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PLANT IMMIGRANTS

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GENERA REPRESENTED IN THIS NUMBER

	Page		Page
Acer	1983	Olea	1985
Casuarina	1991- 1994	Populus	1986, 1987
Citrus	1983	Prunus	1987, 1988
Juglans	1984	Pyrus	1988, 1989
Leschenaultia	1984	Salix	1989
Malus	1985		

A NEW AGRICULTURAL EXPLORATION OF NORTHEASTERN CHINA

THE CASUARINAS
With reports on the behavior of C. cunninghamiana

Illustrations

Plate 353. Boiled chayotes ready to serve with butter. (*Chayota edulis*)

Plate 354. The Betoum, a handsome shade tree for semiarid regions. (*Pistacia atlantica*)

United States Department of Agriculture
BUREAU OF PLANT INDUSTRY
OFFICE OF FOREIGN SEED AND PLANT INTRODUCTION

WASHINGTON, D. C.

ANNOUNCEMENTS OF IMPORTANCE TO ALL EXPERIMENTERS.

It is desired to call the attention of experimenters and correspondents of this Office to the purpose of its various publications. Plant Immigrants is a monthly circular, designed to inform plant breeders and experimenters of the arrival of interesting material which may be available later; to report interesting results obtained with plants which have been distributed in past years; and to popularize, by means of special articles and illustrations, plants of particular interest or promise.

The permanent Inventory of Seeds and Plants Imported, which does not appear until a year or more after the receipt of plants which it describes, is an historical record of all introductions made by this Office. It also furnishes experimenters with such data as are available concerning the character of each species or variety, its origin, uses, and cultural requirements.

The Annual List of Plant Introductions, which is published toward the end of the year, and is sent to all cooperators, describes all species and varieties available for distribution. Requests for plant material should in general be based upon this list. When based upon the Inventory, which describes everything received, it is frequently impossible for us to fill them. Many introductions are eliminated in the first tests, and are not propagated for distribution; while our stocks of others have been exhausted by the time the Inventory is published.

This number issued August 25, 1924.

Plants recently received, not yet available for distribution.

ACER spp. (Aceraceae). **Maple.** From Darjiling, India. Seeds presented by G. H. Cave, curator, Lloyd Botanic Garden.

For many years, Mr. Cave has sent annually to this Office seeds collected from the plants under his charge, and from the surrounding region. Many of them, naturally enough, have proved too tender for cultivation in most parts of the United States. Darjiling lies at the upper edge of the subtropical zone, and its climate is sufficiently mild to permit the cultivation of plants like *Erythrina arborescens,* which repeated trials have shown to be scarcely hardy in California. The Lloyd Botanic Garden contains, however, many plants from higher elevations, whose cultivation should be practicable throughout a fairly wide area in the United States.

The three maples which Mr. Cave has sent, and which are briefly characterized below, are suggested for trial in the South Atlantic and Gulf Coast States, and will be propagated for that purpose.

58901. ACER CAMPBELLII. Described as a handsome tree, whose bright-green foliage contrasts prettily with the red stalks and twigs. The timber is used in India for cabinet work and for planking.

58902. ACER HOOKERI. A handsome tree 40 to 50 feet high, with deeply fissured brown bark, native to the Sikkim Himalayas at altitudes of 8,000 to 10,000 feet. The oval leaves, though usually green, are sometimes copper colored. The wood is gray with small pores and numerous fine red medullary rays.

58903. ACER LAEVIGATUM. A tree with a broad low crown, yellowish or ash-colored bark, and leaves of pleasing green. The hard, close-grained shining white wood is popular in Nepal for building purposes.

CITRUS GRANDIS (Rutaceae), 58840. **Grapefruit.** From Ancon, Canal Zone. Budwood presented by W. T. Robertson, Pedro Miguel, Canal Zone, through James Zetek, Ancon. This is a rare and interesting variety of grapefruit said to produce fruits with juicy flesh of blood red. Its origin is uncertain, but it seems probable that it was brought from Asia in the early days of trans-Isthmian travel. Red-fleshed grapefruits, or pomelos, are common in India, but they usually lack juice and are quite different from the grapefruit of Florida in general character. Some of the Indian varieties have been introduced into the United States, where they have failed to become popular. A pink-fleshed grapefruit, which originated in Florida as a budsport from one of the standard commercial sorts, has met with a more favorable reception, but has not attained commercial importance.

