

Date Culture

IN SOUTHERN CALIFORNIA



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Ralph D. Cornell

50 CENTS

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GEORGE WHARTON JAMES

*Editor OUT WEST, author of "The Wonders of the Colorado Desert,"
"In and Around the Grand Canyon," "In and Out of
the Old Missions of California," etc.*

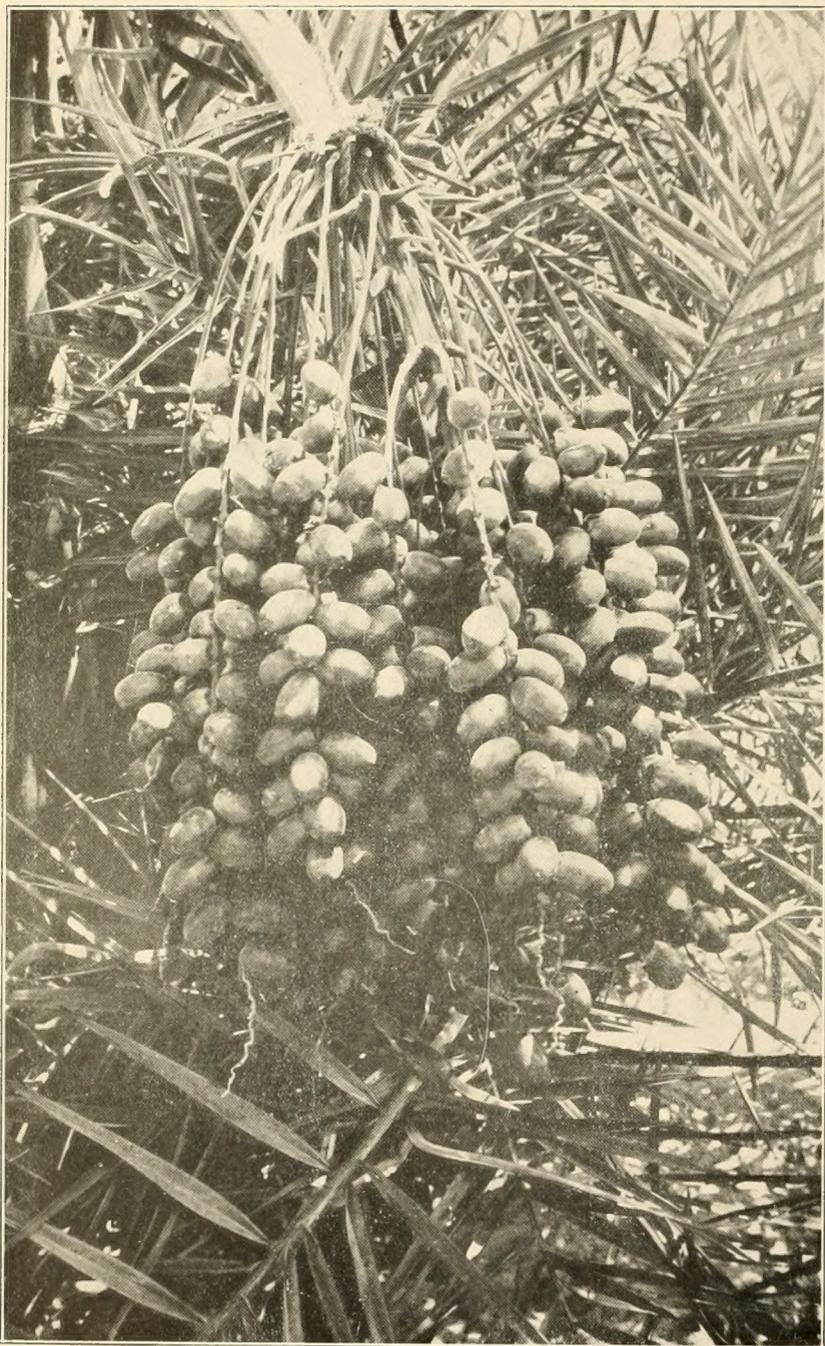
PAUL B. POPENOE

of the West India Gardens, Altadena.

RALPH D. CORNELL

of Pomona College.

OUT WEST
218 New High Street
Los Angeles, Cal.



El Kesba, an early ripening variety from Tunis, fruiting in the Coachella Valley, California.

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Date Growing on the Colorado Desert.

By George Wharton James

Author of "In and Around the Grand Canyon," "The Wonders of the Colorado Desert," etc.



IT IS to be doubted whether any other country in the world possesses such marvelous adaptability for the growing of such a variety of plants, trees, shrubs, and flowers as does California. There are several reasons for this. Its soil is as rich and as varied as the needs of plant life, its topography ranges from nearly 400 feet below sea level to over 14,000 feet above, its climate runs the gamut from Saharan Desert to Alpine Snows, and it possesses inland valley, mountain height, foot-hill slope, ocean shore, and island surfaces upon which floral and arboreal growths are as wonderfully varied as anywhere in the world. The result is that one need not be surprised at anything he hears as to the possibilities of California's horticulture.

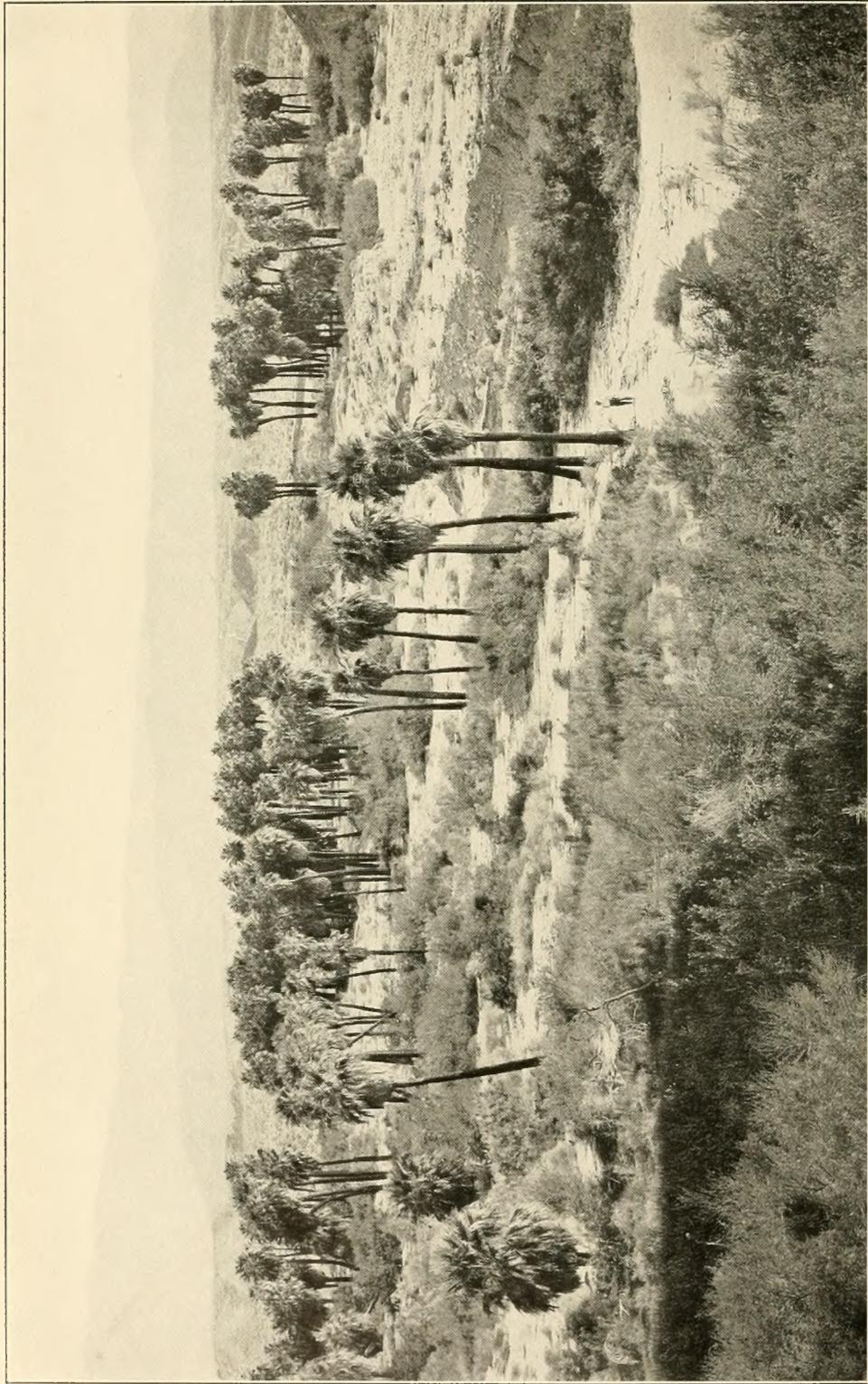
For centuries the Fan Palm, known to scientists as the *Neo-washingtonia Filifera*, has been growing profusely in the canyons and foothills of the mountains that surround the Colorado Desert in Southern California. Great clusters of fruits are annually ripened upon these palms upon which the Indians have a feast. These facts suggested to the United States Government plant-experts and experimentalists that here, under the high culture of American methods of farming, the date palm of the Persian Gulf region might be brought to the highest possible state of perfection. Accordingly, about seven years ago experimental date farms were established at Mecca on the Colorado Desert, and at Tempe in Arizona. In spite of unusual and adverse conditions the results have been eminently satisfactory.

But even more pleasing than the results obtained at the Government's experimental farms, are those achieved by an experimentalist who was neither farmer nor scientist. Six years ago last October (1911) James P. Read "took

up" 160 acres of desert land, four and a half miles northwest of Mecca in the artesian belt of the Coachella Valley. It took a year to get his well bored and the land cleared and ready for planting. Hence, nothing upon his place is more than five years old. He visited the experimental date farm and became so interested that he wrote to Dr. Walter Swingle, the head of the experimental department of plant life at Washington, D. C., and asked if he would send him a variety of date shoots, all of which he would plant, carefully tend and experiment with. Accordingly seeds of 26 different varieties of edible dates were sent to him, all of which were planted with unusual care. Nearly all of them came up and thrived abundantly, but now, after five years of experience, Mr. Read is devoting the major part of his attention to seedlings of but three varieties: namely:—the Deglet Noor, the Menakher and Tafilet.

