

Sixteenth Annual
Date Growers' Institute

APRIL 22, 1939



HELD IN
COACHELLA VALLEY
CALIFORNIA

4.62
23
th
22

Sixteenth Annual Date Growers' Institute

HELD IN
COACHELLA VALLEY
CALIFORNIA
APRIL 22, 1939



Table of Contents

	Page
When to Harvest - Discussion ----- Led by Wm. W. Cook	3
The Decline Disease or Omphalia Root Rot of Date Palms ----- By Donald E. Bliss	7
The Sub-Standard Date Diversion Pool ----- By H. W. Proctor	8
Factors Influencing the Cost of Growing Dates ----- By H. B. Richardson	10
Notes on Date Culture in Basrah ----- By V. H. W. Dowson	13

Published by
The Date Institute
Indio, California

- 0 -

A cooperative, non-profit Date Growers' Educational Institute held annually since 1924.

Officers and Trustees

H. L. Cavanagh	Joe Sidwell
W. W. Cook	Leonhardt Swingle
Roy Franklin, Jr.	H. B. Richardson Asst. Farm Adviser Ex-Officio member
W. G. Jenkins	
Robbins Russel	Hugh W. Proctor Secretary-Treasurer

- 0 -

Annual dues \$1.00, entitling each member to all privileges of the Institute, including a printed copy of the annual proceedings.

For additional information, or single copies, or bound sets of the annual proceedings, address

P. O. Box 565
THE DATE INSTITUTE
Indio, California

Sixteenth Annual Date Growers' Institute

Saturday, April 22, 1939

MORNING SESSION

Chairman, Dr. L. D. Batchelor, Director of Citrus Experiment Station, Riverside

WHEN TO HARVEST - DISCUSSION

Led by Wm. W. Cook

It is a simple matter for a date grower to talk to almost any group about the problems of date culture and to get up before a group of date growers in the guise of an expert on date growing. . . . Everyone here is too well informed on the subject for it to be possible. So we will not have the subject "When to Harvest" expounded by an expert on picking management, but rather will ourselves discuss the matter on the basis of comparing notes. The method of attack should be that of considering the relationship between various methods and manners of picking and the pocket-book of the date grower.

I do consider myself enough of a date expert to be able to testify as to the chronic slimness of the date growers purse. If we can learn anything from this discussion that will help us to reduce our picking cost while maintaining or improving the quality of our dates, the time consumed will not be wasted.

It is obvious that the date grower must strike a middle ground between two extremes. On the one hand he can watch and nurture each individual date in his garden, with a mother's loving care, picking it at just the right degree of maturity and rushing it to the packing house as soon as picked. That, of course, would not be farming. I do not know just what to call it, but by whatever name, it would be an expensive way to harvest dates. On the other extreme, one can allow the dates to hang on the palm till they are all ripe, most of them being dry, and then strip them off—bugs, culls, bird ncs's and all. That could hardly be called farming either; but it would be an inexpensive method of harvesting. At least it would appear so until such time as the grower got around to figuring his profits for the year. It is obvious that a crop cannot be profitable if harvested by either of these methods, but there is

a point somewhere between these two extremes that will yield the grower the maximum net revenue from his crop. He should increase his picking expense in time, energy and money to the point where there is not sufficient added revenue to offset added harvesting expenditures.

The purpose of this discussion, therefore, is to see if we can find the most efficient method of handling the mechanics of our picking, and to determine how far we should go toward picking every date at the exact time it is at its best. In other words, how frequently should we pick, and how can we pick dates both correctly and efficiently.

PICKING CREW MANAGEMENT

By W. G. Jenkins

I will discuss the management of a picking crew for the harvest of Deglet Noor dates. Other methods would, undoubtedly be more satisfactory for certain other varieties of dates. There are three methods of handling and paying labor in general use in the Coachella Valley for picking Deglet Noor dates. The best solution of the harvest problem, I believe, lies in the use of one of these three methods. They all have their advantages and their problems and whichever one you follow you will wish you had used some other one before the season is half over.

The first method is to pick by piece work, i. e., to pay so much per box or per pound of fruit picked. It is best to have a foreman and to hold him responsible for the quality of fruit picked and for the careful handling of the equipment as well as the gentle handling of fruit bunches and strands. Rough handling of the bunches during picking time often results in serious loss of fruit by causing immature dates to shatter off

the bunches onto the ground. In extreme cases of rough handling of the bunches the grower will lose more than the pickers' wages would amount to. In picking by piece work each picker keeps his dates separate so the grower can inspect it and correct his work from time to time. If the picker fails to do his work properly after he knows what is expected of him, then he must be eliminated.

The second method is to pay for the picking by the hour or day. It is more than ever necessary to have a good foreman when this method is used. In fact the effectiveness of the foreman will make or break this plan. During the first and last part of the season the picker working on the hourly basis will earn more than the piece worker and during the main part of the harvest the piece worker will earn more. Some pickers like to work for a grower on an hourly basis until harvest is well under way and then when there are lots of ripe dates they will try to change employers so they can pick by piece work while the dates are plentiful. To forestall this practice most growers withhold a small part of the pickers' pay at the first of the season and give it to him at the end of the harvest as a bonus for staying clear through the season.

The third method is a combination of the first two and there are many formulas being tried by combining the good features of piece work and time payment. For instance, a grower will have a base pay of say \$1.00 per day and pay so many cents per box for all fruit picked in addition to the base pay. This permits a good picker to be paid what he is capable of earning. Many pickers can consistently pick double the amount others are able to pick and still maintain as good or better standard of work. In fact it has been my observation that the picker who produces the most work generally has a clean-

er and better date than the slower picker. On the above plan, let us say one man picks forty (40) boxes of fruit while another picks only twenty (20) boxes, and that the grower is paying base pay of \$1.00 per day plus seven cents per box. The good picker would earn his base pay of \$1.00 plus \$2.80 for the forty picked boxes at seven cents per box or a total of \$3.80 per day while the other picker would receive his base pay of \$1.00 plus \$1.40 for the twenty picked boxes at seven cents per box or a total of \$2.40 per day. If both men were picking by the day or hour they would be paid the same wages and the better picker would be penalized. The daily wage method does not encourage a picker to do more than enough to just get by and hold his job. There is no incentive for him to do better than mediocre work, frequently penalizing the grower to that extent. On the other hand care must be exercised on the piece work payment plan to see that the quality of dates picked does not suffer from an attempt on the part of the picker to work solely for tonnage.

Whichever method a grower uses, he should, at all times have the pickers keep their fruit separate until it has been inspected. If a picker knows his work is to be inspected he will do a better job under any of the three plans.

Most pickers use a twelve or fourteen quart bucket with a hook on the handle to pick into. At the very beginning the grower must train the pickers never to hook the bucket on a frond in such a position that the bucket will rest beneath the bunch. This is especially important in a wet year as all the trash and culls would fall into the picking container while the bunch is being handled. Also in handling the bunch if the bucket is placed immediately under the bunch all the green shatter dates and dates affected by fungus or rot at the calyx promptly fall into the picking container as the fruit bunch is being handled for picking.

The lapse of time between pickings should be governed by the weather and the rapidity of the ripening processes of the dates. The dates should be picked as soon as they have ripened enough so they will need little if any artificial maturation and at the same time care should be used to pick often enough and clean enough to prevent drying out on the palms to a degree where it becomes necessary to hydrate them before they are offered to the consumer. While too long a lapse of time between pickings will cause the dates to become

dry and lower the general grade out. The picking of fruit before it is mature enough not only costs the grower a lowering of his grade out, but it costs his packer infinitely more labor and expense in attempting to put the fruit into such shape that it will stand the rigors of distribution. Furthermore the picking of immature Deglets is not conducive to an increased consumer demand. In other words immature Deglets are insipid in taste, frequently having a faint taste of tannin, they turn dark quickly and have a greater tendency to mold and shrivel after they are packed. The same fruit, if left on the palm a little longer, would be placed in a higher grade, would stand up properly during distribution and would reach the consumer in excellent physical condition as well as retaining its original delicious flavor. So it behooves the grower to use the utmost care in picking his fruit for, no matter who packs it, he has to stand or fall on the condition of his fruit when it reaches the consumer.