If the variety which Mr. Robertson has sent proves to be of good quality, and at the same time has flesh of attractive red color, it will be a novelty of much interest. In forwarding the budwood he says:

"In one of the oldest towns of the Republic of Panama, about 8 miles from the Canal, I found 3 trees of the blood-red grapefruit. I was told by one of the oldest inhabitants that these were the original trees, all the others in the vicinity being seedlings from them. These 3 trees have never been cared for, but were simply planted and allowed to grow up in the jungle, without pruning, spraying, or fertilizing. They appear to be at least 40 years old, and are about 50 feet high."

JUGLANS INSULARIS (Juglandaceae). 58810. **Cuban walnut.** From Santiago de las Vegas, Cuba. Seeds presented by Prof. Gonzalo M. Fortun, director, Estacion Experimental Agronomica.

"In the summer of 1915 I traveled in Cuba, accompanied by Prof. Fortun. Our principal object was the study of Cuban mangos, but we made observations on other Cuban plants of economic interest, among them the native walnut, *Juglans insularis.* On the southern coast of the island, near Trinidad, we saw this tree in the wild, and obtained nuts which Prof. Fortun planted at Santiago de las Vegas. The trees which sprung from them have now come into bearing, and Prof. Fortun has forwarded this shipment of seeds.

"In the Journal of Heredity for December, 1915, an article entitled 'Plant Breeding in Cuba', was published by F. S. Earle and myself. Illustrations of the Cuban walnut accompanied this article, in which appeared the following note:

"'Another native plant of possible economic value has recently been brought to the attention of horticulturists by H. A. Van Hermann and Dr. Juan T. Roig. This is the Cuban walnut, *Juglans insularis,* a tree occurring in the mountains of the island and producing nuts which compare favorably in size with the northern black walnut. The kernels are difficult to remove from the shell, however, and the partitions are thick. The tree is not at all common, and horticulturally speaking it is practically unknown, yet it might be of great value as a stock on which to graft some of the cultivated walnuts, or through selection it might be improved considerably. There are very few first-class nuts which succeed in Cuba, or in the Tropics generally, and the addition of a walnut to those already cultivated would be a distinct advance.'

"Since the above lines were written, little has been done to further the horticultural development of this interesting tree. From the seeds now sent by Prof. Fortun we hope to grow plants for distribution to tropical horticulturists and plant breeders, whose active interest in the Cuban walnut would probably have been aroused earlier, had such material been available to them." (Wilson Popenoe.)

LESCHENAULTIA BILOBA (Goodeniaceae.) 58674. From Perth, Western Australia. Seeds presented by S. L. Kessell, Conservator of Forests. This handsome shrub, native to Western Australia, is suggested for

trial in the Southwestern States, southern California in particular. It is described by Bentham, in the Flora Australiensis, as 2 to 3 feet high, with slender scattered leaves half an inch in length; flowers either in small clusters in the upper axils, or borne in a large leafy terminal cluster; corolla about an inch long, with spreading dark-blue wings marked with parallel transverse veins, the sepals narrow like the leaves. The family to which it belongs, Goodeniaceae, is distributed mainly through Australia and the Pacific Islands; the plant itself seems little known horticulturally, and likely to prove worth cultivating in this country as an ornamental.

MALUS YUNNANENSIS (Malaceae). 58828. From Yunnan, China. Seeds collected by J. F. Rock, Collaborator of the Bureau of Plant Industry. During his explorations in southwestern China, Mr. Rock collected many wild species of Malus. Plants grown from seeds secured by him were distributed by this Office the past season. In November, 1923, he obtained the present species at Ganhaitze, Yunnan, where it occurred at altitudes approximating 11,000 feet. Mr. Rock's note, which accompanied the shipment of seeds, describes the plant as a handsome spreading tree 25 feet high, with large, hairy, broadly oval leaves, dark green above and yellowish gray beneath; and white, rose-tinted blossoms produced in many-flowered clusters. The fruits, which are borne in large numbers, are yellowish red and about the size of cherries. Since it comes from a region of comparatively mild winters, it may not succeed in the eastern United States north of the Carolinas. It deserves trial as a stock-plant for cultivated apples, and may be useful in breeding apples which will succeed in warm climates. For ornamental plantings also, it may be of value.