At the outset it must be understood that the date palm is diecious, some trees being male and some female, and it is essential that the growing fruit be fertilized with the pollen from the male trees. Experience has demonstrated that this can better be done artificially than by nature, which permits the digging out of the major part of the unnecessary male trees which would otherwise occupy the ground to no advantage. It is found that one male tree is capable of fertilizing the fruit of fully fifty female trees, which is about the number planted to the acre. It is impossible, however, to determine whether the palms are male or female until they are three or four years old, and already Mr. Read has dug up over a thousand male palms. In his experience the proportion of male to female trees, grown from seeds, is about sixty per cent.

The process of artificial pollination



A Group of Native Palms (*Neco Washingtonia Filifera*) on the Colorado Desert, California.



Hon. James P. Read, the Pioneer Date Grower of the Coachella Valley (Colorado Desert) California

is very simple. The male trees pollinate as early as February. The fruit of the female trees is contained in lanceolate shaped sheaths and as soon as these sheaths split open they are ready to be pollinated. A sprig of the pollen-bearing male plant is placed inside the female sheath and tied there, and this close contact is found to produce a surer result than when the pollination is left to the simple process of nature.

It is now well known that if one will go to the trouble of planting seeds and carefully watching the growth of the plants that spring therefrom that new and improved varieties may be discovered and bred. This is one of the secrets of Luther Burbank's marvelous achievements, and already in date culture, in Mr. Read's orchard, it has given to the world the finest and best date palm known to the United States. The palm is but five years old, yet its fruit is already recognized as that of a date of exceptionally high standard. Its seeds are small, the meat of the fruit of more delicious flavor, its color and form better than that of any date known in American commerce. When it was but three and a half years old this palm

bore ninety pounds of fruit. The following year it bore nothing, having doubtless exhausted itself the year before, but this year (1912) there is every indication that it will yield from three to four hundred pounds of fruit. The palm now stands 18 feet high and is about four feet in diameter at the base.

When the fact of the development of this remarkable date from seed is better known there can be but little question that a great impetus will be given to the planting of dates in the desert regions of Southern California. Experience has demonstrated that the soil and climate are all that can be desired and while last year the temperature on Mr. Read's ranch at Thermal fell to as low as sixteen degrees, Fahr., his date palms and fruit were uninjured.

This is what Mr. Read said personally about this experience:

"The first week in January, 1912, we had the most severe frost I have ever experienced or have been able to learn about on the desert. Every morning for about an hour for a week the temperature went down to sixteen. There never was such a severe frost on the desert. It killed all the young limbs of my fig

and orange trees, but on the dates, it merely scorched the outer tips of the leaves without doing the slightest injury to either trunk or fruit."

The Arabs have a proverb that the date palm must have its feet in water and its head in the sun, consequently an essential condition to perfect growth is an abundance of water. Where this has been supplied in the Coachella and Imperial Valleys excellent dates have been the result, and there is every reason to assume that before many years have elapsed the Colorado Desert will be producing all the dates that the commerce of the United States calls for. It should be borne in mind, however, that the dates brought into the United States are of the poorest quality. None of the better classes ever reach this country, as they are all purchased by the French, English and Turks who control the oriental date orchards, and the supply being limited, they are never placed upon the general market. Even under these conditions the date growers receive twenty cents per pound on the trees for all the superior quality of dates they are able to grow.

Mr. Read's experience in the planting of dates will undoubtedly be of service to those who contemplate engaging in this branch of horticulture. He plants sixty-five palms to the acre, though he has found that the suggestion of the Government of fifty palms to the acre is more successful to grow an orchard from the seed. The rows should be six feet apart and the palms twelve feet apart in each row. Plant the seeds out at the very start instead of in a nursery. They thrive better when apart and while the unnecessary male trees have to be dug out as soon as they prove themselves, it is better to do this than plant all the seeds in a nursery and lose a full year's growth of the bearing trees by transplanting. The seeds should be planted three inches deep. A good plan to secure evenness of depth is to tie a string three inches up on an old broomstick and use that for planting.

In preparing the soil for the planting of dates, it is well to fertilize it, and this fertilization should be renewed every year. The trees themselves need nitro-

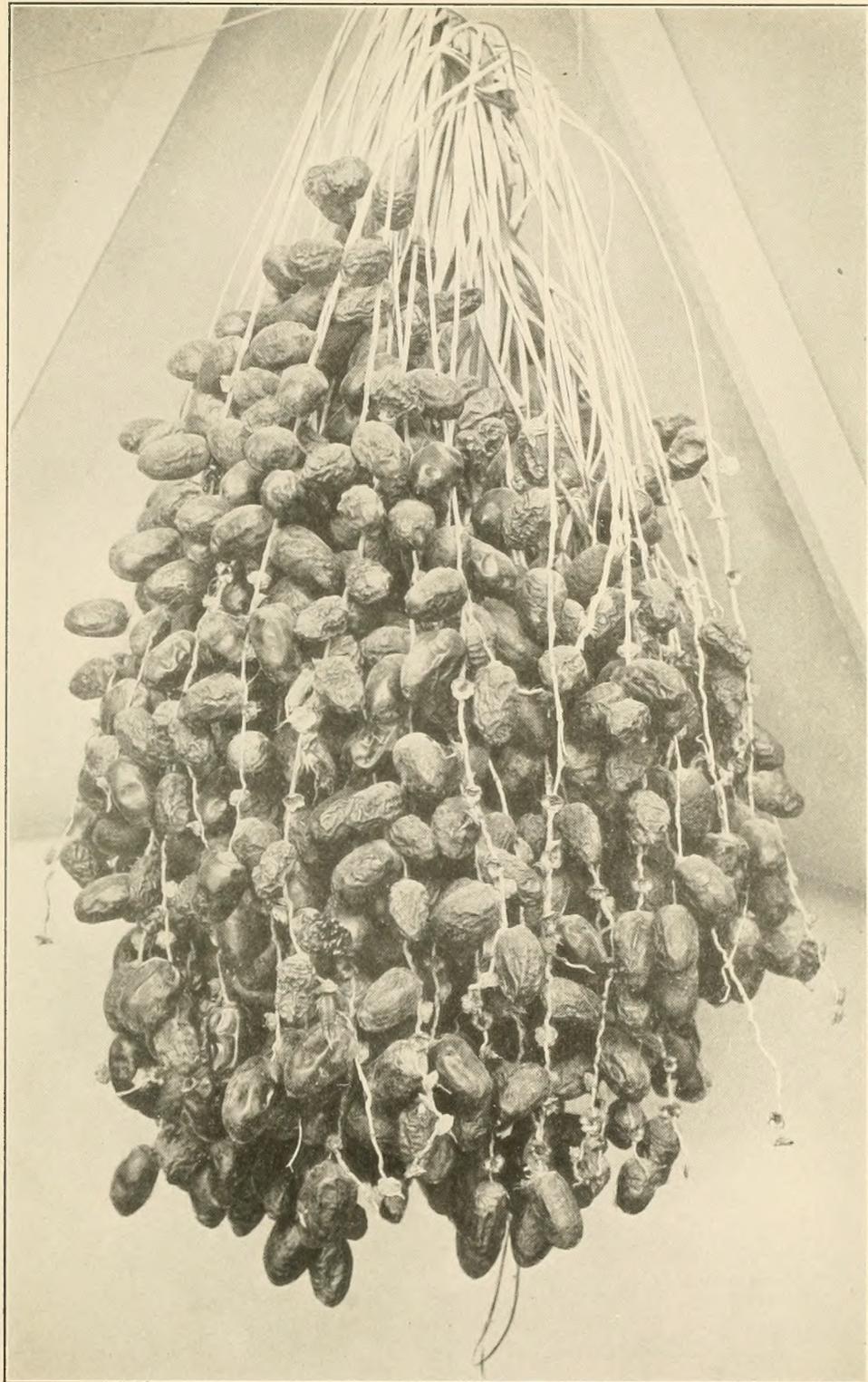
gen and this is supplied by ordinary stable manure. When they begin to bear fruit, phosphates are required and this can be purchased in the chemical or bone mixtures. In Los Angeles, phosphate manure is supplied at about \$20 per ton. In speaking further about fertilizers Mr. Read said: "Very few people are acquainted with the value of the mesquite of the desert as a producer of fertilizer for the soil. There are two kinds of mesquite, one grows an ordinary flat bean and the other the screw bean. I have found the screw bean the most valuable. Not only is it serviceable for this purpose, but also as a windbrake. I have planted quite a number of the trees in rows within five or six feet of each other and within three years they have grown to be fifteen feet high, with a dense foliage that reaches to the ground, thereby affording adequate protection from the desert winds."

In addition to fertilization dates require plenty of irrigation.

