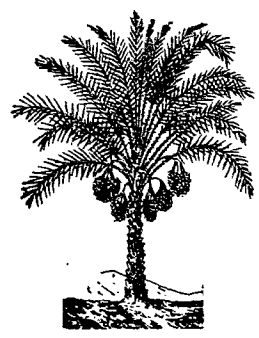


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REPORT OF
FIFTH ANNUAL
Date Grower's Institute

HELD IN
COACHELLA VALLEY
CALIFORNIA

MARCH 31, 1928



MADE IN U.S.A.

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Valley Farm Center

Fifth Annual Date Growers Institute

MORNING SESSION

Dr. H. J. Webber, Director Citrus Experiment Station, Riverside, Presiding

Dr. H. J. Webber, Director of the Riverside Citrus Experiment Station, acting as chairman, in opening the morning session said in part:

I consider it a great honor in being asked to preside over this meeting, and in accepting it am reminded of the answer the father gave his son who inquired as to what constitutes a great man. The father replied, you know, that a great man is a man who is able to gather around him many assistants who do all the work and take all the blame, and he takes all the credit. That is very much the kind of a chairman you may expect at your morning session.

Seriously, I want to congratulate the date growers in being able to conduct a meeting of this kind. There are always differences of opinion in procedure, and policies, until we finally reach a decision of correct judgment and that takes time, and we are glad you have created a clearing house for the development of understanding in matters common to the date industry. The published proceedings of your four preceding

Institutes have been of incalculable help to you, as you are building up a literature of which you will all be proud, and from which conclusions can be drawn. The avocado industry did this, and today many of their developments are unquestionably the most advanced and best methods extant, because they organized early in the history of the industry. So your annual Institutes, and your reports thereof will be of great value in advancing the date industry. If you desire help from the state or the national government it is necessary for you to act as a body, as an industry; and these meetings stimulate your interest in each other, and stimulate your willingness to impart the information to others which you yourselves have achieved and learned.

You naturally expect me to say something about the work of the Experiment Station. We always stand ready so far as the funds, means and time are available to help every agricultural industry in the state, and that applies equally to the date growers. Our station is built in a

large measure on work already established which takes practically all of our time. When we take on new work it means we must take on new means and facilities, but we are anxious and willing to help you as far as possible.

I wish to congratulate you in having in your midst as an ardent co-worker Dr. W. T. Swingle. His work is of untold value to the date industry of Southern California. It is through his experiments, observations and studies, and his original starting point that this industry has attained its present standing. This far your achievement has been tremendous, and you are building up a literature which is not only unique, but which can be obtained nowhere else. I am not one who believes that all of our ills in any industry can be solved by co-operation; but I do believe it is one of the most important factors in its success, and I am pleased to notice the development of co-operation not only in this Institute but in the handling and marketing of your product.

Fertilizing Experiments

By Homer Smith, Manager Bryan Haywood Model Date Garden

IN this paper I am going to try to describe very briefly the treatment that has been applied to the palms of the Model Date Garden in the way of water and fertilizer during the past four seasons, and the results in terms of quality and yield of fruit that have been obtained.

Fertilizing Date Palms on the Model Date Garden

1924 Crop

14 tons L. A. wet manure per acre.
25 lbs. 4-10-10 commercial fertilizer per palm.

15 acre feet water between March 15th and September 1st; total for season, 18 feet.

Cover crop, Melolotus Indica.

Crop from 89 palms, 7 years old, 18,640 lbs., average 210 lbs.

1925 Crop

7½ tons Lovelock, Nevada manure per acre.

25 lbs. 4-10-10 commercial fertilizer per palm.

18 acre feet water annually.

Cover crop, Melolotus Indica.

Crop from 89 palms, 8 years old, 14,600 lbs. packed, 9,000 lbs. estimated buried on account rain damage; total 23,600 lbs., average 270 lbs. per palm.

1926 Crop

7 tons Lovelock manure per acre.
25 lbs. 4-10-10 commercial fertilizer per palm.

18 acre feet water annually.

Cover crop.

Crop from 89 palms, 9 years old, 22,695 lbs., average 255 lbs.

Note:—Dates too large and sugar content low, sucrose 22%.

1927 Crop

Cover crop, Melolotus Indica.

1 row no commercial fertilizer; total sucrose 25%, total sugar 62%.

5 rows, 25 lbs. 0-10-12 fertilizer; total sucrose 30%, total sugar 60%.

5 rows, 50 lbs. 0-10-12 fertilizer; total sucrose 36%, total sugar 60%.

Crop from 89 palms, 27,768 lbs., average 312 lbs.

Note:—The lack of manure for the 1927 season is shown now, in the spring of 1928, by smaller spaths and fruit stems than ordinary.