OLEA EUROPAEA (Oleaceae), 58661. **Barouni olive.** From Ariana, near Tunis, North Africa. Cuttings presented by Dr. F. Boeuf, chief, Botanical Service. In 1904, Dr. T. H. Kearney, of the Bureau of Plant Industry, traveled extensively in Tunis, where he secured and forwarded to the Office of Foreign Seed and Plant Introduction scions of the Barouni olive. In recent years, trees grown from these scions have attracted much attention in the Sacramento Valley of California.

From a bulletin entitled "L'Olivier en Tunisie," written by N. Minangoin and published by the Direction of Agriculture and Commerce of Tunis in 1901, we translate the following information concerning Barouni:

"This variety is found almost exclusively in the olive orchards of the Sahel (eastern coast of Tunis), and in particular at Kalaa-Srira, 11 kilometers from the town of Sousse. It is characterized as follows:

"Foliage sparse, leaves about 5 cm. long, narrow, light green on the upper surface. Fruits single, very large, shaped like a pear upside down, wine red when mature, ripening very early. Peduncle long and strong, flesh thick and white, seed one-sided, long and thick, ending in a point. Flowers at the end of February."

Recently Dr. Kearney has supplied the following notes to supplement those which accompanied his original shipment of scions:

"M. Minangoin told me himself in 1904 that the variety is extremely rare and that he knew of only three trees, located on the estate of M. Robert at Kalaa-Srira. The word Barouni means foreign, and the variety is supposed to have been introduced by one of the Beys of Tunis from Greece or Turkey. He said that the trees in question are old, and do not bear well. He further stated that the fruits sometimes weigh as much as 20 grams each.

"I met M. Robert, who was at that time vice-president of the Municipality of Sousse, and he also stated that Barouni is found only at Kalaa-Srira. He said it is not commonly grown, as it requires a good deal of water and must be irrigated.

"There are two varieties of olive in Tunis to which the name of Barouni is applied. The large picking olive is Barouni de Kalaa-Srira, while the other is known as Barouni de Soliman and has small fruits used for making oil."

Because of the fact that Barouni, as introduced by Dr. Kearney, is showing great promise in California, we thought it desirable to secure all possible data concerning the variety, and addressed an inquiry to Dr. F. Boeuf, present chief of the Botanical Service at Tunis. In replying, he forwarded a number of scions which are represented by this number, and which will be grown in California for comparison with Dr. Kearney's Barouni.

As grown at the Plant Introduction Garden, Chico, Barouni is a large olive, averaging about an inch in length. Its oil content is higher than that of most other large olives, and in consequence it has, when processed, a richer and more nutty flavor. It ripens fully two weeks ahead of the Mission olive, thus minimizing danger from frost, and unlike the latter, it has shown no tendency to fruit in alternate years, but has borne increasingly large crops annually.

POPULUS spp. (Salicaceae). **Poplar.** From Echo, Kirin Province, Manchuria. Seeds presented by A. D. Woeikoff, director, Experimental Farm.

Mr. Woeikoff, who before the Great War sent seeds to this Office from Russia, has recently been appointed Director of the newly established experiment farm at Echo, not far from Harbin, Manchuria. From that region he is now forwarding seeds of ornamental trees and shrubs, hardy fruits, forage crops and other plants. His shipments possess un-

usual interest in that they come from the extreme northern part of China, a region of severe winters and hot summers, generally similar in climatic conditions to the Northern Great Plains area of the United States.

Though one of the following poplars is not new to this country, they will both be propagated for trial. It is possible that Mr. Woeikoff's form of *Populus maximowiczii* will prove slightly different from the one previously distributed by this Office.

58483. **POPULUS MAXIMOWICZII.** A handsome, stately poplar which is said to reach large size in its native country, Manchuria. In the United States, it is one of the few large deciduous exotic trees which can be recommended for general planting in extremely cold sections. John Dunbar, assistant superintendent, Department of Parks, Rochester, N.Y., who has grown this tree for some years, and who has been instrumental in effecting its dissemination in this country, says that it is successful on dry gravelly soil where Norway spruce and white ash are failures. During the first eight years, it increases in height at the rate of 3 to 5 feet annually. Its foliage is of striking appearance. Unlike that of many other poplars, it hangs on until late in the season. The specimens grown in this country up to the present time have shown remarkable freedom from borers and from several rather obscure diseases which affect other poplars, and which are generally known as "canker." Unless all indications fail, *Populus maximowiczii* will become an important shade and windbreak tree in the northernmost parts of the United States.