So in simple words, the effectiveness of picking crew management, lies in one's ability to have the dates harvested after the fruit has reached maturity on the palm and before it has dried out to a point where it needs hydration.

By Arthur Cavanaugh

Day's Pay vs. Contract

Day's pay, \$2.25-\$2.50.

Contract, \$2.50 for 22 lugs, 10c lug over 22.

10c to 15c per lug on varying size tree on straight contract.

I prefer contract to day's pay in our orchard. The cost is about the same per pound as day's pay, with contract you can cover more ground per man and need less equipment because the men will work longer hours. Day's pay works better in small planting while contract works better in the larger plantings. The quality of the fruit picked on contract can be as good or better than day's pay. Picking cost should run about .50-.65c per pound average.

Method of Checking Quality of Picker's Fruit

When a new picker starts, I let him pick three or four lugs, then go through these and the bunches and show them what to and what not to pick.

The fruit must be checked for green and cull fruit, also the fullness of the boxes. When a picker does not fill his box, make him take a lug or two and fill his boxes extra full a few times or knock off two or three boxes from his total.

How to Keep Out Culls

On the first picking we clean the bunches of shrivels and culls that are on the bunch at the time. This, of course, raises the cost of the first picking but the pickers are not troubled with them so much throughout the season. Constant checking of the picker's work is very important in keeping out culls.

We do not drop a great amount of dates on the ground, yet our cull percentage is below average. Cull average should be around two to three percent.

Best Interval Between Pickings

I don't believe there can be any set rule as to intervals between picking because of the weather changes at picking time. Only by watching the ripeness of the dates and a crew large enough to get over and pick the dates at the proper ripeness.

Between the first and second picking we usually wait two weeks, as the picking advances we cut to one week. Then later on at the end of the season the picking exceeds two weeks.

Proper Degree of Ripeness

I think a better grade of fruit can be obtained by picking the fruit before it is fully ripe. It then breaks down into a fine grade of fruit. The degree of ripeness must vary with the weather.

There is danger in picking the fruit too green due to the fact that this will run the packing house costs up, so care must be used in picking fruit this way. Not less than seventy-five percent ripe, eighty percent to eighty-five percent seems to be best.

Effect of Various Picking Practices in Grade-out of Fruit

Picking has a great deal to do with the grade-out of fruit. I have seen several orchards let their fruit go and pick it all at once. The picking cost was very low, and also the grade of the fruit, mostly culls and dries.

Too green a fruit will have a heavy percentage of culls and cost more to pack. Not culling fruit in the field causes higher picking and grading costs.

PROBLEMS OF HARVESTING FROM TALL PALMS

By Hawley O. Duncan, Supt.
Bryan Haywood Date Gardens

- 1—Problem Troubles.
- 2—Increase Cost.
- 3—Methods in Use.

Our first and largest problem trouble is in the selection of men who really need work and are willing to

work rather than just hold a position as so many people want to do nowadays.

After the right selection has been made, then he must be able to carry a tall and heavy ladder as well as to stand up and walk around the platforms which we are using on all our tallest palms.

We still pick a lot of our dates from 24- and 26-foot ladders. The real cost of picking dates from platforms is less than three-quarters of a cent per pound, while the dates we pick from the tall ladders will run close to one cent per pound.

If a small part of the cost of platforms should be charged against the picking cost each year it would run the cost close to one cent per pound.

It would not be correct to charge all the cost of platforms against picking, as so many other operations are performed from them, like thinning, dusting, bagging, taking bags off and pruning.

So from our standpoint the cost of picking is no greater than most ranches where the palms are much smaller and ladders are used for picking.

No doubt one big reason for our picking so cheap from the tall palms is due largely to a much larger yield.

To give you an idea of the yield from tall palms on the Model Date Garden where the palms are as tall if not taller than any garden in the Valley, on 205 palms since 1931 when I started to work at said garden, the average has been from a low of 265 pounds per palm to a high of 345 pounds per palm.

Quite often we pick 80 pounds to 100 pounds per palm at one time, going up, letting the dates down by rope.

But where we pick from tall ladders we have to change them from three to four times per palm and sometimes even more. Even if the palms produce the tonnage the cost is much greater from ladders.

We have one track ladder; used it a little two years; but in our case our palms are not straight enough to use it on anything like all and by skirting around the garden to get straighter palms we found the cost was greater than if we picked from the regular date ladder (or straight ladder.)

If I may, let me say in talking the cost of production from start to finish, fertilization, irrigation, cultivation, harvesting, etc., that the

cost per pound is no greater from tall palms than from palms eight to twelve years old where short ladders are used due to the much larger yield.

And with better quality dates from the taller palms, along with the large yield, we have been able to show a profit where the smaller or younger palms ended in the red.

* * *

By H. L. Cavanagh

In picking the dates from high palms we use 16 foot ladders as far as they will reach. From there up, we use the rotary-type extension ladder. These extension ladders will take us up 31 feet and by standing near the top of the ladder, the picker can reach up to about 35 feet.

This past season, some of the highest palms could barely be reached from our longest extension ladder, so sooner or later we have confronting us the working out of a means of handling these palms. We are not willing to abandon these old palms on the basis of the economics of caring for them. They are our most prolific bearers of quality dates.

The cost of picking from these palms for the past season has been .75c per pound for the highest palms, which run up to almost 40 feet to the fruit. The next group of palms from 20 to 30 feet to the fruit was .65c per pound and the smaller palms were .55c per pound. The picking was done by contract at the following prices: For the oldest group 15c per 20 lb. field box; for the next group 13c per 20 lb. field box and for the youngest group 11c per 20 lb. field box.

PICKING PRACTICE AS RELATED TO PACKING HOUSE OPERATION

By Leonhardt Swingle

It has been my experience that there is sometimes a feeling of antagonism between the grower and packer that should never exist. The grower is inclined to believe that he grows perfectly wonderful dates and then turns them over to the packer who turns them into choice, poor dry and culls and the packer feels that the grower will bring in anything that has a seed and will expect them all to be made into fancy dates. As usual they are both at fault, but it is necessary for the best results that they work together in all possible ways.

We must always remember that the packing house can add or subtract moisture and sort the dates in-

to grades as soon as they have reached the stage in which they can be packed but the packing house cannot add sugar, make big dates out of little ones, or get rid of the wind-scars and blacknose. The packer only works with the dates the grower delivers.

The grower is entitled to get the best possible grade out of his deliveries and a great many times the crop is very far from what he desires or tried to grow, due to conditions over which he had no control. It is for the grower to deliver the best he can and the packer to pack this crop in the best and cheapest manner.

The point where the two must work together is in picking the crop at the proper maturity. To pack out the best grades of Deglet Noor dates, the fruit must be picked just before it is completely mature and it is very important that this picking be done at the time desired by the packer. If picked too green, the date is lacking in the full quota of sugar and the excess moisture must be gotten rid of by drying or curing in some manner. All this adds very materially to the cost of packing and a date picked too green may turn out inferior to a comparative date picked a short time later.

On the other hand, if the picking is delayed too much, the date will have gone too far with its ripening on the palm and only dry dates will be the result. A crop can very easily lose a grade by a little delay in picking.

It is not for this writer to say in this paper just what this picking stage should be. That is the question on which the grower and packer must cooperate at the time the particular crop is being picked. Not only at the start of the harvest but all season.

The weather is a big factor in this matter. The fall of 1938 was in many ways a very favorable fall for ripening. The season was spread out without rain in most of the Valley and it was possible for the grower to pick the crop as it matured and for the packer to handle it as it was delivered. If we think back to 1934 or 1936 we can remember with what extreme speed the dates ripened. In 1934 if labor and boxes had been available, a great many gardens would have picked the entire crop in a few weeks. A condition such as existed then is something that neither grower or packer can overcome but must make the best of things.

Some of these days we will have

a big rain again and when that happens, before a grower rushes out to pick and take the dates to his packer, just see what will happen then. They are the growers' dates until they are graded or sold, and if they start to rot and fall off the palms, they will undoubtedly continue to spoil when in a picking box or packed box at the packing house and the packer cannot help it any more than the grower. Do not fail to get in touch with your packer before picking in such a case.

As a general rule dates are picked much more mature than they were ten years ago with a very material saving in packing operations and possibly a little loss in grade. We have found it best to let the dates get as ripe as they can before they get too dry and this has saved much money in packing and many sour dates and heavy culling.