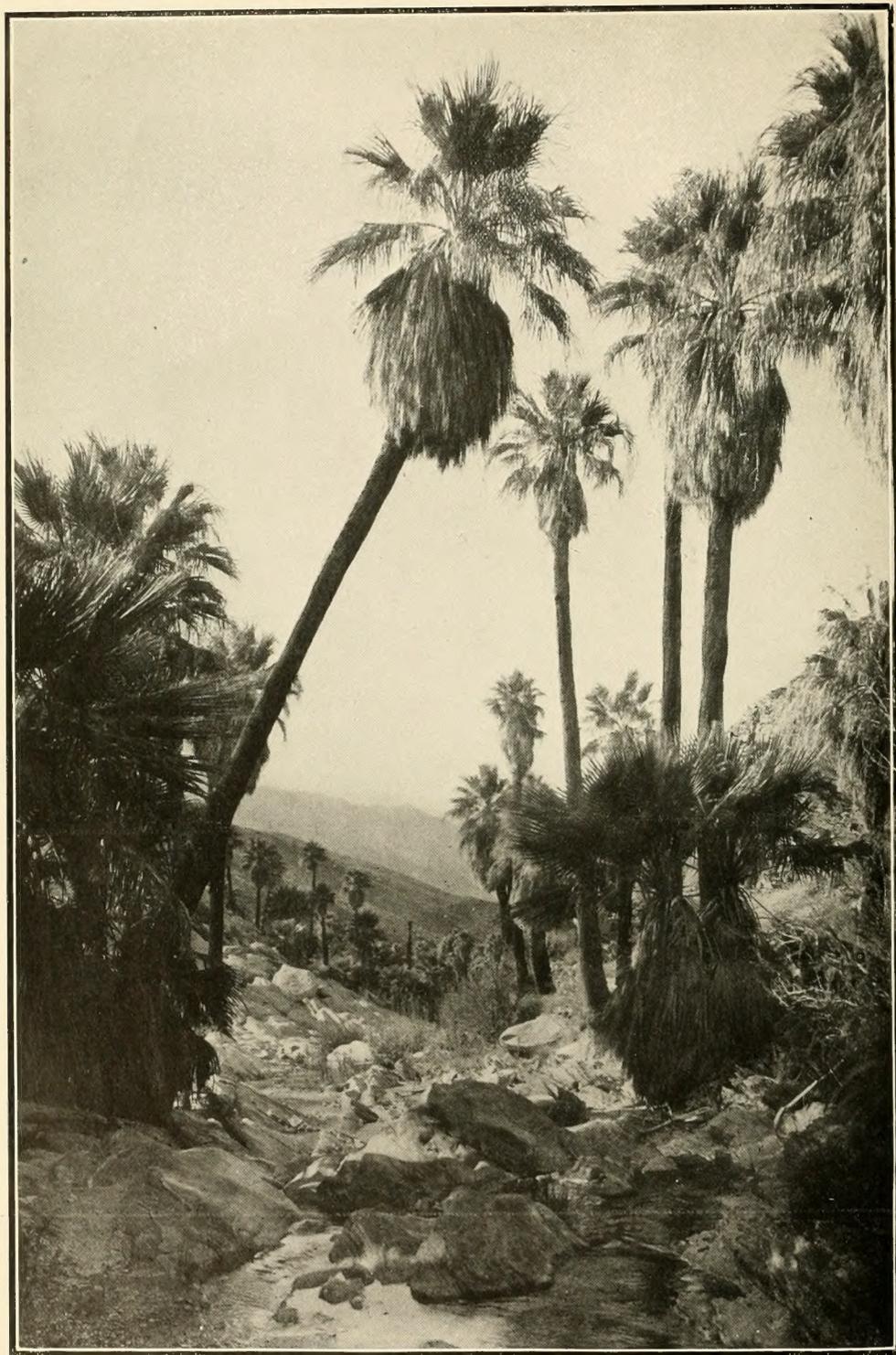
They should be irrigated whenever they need it. It doesn't take any one very long to learn when palms need water. Cultivation should always follow irrigation and it is a safe plan for a beginner to irrigate not less than every month.

While trees begin to bear, as shown in the case of the typical date to which I have referred, as early as three and one half years after planting, a palm is not considered mature until it is ten years old. If it is properly cared for it will improve all the time both in the quality and quantity of its fruit. After this time the older it gets the better the fruit should become, and the larger the quantity. In their native habitat trees that are one hundred years old are as strong and sturdy as trees of a decade and seem good for hundreds of years yet to come.

At from six to ten years of age a thrifty tree should bear not less than one hundred pounds of dates. Some trees will bear double that before they are ten years old, and when it is considered that our poorest dates are far superior to the best that can be bought in the ordinary American markets, it can be seen that the prices always ought to be fairly good. Then, too, there is a vast difference between dates "jammed" to-



A Bunch of Dates Grown on the Colorado Desert, California.



In Palm Canyon

gether in the rude and dirty fashion in which ordinary dates are generally purchased, and dates that are allowed to cure on the trees, from which they are carefully removed and packed in small cartons like chocolates. People nowadays would far rather pay a good price for their foods neatly and healthily packed with assured cleanliness.

While there are many kinds of dates they may all be classified under one of the following heads:—1. Dry; 2. Semi-Dry; 3. Soft. The dates with which we are familiar are the semi-dry, and the very best of this class is the Deglet Noor. A good Deglet Noor is not only luscious and sweet, but has a nutty flavor which is the standard by which all dates are judged. But there is all the difference in the world between these dates when mashed together in the way we generally purchase them and when allowed to ripen on the trees.

The Hawaiians grow a dry date but they are practically unknown in the United States. There are soft dates that some people like very much better than the semi-dry Deglet Noor. Among these are the Tafilet and Menakher. An ordinary date of either of these kinds will give two good mouthfuls, and they are richer, more luscious and delicious than any other fruit. The dates of the desert generally ripen from September to December.

In speaking to Mr. Read about his experiences in date culture, he quaintly remarked:—"While I have learned a good deal, I know there is still much more to be learned. When I first began I used to ask a great many questions and paid careful attention to the answers, but experience has taught me that it is a foolish and dangerous business asking for information from those who don't know.



The World Famed Deglet Noor Date Palm, grown by James P. Read Coachella Valley, Colorado Desert, California.

"To those who have filed upon desert land and who within three or four years expect to be able to secure water, and who desire to plant dates, I am glad to give the results of my own experiences and would suggest that time can be saved by adopting the following procedure. Get all the good date seeds you can. Put them in a gunny sack and bury the sack for ten days either in a ditch or any other place where there is an abundance of water. The seeds will thus be softening and when planted will sprout quicker. Carefully prepare the soil, fertilizing it with well-rotted barn manure, then plant the seed, three inches deep twelve inches apart in rows two feet apart. Should they remain there until they are three or four years old their roots will appear like a large onion. By this time it may be possible to detect the sex of a few, or many, of the plants and thus the males can be eliminated before they are transplanted. They practically lose a year's growth by being transplanted. Hence, if you have the ground, plant your seeds out where you expect your palms to grow. Fertilize, irrigate and cultivate as has been suggested elsewhere and there is nothing to prevent your having abundant success."

While figures may be made to tell almost any kind of a story, here are a few figures which Mr. Read or any other experienced date grower will verify. Suppose one has fifty palms to the acre, and that they are in moderate bearing, say one hundred pounds to the tree. At twenty cents a pound, that is twenty dollars per tree, or \$1,000 per acre. Cut the price in half, and \$500 per acre is still a wonderful return, and the price of ten cents per pound for rich, delicious dates, cured on the tree, packed in neat cartons and otherwise prepared for the market, is by no means an exaggerated figure.

A few facts in the life of this pioneer date grower of California cannot fail to be interesting.

He was born in New Jersey, April 29, 1835. His parents were Irish who emigrated to this country almost immediately after their marriage. Up to his fifteenth year the growing lad was sent to school and there gained all the school education he was ever to receive,

for when the Gold Rush of 1849 came, he ran away from home, hurried to New York, succeeded in getting aboard a vessel going to the Isthmus of Panama which he crossed, and eventually landed in San Francisco. Here he spent two or three weeks and then hurried to the mines at Potts Bar of the Yuba River. Then began a roving life which lasted for several years, life itself being his stern monitor and experience his teacher. Indeed, as he himself says, he has had far more schooling since he left school than he had while he was there.

Tired at last of the roving life, he learned the carpenter's business in Butte Co., and soon had a good business—house-building, mill-building and the like. Forty-three years ago he built a quartz mill in Brown's Valley, Yuba County, and there he has occupied every position from the lowest to the highest. Prospecting for gold, however, has always been his chiefest lure, and every summer he has gone out into the mountains seeking for the precious metal.

Ever since his wife died, twenty years ago, he has felt that he has had no home, hence, when some friends who had a high opinion of his ability asked him to come down to the Colorado Desert to prospect for oil, he yielded to their persuasions and came. He has a good outfit and made a thorough search for what his friends hoped to find. He entered the desert from San Diego by way of Carrizo Creek and struck the Coachella Valley just about the time of its first boom. In spite of its desert appearance, he was attracted to the country and seemed instinctively to recognize its marvelous horticultural possibilities. He settled down, planted out his date orchard as before related and a short time ago was joined by his son who has been a sailor all his life, holding positions of trust on the steamers of the Hawaiian Company, but who has given up his sailor life in order to help his father develop this new, fascinating and poetic occupation on the desert.

In addition to grapes, apricots, figs and small vegetables, Mr. Read has sixteen acres planted in dates, and in his date nursery enough palms now ready to be transplanted for another forty acres, which will all be in place before the end of 1912.

Date Culture on the Colorado Desert

By Ralph D. Cornell



IN JULY, 1912, Mr. Ralph D. Cornell, formerly of Pomona College was engaged by the Chuckawalla and Palo Verde Irrigation Association to make a study of date, citrus, fig and other fruit growing conditions in the Indio, Coachella and Imperial Valleys and Yuma region. From this report we quote the following on date culture.

"About seven thousand date shoots have been imported into the United States since the beginning of the date industry. Dr. Coit says that all of the requisite conditions for the successful growing of dates may be found in many places thruout the Imperial, Coachella and Colorado Valleys, and the country around Palo Verde and Blythe, Riverside County. The Imperial, Coachella and Colorado Valleys are the regions in which date culture has proven its worth, and where are now to be found bearing orchards and thousands of newly planted off-shoots. Dates are so far subject to pests, only as imported on the young plants and subsequently scattered. This infestation is in the form of scale of two distinct varieties: the Marlatt and Parlatoria. A spray has been found that will kill these scales, thus eliminating all future danger from outside infection and making possible its eradication, as now extant. Spraying and burning with a gasoline torch have proven to be effective means of killing scale on old and established palms.

"The date is not particular as to the soil in which it grows, and will thrive in considerable alkali. Light and heavy soil alike seem to produce dates. While the date is a desert palm and requires a long period of intense heat for proper development and ripening, the roots require an abundance of water. Dr. Coit says that one miners inch of continual flow is sufficient to maintain a five acre orchard of bearing dates.