58484. **POPULUS SUAVEOLENS PRZEWALSKII.** Mr. Woeikoff reports this to be a fairly common tree in towns and villages of northern China, easily distinguishable from others by its close, compact habit. For hot, dry climates it is recommended as highly valuable. While it is of slower growth than *Populus maximowiczii,* it eventually becomes a large tree of ornamental appearance. The small, oval leaves are prominently whitened beneath.

PRUNUS ARMENIACA (Amygdalaceae), 58809. **Apricot.** From Tripoli, North Africa. Seeds presented by Dr. E. O. Fenzi. In forwarding seeds of this curious variety of apricot, Dr. Fenzi remarks that it is known locally as 'ain thor' (bull's eye) and 'bergsam.' He describes it as "a very large tree, taller and more vigorous than other kinds; leaves thin, irregularly toothed; fruit globular, with hardly any suture, weight 40 grams, diameter 40 mm.; skin scarcely tomentose, reddish yellow, adhering closely to the flesh, which is more juicy than that of other apricots, clings to the stone, and suggests a plum in flavor. It is not common in Tripoli."

This form should prove interesting for trial in the western United States, not alone for its fruit, but also as a possible stock-plant on

which to graft other varieties. It will be noted that the seeds, not scions, are introduced; there is no assurance that the fruit produced by seedlings will agree with the above description, but we infer that this is a semi-wild form, not a highly improved one, and that seedlings will in consequence bear fruit more closely resembling that of the parent than is usual in cultivated North American apricots.

PRUNUS spp. (Amygdalaceae). **Cherry.** From Yunnan, China. Seeds collected by J. F. Rock, Collaborator of the Bureau of Plant Industry.

Among Mr. Rock's recent collections in Yunnan, the following two cherries stand out as of particular interest. They both have red flowers, and come from an elevation which indicates that they may prove sufficiently hardy for cultivation in the northern United States. *Prunus tomentosa,* which stands the winters of North Dakota, occurs in the same region.

58832. PRUNUS sp. "(No. 11221. Champutong. October, 1923.) A red-flowered tree 15 feet high, from an altitude of about 13,000 feet in the Salwin Valley. The fruits are ovoid and red."(Rock.)

58833. PRUNUS sp. "(No. 11237. Mount Kenichunpu. October, 1923.) A dwarf cherry which grows as a shrub 4 feet high at an altitude of about 13,000 feet on the Salwin-Irrawaddy Divide, Tibetan Border. It has oval, serrate leaves, red flowers, and ovoid black fruits." (Rock.)

PYRUS spp. (Malaceae.) **Pear.** From Yunnan, China. Seeds collected by J. F. Rock, Collaborator of the Bureau of Plant Industry.

Last season this Office distributed an extensive series of wild pears, collected by Agricultural Explorer Rock, who has since January, 1923, been conducting his work under the auspices of the National Geographic Society of Washington, D. C. Mr. Rock sends in two additional species, as yet undetermined botanically, which he thinks may be valuable as stock-plants on which to graft cultivated pears. Since these species come from 10,000 feet elevation, they are not likely to prove hardy in the northern United States, though an actual test will be required before it can be ascertained just how much cold they will tolerate.

58834. PYRUS sp. "(No. 11480. November, 1923.) A tree 20 feet high, found along stream beds at the foot of and on the slopes of the Likiang Snow Range at about 10,000 feet altitude. It is a handsome species, with large crenate leaves white-tomentose beneath, white flowers, and yellowish red fruits the size of a cherry." (Rock.)

58835. PYRUS sp. "(No. 11492. Lautchunshan. November, 1923.) A handsome tree about 25 feet high, with leaves white-hairy beneath, and corymbs of red fruits. It grows at an altitude of about 10,000 feet." (Rock.)

BOILED CHAYOTES READY TO SERVE WITH BUTTER.

(*Chayota edulis* Jacq.)

The chayote, a southern vegetable belonging to the same family as the cucumber and squash, produces its pear-shaped fruits in the fall and, in the far South, sometimes also in the late spring. In flavor the chayote is more delicate than summer squash or vegetable marrow and in texture it is much superior to either. A number of excellent dishes are prepared from it. For "buttered chayotes," as shown in the above illustration, the fruits are sliced about three-quarters of an inch thick, crosswise through the seed, and pared. They are boiled until tender in just enough salted water to cover, then drained and placed in a serving dish with butter on the top slices, so it will melt over the lower ones. The boiled chayotes also may be diced and used in salads or served with a cream sauce. Most delicious sweet pickles are made from partly cooked chayotes. (Photographed by E. L. Crandall, Photographic Laboratory, March 20, 1923; P28150FS.)