One point along this line I wish to call to your attention. A crop that has suffered from water during the growing season or as it started to ripen, cannot be changed into a first class crop by a heavy irrigation just before picking. It is possible to fill the dates with water so they look plump and fine but this is all water and not sugar and it all has to come out in the packing and the date goes right back to the small shrivelled specimen it was except that it will probably be darker than average after all this water goes in and out.

I do not say not to irrigate as you start to pick, or in a hot, dry spell, but I do say that if your dates have lacked water all season, you cannot cure this lack with a sudden heavy supply just as they ripen. It is sugar that makes quality and water helps only as it adds to the sugar.

As a general rule the tendency is to pick too early when the season starts and then later on not to keep up with the picking as close as is desirable. The first dates are never very good in spite of how good they may appear. They do not have the quality of later dates. By long and bitter experience the writer has learned not to rush the first pickings but let the first dates ripen on the tree and dry down into dry dates. Then when picking is started, these first dates come off with a picking of good dates at a lower picking cost for the crop and a supply of good dates to start the season. After you start, pick closely without getting them too green but consult your packer about this matter.

All these thoughts mean simply a

close cooperation between the grower and packer for no two growers pick quite alike or have quite the same crop and no two packers handle the crop quite alike. Only when the two work together at all times can the best pack be put out in the most economical manner.

* * *

By D. H. Mitchell

There are two extremes in picking dates.

One is to adopt the policy of letting the dates hang on the palms until a considerable percentage is ripe, and to pick as few times as possible thereafter during the season. This plan means low picking costs, but requires the packing house to hydrate an undue percentage of dry dates. The grower saves a small amount in picking costs but receives a reduced average sales price for his fruit.

The other extreme is to pick as green as possible without too much complaint from the packing house. This plan also does not work out to the advantage of the grower.

The first policy simplifies the work at the packing house at the expense of the higher grades of fruit which have brought the premium prices. The second increases the cost of handling the fruit and also increases the percentage of culls.

The "happy medium" policy would seem to be the best. At the beginning of the season only dates that were ripe would be picked. This is due to the fact that the first ones are noticeably lacking in keeping quality as compared with dates picked later. Picks would be made as frequently as possible without incurring excessive picking costs. As the season advances, slightly green dates could be harvested but close supervision is very necessary. The dividing point between the amount of greenness that is desirable and the larger amount that is undesirable is not distinct. The line seems to be indicated by the color change that comes with ripeness, moving from the tip to the calyx end. When this color change from orange to brown has covered a half to two-thirds of the distance from tip to calyx end the maximum amount of greenness permissible has been reached. The date has its sugar at that time but has a "raw" taste that is not relished by the majority of consumers.

With the equipment that we have at the California Date Growers Asso-

ciation we are usually able to make excellent quality dates for packaging from this type. If a greater amount of immaturity is given us to work with results are not as good. Dates that shatter from the bunches at a touch and fall to the ground are often defective and are usually not worth the cost of salvaging.

The procedure used at the Association packing house to take care of slightly green dates is simple. Dates of this type are separated from the incoming fruit as promptly as possible and spread on drying trays in a thin layer. These trays are trucked to warm maturation rooms and allowed to remain there until the breaking down process is complete. The dates are then quite soft and juicy. The drying process follows and then grading and packing. Some of the finest dates that we handle are prepared for market in this way although this treatment will not of course make a good date out of one that was inferior to start with. Packing dates without maturation and drying of all over soft or green dates will result in difficulty later on unless the time interval between packing and consumption is very short.

It has been five years since we have had a rush during the harvest period. By the law of averages we should be due for one now. With that in mind we are building 10,000 drying trays. These trays will not restore dates that have moulded in the field, but they will greatly reduce the spoilage in the packing house that would occur otherwise. There is nothing as valuable to a packing house in a wet year as a good supply of drying trays. Only sound fruit should be picked following a rain. Growers should give close inspection to all fruit picked following a rain. Since all culls eliminated in the fields relieves the pressure on graders in the packing house by that amount. Every date requires a careful inspection, for mould may develop in the cavity around the seed with a slight change in color being the only indication. The reputation that California Dates have built up over a period of years can be wrecked by careless grading following a rain. Everyone should co-operate if such a trick of weather should occur, for only if the grower, picker and packing house work together will we be able to get a satisfactory pack out.

The Decline Disease or *Omphalia* Root Rot of Date Palms

By Donald E. Bliss, Assistant Plant Pathologist, Citrus Experiment Station,
Riverside, California

FROM the information which is now available it seems that the decline disease of date palms was unknown before the year 1921. At that time a stunted palm was noticed in a date garden west of Indio, California. Little attention was given the trouble until other palms standing nearby became similarly affected. By 1927 there was observational evidence that palms previously normal in appearance had lost vigor and had become worthless. The attention of the Citrus Experiment Station was first called to this trouble by officials of the U. S. Experiment Date Garden, Indio. A preliminary survey by H. S. Fawcett revealed groups of stunted palms in four other date gardens within a radius of a few miles. Apparently all of the first known cases of the disease involved palms of the Deglet Noor variety which had originated as offshoots in North Africa and had been planted about 1915 in the Coachella Valley. Stunting, the most obvious symptom of the disease, was noted first when the palms began to fruit. The potential importance of the trouble was not realized, however, until the time when these date plantings had reached the stage of maximum fruit production.

Scientific investigations of the decline disease were initiated in 1927. The first published reference (7) to the malady appeared in 1930 in the Report of the California Agricultural Experiment Station for 1928-1929. A study was being made of "a slow deterioration of date palms in local areas with loss of fruiting." About the same time Klotz (10) referred to the trouble as "the stunted growth disease or slow failure or degeneration disease." He suggested two theories regarding the cause: one, that it was due to fungi, and the other, that faulty nutrition was to blame.

Haas and Klotz (9) were the first to use the name "decline disease." They reported that many roots of affected palms had deteriorated. Citrus interplants in decline disease areas "thrived while the palms continued to retrograde." The view "that the decline disease is a result of inadequate fertilization" was refuted by these writers. However, they report the improvement in the

condition of one affected palm following the application of 50 pounds of copper sulfate to the soil about its base.

In 1932 Fawcett and Klotz (8) expressed the belief that the cause of decline disease is in some way related "to the nature of the soil." No characteristic lesions had been identified, although many dead roots were found on badly affected palms.

The first experimental evidence which indicated that *Omphalia* spp. were the cause of decline disease was published by Bliss (1, 2) in 1934. The development of the conviction that this is essentially a root rot disease and that it is caused by soil-inhabiting fungi marked a significant step in the investigation. It clarified the problem of disease control. Soil disinfection (3) was suggested as a means of eradicating the causal fungi from affected areas. Later, the use of disease-free offshoots (4) was shown to be a means of controlling the spread of decline disease. The two species of fungi which are associated with and responsible for the root rot symptoms of the decline disease were identified and described (5) as *Omphalia pigmentata* Bliss and *Om. tralucida* Bliss.

The decline disease has been associated from the first with the Deglet Noor variety. Although it is the most susceptible variety of date palm known at present, *Omphalia* spp. have been cultured (6) from naturally infected palms of the Saily and Iteema varieties and from two male palms. These fungi were found also in dead roots from palms of the Tafazwin, Zahidi, and Horra varieties. Artificial inoculations* using pure cultures of *Omphalia* spp. on healthy 5-year-old date palms in the Coachella Valley have produced root rot symptoms in 18 varieties, including the Deglet Noor. The lesions were similar to those found in naturally infected palms and the fungi used for inoculation were reisolated from the necrotic tissues in every instance. Similar palms which were left uninoculated were free from lesions. These experiments, which were conducted under orchard conditions,

*Unpublished data on file at the Citrus Experiment Station, Riverside, California.

substantiate earlier findings based on the response of potted seedling date palms. It is evident that the rules of proof,** as formulated by Koch (11), have been fulfilled in regard to that type of root rot which is now considered to be the primary symptom of decline disease.