The off-shoots are set 25 ft. by 30 ft. apart, or about sixty trees to the acre, and begin to bear at the ages of from three to five years. Seedlings are somewhat uncertain, but off-shoots always come true to the parent. A conservative estimate of the bearing capacity of a ten year old tree would be 100 pounds. Some will bear as high as 400 pounds to the tree. A leading Los Angeles grocer has placed the average retail price for fresh, California dates at from 50 cts. to 75 cts. a pound. They bring from 15 cts. to \$1 a pound to the grower. Fruit matures, here, from September thru December, some varieties ripening on the trees, others requiring artificial heat. The Deglet Noor is very popular, among growers, at present, as it will ripen on the tree before the cold weather comes, and is of unusual delicacy of flavor.

"A palm reaches its maturity of bearing capacity at ten years and will continue to produce for one hundred. One palm sometimes bears as high as twenty bunches in a season. Off-shoots are produced between the age of three and fifteen years, after which no more appear. During this period, one palm will produce ten or twelve off-shoots, sometimes more. The importers' price for off-shoots is \$8 apiece. Those grown locally cannot be had for that.

"Palm Springs can boast of a few young date palms that have come into bearing, but has nothing on a commercial scale, nor any palms of much age.

"At Indio, is located one of the Government experimental stations, where date culture is being forwarded. On an adjacent ranch, are four Deglet Noor trees that produced 300 pounds last year that sold for \$1 on the average. Twelve imported trees, on the same ranch will produce at the age of seven years, about 750 pounds of fruit, as they are now laden with 75 bunches of dates. An offer

of \$25 apiece for off-shoots from these Deglet Noor trees was refused, as the owner wished to set more plants, and considered them worth that much himself.

"At Mecca is the largest Government date garden in the valley. These trees are growing on soil containing three-tenths of one per cent alkali, and have been fertilized regularly each year with one yard of manure to the tree; and have received frequent and abundant irrigation, with prompt cultivation after each watering. The trees have been sprayed for scale. All of the old palms are heavily laden with fruit, and in splendid condition.

"Situated a few miles south west of Mecca, is an orchard containing 5000 date palms. Of these, between 300 and 400 are of bearing age, running from three to five years. The crop on them is estimated at 2000 pounds and should average 75 cts. a pound. From one Deglet Noor tree the owner took 90 pounds of fruit when it was three years old. When four years old no fruit was produced. This season, at the age of five, the crop is estimated at 250 pounds, of which 150 pounds are engaged at \$1.50 per pound. In addition the palm has already produced three off-shoots. This grower expects to net from \$300 to \$600 an acre from his dates when they have become ten years of age.

"These trees are growing in soil that contains from one to six-tenths per cent of alkali and some salt. They are fertilized with manure once a year, and for trees producing fruit potash, phosphates and cotton seed are applied. Several other ranches in this vicinity

have trees producing excellent fruit.

"The Imperial Valley is sprinkled with date plantings, and has several experimental farms where dates are grown. The trees thrive and fruit here very readily and are well adapted to such climatic conditions.

"One of the Arizona experimental farms is situated at Yuma where seven year old dates may be seen in full bearing. These trees have never been fertilized. Cultivated crops have been grown between the rows, thru which the dates have received their only tillage. In the spring of 1912 the palms were pruned severely and burned with a gasoline torch to kill the scale. After this harsh treatment one seven year old palm that already contained eight off-shoots produced ten bunches of fruit. Some palms did not bear at all.

"Fruiting palms of thrift are also to be found on the mesa near Yuma. These have had little care but the water necessary to keep them growing. One nine year palm produced, in 1911, 210 pounds of fruit that sold for 10 cts. F. O. B. Yuma.

"The date industry seems to be a coming thing for these valleys, while the results so far obtained are largely problematical, there seems to be no reason why the future shall not witness the growing of dates as a highly commercial success. The seedlings are uncertain as to sex, quality of fruit and age of bearing, but by proper selection and propagation from off shoots standard varieties can soon be produced in abundance. Scale is under control and the climatic conditions are proven. Time will do the rest.



Date Growing in California and Arizona

By Paul B. Popenoe, West India Gardens, Altadena.

SO WELL ADAPTED is the date palm to culture in certain parts of the southwest that ever since attention was widely called to it, a decade ago, it has been looked upon as the most promising industry there. The hopes of that period have now been changed to certainties, by

it is admitted to be one of the most desirable industries in which ranchers can engage. The areas named are not large in total extent, but they probably exhaust the list of good date regions in the United States, if a little strip of Texas in the neighborhood of Laredo, where the government has recently



Grown in Arizona.

the work of many experimenters, so there remains no doubt as to the possibilities of this culture. For the Coachella, Imperial, Chuckawalla and Palo Verde valleys and certain low-lying parts of Arizona there is no uncertainty about the production of dates:

started encouraging experiments, be added.

Eventually, it will no doubt be possible to grow certain varieties of dates in other parts of California. Seacoast varieties can probably be found which



Imported Offshoot after six years at Indio.

will succeed in such a climate as San Diego, while there are plenty of early-maturing sorts that will doubtless fruit with fair regularity in parts of the San Joaquin valley, the Sacramento valley, Death valley and similar locations, warm in summer but cold in winter. These last-named areas will not be likely to affect the market in dates; they will grow fresh fruit for home consumption, but can hardly produce enough high-grade dates to create much of a commerce since the best varieties of dates usually ripen rather late because they require a great amount of total heat to mature properly. This, at least, is the case with North African varieties; it is possible that the early-ripening Persian Gulf dates may change the situation entirely, but as they have not yet been tried in such regions as I have mentioned, one can only speak from conjecture.

Attention was first called to date culture as a possibility for the southwest by the fruiting of a number of scattered seedlings, notably those planted by J. R. Wolfskill near Winters, Yolo county, about 1858; a few in the neighborhood of Yuma, and still others in the Salt River valley in Arizona. Some of the seedlings planted in this valley bore fruit of excellent quality; accordingly it was Arizona rather than California that took the lead in scientific propagation of the date.

In 1889 the Department of Agriculture imported fifty-nine offshoots in tubs from Egypt, nine from Algeria and six from Maskat, which were planted in the Arizona experiment garden at Phoenix. Those that survived flourished, but more were lost by various transplantings, and I believe there are now only two of this original importation in existence—one in Arizona and another, an Egyptian variety, near Indio.

In 1889 the co-operative date garden was established at Tempe, Ariz., by the State University and the Department of Agriculture and about 450 North African offshoots secured for it, a few being sent to other points in the Southwest. Since then the Department of Agriculture has imported more than 1,000 offshoots from all parts of the world, until the Tempe garden has the

largest collection of varieties to be found anywhere—something above 230.

Unfortunately, the soil of this station is utterly unsuited to careful investigations of the varieties, or even the production of good dates, being heavily alkaline and saturated with drainage from irrigation ditches. The Department of Agriculture has established two stations in the Coachella Valley, one at Mecca on soil which is too sandy to produce the best results, and more recently a station near Indio, which is admirably located and will in time certainly become the principal station. At present it has not a large collection of varieties, but new ones are being added by bringing offshoots from the other stations as rapidly as possible.

The success of these government importations encouraged private growers, and several good plantations were started, notably those of the California Date Company at Heber, Imperial county, and Bernard G. Johnson at Mecca, Riverside county, California. The latter has since been sold to the American Date Company. Both of these consisted principally of Deglet Noor palms from Algeria and are today the two oldest and finest private plantings in the country. Other importations followed, so that between 6,000 and 7,000 offshoots have been brought to the United States from Algeria, mostly of the Deglet Noor variety. Many of these have already yielded offshoots for planting, and as the government has been liberal in giving away or selling shoots from its palms, there are nearly 10,000 palm trees of foreign origin in the United States at the present time, the larger number being in the Coachella Valley.

Other growers, both in California and Arizona, have planted seedlings in large quantities, and some of these are already in bearing. The total acreage of dates in the Southwest at present must be several hundred, of which at least sixty acres are now in bearing, many of them for the first time this year.

Evidently, this is an industry that has passed far beyond the experimental stage. The growers of Arizona, indeed, have been held back by lack of varieties suited to their peculiar climate, but this

situation is now being remedied. The ranchers of Imperial Valley have been making so much money out of other crops that they have not given much time to dates; so the Coachella Valley is the principal exponent of the industry at the present time; and no one who has inspected what has been done there can entertain any doubt as to the future of date growing in the United States.

Requirements of the Palm.

The prime requisite for successful date culture is intense summer heat. Dr. W. T. Swingle of the Bureau of

palm, and one miner's inch per acre is a desirable supply for successful date growing, unless one is in a very heavy soil that will absorb and hold moisture a long time. Warm water is an advantage; it is by the flow from hot springs that the dates of Hasa, most famous in the world, are produced. Artesian water in most parts of the Southwest is sufficiently warm to be satisfactory.

The question of soils is a little more complex. Normally the date succeeds best in a sandy loam; yet it is cultivated with good results in many places where the loam is in a very small amount. On



Imported Persian Gulf palms at the U. S. Agricultural Experiment Station, Mecca.

Plant Industry, has carefully figured out the necessary amount (in Bull. No. 53) but in practice it may be said that any of the localities mentioned at the beginning of this article: Coachella, Imperial, Palo Verde, Chuckawalla Valleys and the lower parts of Arizona meet the requirements for heat. The great drawback in many localities is that, while the midsummer heat may be intense, the autumn coolness begins too early; but this drawback is partly avoided by artificial ripening of the dates.

The other essential, co-ordinate with heat, is water. There are few cultures that require as much irrigation as the

the other hand, some of the best Deglet Noors in Algeria are grown in a stiff clay, comparable to that of Imperial Valley; while the excellent dates of the Tigris and Euphrates Rivers flourish in a silt that is pure adobe, although the natives consider a slight admixture of sand preferable.

In general, the date can be grown in any good soil that is not too heavy, provided the right varieties be selected for the soil. A pure sand is to be avoided, however. The soil of the Mecca experiment station is one of the worst pieces of Coachella Valley, and it is only beginning to give fairly good



Imported Palm fruiting in California, 1912.

results because five carloads of manure have been put in it during the last few years. Of course, the date will yield results proportionate to the good soil and good care it gets, just as other fruits will.