THE BETOUM, A HANDSOME SHADE TREE FOR SEMIARID REGIONS.

(*Pistacia atlantica* Desf.; S. P. I. No. 10267.)

The only tree of considerable size growing in the northern part of the Sahara Desert is the betoum, a close relative of the pistache (*Pistacia vera* L.). It is deciduous, reaches a height of 40 to 50 feet, and develops an attractive, well-rounded head of foliage. As a shade tree for semiarid regions in the United States, particularly those which have slightly alkaline soils, it promises to be of value. The two specimens here illustrated were planted in the cemetery at Chico, Calif., about fifteen years ago. (Photographed by P. H. Dorsett, October 16, 1921; P27400FS.)

SALIX RORIDA (Salicaceae), 58485. **Willow.** From Echo, Kirin Province, Manchuria. Budwood presented by A. D. Woeikoff, director, Experimental Farm. Mr. Woeikoff, who has sent also two interesting poplars described in this issue of Plant Immigrants, forwards cuttings of this remarkable willow, accompanied by the following note:

"This is a giant among willows. In the river valleys of Manchuria it reaches a height of 150 feet, with an enormous circumference." It will be propagated for trial in the colder parts of this country.

A New Agricultural Exploration of Northeastern China.

For a number of years the Department of Agriculture has been exploring the agricultural resources of China. The late Frank N. Meyer, dean of agricultural explorers, was first sent to that country in 1905. During the succeeding years he traveled widely, not alone in China, but also in Turkestan, Russia, Siberia and other parts of eastern Asia. The agricultural reconnaissance which he made, and the plants collected by him, are proving of great value. In 1922, C. A. Reed of the Bureau of Plant Industry traveled in the walnut-growing regions of China, and brought back much information concerning nut crops, as well as plant material. Joseph F. Rock, originally sent out as an Agricultural Explorer of this Department, and later transferred to the National Geographic Society, explored the remote and little-known southwestern portion of the country, securing a vast amount of information concerning the native flora, and seeds of many plants likely to find a congenial home in certain parts of the United States.

A new agricultural exploring expedition, distinct in character from those which have preceded it, left San Francisco on July 22. This is headed by P. H. Dorsett, Agricultural Explorer, a man connected with this Office for nearly a quarter of a century, and well known to most of our experimenters and correspondents. The work of the expedition, which will confine its activities to the northeastern part of China, in particular the provinces of Chihli, Shansi, and Manchuria, is designed to benefit principally the northern portions of the United States, and especially the Great Plains region. The Department has long desired to undertake an intensive search for hardy crop plants, fruits and shade trees, but disturbed political conditions in eastern Asia, the most promising field for such an exploration, have necessitated considerable delay in carrying out the project.

For many centuries the Chinese have been cultivating and improving fruits, vegetables, and crop plants of many sorts. Their highly developed plant types may prove of great value to us, fitting into climatic, soil, and economic needs we have hitherto been unable to meet. The expedition, therefore, will work upon the plan which the Department has been following for several years in its Latin American ex-

plorations, - in place of covering a wide range of territory, devoting but little time to any given section and its crop plants, a permanent base will be established in some conveniently located place, and critical studies will be made of plants found there, not alone with a view to securing seeds or propagating material, but also to obtain information which may be used to strengthen our agricultural and horticultural industries generally.

Forage crops and cereals of value are likely to be found in Manchuria, and the soy bean, which has in recent years become an important crop in the United States, will be studied carefully, with a view to securing new varieties of promise. From northern China, several hardy, drought-resistant shade and windbreak trees have already been introduced into this country. These have shown themselves capable of growing in regions where few other shade trees prosper, and it is expected that the present expedition will result in the introduction of numerous similar trees of value for the Great Plains region. Wild fruit trees, or wild relatives of fruits cultivated in the United States, will be obtained for the use of breeders now at work on the problem of securing hardy fruits for regions of extremely cold, dry winters; while other species of the same general character may prove valuable as root-stocks on which to graft our cultivated fruits, just as *Amygdalus davidiana* from northern China has already done.