The views expressed by Postlethwaite (12, 13) indicate that he was not fully informed as to recent developments in regard to the decline disease. If opinions differ concerning the interpretation of experimental data, it is probable that some confusion exists in the definition of terms. Acting on the suggestion of H. S. Fawcett, the writer is therefore proposing the name "*Omphalia* root rot" for that disease of palms which is caused by *Omphalia pigmentata* and *Om. tralucida*.

"Decline" is a noun of rather general meaning. It is defined as a falling off; a tendency downward; a gradual change to a weaker, inferior, or less favorable state; or, the process of deteriorating. "Decline" was used first to describe the more obvious effects of the disease but without specific knowledge as to the cause.

The proposed name "*Omphalia* root rot" is specific. It incorporates both the generic name of the causal organisms and the primary symptom of the disease. To be affected with *Omphalia* root rot, a palm must have a decayed or rotten condition in the roots which is caused by *Omphalia* spp. There is much to be learned

**C. E. Owens in his "Principles of Plant Pathology" (629 pp., John Wiley and Sons, Inc., New York, 1928) applies "Koch's Postulates" or rules of proof to plant pathology as follows: "(a) An organism which is always found associated with a particular diseased condition of a plant, (b) should be isolated and grown in pure culture, then (c) inoculated into a healthy plant of the same kind and result in the characteristic disease, and finally (d) the organism should be reisolated from the second plant and compared with the first culture. Both the diseased condition induced by inoculation, and the organism recovered from the inoculated plant should correspond to the original diseased condition, and to the first organism isolated, respectively. . . . It is only when all of these steps have been taken that one is justified in concluding that any particular organism is the cause of a certain disease."

regarding the effect of environment (climate, soil, nutrition, etc.) on the predisposition of palms to *Omphalia* root rot. There are also unanswered questions relating to the factors of disease development and spread.

It is theoretically possible that the health of date palms might deteriorate gradually due primarily to malnutrition, mechanical injury, or other causes which are entirely different from *Omphalia* spp. If such conditions exist they should be named in such a manner as to indicate specific causes. Such a procedure would tend to clarify the confusion which, for a number of years, has surrounded the name "decline disease."

Literature Cited

(1) Bliss, Donald E. 1934a. Investigations on the cause of decline

disease in date palms. *Date Growers' Instit. Ann. Rept.* 11:4-6.

(2) ————. 1934b. The parasitic action of *Omphalia* sp. on tissues of the date palm. *Phytopath.* 24:1143. (Abstr.).

(3) ————. 1935. Soil disinfection as a means of combating decline disease in date palms. *Date Growers' Instit. Ann. Rept.* 12:13-16.

(4) ————. 1937. The spread of decline disease in date palms. *Date Growers' Instit. Ann. Rept.* 14:4-8.

(5) ————. 1938a. Two new species of *Omphalia* which cause decline disease in date palms. *Mycologia* 30(3):313-326, 10 figs.

(6) ————. 1938b. Discussion. *Date Growers' Instit. Ann. Rept.* 15:6-7.

(7) (Fawcett, H. S.). 1930. Plant pathology. *California Agr. Exp. Sta. Rept.* 1928-1929:39-42.

(8) Fawcett, H. S., and L. J. Klotz. 1932. Diseases of the date palm, *Phoenix dactylifera*. *California Agr. Exp. Sta. Bul.* 522:1-47.

(9) Haas, A. R. C., and L. J. Klotz. 1931. Nutrition and composition of the Deglet Noor palm in relation to the decline disease. *Hilgardia* 5:511-530.

(10) Klotz, L. J. 1930. Diseases of the date palm. *Date Growers' Instit. Ann. Rept.* 7:7-10.

(11) Koch, Robert. 1882. Ueber die Milzbrandimpfung. Eine Entgegnung auf den von Pasteur in Genf gehaltenen uns leider nicht zugänglich gewesen Vortrog. 37 pp. Kassel und Berlin (Th. Fischer). (Original not seen.)

(12) Postlethwaite, R. H. 1938a. The Coachella Valley and its date industry. 47 pp. Coachella, California.

(13) ————. 1938b. Observations on so-called decline disease. *Date Growers' Instit. Ann. Rept.* 15:5-6.

THE SUB-STANDARD DATE DIVERSION POOL

By H. W. Proctor, Assistant Secretary, Coachella Valley Date Growers, Inc.

THE substandard date diversion program has now been in effect for three years and, in order to properly appraise its value to the date industry, consideration must be given to its effect on the date industry as a whole as well as to the problems of handling and disposing of the dates in the pool itself.

Prior to the inception of the first diversion program in 1936, the date industry was in a demoralized condition. The only cooperative association of date growers then in existence handled less than 50 per cent of the crop grown in Coachella Valley. The balance of the crop was sold wherever possible by individual date growers. The result of this indiscriminate manner of marketing brought in all kinds of dealers who were looking for a cheap product to market, and who took every advantage possible of this disorganized condition without any regard as to the cost of production of dates, or the welfare of the growers themselves.

The diversion programs of 1936-37 and 1937-38 brought about a great improvement in this situation because during those two seasons most of the substandard dates were brought into the pool established by the Coachella Valley Date Growers, Inc., and kept out of the regular channels of trade so that they could no longer be used as competitive material by unscrupulous dealers. In addition to this benefit, the growers,

who had been brought together in Coachella Valley Date Growers, Inc., learned the value of cooperation, formed a new association, the United Date Growers of California, to pack and market the standard grade dates.

Although the marketing situation was benefited by the programs of 1936 and 1937, the greatest benefit was not realized until this past season of 1938-39 when a state marketing agreement was put into effect, making it illegal to market substandard dates as whole dates, thus removing 100 per cent of substandard dates produced in California from competition with standard grade dates.

Since the Order has been in effect, regular inspection under the supervision of the State Department of Agriculture has been made on standard grade dates offered for sale, to maintain the quality of California dates on a high level. The Order has been in effect now for one entire season and has worked smoothly with practically no friction among the growers or handlers; and up to the present time there has been no concerted effort to make any changes in its provisions.

As to the operation of the Diversion Corporation, we feel that we have made considerable progress in the development of the market for manufactured date by-products. Prior to 1936, not more than 150,000 pounds of dates had ever been used in one season for by-product purposes. In 1936-37, one million and

a quarter pounds of substandard dates were sold to be manufactured into date confection, date flakes, date sugar, and date brandy. In 1937-37 a million and a half pounds were sold to go into the same products.

At the beginning of the 1938-39 season a considerable change was made in the handling of the dates turned into the pool. Prior to this, the substandard dates had been sold to manufacturers under contract to macerate and convert the dates into approved products after which a conversion certificate was signed and indemnity voucher filed for the payment allowed by the government. In 1938, however, the dates were macerated under the supervision of the diversion corporation before they were sold. The contracts for maceration of the dates brought a substantial additional income to the Valley, and also served the purpose of preventing the possibility of any substandard dates leaking out of the pool and being sold as whole dates.

In addition a change in the method of financing the operation of the pool was adopted at the beginning of the 1938 season. For the first two seasons of 1936 and 1937 the diversion corporation secured loans from the Commodity Credit Corporation to enable it to make payments to growers prior to the time when the payment could be received on indemnity vouchers. Due to unavoidable delays, payments could not be made promptly to growers during these

first two seasons. During the 1938-39 season it has been possible for the diversion corporation to pay the growers promptly on delivery the entire amount of 3½c per pound, which was allowed as payments by the government. We were able to do this without obtaining a loan from the Commodity Credit Corporation. We did obtain a small loan of \$3,000.00 from a local bank and together with the proceeds derived from early sales we obtained sufficient money to use as a revolving fund. Within a few weeks we were able to pay off the loan and have since paid cash to each grower immediately on delivery of his fruit. This has been of great value to us in keeping the goodwill of the growers, and has enabled us to increase our membership until now we have practically every California date grower as a member of our organization.

We have also increased the outlets for our by-products. From the beginning of the program we have attempted to make sales to the bakery trade with very little success as the competition from low grade foreign dates is too keen, the demand having been supplied with these dates for years. We had no difficulty selling California Macerated Dates to replace imported dates for use in the confectionary trade as the domestic date is more desirable in every respect for this purpose. Recently the manufacture of a date cookie, similar to a fig newton, has been started; and from present indications it appears that probably three hundred thousand pounds of macerated dates will be used in this product this season. If this product is successful and meets public favor, a very large percentage of all substandard dates can be used in its manufacture in the future.