The palm is not at all discouraged by the presence of a slight amount of alkalinity in the soil. Some years ago it was held to succeed better in a salty ground than in a clean one, but many growers are beginning to doubt this and to hold that, while it is remarkably tolerant of alkali, it will give the best results in the best surroundings. However that may be, it is certain that a small amount of salt in the ground is no hindrance to successful culture, and that dates can even be grown after a fashion in soil that is too alkaline to produce anything else. The station at Tempe, for instance, is so salty that weeds will not grow in the garden, and there is practically nothing, aside from the dates, except a few unhappy pomegranates. The salt on the surface is the thickest, and of course it does the least harm here, but the fact that the palms will grow at all in such surroundings speaks well for their resistance.

Anyone who contemplates establishing dates in an alkaline soil should investigate it thoroughly to a depth of six or eight feet. If there is a good

layer of soil which does not contain more than one per cent of salt, the date roots will spread out in this layer, and the palm will thrive even though there should be a surface layer, or several other layers, that are much more alkaline. If there is not a body of soil with less than one per cent of alkali, it is useless to plant dates and hope for good results. Those who intend to make commercial plantings can not be too strongly advised to select land that is as rich and clean as possible, for their results will be proportionately better. One often hears a rancher say, "I've got a piece of ground out there that isn't fit for anything else; I guess I'll turn it into dates." Such practice is not likely to benefit either the landowner or the State very much.

If the soil is alkaline and the water supply pure, the latter will help overcome the former. On the other hand, if the ground is clean, alkali in the water will not do any harm. But salty soil and bitter water is a combination that should be avoided.

The palm will stand a good deal of cold weather in winter, if it is not too prolonged. Temperature 17 F. in the Coachella Valley last winter injured the appearance of some of the palms, but apparently had no effect on the following crop.

Offshoots or Seedlings.

Having picked out a piece of soil suitable for his purposes, the intending grower of dates is at once confronted with the question whether he shall plant offshoots or seeds. The former method is in use in all the important date-growing countries of the world; the latter has been advocated by government officials, particularly for growers without capital, and has enlisted some violently enthusiastic advocates, so that the date-growing world is now practically divided into two hostile camps.

A deliberate consideration of the experience of other countries, and of previous attempts in this one, as well as of the biological principles involved, should put each method in its proper place and remove the grounds for confusion. The seedling method may be summed up as follows:

Seedlings are planted thickly in nursery rows, and will often bloom in the third year, when approximately one-half will be males, and as they do not bear fruit can be removed and destroyed. Within two years more the remaining females will have borne a little fruit, which can be tested, and those that seem desirable can be retained, while the others, perhaps three-fourths of the whole, can be destroyed. The remaining females will probably be twenty per cent of the total number of seeds planted; these palms can be transplanted to orchard form. Obviously some will be much better than others; as the plantation grows and all the palms produce offshoots, the inferior ones can be removed and replaced by offshoots from the superior ones. These offshoots will of course require five years more to come into bearing; so that it will be ten to fifteen years before the grower has a full acreage of bearing palms; but this will have cost him nothing except his time, other expenses of cultivation, and interest on investment.

The method has certain advantages for men—homesteaders, for instance—whose land is abundant and time very cheap. Most growers, however, if they calculate the value of their time, and the use of their land for ten or twelve years, will find that they would actually

have saved money by planting imported offshoots in the first place. But worst of all, even when the orchard has been weeded out until only good palms are left, these will all differ, variation among seedlings being just as great in palms as in any other fruit.

On this last point there seems to exist considerable misapprehension. The fact that seedlings have sometimes yielded fruit, fully as good as and indistinguishable from the parent has been heralded so much that those not in touch with the situation come to think this is the rule, rather than the exception. If one secures all the data in regard to any given planting, he will find the situation far otherwise.

Dr. Swingle, for instance, says in the bulletin above mentioned (p. 20): "The seedlings of a single sort of date may present the most remarkable variations, and usually the parent type is not exactly reproduced by any of the offspring. This is clearly shown by the experiments of Col. Sam Taylor of Winters, Calif., who tried to propagate from seed the valuable early ripening Wolfskill date growing on his place. This was done because this palm had ceased to produce offshoots before its value was recognized. Many of these seedling dates have fruited, but none resembles in the slightest degree the parent variety; most of them are much later and consequently fail to mature at Winters, where the summer heat is insufficient to ripen any but the earliest sorts."

The Example of Spain.

Finally, any one who wishes to see how the seedling theory works in practice, should visit the date groves of Eastern Spain, which have been propagated by seedlings. It is true that the climate there is not favorable to the production of high grade fruit; yet the influence of seedling propagation can be seen at a glance; every tree bearing a different variety, so that it is impossible to grade the dates, and they are sold very much as cull oranges are in California. Any one who tries to get into commercial date growing by planting seedlings will secure similar results; even if his seedlings should be of good



Khadrawi, a Persian Gulf palm fruiting at the ranch of Fred N. Johnson, Indio, California; seven years old and bearing one hundred pounds of delicious dates which began to ripen September 1. This variety has proven to be especially desirable for Arizona also.

quality, they will be so diversified that he can not supply a high-priced trade, which demands well graded dates, each box uniform. Such dates, at present, can only be produced by planting offshoots, which will exactly reproduce the parent variety and allow one to know what he is getting.

On the other hand, it is to be desired that every grower should plant a few seedlings where they will not be in his way—as a wind-break, for instance—and let them grow. In this way the State will in time secure some varieties of local origin that may be as fine as anything known; and although propagation from one specimen will be very slow, yet it was in this way that all the famous foreign varieties were originally propagated. We are now taking advantage of the centuries of work of the Arabs; those who plant seedlings for commercial use are going several hundred years behind the times.

The Bureau of Plant Industry has set out nearly 400,000 seedlings in Arizona, with the desire to produce new varieties. Work has also been started to breed seedling dates, by securing males of known pedigree, Deglet Noor, for instance, and pollenizing Deglet Noor females with them. It will take several generations to get a male that is fairly pure, but when that has been done, seedlings can be produced with a much better chance of success.

Basing their decisions on the considerations above stated, nearly all growers with capital who have embarked in the date industry, have done so with offshoots, and the number is increasing each year. At present any large number of offshoots can only be secured by importation from abroad, since the supply produced in the United States is only a small fraction of the demand. Excellent results have been had with importation, when proper care was used, so that it is not a risky proceeding. The California Date Company, of Heber, succeeded in getting ninety-eight per cent of its imported offshoots to grow, whereas the best growers in Algeria, transporting their offshoots only a few miles, are satisfied with seventy-five per cent.

Needless to say, the female palm

produces only female offshoots, and the male palm males. Offshoots must be two or three years old when taken from the tree, and should be from fifteen to forty-five pounds in weight. After being left in the shade for a day or two to dry, they are trimmed up, only a foot or two of the leaf stems being left, and the roots wrapped in moist moss or palm fibre. It is desirable to seal the cut ends of the stems with asphaltum, and if a long journey is contemplated, to coat the stump, where it was severed from the tree, with the same material. In transit, there is more danger in bringing the offshoots too wet than too dry—in fact, fair results have been had under favorable conditions with shipments in which no moisture is used. Bernard G. Johnson of Mecca has tried putting the palms in an iced car, at least for the latter part of the journey, and considers that this gives good results.

At present the County Horticultural Inspectors of California require that offshoots be kept in nursery rows for the first year, in order that scale may be eradicated. They should be planted to the depth of their greatest diameter, and it is well to shade them with palm leaves or a loose burlap wrapper, which will not only protect them from sun during the first summer but from frost during the following winter. They should not be planted until the ground is warm; May and June are the best months.

Bad luck has been had with offshoots brought from the Tempe garden and planted in Coachella Valley, where they show a disposition to sour and die. Taken from a sodden field, the dry soil and air from Coachella Valley is too much for them, and fermentation quickly sets in. It is worth while to notice this as a warning, that offshoots should not be transplanted into too dissimilar conditions. Such a situation rarely arises in practice, however.

Offshoots Need Care in Rooting.

When the offshoots are in the ground, begins the most critical period of their life. Unless they are kept at the proper degree of moisture during their first summer, the loss will be heavy. It

must be remembered that the process of rooting an offshoot is similar to that of rooting a slip or cutting in the open ground. Tiny rootlets are thrown out, and these must be nourished into vigor; a few days of drought in the hot desert sun may kill these soft roots, and the offshoot will then give up the struggle for existence. Some heavy losses have been recorded in the history of the industry in California, in most cases due to mere carelessness and negligence; but if unremitting care is used, there is no reason to apprehend any trouble in saving a very large percentage of the palms.

No hard and fast rule can be laid down for watering the offshoots, as it depends on the nature of the ground. Arabs in some parts of the Sahara water them every day for the first forty days; in heavier soils, every day for the first week, then every other day for another week, and so on, tapering off. Sometimes a good plan is to water on two successive days and omit the third day, keeping this up for several months if the soil is sandy, but not putting too much water on at any one time. The soil must be kept moist, but it must also be allowed to dry out a little from time to time, in order to admit air, otherwise the offshoots will drown.

Half of the palms should show signs of growth before the first winter, and the rest will come along in the following spring and fall, it being not unusual for an offshoot to remain dormant for a year and a half after it is planted. When they are well rooted they may be transplanted to orchard form, preferably thirty-three feet apart each way or forty to the acre. From then on, they require little more than irrigation and cultivation with fertilizer once a year, and there is little danger of irrigating too much, if the soil is well drained. It is a waste of time to plant palms in a soil that is not well drained.

During most of the year they should be watered at least once a week, this being suspended while they are blossoming, and at the time the fruit is ripening. During the summer, when the fruit is developing, twice a week would be good, or in light soil even oftener. In a sandy soil, Arabs some times give

water every day; of course, good judgment should be used.

Pollinating the Female Palm.

The only operation which causes any trouble is pollination of the female blossom, which must be done by hand. A sprig of male blossom is shaken over each cluster of flowers, and then tied in place there, so that Nature can complete the distribution of pollen. The females in America have shown a tendency to blossom early, often opening up in February, and it is not always easy to get male blossoms so early. The large number of seedlings recently planted will perhaps furnish more early-blooming males; in the meantime, those who purchase offshoots should see that they get three or four males to each 100, which are known to bloom at a suitable time. The California Date Company of Heber lost almost the whole of its first crop through inability to get pollen.