I believe that the sugar content

depends nearly, if not as much, on the pruning as on the fertilizing; the closer the pruning, the less sucrose, and vice versa.

My leaf pruning is much heavier than common in the Valley, and all fruit clusters hang free of the leaf stems.

In the rear of the five acres we have 81 Deglets, mostly four years old this spring, that are as big and lusty as most six year olds, and while they are only half through with off-shoots, they are so vigorous that we are pollinating an average of seven bunches of fruit per palm.

The number of bunches varies greatly, being from nothing to thirteen per palm, depending entirely on the vigor of the individual palm; they all throw out about the same number of bunches, but those referred to are those we pollinate.

These young palms are on soil that is straight sand on top for about a foot depth, but from there on down there are many small strata of good soil.

The soil on the whole place is a light sandy loam, there being no heavy spots in the garden.

That the soil has much to do with the efficiency of fertilization is shown by the fact that on one of our other places, where the soil is distinctly on the heavy order, the growth and strength of the palms is not equal to those first mentioned, though they have all had the same treatment.

We have a sandy corner on another place, where a sand dune was levelled, that is giving us much trouble in getting good growth, regardless of the fact that this area has been much heavier fertilized than elsewhere with manure, and we are now treating these palms with two pounds ammonium sulphate each every two weeks, and will continue this for several doses.

This soil is straight sand, without humus, for fourteen feet depth, the sand being very coarse, so it does not hold the fertilizer well.

DISCUSSION

A member: What difference did you notice in the size of fruit stems before and after fertilizing?

Mr. Smith: By not putting manure on in 1927 there was a vast difference in the size of the fruit stems the following season. I will not pass up the manure again.

A Member: What was the variance in the size of the fruit?

Mr. Smith: The size of the date is shown more in the pruning than

anything else. If the bunches are pruned short and you feed the palms well you will have big soft dates. I let the bunches go unthinned to the first of June, then cut out the centers.

A Member: Do you do any pruning of the bunches when pollinating?

Mr. Smith: I cut the ends off.

A Member: How much do you cut off?

Mr. Smith: It depends on the size of the bunch; we leave some long and some short.

Mr. Cudebec: In regard to your experiments with the various fertilizers what conclusion have you come to in regard to the annual necessity of nitrogen?

Mr. Smith: I do not think there is any way of telling, to be frank with you, how much it does take. Palms as near as I can understand are growing the bloom buds for next year's crop in the fall. Is there any authority on that?

S. C. Mason: In regard to the spaths, their visible growth starts in the spring. They are formed, however, long before the spring growth starts; some of them as early as the previous August or September and even continuing as late as October and November. The spaths that form last in the autumn are the first to appear in the spring. Those formed earlier in the fall appear in the lower circles of growth.

T. J. Gridley: Is there some way by which we can tell whether a palm is securing enough nitrogen or not?

Mr. Smith: I cannot tell you.

Mr. Gridley: What has been your observation as to the annual growth of these palms?

Mr. Smith: All the way from 2½ to 3½ feet in height.

Mr. Gridley: What in your opinion is the variation of one foot in growth due to? Is it the season or what?

Mr. Smith: We found one palm one year would make 3½ feet of growth and the next one to it not so much, and vice versa. I cannot account for the variation.

Mr. Gridley: Do you consider that a growth of 3½ feet is normal or is it too fast?

Mr. Smith: I would not say it is too fast.

A Member: How many rings of fruit stems have the palms?

Mr. Smith: Three and four.

A Member: Which of those is considered the best for fruit bearing purposes?

Mr. Smith: The earliest. We cut the later bunches off. The first ones are the best. My biggest trouble with the low bunches is that they do not mature right. They come on so late that they will not ripen properly. The larger, earlier bunches seem to draw the strength from the later ones. I have never had any luck with the low, late bunches.

Dr. Webber: Is there any difference in the color of the leaves where they have had nitrogen?

Mr. Smith: I have young palms in the sand that we have fed more nitrogen to than our big bearing palms; they are small, and the leaves are brown.

Mr. Cudebec: Following out what Prof. Mason said, there may be a simple fact that we have overlooked in the growth of the palm. Namely, we all know it is a heart grower, that the strongest growth and the strongest sap coming up in the tree is at the heart. The center spaths coming on first are the strongest spaths, they will carry the heaviest bunches and will sugar well. I agree with you that the later spaths do not mature as well as the others, and I have laid it to the fact that the sap, as it goes out toward the periphery of the tree is less active, and that is where the late buds are formed. Near the outside of the palm it is dry and the nutrition is not as strong in that section as in the center, and therefore this year we are pollinating more bunches than ever, as high as 17 and 18 bunches, figuring on a little later cutting off from five to six of those bunches which do not appear to be getting the nutrition that they should have.