Special attention will be given to the study and collection of highly developed fruit and nut crops, such as the bush cherries, jujubes, persimmons, pears, peaches, plums, and chestnuts. The Department has made a number of introductions of the Chinese hairy chestnut, a promising species. It is blight resistant lends itself to orchard culture and furnishes a nut closely resembling that of our native species. Up to the present however, seeds only have been introduced, and seedlings do not come true. An effort will be made to secure grafting wood of numerous fine varieties known to exist to the north of Peking.

These are a few of the lines of work which the Northeastern China Expedition will undertake to carry out during the next year or two. The cooperation of the agricultural experts of Nanking University and other institutions in China will be secured to the fullest extent possible, and it is expected that American missionaries, who have always been helpful to this Department, will assist in making the work of the expedition a success. New and promising varieties of fruits, forage plants, cereals and other crops which are discovered by the expedition will be brought to the attention of local agriculturists and horticulturists, so that China may profit by the work as fully as the United States. It is planned in fact, to make this a mutually beneficial agricultural exploration of northeastern China, - one of the oldest agricultural regions in the world.

Wilson Popenoe.

The Casuarinas

(With Reports on the Behavior of C. cunninghamiana.)

For a quarter of a century the Office of Foreign Seed and Plant Introduction has been bringing species of Casuarina into this country. It first seriously turned its attention to these plants in 1898, when W. T. Swingle returned from France with the seeds of four Australian species. While the Department of Agriculture cannot claim the credit of introducing the kinds most commonly grown in the United States, it has brought in many lots of seeds, including a number of rare species, some of which eventually may become widely popular in this country.

There is always a peculiar interest and romance centering about the Casuarinas. When we look upon their somber beauty, we are gazing -- if we may except the conifers and their allies -- on what are probably the oldest living flowering plants. There is something weird, and even suggestive of by-gone geologic ages in the appearance of these plants. They look like pines, yet they are not pines; they have what appear to be needles but are in reality branchlets functioning like leaves, while the true leaves are reduced to a sheath of joined teeth around each node. In the last-named characteristic, the Casuarinas resemble the Equisetums or horsetails.

For windbreaks the Casuarinas are powerful and have the advantage of being evergreen; they grow with great rapidity, live long, and in this country are almost wholly free from diseases and pests. For fuel they are often considered as good as, or better than, oak. Since the wood takes a fine polish, its uses in turnery and veneering are many. In contact with water it is very durable; it may be used for piles, posts, and especially for shingles.

More or less tannin is contained in the wood, bark, and branchlets, but until chemical determinations are correlated with careful identification of the samples, the statistics can mean little. One tanner in Miami, Fla., is now treating alligator hides with Casuarina extract.

The stringy branchlets, with their many close vascular bundles, contain fiber used in Australia for packing and even for printing paper and millboard.

The bark is medicinally employed as an astringent in cases of dysentery and similar ailments. The branches and flower spikes are eaten eagerly by Australian cattle, despite the tannic acid, and in that country Casuarina is looked upon as one of the chief winter forages of the arid ranches.

Still more interesting is the discovery, published in the Indian Forester, vol. 44, pp. 265-269, in 1918, by M. J. Narasimhan, that *Casuarina equisetifolia,* and presumably other species, bears on its roots nodules which are colonies of nitrofixing bacteria.

CASUARINA EQUISETIFOLIA (S.P.I. Nos. 9818, 19386, 29178, 30380), a tall tree or often headed back to a hedge, is the most abundant species here and abroad, though it is not grown in the Gulf States or northernmost Florida with much success, and in California too it is not the hardiest species. It is the bark of this tree that is the most used medicinally, and the fuel value of the wood, together with the tannin properties of this species, makes it distinctly valuable. Its ornamental qualities are exceeded by those of other species, and it is possible that it has been planted to the exclusion of its more beautiful relatives, but it is undoubtedly useful upon barren sands and salt-sprayed coral rocks. Distinguished by thick round branchlets.

CASUARINA TORULOSA (Nos. 1304, 1866, 15689, 18686, 49854) is fairly commonly grown in the same range as the preceding species. It does not differ markedly in ornamental worth. In Australia it is considered a good fuel and lumber tree. Distinguished by square branchlets.

CASUARINA SUBEROSA (Nos. 12796, 56564) is a rare tree in southern Florida. The forage it provides in Australia is particularly good. The branchlets are very slender.