Up to the present time we have received 1,766,610 pounds of substandard dates into the 1938-39 pool. Under the terms of our agreement we can receive subsidy payment on 1,750,000 pounds only. However, we have paid the growers 3½c on delivery of all fruit which will result in prorating all the money received as subsidy payment on an equal basis to the growers.

During the 1938 season we have made payments to 163 date growers including the California Date Growers Association which represents about sixty date growers, making a total of 223 individual date producers who received payments and who are members of our association. The date industry is composed almost al-

together of growers with small acreages making cooperation a vital necessity for its success.

The entire date industry has been benefited by the diversion programs in that the lowest grade dates have been kept off the market as whole dates. This type of program is greatly to be preferred over a prorate program since it results in the elimination of poor grades of fruit, thus giving the consumer a better quality of dates, in addition to building up the name and reputation of California dates as a quality product. Under the prorate system, surplus commodities are removed from the market by allowing only a certain percentage of the crop to be shipped regardless of grade, which results in penalizing the producer of superior quality fruit.

Under our diversion program, however, the lowest grade is removed from the market, and used for by-products only, thus giving the buyer a more attractive package and the consumer a better quality of dates, in addition to building up the name and reputation of California dates as a quality product. It encourages and rewards the grower of better grade dates, while discouraging the production of marginal or substandard grade. It aids materially in stabilizing the market and eliminating unfair competition.

American dates are grown only in Arizona and California with a total planting of approximately 4,100 acres, of which 3,400 are in California and 700 in Arizona. The total production of American dates for the crop year of 1938-39 was approximately 7,200,000. This light crop was due to the effects of the severe freeze of January, 1937, at which time a very large percentage of the date leaves were frozen back and from which the palms have not yet fully recovered. The effect of this freeze was shown in the 1937 crop which was dropped half a million pounds from

1,800 acres are five years or older at which age a date palm begins bearing, but is not in full bearing until it is eight years old. A normal crop for the season of 1938 for the Coachella Valley alone would have been from nine to ten million pounds.

In addition to affecting the tonnage of dates produced, the freeze also affected the quality and caused a large percentage increase of substandard dates as shown by the following table:

Year	Total Production (thousands of pounds)	Substandard	
		In Pool	Sold Outside
1936-37	8,000	1,240	200
1937-38	7,600	1,400	300
1938-39	7,200	1,760	30*

*Arizona only

Although the palms have not fully recovered yet, enough have already blossomed to indicate that there will be a very considerable increase in crop this year, that it will be by far the largest crop ever produced and will in all probability be from ten to twelve million pounds. This increase in tonnage brings with it a very difficult marketing problem, in that the date industry has never been called upon to market more than seven million pounds in any one season. While very definite progress has been made during the past three seasons toward obtaining better distribution for American grown dates and each year has seen more dates distributed and sold, the date industry has not yet reached a point where it can handle ten or twelve million pounds without extreme difficulty. During the past five years or more, up to the present year there has been a constantly increasing carry-over of standard grade dates which at the beginning of the 1938-39 season reached approximately two million pounds, but which since that time has been so reduced that in all probability there will be no carry-over this season.

Year	Carry-Over	Total Production	Substandard	Standard Grade Sold
1936-37	800,000	8,000,000	1,440,000	5,900,000
1937-38	1,500,000	7,600,000	1,700,000	5,400,000
1938-39	2,000,000	7,200,000	1,760,000	6,610,000

Approximately 800,000 pounds on hand in March. This amount will be sold down to about 300,000 pounds or less by Sept. 1, 1939.

that of 1936, but was shown more extensively in the 1938 crop which was a million pounds less than the 1936 crop. This drop in tonnage persisted in spite of the fact that more acres of young palms were reaching the full bearing age each year. There are at present, 3,300 acres of date palms growing in the Coachella Val-

If, as is reasonably expected, 500,000 pounds of standard grade dates are marketed between March 1 and September 1, a total of 7,110,000 pounds will have been sold during the season of 1938-39. This will be the greatest tonnage of American standard grade dates ever sold in one season, and sold at a price which

will return to the grower a little better price than he received in 1936 or 1937. This sale of a greater volume at a better price is more impressive in view of the fact that other California dried fruits during 1938-39 were in a very depressed condition and bringing low prices. This improved condition in the date industry is to a great extent due to the diversion program. First to the

fact that all substandard dates were kept off the market as whole dates during the 1938-39 season, and second, that there has been an improvement in the cooperative marketing of the standard grade dates. In anticipation of increased production of next year and the following years, it is my opinion that every date grower should make a supreme effort to grow the best quality dates

possible. Good dates are always saleable and bring repeat business, while poor dates discourage both the buyer and consumer. In addition there has been created a firm market for at least one million pounds of macerated substandard dates, but tonnage greatly in excess of this amount, brings problems of marketing which will require additional time for their solution.

AFTERNOON SESSION

Chairman, Prof. L. B. Smith, Assistant State Leader of Farm Advisors

Factors Influencing the Cost of Growing Dates

By H. B. Richardson, Assistant County Agent, U. S. D. A.

IN 1934, under the sponsorship of the old Date Control Board, a group of Coachella Valley date growers agreed to keep accurate figures on the cost of growing dates in cooperation with the Agricultural Extension Service. This project has proven to be a successful activity. First it has given the grower a better understanding of his business, secondly has furnished the industry authoritative cost of production information that can be used in many ways. Today, I shall discuss some of this data and how it can be used by all date growers.

At the time this study was started the industry was in need of figures on the cost of production of Deglet Noor dates. Previous difficulties in arriving at cost of production figures from strictly individual sources was that records from these sources were not comparable. Each grower had a different method of arriving at his production costs. One of the important values therefore, of a study of this kind lies in the fact that all records are handled alike after the individual reports are received at the Extension office. It will interest those who are not cooperators in this study to know how this work is carried on. In the first place a grower must be interested in learning more about his own operation costs and be willing to furnish our office a monthly summary of his expenses giving such items as labor for picking, material costs, his pumping hours, cost of power, machinery, repairs, taxes, etc., which are all listed on blanks sent by us to that grower the first of each month.

An inventory is made of each cooperator's date property to determine capital outlay, depreciation charges to be made against palms, pipe lines, etc., together with the age of the different palms. After obtaining the inventory for 12 months, report blanks are mailed out to growers and they in turn return to our office the filled out blanks. To some growers we send duplicates as they wish to keep a record for their own use as well as returning one to our office. At the end of the twelve months period, the date grower gives us his production record together with his crop return for size and grade. In the case of this date cost study, the returns are a year behind the publication of the report. By that I mean, we have five years records of production, but to date, only four years returns. This is due to the fact that the majority of growers who ship through the California Date Growers Association are not receiving their final crop checks with refunds, in time for us to include them in the current year's study.

After all the material is collected an Extension Specialist in Farm Management comes to our office and works over the records item for item—making comparison tables of the significant costs. These summary reports have been published each year. The one which I have here with me today is the fifth Summary this office has gotten out for the cooperators. At this point I would like to express my appreciation to those growers who have made this cost study possible. Through their support and the assistance of the Cali-

fornia Date Growers Association, we now have collected considerable basic data on the industry. We do not have as many cooperators as I would like to have. The more cooperators, the larger the base and the more representative of the industry one of these studies becomes. A study of this kind needs to be as accurate and comprehensive as possible if it is to be of value to the industry. We feel that in a study of this kind the report is more valuable to growers who have participated and is not necessarily an industry standard. The growers represented are only a small sample and they may or may not be typical. We do feel, however, that cooperators who furnish the monthly cost reports and other information needed for a complete record would be above the average in managerial ability and hence have lower costs and greater profits. Aside from the industry value of these reports, the primary object is to let cooperators compare each other's costs as set up under serial numbers in the tables. Each cooperator knows his serial number and by these comparisons he can see how his expenditures compare with other cooperators' and where he is out of line in his costs. A great many things can be shown from these tables of a cultural aspect as well as the dollar and cents values. The more accurately a cooperator reports his costs and kinds of material going into his garden, the better job of summarizing these records we can do, and the more valuable they become, not only to the individual, but to the industry also. We continually get requests for these

studies from public as well as private agencies, and we need to make them as accurate as possible.