In Arabic countries, a little pollen is kept over from year to year, for use on female palms which are precocious in blossoming. This is a desirable practice, as the pollen apparently loses none of its power; in fact, a pollenization was made this year at Mecca with pollen seven years old, and gave good results. Experiments have also been made in pollinating date palms with the pollen of *Pheonix canariensis*, the common Canary Island date palm which is found in gardens all over California, and also with male blossoms of the desert fan palm, *Washingtonia filifera*. In both cases good results have been secured, and growers who find themselves unable to get pollen might have recourse to one of these expedients; but the danger of failing to get it becomes slighter each year.

After pollination, water should be withheld for a few weeks, in order to get the fruit well set; then the palm takes care of itself for some months. The first fruit will ripen about the beginning of August (this from early Persian Gulf varieties) and the harvest will continue, as one variety after another comes into action, until well into October, when the Deglet Noor finally gets its berries filled with sugar.

A Profitable Side Line.

In addition to the fruit, a very profitable feature of the industry here will be the offshoots, which the palm produces until it reaches the age of fifteen years or more. It cannot, of course, bear a heavy crop and carry a full load of offshoots at the same time, and as the offshoots are so valuable, growers now limit the tree to only a few bunches of fruit each year, letting it devote most of its energy to reproduction by the offshoots.

In this way one might take off two offshoots each year, from the fifth to the fifteenth or longer, and at the same

It will probably take a number of years to work out these problems, if indeed they are capable of solution.

Yield.

The yield of a palm in full bearing varies widely with the variety, but in no case should it be allowed to produce more than ten or twelve clusters, and for a younger palm, four to eight is enough. If it is allowed to retain the full number of clusters it sends out, often fifteen or twenty, it will probably bear nothing the following year. Yields as high as 500 or 600 pounds for a single palm have been recorded, and it is not unusual to find a tree bearing half that



Imported offshoots being rooted in nursery rows.

time get a profitable crop of fruit. By the time the palm has ceased to produce offshoots, it would be in the full vigor of maturity, and could devote its attention to producing nothing but fruit. Those more interested in selling the fruit should remove the offshoots as fast as they appear, in order not to take the palm's vitality unnecessarily. As long as offshoots sell at \$8.00 apiece, few will care to extirpate them in this way.

Experiments are now under way at the Indio station with a view to making the palm produce offshoots more abundantly, and of finding methods to propagate the offshoots when they are very small—only a few pounds in weight.

much in California or Arizona; but in such cases it will bear less the next year, and if the grower gets 100 pounds to the tree, each year, he should be well satisfied; even this will only be with good varieties.

Artificial Ripening.

The softness of the date naturally makes it difficult to handle, and in some parts of Arizona, where late summer rains are frequent, these have proved a great obstacle to date culture because they fell on the fruit when it was ripening, and caused it to sour. A similar objection has always been found at the Tempe orchard, where the constantly wet ground caused the fruit to ferment easily; and it is for this reason that

growers withhold irrigation after the dates begin to soften.

On the other hand, the dryness of the Coachella Valley atmosphere is such that the late Deglet Noor frequently begins to "mummify" just at the time it should be filling with syrup, and becomes a hard, dry, worthless berry. This might be eliminated by giving abundant irrigation at that period, so the fruit would fill with water.

However, these problems are all much more insignificant since the perfection of methods of artificial ripening, which are America's greatest contribution to the date industry so far; it is not too much to say that artificial maturation alone makes profitable date culture possible in the United States. It removes the element of uncertainty, the risk which growers of fruits must face, and puts the industry in the class of dependable things.

Artificial ripening has been practised in many other countries in different forms. The Spaniards dip their dates in vinegar, which acts on them chemically; the Mexicans of Lower California lay them out in the sun during the day and roll them in blankets at night to steam. A somewhat similar process is applied to the famous Medjool date of Tafilalet, Morocco, according to Dr. Swingle. The first experiments on the subject in this country, were made by the University of Arizona, which tried a wide range of chemicals all of which converted more or less of the tannin, and Dr. Vinson finally settled on nitrous ether as the best agent; dates exposed to the fumes of this for a short time became quite edible. R. H. Forbes, superintendent of the station, summed up the advantages as follows;

1. The fruit can be harvested cheaply, by the bunch, before the berries begin to drop or are attacked by insects, moulds or bacteria.

2. Danger of loss by untimely rains is minimized.

3. The ravages of worms in the ripened crop are avoided.

4. Greater cleanliness of the product is possible than with naturally ripened dates.

5. Late varieties, among them the Deglet Noor, which do not ripen satis-

factorily here, may be successfully brought through.

6. Early varieties may probably be grown and ripened at higher altitudes than formerly.

7. Dates while yet hard may be shipped without injury to a distance, then ripened artificially, and marketed in a fresh and prime condition.

Development of the Method.

Previous to his chemical experiments, Dr. Vinson had tried moist heat, which he later abandoned. Mr. Freeman of the same staff took up this feature, and carried the experiments along until he had secured good results, the only drawback being that much of the cane sugar was turned into invert sugar by the process.

At this point Mr. Chumard, manager of the California Date Company at Heber, began to experiment, and made certain changes in the technique which allowed him to market one year's crop in good condition. Where he left off, the Bureau of Plant Industry began work, and Professors S. C. Mason and Bruce Drummond at the Indio station have perfected the method to a point where it seems to be entirely satisfactory. They have succeeded in avoiding the inversion of most of the cane sugar, and also cut down the length of time necessary for exposure in the oven.

In their work they have used a large poultry incubator, since no great degree of heat is required. The fruit is picked when it is just beginning to color, but is still hard, and I understand that it is soaked in water for from twenty-four to forty-eight hours; then put in the incubator on a screen with a pan of water underneath, and kept there from eighteen to twenty-four hours at a temperature ranging around 110 F. As they have not yet published the results of their investigations officially, the exact results are still withheld from the public.

Success depends on absolute control of the moisture and heat, so the process is one that will always call for some judgment, just as baking bread does. It is not complicated, however, nor is it expensive, and it effects such a marvelous change that I believe that all fruit marketed in the future will be pro-

cessed in this way. It also saves a week or ten days in putting the fruit on the market, since it would require that much longer to mature on the tree. The exact technique for each variety of dates will have to be worked out, and each grower who ripens his own will have to experiment for himself until he learns the operation. Probably galvanized iron or zinc ovens will be constructed, with moisture pans at the bottom, and heat supplied by a lamp just as it is for the incubation of eggs.

The University of Arizona experiment station has published the results of its work on the crop last year, which was a particularly favorable one, and reports: "The results of the season's work have shown that evenness of maturity is one of the most important factors in successful date culture in most parts of Southern Arizona. Varieties that mature evenly can be artificially ripened without loss into high quality fruit in the most adverse seasons; while varieties that mature less evenly such as the Rhars, will yield at any given time only about seventy-five or eighty per cent of marketable fruit, of which a large part is relatively worthless, due to its lack of sugar and flavor." Evidently, the question of varieties is all-important, even with artificial ripening; without this, date culture would be almost hopeless as a commercial prospect in the adverse conditions of the Salt River Valley. But by selecting the proper varieties, the report declares that even under the most adverse conditions, "from ninety-five to 100 per cent ripened into first quality fruit of their class" by artificial means.

It was Deglet Noor fruit, grown by Fred N. Johnson of Indio and ripened artificially at the government experiment station, which sold for \$1.00 a pound in Los Angeles last fall. Furthermore, it has been found possible to take Deglet Noor berries which had "mummified" on the tree, and by putting them through the incubator, to restore them to perfect condition. And the process will be even more valuable for the softer varieties of dates than it is for Deglet Noor, since they are more liable to injury if left to ripen on the tree. The amount of fruit wasted by the

Arabs in handling is appalling, and in Arizona, in bad seasons, the crop has been almost a total loss. These calamities will be averted by artificial ripening, and the certain profits of the industry increased to that extent.

There is no doubt that the best quality of dates should be put up in fancy one or two-pound boxes for the American retail trade, just as confectionery is put up. In this way alone can fancy prices be realized. But the great bulk of the trade will still remain in the second grade berries, selling in bulk at fifteen to twenty-five cents a pound, and so far superior to imported dates in handling and cleanliness that they will hardly be competitors.

Second Obstacle Removed

The perfection of a method of artificial ripening removed one of the two great obstacles to the success of date culture in the United States; the other was swept aside this spring, in the discovery of means to exterminate the scale insects which, introduced from North Africa on offshoots, had threatened the life of the industry in this country. By use of the mealy-bug spray based on various phenols, principally cresylic acid, the problem has been solved and no longer need worry the grower or intending grower.

The Parlatoria scale (*Parlatoria blanchardi*) was introduced to the United States on the first importation of offshoots, made in 1889. It is a gray or brownish insect living on the leaves of the palm, and apparently confined to that plant alone; it remains nearly dormant during the winter, but is active throughout the summer. It proved very difficult to reach with insecticides, but finally the method of burning over the palms with a gasoline torch was originated, and many of the older orchards in the Southwest were so treated last year. This set them back for a year, but did not injure them permanently, as the palm is extraordinarily resistant to fire.

The Marlatt scale (*Phoenicococcus marlatti*) was possibly introduced at the same time, or at any rate on the following importation of offshoots from Africa. It lives usually at the base



El Kesba, imported from Tunis, fruiting at the government experiment station, Mecca, California
September 5, 1912



Theory, a valuable dry or bread date from Northern Africa, fruiting at the government experiment station,
Mecca, California.

of the leaves, inside the palm where it is almost inaccessible, but comes out at intervals during the winter to moult. The female secretes a white, waxy substance, but not a true scale like *Parlatoria*; its life cycle is about forty days. When a palm is pulled apart, masses of *Phoenicoccus* may be seen at the base of each leaf, sometimes so thick as to look like a piece of beefsteak. This scale caused particular damage by clustering around the young spadix before it had emerged from its sheath, and sucking the sap out of it, so the cluster appeared withered and the dates which it set were shriveled and unfit for use.