CASUARINA STRICTA (Nos. 1863, 1864, 8254, 15688, 18687, 30379, 44909, 46882, 46883) a favorite in California, seemingly more rare in Florida, is a fairly hardy species making a low, often shrubby growth. It is conspicuous on account of its very thick, often pendulous branchlets and frequently very big cones - when mature, larger than those of other species. In appearance it is not so elegant as some other sorts, and it is occasionally rated as a coarse plant, but it is very striking and for its reputation can fall back on its economic worth. The branchlets are said to be a favorite forage of Australian cattle and are the chief source of the Casuarina fiber which has been mentioned. For shingles and posts the wood is especially sought.

CASUARINA GLAUCA (Nos. 1862, 38147, 42286) is cultivated in southern Florida. In its native home it is accustomed to salty inundations, and this fact may augur a future upon the Everglades. Its graceful branchlets possess a beautiful blue-green cast and are very long and often pendulous. For ornamental charm this elegant tree may well be considered the best of the genus. The wood makes especially fine shingles and the bark yields a promising percentage of tannin. This tree suckers and sprouts from the base, and stands trimming. It may therefore be used for hedges if desired.

CASUARINA SUMATRANA (Nos. 37119, 45659, 54705), a native of the Dutch East Indies, has had a difficult time establishing itself in this

country. Its only future as an out-door plant probably lies in southern Florida. The square, thick, forking branchlets, unlike those of other species, are of a lustrous, dark green which, combined with the thick, bushy, pyramidal growth adapted to pot culture, may give it the place in the Tropics that box holds in the North. For growing in pots it should have a light vegetable mold and peat with a small quantity of sand; it is then to be placed in well-drained pots. Cuttings of the young shoots make charming bouquets. This species is the only one of those in the United States which is likely to be seen outside of the warmer portions; as a pot plant it is appropriate to northern homes quite as much as palms, cycads and Ficus.

CASUARINA CUNNINGHAMIANA (Nos. 1860, 1865, 44532, 46881, 47973, 48155, 49720) is a species with slender branchlets and very small cones; it is considerably more elegant in appearance than *C. equisetifolia*, though often confused with it. In Florida it seems not to sucker from the base, and when allowed to reach its full height it grows in Austraiia to be a very tall tree with a sturdy trunk which shoots up straight and unbranched. Economically this is probably the most important of the genus. Maiden's studies in Australian trees refer to it as one of the tallest, thickest, fastest growing, most useful and noble trees of the forest. Its timber ranks high for fuel and more especially as construction lumber, since it checks less than its relatives.

Maiden asserts that this is distinctly a fresh-water tree in Australia; in Florida some specimens are to be seen on the Everglades, though not actually in the brackish waters but rather on elevated reefs. It seems likely to prove hardier than any other species known in this country.

This Office has recently made a canvass of all the experimenters who have received plants of *Casuarina cunninghamiana*. Forty replies were returned from ten states. Only one experimenter expressly rated this species as inferior to the others, and almost half of the answers showed that it was a favorite. There were some losses of trees through causes bearing no relation to hardiness, but a large number of data were secured concerning their resistance to cold.

R. S. Elliot, of Kerman, Calif., says, "This is one of the finest Casuarinas I have seen, better than *Casuarina equisetifolia* or *C. stricta*." Temperatures there have reached 11° F. since the plants were set out.

E. O. Orpet writes from Santa Barbara, Calif., where the plants have endured 25° F., "Probably the best of the Casuarinas."

Harold Mowry, of Gainesville, Fla., reports on Professor Rolf's plants that only the tips were injured by 20° F., a damage so slight that a careful examination was required to find it.

Paul Popenoe, of Coachella, Calif., reports that his trees have withstood excessive heat, drought, wind, and temperatures of 25° F.

His verdict is, "They are a real acquisition for this desert country."

W. B. Pratt, State Forester, at Sacramento, Calif., tells us that, "*Casuarina cunninghamiana* has made remarkable growth at the State Nursery .....This winter we had a cold spell which frosted back many of our eucalyptus and acacia trees, but it did not affect this tree."

From San Diego, Calif., comes the report of C. P. Barrows who says, "The tree has done remarkably well and I think much of it. The soil is not deep and quite stony, yet this tree has found good rooting."

C. J. West, of Lake Stearns, Fla., does not report the critical temperatures, but he says, "A very beautiful tree which outgrows everything else on the place."