This is a considerable distance away from my assigned topic of "Factors influencing the cost of growing dates," but I thought a brief explanation of the study and its objective would be interesting to those who were uninformed of this work.

In going over the general summary and comparison of date records for the past five years in mature gardens from 1934 to 1938 inclusive, we find that during that period we had thirteen operators reporting each year on a total of 125 acres. With a Valley acreage of approximately 3,100 acres, this is about 4% of the total. The number of acres per record was 9.4 and the average age of the palms was 10.3 years and the average number of palms per acre was 50.6. You can see from the above that we haven't had a very large base to work on, but those who have been reporting have kept fairly accurate records.

In going back over the records, I find that the yield in pounds per acre vary greatly. Some gardens with heavy production and low costs have made a profit during this period but prices in the main have been too low for all reporting growers to show a profit. The 1934 season, the first one in which the study was started, was one of low prices with an average yield of 5,201 pounds per acre. In 1935 the yields were better or 8,496 pounds per acre, in 1936 the yields were slightly lower from 1935 or 7,304 pounds per acre. In 1937 the yields were down again to 5,976 pounds per acre. This was due to the severe freeze of that year. The effects of the cold spell are still reflected in the 1938 yield which averaged 5,199 pounds per acre. The average yield over the last five years is shown by the records to be 6,453 pounds per acre or 127 pounds per palm. This is a low average yield.

A grower should certainly strive for a higher production per palm than is indicated by the average of this study. The yield of the date garden is more or less under the direct control of the operator, and can be materially influenced by the manner in which he cares for his property. Cultural labor costs have varied from a low in 1938 of \$54.00 per acre to a high of \$96.45 in 1936—or a five year average of \$75.85 or approximately \$1.50 per palm. Harvesting costs vary directly with the size of the crop. The smaller the crop the less the harvesting costs. I doubt whether the individual can control

this high cost of harvesting which has averaged \$48.53 per acre or about \$1.00 per palm over a five year period. This figure may perhaps be somewhat below the average for the industry as the average age of the palms in the study is only 10 years. One would expect the cost of harvesting to increase as the palms get older and taller.

Material costs per acre varied from a low of \$51.70 per acre in 1938 to a high of \$82.47 per acre in 1934. The trend here has been steadily downward, a sign that growers are paying more attention to costs of production while still maintaining quality. Fertilizer costs are included in the above costs. In 1934 the growers reporting spent \$29.22 per acre for fertilizer, 1935, \$29.44; 1936, \$36.46; in 1937, \$19.48, and in 1938 an outlay of \$28.48; or as a five year average, \$28.55 per acre. This is a relatively wide variation some of which is perhaps due to growers reporting two applications of fertilizer during one year. There are also wide variations in individual yearly expenditures. In 1934 a grower reported a low of \$2.00 and another a high of \$69.79 per acre. In 1935, \$2.50 to \$78.22; in 1936, \$3.46 to \$68.04; in 1937, \$1.59 to \$59.00; and in 1938 a grower showed a low of \$0.31 and another a high of \$64.90 per acre.

This indicates the wide range of practice carried on from practically no fertilizer to a cost equivalent to that of approximately 2 tons of our cheapest nitrate: Sulphate of Ammonia. This also shows the lack of an industry standard fertilizer practice such as we now have on citrus. It is hoped that the fertilizer experiments now going forward on the Arkell Ranch will help toward giving a better picture of nutrition requirements of the date palm. In summarizing some of the individual records, we find that many of the growers are staying with a program of Barnyard and Nitrogen. In the barnyard manure we have a complete fertilizer which supplies most of the elements necessary to maintain production. This plus the addition of nitrogen should round out a balanced fertilizer program based on present knowledge. Nitrogen seems to be the element which rapidly becomes deficient in all soils after continued cropping.

While on the subject, I note from the study that more and more of the cooperators are raising cover crops as evidenced by their purchases of seed. This is helpful in maintaining the desired soil fertility by the addition of organic matter. Cover crops

are about the cheapest source of organic matter we have. Such crops as Hubam clover, certainly add large quantities of organic matter to the soil. Most desert soils are deficient in organic matter. A good cover crop will return from 2-6 tons of dry organic matter per acre.

Another major production item of expense and a large part of the total cash cost of date growing is the cost of water. In going back over the records, the cost of power alone per acre in 1934 averaged \$48.60 per acre to apply 9 2/3 acre feet; in 1935, \$35.96 per acre to apply 11 acre feet; in 1936, \$30.58 per acre to apply 11.3 acre feet; 1937, \$34.15 per acre to apply 11.5 acre feet; in 1938 the cost was \$30.83 for power to apply 10.4 acre feet. The cost per Kilowatt for power is a fixed charge over which the individual grower has little control. He does, however, have control over the amount he applies. With the final report on the water requirements of the date palm soon forthcoming from the Division of Irrigation of the University of California, a better understanding will be had on the water requirements of the date palm. One thing should be remembered, that the date palm is no different from other plants in that it can only use so much water at a time. To apply water to an already wet soil is not good practice. Your date palm cannot use it and you are only leaching some of the nitrate below the root zone as well as increasing your power bills. The use of a soil auger to determine the moisture conditions before irrigation is desirable. The use of an auger or a tube should help to reduce these power bills and make more effective the irrigation water used.

The 1938 summary reports show a total average cost for water of \$5.35 per acre foot and assuming about 10 acre feet are applied each year, a cost of \$53.50 was incurred.

I have pointed out some of the main items of cost which the date grower has to face in the proper maintenance of his garden—namely Fertilizer and Irrigation. Other costs such as brush disposal, cover crop seed, irrigation labor, pollination labor, thinning and tying, bagging, dusting, etc., have remained fairly constant throughout the period of the study. I doubt whether the grower can lessen these costs materially and maintain consistently good cultural care. There is one more item, that of cultivation and furrowing, for which some operators spend a considerable sum of money. Average costs in 1934 under this

heading were \$24.17; in 1935 a cost of \$22.19; in 1936 a cost of \$30.97; in 1937 a cost of \$23.34; 1938 a cost of \$18.11. The average for the 5 years being \$23.75 per acre. I feel certain growers can reduce this cost considerably by doing as little cultivation as possible. Tendency in the past has been to cultivate too often and too deep. With closer attention to the frequency of cultivations, reducing the number per year to a minimum, doing then only enough shallow cultivation to reduce weed growth, the grower should be able to reduce his tillage cost.

It is my belief that economy of items shown in these studies should not be directed toward reducing yield and quality but rather toward performing the necessary work as economically as possible through efficient methods and convenient facilities.

So far nothing has been said about yield in relation to certain practices. This figure is very difficult to arrive at. The freeze of two years ago complicates the picture considerably and is one of the reasons why we, and the cooperators, have decided to continue the study for another five-year period with the hopes that the next five years will show better production and returns to the grower than the first period. The following figures are of interest, however. In 1934, with the yield of 5201 pounds, the average price returned to the grower was \$4.69 per 100 pounds. The total cost of production for those growers reporting was \$6.41 per 100 pounds or a loss of \$1.74 per 100 pounds. Obviously a grower cannot continue business long at this rate. In 1935 the yield of 8,496 pounds per acre and an average price of \$4.65 per 100 pounds and a cost of \$3.82, a net of 83c per 100 pounds was returned to the grower. Again in 1936 we see they received \$4.31 per 100 pounds on 7,304 pounds average yield and at a cost of \$4.82, resulting in a loss of \$0.51 per 100 pounds. In 1937 the cooperators received a price of

\$5.43 per 100 pounds and his costs were \$5.24 per 100 pounds or a management income of \$0.19 per 100 pounds. The average cost of production in 1938 was \$5.49 per 100 pounds. The income figures have not been received to date, so we don't know what the price received per pound will be for the 1938 crop. We do know, however, that the 1938 yields are the lowest in five years and if prices are no better than for the 1937 crop, there will be a small loss. The total cost of production for those cooperators reporting over the five-year period is 5c per pound for orchard run dates, some of which bring more but most of it brings less than this amount.

From figures obtained, it would appear that a date garden to be profitable, will have to have a yield of 5,000 pounds per acre if the fruit brings 6c a pound or 6,000 pounds if the fruit averages only 5c a pound.