No natural enemy of the Marlatt scale is yet known, although ladybirds and other insects prey upon the more exposed *Parlatoria*. Experiments made in the Coachella Valley this spring shewed that both scales yielded to the phenol dip, and all offshoots are now immersed in this for two fifteen-minute periods, before planting. No ill results are visible, and the treatment practically exterminates the scale. In some cases where the *Phoenicoccus* was in dense masses, a few of the under layer survive, but these can easily be reached by a spray the following spring. It is, then, proper to say that we are now sure of being able to keep these two dangerous scales in absolute control, and when further study of their life history teaches us more effectually methods of combatting them, there is every reason to suppose that they can be absolutely exterminated.

Types and Varieties of Dates.

The subject of varieties is just as important with the date as with any other fruit and it is fortunate that the southwestern states now contain the largest collection of varieties to be found anywhere in the world, so that we are gradually getting full data as to what should be planted here. As was to be expected, some varieties have not succeeded so well here as in their native home; some have succeeded better; but there are a dozen or more which can be confidently recommended for planting, and on which the planter runs no risk of making a mistake.

Dates are ordinarily divided into

three types: soft, semi-dry and dry. The finest varieties fall under the first class, the second contains a number of good ones for every day use, while the third type is unknown to Americans, although it is the one preferred by most Arabs for a steady diet, since it is not so cloying or heating as the softer kinds. In North Africa the mountain and oasis dwellers usually eat dry dates, while the nomadic caravan Arabs prefer a very soft date (usually the Rhars) packed tightly into skins in a sort of paste. The dry date is usually light in color and the flesh sometimes so hard that it is eaten with difficulty; it has a pleasant nutty flavor, reminding one more of a cereal than a date, and the fruit has the great advantage that it can be kept indefinitely under any kind of conditions without deteriorating in any way. It can be handled as readily as peanuts for shipping or packing. Few have yet been planted on a commercial scale in the United States, but it is to be desired that some one start a plantation of these in order to test the market. There seems little reason to doubt that a good trade would quickly be developed, especially among the rapidly growing class of people who use fruit and nuts largely as a diet.

Among the varieties that have been introduced to California or Arizona and fruited here, the following are best known:

Deglet Noor must be put first, because it is the most widely cultivated if for no other reason. It is the standard of excellence in North Africa, where it is the only date served on the tables of the rich, as a general rule; and while it is perhaps not the finest date grown there, yet it is by all odds the best that is widely obtainable. Thomas H. Kearney describes the variety as follows: "A soft date, one and one-third to a little over two inches long and about one-half as wide, ovate oblong in shape, generally widest at or near the middle and blunt-pointed at the apex, often narrowed also at the base, maroon colored when ripe, the flesh two to three lines thick, translucent, the seed a little more than one-half as long as the fruit, conspicuously pointed and dark chestnut brown color. The stalks and

branches of the fruit clusters are bright yellow (not orange), the stalks long and slender, sharply curved near the base, so that the bunches hang down far below the crown of foliage. The trunk is comparatively slender. The foliage is light and delicate looking, and the narrow leaves and leaflets are rather yellowish green. The spines are slender and weak."

This variety has many advantages. Its offshoots are more easily transplanted than those of any other; it bears quite heavily in this country (although considered a shy bearer in Algeria); and it bears evenly every year, if well treated. Its root system is rather shallow, however. It matures as late as any, usually in October. In flavor it is particularly mild, having very little of what may be called the characteristic date taste, and in fact, more resembles confectionery than dates. No doubt it will continue to be sold on this basis for many years to come.

Menakber, the famous date of Tunisia, has gained a good deal of notoriety through its romantic history, but its performance in the United States has been something of a disappointment. The fruit is improving, however, as the trees grow older. It is one of the largest dates grown, and the story is that it was considered the finest in Tunisia, under the despotic reign of the Beys, so these rulers used to order the whole crop from every one who grew Menakbers, and then forget to pay. After this had gone on a good many years, the growers decided they would rather raise some inferior date from which they could derive a little income, so cut down their Menakher trees, and the variety is practically extinct. The Bureau of Plant Industry has two trees in this country, however, and their offshoots will slowly establish the date here. Its size, added to its good quality, is certain to make it valuable.

Rbars, the commonest Algerian variety, has been planted to a considerable extent in the United States, and the fruit, as handled by American methods, is certainly much preferable to the disgusting mess sold in the Algerian markets. Its principal value is earliness, but as the better Persian Gulf

dates come into the market, it will lose this advantage, and I believe it will lose its popularity. It has proved a shy bearer in this country, and unless very carefully handled is a difficult shipper. The offshoots are hardy and resistant; the roots go deep down for water, and the tree requires less fertilization and irrigation than choice varieties like the Deglet Noor. In Algeria it tends to bear only every other year. The Arabs consider it the best date grown from the point of view of healthfulness, and eat it in immense quantities without detriment to their digestive organs; they even make it into a paste with grease and give it to colicky infants. They also declare that if buried in the ground it can be taken out again after six months, in perfect condition.

Dr. Swingle has been advocating the growth of Rhars in the more favored spots of the San Joaquin Valley, believing that experiment would show good dates for local use could be produced there. So far as I know, the experiment has not yet been made. I believe the best Rhars grown in California have been on the sandy soil of the Mecca ranch planted by B. G. Johnson. In the wet soil of the Tempe garden, it has proved a great failure, the last report of the station noting, "unevenness of maturity to be as serious a commercial defect in the Rhars dates under the conditions prevailing in Salt River Valley the past season as the poor keeping quality of the fruit when ripe."

Itima is one of the choicest Algerian varieties, ranked equal to Deglet Noor by some natives, and certainly deserves to be placed second to it. The berry is large, soft and the color of cafe au lait; the offshoot is delicate.

Thoory is considered by government experts to be the best dry date so far tried out in the United States. It is a rare variety in the oases of the Western Zab, Algeria, but eight fine trees are now growing at the Indio station, from which the variety can be perpetuated.

Horra, a large, light yellow, dry date common to Algeria, has been introduced in more quantity, and can be recommended.

Tadala and *Bent Kebala* are varieties



Rhars, from Algeria, fruiting at the government experiment station, Mecca, California.

originating in the M'zab oases of Algeria, which are promising for this country, although not planted on a commercial scale.

Many other Algerian varieties have been introduced, but most of them are still confined to the government experiment stations. Commercial importers during the last few years have practically limited themselves to the Deglet Noor, and the field for this is temporarily exhausted. Competition of American offshoot buyers has also resulted in doubling the price for this variety during the past few years, so the Algerian growers have become discontented, and it is likely that further exportation of offshoots from that colony will be forbidden. This will cause commercial growers in the United States to turn to the famous dates of the Persian Gulf, which have been undeservedly neglected, solely because Algeria was so much more accessible.

Persian Gulf Varieties.

Ten years ago David G. Fairchild of the Bureau of Plant Industry made a visit to the Persian Gulf region, hastily studied the principal varieties, and brought out offshoots of most of the good ones. Some of these did not survive, and although other offshoots have been obtained from time to time, by correspondence, no student of date culture has been in the district since his trip. Furthermore, the labels on many of the Persian Gulf dates brought to this country were lost, so that of those now at the Mecca station, for instance, almost none can be definitely named.

It will thus be understood that these dates have been tried out under the least favorable circumstances. Nevertheless, by their quality and still more by their early maturity, they are rapidly winning a place for themselves, particularly in the hearts of the Arizona growers, whose climate has led them to search for new varieties, while Californians were confining their attention to the Deglet Noor. Of the Persian Gulf dates which have fruited in this country, the following are of high merit:

Kustawi, "A medium to large, oblong, soft, sticky date, ripening in August,

with stone of small size and little or no fibre or 'rag.' Skin a light golden brown, very delicate in texture and adhering to the soft golden flesh, which is of exquisitely rich, sweet date flavor." — (Fairchild).

Maktum, considered one of the two best sorts in the Bagdad region, closely resembling the *Kustawi*, but of finer quality.

Halawi. This is the date principally sold on the American market, in very bad condition, under the trade name of "Golden Date." It is the commonest variety around Basra, but as grown under American conditions it is a fruit superior by far to anything Americans have previously eaten under that name. It prefers an adobe or clay soil. So far as I know, the only imported Halawis have fruited in Arizona, but Fred N. Johnson of Indio has a seedling Halawi which happens to reproduce fairly well the characteristics of the parent, and is highly esteemed. The Halawi ripens a little later than the first two mentioned, and is described by Fairchild as "a medium-sized, soft date of sticky consistency. The stone is medium to small; there is little fibre present, and the light brown skin of delicate texture sticks closely to the flesh, which is abundant of a deep brown color, golden toward the stone. It possesses a strong date flavor and is of unusual sweetness. It is one of the best packing dates, as it keeps well and can be sent all over the world."

Khadrawi is one of the best tried out in this country, and is similar in general characteristics to the Halawi. It is highly prized in Arizona; Fred N. Johnson of Indio has an imported palm which is believed to be this variety, and which produces dates of excellent quality, although they demand different methods of handling than the Deglet Noor.

Fard, the famous date of Maskat and the best exported to America, has fruited in the United States only as a seedling. It is believed, however, that this date does even better in this country than in its own home, and as it is a variety of particular excellence for packing and shipping, it is one to be marked as desirable. Sandy soils would probably



Preparing West India Gardens' 1912 shipment of offshoots in Sahara Desert.

suit it best, although the great Semail Valley of Oman, where it grows, has never been entered by a man scientifically interested in the study of dates.

Moltagi is a little known Persian Gulf date enumerated by Director R. H. Forbes as one that has done well under conditions at Tempe.

Advantage of Early Varieties.