Henry Nehrling, of Naples, Fla., reports that *Casuarina cunninghamiana* is "an excellent plant for south and central Florida, much finer in my opinion than *C. equisetifolia*."

From Appleton, S. C., where the State Experimental Farm is located, Mrs. Dora D. Walker, Specialist in Production and Conservation, reported February 16, 1924, that her tree was still living, having endured the cold waves up to that time. This is the "farthest north" for this species at present. Time will be required to show that it can be cultivated successfully in such latitudes on the Atlantic slope.

Reports from more unfortunate experimenters show that all the trees of this species on the Gulf Coast were lost in the cold spells of January 12, January 22, and February 11, 1924.

At College Station, Tex., Prof. H. Ness says, "They were killed by the first frost of the season, in December, 1923. The frost was hardly sufficient to kill such tender vegetables as tomatoes and garden beans. The plants were in fast growth at the time of its occurrence."

One loss only was attributed to frost in California, when Albert Etter, of Ettersburg, lost all of his trees at a temperature of 17° F. The temperatures which killed the Gulf Coast trees were 18° and 19° F., so that the temperatures 17° - 19° F., are probably the critical ones for young trees.

Reports concerning the hardiness of *Casuarina cunninghamiana* are a trifle conflicting. Differences in the age and exposure of the trees may account for this. But it seems quite certain that this species can be grown farther north than any other of its kind yet tried in this country.

Specimens of Casuarina received from experimenters of this Office show that even keen plantsmen get confused about the species. Furthermore, in some cases the names under which this Office received seeds were incorrect. Until recently it has been impossible to check up these errors, but now several identifications have been corrected. The Office therefore invites experimenters to send for identification branches, especially flowering or fruiting ones, together with S.P.I. numbers if possible, in order that the names of Casuarinas distributed in past years may be revised.

Donald C. Peattie.

FOREIGN SEED AND PLANT INTRODUCTION

Scientific Staff.

David Fairchild, Senior Agricultural Explorer in Charge.
Wilson Popenoe, Botanist, Agricultural Explorer Acting in Charge.

Roland McKee, Horticulturist, In Charge of Plant Introductions.
P. H. Dorsett, and F. A. McClure, Agricultural Explorers.
B. T. Galloway, Senior Pathologist.
C. C. Thomas, Associate Horticulturist, Plant Distributions.
Peter Bisset, Horticulturist.
H. C. Skeels, Assistant Botanist, Seed Collection and Herbarium.
R. A. Young, Assistant Horticulturist, New Crops for the South.
Donald Peattie and Paul Russell, Junior Botanists.
F. J. Hopkins, Senior Scientific Aid.
Irving W. Dix, Scientific Aid.

Plant Introduction Garden Superintendents and Propagators.

Bell Md. (P.O. Glenn Dale, Md.)
- Edward Goucher, Superintendent.
- Ray W. Woodbury, Senior Scientific Aid, Plant Propagation.
- Albert Close, Scientific Aid, Plant Propagation.

Bellingham, Wash.
- B. L. Peters, Scientific Aid, Acting in Charge.

Chapman Field, Fla. (P.O. Coconut Grove, Fla.)
- W. A. Patten, Superintendent.
- Charles H. Steffani, Senior Scientific Aid, Plant Propagation.
- Eric Carlson, Scientific Aid, Plant Propagation.

Chico, Calif.
- J. E. Morrow, Superintendent.
- Henry Klopfer, Scientific Aid, Plant Propagation.

Miami, Fla.
- Edward Simmonds, Superintendent.

Savannah, Ga.
- David Bisset, Superintendent.

Special Collaborators.

L. H. Bailey, Ithaca, N. Y.; J. H. Dorsett, Peking, China; Robert H. Forbes, Kulikoro, French West Africa; A. C. Hartless, London, England; Holger Johansen, Balboa Heights, Canal Zone; Barbour Lathrop, Chicago, Ill.; Dr. H. L. Lyon, Honolulu, Hawaii; Henry Nehrling, Naples, Fla.; Dr. A. Robertson Proschowsky, Nice, France; J. F. Rock, Washington, D. C.; Charles T. Simpson, Littleriver, Fla.; Dr. L. Trabut, Algiers, Algeria; Dr. William Trelease, Urbana, Ill.; E. H. Wilson, Jamaica Plain, Mass.