Records four, five, six and eight have been in the study since its inception five years ago. Record number 8 reported an average production per acre of 9,982 pounds of dates and a total cost of production per acre of \$375.00, leaving a capital and management income (net profit plus interest on investment) of \$158.00 per acre.

Record number 5 reported an average production per acre of 8,942 pounds of dates and a total cost of production per acre of \$352.00, leaving a capital and management income of \$141.00 per acre.

Record number 4 reported an average production per acre of 7,681 pounds of dates and a total cost of production per acre of \$329.00, leaving a capital and management income of \$58.00 per acre.

Record number 6 reported an average production per acre of 9,858 pounds of dates and a total cost of production per acre of \$426.00, leaving a capital and management income of \$164.00 per acre.

A summary of cost records 8, 5, 4 and 6 show that these four date gar-

dens had an average production per acre of 9,116 pounds of dates produced at a total cost per acre of \$375.75, leaving a capital and management income of \$130.00 per acre. It is interesting to note that these four gardens have consistently used during the past five years rather large quantities of barnyard manure supplemented with concentrate nitrogen. There has been some variation from this practice in one garden but the amounts of other materials applied are not significant. It is evident from the above figures that the operators of the above gardens have been above the average in managerial ability in order to have made such returns in the face of a depressed market condition.

The entire study shows average total costs per acre over the five-year period were about \$320. The lowest total cost was \$285.49 in 1938 and a high in 1936 of \$351.60. These include items of harvesting, labor, materials, cash overhead, depreciation and interest on investment at 5%.

Like most every other agricultural industries there are some who are making money, others breaking even, and others incurring losses and going out of business. The growers who are the most successful are those who study and watch their costs, spending money for only those known essentials which will contribute to the production of better quality products. Those cultural practices that directly increase the quality of the product not only make for better grower returns, but help your sales organization to do a better job of selling. If this study during its last five years has helped grower cooperators to analyze their costs and do a better job of producing, we feel amply repaid for the time and effort that has been put into compiling these yearly reports. I sincerely hope that at the 21st Date Institute, five years hence, I will be able to report high quality production, lower costs and higher grower earnings.

NOTES ON DATE CULTURE IN BASRAH

By V. H. W. Dowson, Manager of Hills Bros. Eastern Company, Basrah, Iraq
(Illustrated with slides)

SLIDE 1. Map showing the position of Basrah.

Basrah lies at the head of the Persian Gulf and at the south end of the 'Iraq. The 'Iraq is bounded on the east by Iran, on the north by Turkey, and on the west by Syria and Najd. Basrah is on the same line of latitude as New Orleans, that is to say it is three degrees further south than Brawley.

The Satt el-'Arab is the river which enters the sea close to Basrah. For 100 miles, that is to say for a distance nearly as long as that between Banning and Brawley, its banks are lined with date palms, perhaps half a mile thick on either hand.

SLIDE 2. Laborers uprooting a palm to make room for a Hallawi shoot planted near.

The implements used are a long-handled, triangularly-bladed spade, and a crowbar with a chisel end. The spade is unsatisfactory in one respect, in that the wooden peg, on which the digger's bare foot presses, is inserted through the shaft at its point of maximum strain, just above the junction with the blade.

The fronds of the shoot are tied up with a severed frond, so that they do not interfere with the men working.

The laborer wears cotton trousers, a shirt, skull-cap and kerchief; and the whole costs, when new, from \$1.25 to \$1.50.

The orange tree nearby is ten years old, but has made little growth, probably because the high water-table of Basrah makes conditions unsuitable.

SLIDE 3. Laborers digging.

Three men dig together as one unit; and each spadeful is raised by their united efforts. In this way, they can dig more deeply and more thoroughly than three men working separately; for the soil, after being soaked in spring by the floods, and baked by the sun in summer, gets hard. These men were working on contract at \$7.50 an acre. They dug about one foot deep.

Alfalfa is being dug in. It has been growing for three years. Most growers leave it in longer.

The fronds in the foreground have been cut off the palms to allow the men to dig close to the palm trunks.

This photo was taken in June, when the weather was hot. It will be no-

ticed that the men have discarded all clothes but shirt, belt, and skull-cap, and that some have discarded the cap also.

In the background, can be seen tamarisks planted as windbreaks. They grow in the Basrah date belt more slowly than they do in the Coachella Valley, probably because they, like the oranges, find a high water table unsuitable.

SLIDE 4. The Abul Mugirah Creek.

This creek is one of the large number of tidal creeks, which take off from, more or less at right angles to, the Satt el-'Arab, every few miles, on either bank. Most were probably formed naturally, during the deposition of the delta, by the wearing away of the alluvium by the returning flood water at the ebb of the tides. From these main channels, secondary ones take off, and from these tertiary ones, so that, broadly speaking, the water is led to every palm in the date belt. These channels act as irrigation channels at high tide and as drains at low tide.

Mulberry trees are common along the channel banks, but are used now only for their wood and shade. Silk used to be made to a small extent in Basrah, but is not made now.

SLIDE 5. Zahdi palms on the bank of the Abu IKasib Creek.

Beneath the palms, are mulberries and oleanders. When these oleanders are in bloom, the Basrah creeks are indeed lovely; and one cannot help reflecting that Basrah might be a pleasant place, if only it were not hot enough to allow of date cultivation.

The Abu IKasib Creek has often figured in the history of Basrah, notably in the IXth century, when it was one of the strongholds of the Zanj rebels, who overran lower 'Iraq for fifteen years.

SLIDE 6. The opening of a sluice to allow the passage of pumped water.

Nowadays, a few landlords, in the higher gardens, have installed pumps to supplement tidal irrigation, which, most years, remains adequate only a certain distance from the sea and in the lower gardens. Two causes operate to make an increasing necessity for artificial means of irrigation, one, the natural rising of the land, as the delta marches further into the sea,

and the other, which made its influence felt more particularly soon after the war, when garden owners had plenty of money, the encroachment on the foreshore. The landlords dammed the low foreshore, and filled it in behind their dams, thus reducing the width of the river. Consequently, the flood tide is now slower than it used to be; and gardens at the tails of the creeks are often dry.

The willows shown in the slide, when planted along irrigation channels, make good windbreaks. As they are of either the species *Salix alba*, L., or *S. acmophylla*, Boiss., both of which are common at Babylon, it may be that these were the trees on which the Israelites hung their harps, when they wept in exile on the banks of the Euphrates.

SLIDE 7. The filling-in of the foreshore, on the left bank of the Satt el-'Arab.

The dam has been made at the water's edge; and the marshy land is being filled in with earth brought half a mile from the desert on the big, white donkeys of Najd.

Two boats of the type known as *balam* are to be seen in the background. They are six feet wide, forty feet long, pointed at both ends, flat-bottomed, built carvel-wise of teak, and, though introduced into Basrah less than 100 years ago, from the Malabar coast, yet, are now, owing to their suitability for their new home, the most characteristic craft of Basrah waters. They are used for the transport of sheep, manure, earth, palm fronds, palm frond-bases, chopped palm trunks, vegetables, fruit, dates, and passengers.

SLIDE 8. Cutting-off dead palm fronds.

Late in summer, when the fronds are thoroughly dry, they are cut off with the saw-edged sickle, which is the laborer's constant companion, and one of his two chief tools. The other is his digging spade.

The laborer has five iron tools, sickle, digging spade, channelling spade, and the heavy, sharp, curved knife, with which he removes the dried frond-bases.

The laborer grasps the frond in his left hand, his sickle in his right, and works round the palm counter-clockwise. The frond bases are not

removed till about two years after the fronds.

SLIDE 9. Breaking the adhesions between the fibres of a split palm frond.

When the fronds are cut, they must be carried to the store before sale as firewood, or, if sold immediately, then to the waiting balam, in which they will be carried to market, so they are bundled in twenty-fives, and tied with young, green fronds, split in four, made pliable by having the adhesions between the fibres broken down. This is effected by drawing the split frond over the handle of a sickle and bending it at the same time.

SLIDE 10. Cutting a frond-base.

The skilful operator makes only three cuts, two to make a preliminary, V-shaped nick in the dorsal surface, and a third to sever the base completely and to bring it tumbling down to the ground.