It may well be doubted, however, whether we have yet secured the varieties that will eventually prove the most desirable. The Deglet Noor itself may be relegated to the lower ranks, as new countries are laid under contribution by the growers of the United States, and it is certain that the early ripening Persian Gulf dates will do much to minimize the importance of the Deglet Noor and other late varieties, since the former will be on the market and all sold weeks before the latter are obtainable. The wise grower will, of course, plant both early and late varieties, thus extending his season from August 1 to November 1; he certainly will not confine himself solely to late varieties, as he has done in the past. On this point the twenty-second annual report of the Arizona Agricultural Experiment station says:

"The study of varieties has been found most gratifying in that several have been found that will furnish a

substantial basis for future successful date culture in Arizona. These varieties respond easily and perfectly to artificial methods of ripening and furthermore mature evenly enough under the most adverse Salt River Valley conditions so that they may be harvested by the bunch, and from ninety-five to one hundred per cent ripened into first quality fruit of their class. In quality none of them approaches the Deglet Noor, but it is believed they will not enter into competition with that fruit since they will have been harvested and consumed weeks before the Deglet Noor crop matures. Moreover, they will find an entirely different market, since they can be produced at a price that will make them food for everyone, rather than a delicacy for the wealthy.

"Among the light colored or so-called 'golden' dates that meet these conditions very perfectly, have been found the Khadrawi, the Kustawi, the Maktum and the Moltagi. The Khadrawi, in particular, is a most excellent variety, and handles well in the orchard; the Kustawi is a close second, although somewhat inferior in size. Several large varieties of dark colored dates have also proved very satisfactory under the unfavorable climatic conditions of the past year. These were the Nazl e Bacha, the Birket el Haggi, and th^e Hayani. Although rather coarse in tex^e

ure, their great size and general appearance secure a ready market for them. There seems to be no reasonable doubt that the culture of any of these varieties will prove commercially successful under the conditions prevailing in the more favorable localities for date growing in Southern Arizona."

These choice, early Persian Gulf dates are to be imported on a large scale next spring, and with them it is hoped to bring a large number of offshoots of the most famous date in the world, the Khalasa of Hasa. This superlative variety was secured by Mr. Fairchild, but did not survive. The district around Hofhoof, where it grows, contains 2,000,000 palms, according to the Turkish census of 1871, and there seems to be no reason why this should not be secured on a large scale. If it can be established in California in that way, it is likely at once to assume the place of chief dessert date, supplying the fancy box-trade that has already proved so profitable.

Most Famous Date in the World.

The explorer, W. G. Palgrave, in his "Narrative of a Year's Journey in Central and Eastern Arabia," written in 1863, says:

"Almost the whole space between Hofhoof and Mebarraz, a distance of about three miles, is filled up with gardens, plantations and rushing streams of water. Here for many leagues around grow the dates entitled 'Khalas'—a word of which the literal and not inappropriate English translation is 'quintessence,' a species peculiar to Hasa and *facile princeps* of its kind. The fruit itself is rather smaller than the Kaseem date, of a rich amber color, verging on ruddiness and semi-transparent. It would be absurd to attempt by description to give any idea of its taste; but I beg my Indian readers at least to believe that a 'Massigaum' mango is not more superior to a 'Junglee' than is the Khalas fruit to that current in Syrian and Egyptian marts. In a word, it is the perfection of the date. The tree that bears it may by a moderately practised eye be recognized by its stem, slenderer than that of the ordinary palm, its less tufted

foliage, and its smoother bark. Another species, also limited to this province, is the Rekek; it would hold the first rank anywhere else. During my stay in Arabia I counted a dozen different kinds of dates, each perfectly distinct from the other; and I have no doubt that a longer acquaintance might have enabled me to reckon a dozen more. As to the Khalas in particular, its cultivation is an important item among the rural occupations of Hasa; its harvest an abundant source of wealth; and its exportation, which reaches from Mosoul on the Northwest to Bombay on the Southeast, nay, I believe, to the African coast of Zanzibar, forms a large branch of the local commerce."

Mr. Fairchild describes it as follows, in his Bulletin on Persian Gulf dates:

"*Khalasa* (or Khalasi). A medium-sized, ovate, sticky date with small stone and no fibre, ripening as early as August in the region of Hasa. The skin is a golden brown and of the most delicate texture, covering closely the rich, golden flesh, which is of exquisite date flavor and with the consistency of a chocolate caramel. Said to be a delicate packer and never exported except in the form of presents. It has the renown all over the Persian Gulf of being the most delicate date in the world. Of its productiveness or hardiness, little is known, but it is probable that a sandy soil will suit it better than an adobe soil, as it comes from the sandy region of Hasa, which is fed by underground water-courses. This variety probably requires surface irrigation also."

With this must be mentioned the Tafiilet date known as "Medjoul," certainly one of the best dates grown. The oases of Tafiilet are in the Saharan part of Morocco, where they can at present hardly be reached by a foreigner, and but little is known of the date except that it is largely exported to England and Spain by the Moors. Many seeds have been planted in the United States during the past year, since Dr. Swingle heralded it as one of the coming leaders in date culture; and a Coachella Valley company claims to have secured a few offshoots of it from the oasis of Colomb-Béchar, in Algeria,

last winter. Dr. Swingle is attempting this winter to secure authentic offshoots from Morocco, and to secure more data relative to the method of artificial maturation practised, which gives the flesh the consistency of a chocolate caramel, and renders it so dry that it can be shipped anywhere.

The date is larger than most of those so far introduced to the United States, dark in color and characterized by a wrinkled skin. Unfortunately, there is little prospect of getting offshoots on a commercial scale for several years, because of the unsettled state of political affairs in Morocco, and even then the government may decide to prohibit the exportation.

There are a dozen or more other varieties of superlative dates in the world, which have not yet been secured for the United States, and any of these may turn out to be equal to our best. The industry will not wait for them, however, although the Bureau of Plant Industry is showing a commendable zeal in securing them; but with the Persian Gulf dates to be secured this winter, and the North African varieties already here, there is range enough to suit the most fastidious grower.

No Danger of Mistake.

The question is often asked, "How can one be sure, in buying offshoots, that they will be true to name—that he will not be deceived by the seller?" If he is buying only one or two offshoots, he must depend on the honesty of the seller, unless he is as expert as the Arabs, who can tell most of the varieties merely by a glance, under any conditions.

In buying offshoots on a large scale, for importation, the problem does not present itself to any marked degree. Each variety is characterized by certain differences in color, in foliage, in the arrangement of the spines, and particularly in the arrangement of the fibres, which are present just as much in the offshoot as in the parent tree, and serve as reliable and invariable guides to the identity. Consequently, if one is buying a large number of any variety, and an odd one is put in the pile, it sticks out like a sore thumb



Seven-year-old Khdrawi, imported from the Persian Gulf, at Indio.

in the midst of so much uniformity—even the novice could detect it. The only way in which one could be deceived would be that the whole lot he bought was one variety, but not the one he wanted; and this is unthinkable since, even if most of the many sellers with whom he must deal were scoundrels and anxious to cheat, there would always be a few honest ones; and if one man out of twenty sold what he promised, the difference in the appearance of his offshoots would at once lead to an inquiry that would result in exposing the whole deal.

In practice, the American buyer always employs an experienced Arab, a man of standing in the community, who has a reputation to sustain, and who can be thoroughly trusted. This man can tell by a glance at each offshoot, whether it is true to name or not, and when the whole shipment is brought together, a far less practised eye can check up the list. So there is practically no chance for mistakes when offshoots are bought in this manner.

During the first importation of offshoots, when they were sent in by natives without any supervision, to persons who had in some cases never seen an offshoot before, there was occasional deception. The shipment of 1889 proved to contain a number of males, labeled as females of choice Egyptian varieties; and even as late as the government importation of 1904-5, which brought the Menakher to this country, several of the offshoots under that name were males. Growers have now had enough experience to recognize the male offshoot without error; but even without this slight experience, if those first importations had been supervised as all commercial importations now are, there would have been no room for fraud. In the Menakher case offshoots were altogether refused for a long time, but finally Mr. Kearney's importunities prevailed and he was furnished a few. Someone may have thought to curry favor by seemingly increasing the number through the addition of a miscellaneous lot of offshoots under the name of Menakher; but such a mistake could not happen now.

Profits of Date Growing.

Finally, a few words on that delicate and interesting question, the profits of the date industry.

Although there will always be a high-priced trade in fancy box dates, such as the Deglet Noor or Khalasa, not much of the total output can be expected to sell for any length of time at \$1.00 a pound, as it did in Los Angeles last fall. It is reasonable to suppose, however, that for this confectionery trade, prices will not fall below fifty cents a pound for some years. Then there will be the larger trade in strictly first-class dates, preferably in small boxes, but possibly in bulk, at all seasons of the year; the most profitable part of this will be the early sales of Persian Gulf dates during the months of August and September. These clean and attractive home-grown dates ought to bring not less than twenty to thirty cents a pound, for many years to come. Finally there will be the inferior dates, the imperfect ones and the inferior varieties, sold in bulk as the imported dates are now dispensed, but cleaner and more attractive; these can profitably be sold

at prices that will meet the competition of the imported dates, or cut below them—ten or fifteen cents a pound. It will be many years before the production in the United States can become sufficiently large to lower these prices.

Furthermore, the consumption is certain to increase as the production increases. At present the United States consumes a ridiculously small amount—only 22,000,000 pounds a year, or something like a pound per family per year, whereas in Arabic countries a family often consumes ten or fifteen pounds per day. Many residents of the United States have never tasted clean, fresh dates, and when they find they can buy them at reasonable prices, the demand is certain to jump. The present consumption could be multiplied by ten, twenty or thirty and still be small compared with that of fruits that are less nutritious.

If one allows seventy-five pounds per tree, which is below the mark, and forty trees to the acre, he can cut off as much of the proceeds for the middleman and retailer as he likes, and still have a profit that will suit the most fastidious. Let him add to this the profit on 40 or 50 offshoots per acre, at even \$4.00 apiece—half the present price—and he will make the proposition still more attractive. Best of all, the element of uncertainty and risk has almost been removed through the perfection of the methods of artificial ripening. As the date will keep indefinitely, and does not require to be marketed on the spot like oranges and most other fruits, the grower can always avoid a glutted market, if there ever should be one, and hold his fruit for better prices, just as wheat growers do.

The situation looks rosy, and is looking rosier each year, as new plantations come into bearing and again demonstrate the possibilities. I do not see how a careful, intelligent rancher with a plantation of choice imported varieties, who gives the matter his personal attention, can make less than \$500.00 per acre; and I believe those who enter the industry now, getting advantage of the high prices for fruit and offshoots during the first few years, will not fail to clean up several times that sum annually.

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