent plant grove at Lingnan University

where we are collecting and studying varieties both native and introduced.

I have said very little with regard to Bamboo, in which we are very much interested, and believe you should likewise be. My colleague, Prof. F. A. McClure, is concentrating his efforts in this field. You will note here a corner of the Lingnan University Bamboo Garden, devoted to the production of shoots for sale. Species used for edible shoots are *Bambusa beecheyana*, *Bambusa oldhami*, and *Dendrocalamus latiflorus*, all sympodial species. Note how the farmers heap earth around the shoots, cut them from the parent plants, and carry them to market. Bamboo areas in China are most picturesque. The bamboo rhizomes you see here are ready for shipment to the United States. These are easy to ship in more or less dormant condition.

In closing I will return to the Lychee, and show you one or two more pictures, because I do not wish you to forget this very old fruit of China, now so promising as one of your newer ones. In China Lychee are not only grown in the hills but also along the dykes. You see here our parent plant Lychee orchard. And these are the glass-framed Wardian cases in which Lychee and other succulent, evergreen plant materials are shipped from one country to another. The airship "Clipper" now crossing the Pacific, and others like it to come soon, will greatly facilitate the work of plant exchange.

I am sure that we all agree this immensely fascinating field of international plant study and exchange is one of the most productive of world peace and prosperity. In the gardens of the world mankind is seen at his best. It behooves us in these days when time and space begin to disappear, to renew our interests, one people in the other; and to emphasize those constructive forces which we are finding it is so needful for us to foster, rather than the destructive ones which so stealthfully creep upon us. Here then is the field of conquest for the youth of our land who look out upon a distressed world. Plant interest, collecting, dissemination and exchange portend the dawn of the new day when the garden interests of mankind are no longer neglected.