That the laborer is careful not to cut the frond-bases, until they are dry may be due to it having been found by experience that the exposure of live tissue may provide a point of entry for fungous spores. If so, here is another instance of the farmer doing the right thing, though he cannot give the right reason for it. Dr. Malencon's discoveries concerning the transmission of the Bayyud and Kamaj diseases in Morocco would suggest that the less cut surfaces of living tissue are exposed to the atmosphere the better.

Slide 11. Two fronds, one of the Dayri variety, and one of the Qintar, showing differences in type, and arrangement of the spines.

This audience does not need to be informed that different varieties of date palms have different kinds of spines; the slide was introduced really because of the interest of the varietal names. From Qintar is derived the English word "quintal," meaning a weight of 100 lbs., 112 lbs., or 220 lbs.

Dayri means "of the Dayr," and "Dayr" means "monastery," as Dr. Popenoe correctly pointed out. As Mr. Nixon pointed out, however, it would seem to be searching rather far afield to ascribe, as Dr. Popenoe appears to suggest, the origin of the Dayri date to a particular monastery in Palestine, especially as (and here a little local knowledge helps) we have our own Dayr, or place of the monastery, close to Basrah, now absorbed by the Islamic religion, and a favorite spot for pilgrimages. Dr. Popenoe's further suggestion that the Dayri and the Hayyani may be the same date is untenable.

Here, perhaps, may be permitted the remark that, although it would be generally admitted that inaccuracies, wherever found in a scientific work, should be exposed, yet nothing but admiration can be felt for Dr. Popenoe's work on dates, taken as a whole. In a comparatively short space of time, he not only traveled widely, and acquired, considering the length of time he was studying it, a remarkable knowledge of a difficult language, but he collected a mass of observations about date palms and their culture and history, much of which was before then unrecorded. To Dr. Popenoe all students of the date palm owe a debt.

SLIDE 12. A male spathe of the Gannami variety, opened to show the inflorescence within.

Last year, inflorescence decay was common in the males, in Basrah; and the price of spathes in the market rose to six-fold.

SLIDE 13. Male inflorescences awaiting division.

The male inflorescences are collected early in the morning, while the dew is still on them, and before they have begun to shed their pollen. Here are seen two lads dividing the inflorescences into sprigs of five, six, or seven spikelets. The pollinators then carry the sprigs in their shirts, and place one in each female inflorescence.

The basket shown in the slide is made of woven palm leaflets. The rope handle is not made of the fibre of the date palm, but of that of the cocoanut palm, which is imported into the Iraq from India.

SLIDE 14. The sprigs ready for distribution to the pollinators.

Odd spikelets, which have fallen, are collected, and tied into half-dozens with thread made of palm leaflets.

SLIDE 15. Making up "pins."

The Arabs call the muslin bags of pollen tied at the ends of sticks "pins." These bags are used when male inflorescences are scarce. The pollen goes further, when used in "pins," than when used in the ordinary way. The disadvantage in using "pins" is that, when using them, one does not know which female inflorescences have been pollinated and which not, whereas, when they are pollinated in the usual way, it is easy to see this has been done by the male sprigs stuck transversely in them. This difficulty presumably does not arise in the Coachella Valley, where the inflorescences are tied up on pollination.

SLIDE 16. Eighteen varieties of Basrah dates in the kalal stage.

Only two of the eighteen are of interest in California, namely the 'Uwaydi and the Maktum.

SLIDE 17. Carrying dates in a basket from the palm to the scale.

On the Kut as-Sayyid Estate, the yield of each palm is recorded, so that the heavy yielders can be used for propagation and the light yielders uprooted.

SLIDE 18. Weighing the yield of one palm.

The yield is being noted down by the boy on the palm card. Each palm has its own card.

In the other gardens in Basrah, individual palm records are not kept.

SLIDE 19. Transport of dates by rail to the packing station.

On the Estate, a light railway is used for the transport of dates. The truck illustrated carries a ton and a half. Dates usually go from the gardens to the packing stations by balam.

SLIDE 20. Cut bunches on the ground, each bearing a few unripe dates.

The dates, which do not fall off the cut bunch, when it is shaken, are allowed to ripen on the bunch. Last year, on the Estate, all cut bunches bearing unripe dates were collected into one place, in order to make guarding them easy, until they ripened and could be sold; but prices for dates were so low, that it would have been more profitable to have left the bunches where they fell and the dates to rot on the ground.

SLIDE 21. The date collecting-station.

Each garden has a patch of land set apart for the reception of dates, before they are sent to the packing station. In these collecting stations, there are places for each kind of date the garden grows; but all the dates of any one variety are not heaped together, for different qualities of each variety must be separated; and, also, the different parcels belonging to the different tenants must be kept separate. So, in each collecting station, one sees a large number of small heaps of dates.

Those dates, which are for subsequent export in wooden boxes, are usually stored in them, but those, which are for packing in baskets, are usually stored loose in heaps on mats. These mats are made of woven, dried, and split reeds, and enter largely into Basrah life.

SLIDE 22. Washing palms to kill the Date Bug.

Ommatissus binotatus, Fieb., var. *libycus*, Berg., did much damage in 1934, 1935, and 1936 in Basrah. In the second of those years, this pest

reached the Estate, and found it unprepared, so makeshift methods of control had to be devised. One was to beat the bugs off the palms and to bury them in the muddy ground by means of a powerful jet from a fire hose. This method was effective but slow.

SLIDE 23. Tanks in which tobacco was soaked for the preparation of a nicotine wash.

As nicotine was not available in the 'Iraq early in 1935, a nicotine wash was made from local tobacco, and proved satisfactory in killing the bug.

SLIDE 24. Spraying.

Here a lad has climbed into the crown of a Dayri palm, so as to hold the nozzle of the spray lance above the leaflets, thereby making it easy for the spray to reach the bugs, which like to congregate in the upturned fold of the leaflet, close to the point of insertion into the frond.

SLIDE 25. A power duster at work.

The most satisfactory method so far tried for the control of the bug is a nicotine dust. This photo was taken towards the end of 1935, when power dusters and nicotine dust became available at Basrah.

SLIDE 26. Two spikes of Hallawi dates, in the kimri stage, one attacked by mite and the other not.

Oligonychus simplex, Banks, or a related species, does much damage to the date crop of the 'Iraq by spinning a web over the ripening dates. Possibly it does damage yearly to the value of \$200,000.

SLIDE 27. Dusting Hallawi dates in the kimri stage with sulfur.

Damage by the mite in feeding on the dates and in spinning a web over them can be easily and cheaply controlled by dusting with sulfur. A hand shaker-bellows is effective in Basrah, where the lads hop up and down the palms with greater ease and celerity than the date growers do in the Coachella Valley.

SLIDE 28. The larva of the Palm Borer.

The larva of *Oryctes desertorum*, Arr., a lamellicorn beetle, eats dead wood and decaying vegetable matter; but the adult bores into the living tissue and causes frond, and fruit, stalk to break. No method of control has yet been sought or found.

SLIDE 29. Two lighters on the Satt el-'Arab.

When the dates are packed, they are carried by water to the waiting steamers in lateen-rigged, local craft, of from twenty to fifty tons burden.

SLIDE 30. The deck of a bum.

Basket dates are exported partly by steamer, but mostly by local craft of various rigs and kinds. The com-

monest of such local craft is the bum, which is distinguished by an immense bowsprit. Large vessels of this type may carry 500 tons, and sail as far as Zanzibar or Ceylon.

SLIDE 31. Basket dates being loaded onto a steamer of the British India fleet for shipment to the Gulf or India.

Some of the baskets are sewn up in gunny, and some go as they are.

The wharves of Basrah were built and equipped by the British during the war, and have since been handed over to the 'Iraqi government.

SLIDE 32. Sawing a palm log.

No one would think of employing date-palm wood for carpentry or building in America; but, in the 'Iraq, trees are so scarce that palm logs, unsuitable as they are, are often used for building. Some varieties are better than others for this purpose; and the same variety growing in one locality may give better timber than when growing in another.

SLIDE 33. Flora of the Palm Grove.

The last slide, strictly speaking, does not illustrate any particular phase of the date industry, but is put in here in the hope that it may induce some of the date growers of the fertile Coachella Valley to pay a visit to the land of the Babylonians, where, they may rest assured, they would be exceedingly welcome.



← Diseases