Dr. W. R. Faries: How late would you advise pollinating.

Mr. Smith: The first of May would be my absolute limit. I have always been through by the 15th of April, except the first year I pollinated up to the first of May and the fruit all seemed to mature in good shape.

Dr. Webber: Mr. Smith, have you ever seen a case where palms had been grown for a number of years without fertilization and then had fertilizer applied, and the reaction that occurred from it? Did the trunks increase in size, etc.?

Mr. Smith: I do not know. I do not know of any garden that has been carried along that way for many years without fertilization and then fertilized heavily.

R. H. Postlethwaite: We have been in the business about 13 years. The first six or seven years we did no

fertilizing and we got an upward growth of about 18 inches a year. Since fertilizing we get a growth of 2½ to 3 feet. The length of the leaf has materially increased with the use of fertilizer.

Mr. Smith: No one year's fertilizing will make any difference in the size of the trunk of the palm, but more leaves will grow out.

Dr. Webber: In Florida, when planting orange groves on new lands, they allow the palmetto, which is partly related to the palm, to remain. When they begin cultivation and fertilization of the orange groves the trunk of the palmettos may increase in diameter six to eight inches. You can tell when fertilization starts by the greater growth of the palmetto trunks. I thought we might have instances of that kind with the date palm. Suppose a palm 10 years old that never had fertilizer, had it suddenly applied. I believe you would notice an additional trunk growth very soon.

Mr. Gridley: Some of the palms in the Valley show that very thing.

L. A. Echols: In regard to fruit stems and bunches, the earlier stems near the center of the crown, in some instances, have a tendency to come out very long and very slender. In that case I have never known the fruit on such stems to be of as good quality as that of the later bunches on the same palm. Whether this is on account of fertilization or lack of fertilization I do not know. I would like to find out.

Mr. Smith: Real early and real late blooms are about the same quality, but I prefer the early blooms as a rule.

H. H. Middleton: In regard to the enlarging of the trunk of the palm, I have one large male palm that is about 12 years old. I notice that the trunk is very small close to the ground; but in recent years it seems to have enlarged higher up. I attributed this to the fact that we are not pruning as much as we used to. I was wondering if pruning did not have a good deal to do with the size of the trunk.

Dr. Faries: On Monte Vista avenue, Los Angeles, there is a row of Robusta palms. They began pruning them when they were quite small. They cut the leaves back so people could pass; for several years they pruned off the leaves and then they began to let them grow again. Below that place you can see today that those trunks are small. Where you cut off the leaves that ends the life of those filaments or fibers.

Mr. Cudebec: Thus far this discussion has brought out three or four good points, and I hope we will get a few more. At our own place I do not feel that we have gone far enough in our tests to justify saying whether or not one fertilizer or another is what we need. This is my fourth season on the place as manager and I have tried to correlate a little knowledge as I went along. We have followed very much after the fashion of the Model Garden as far as fertilizer went, except that we have not check-plotted with large quantities of commercial fertilizer such as has been done there. Still we have, throughout the entire orchard, used considerable commercial fertilizer, all of which I have a record of. Last year we did not get a sugar test. The year previous we did, through the work of Mr. Cook, who sent samples of the various dates to Sacramento. The analyses returned at that time from the orchards tested, I think there were four or five, I do not consider entirely conclusive. I believe if other orchards had been tested there would have been as good results from some of them as there were from those from which samples were sent. My personal experience shows that we should commence check plotting as early as possible, and keep careful records of all our work, shall I say, in a small way, as has been done at Rothamstead, England. Their experiments have been carried on for 70 or 75 years. There they do not figure anything conclusive until they have check plotted something for twenty years. Here, in five years we can tell whether or not to apply heavily of one fertilizer. The palm is a heart grower, and a very fast grower, and it responds to treatment almost like a rose bush, or even more so. Personally I am in hopes of getting some results that we can really count as worth while in perhaps five years. I also trust that more growers will devote time to setting aside a few rows, or a few trees, and make tests of the various fertilizers and report results, and thereby we will know how better to spend our money.

Prof. Mason: I would like to hear discussed the time of year when it is best to apply manure and commercial fertilizer.

R. J. Mather: I cannot give you much information on this subject. I used no fertilizer except barnyard, hay and tillage, and by putting water in the ground we got dates. We are ourselves setting aside five acres for experimental purposes as we

want to do fertilizing and get the best results possible.

R. H. Postlethwaite: The fertilizer question is a hard one I hope to know more next year than I do now. The experiments I have made have been enough to show how little I know. Some of our trees are 14 years old. The first six or eight years we had no fertilizer; the land itself was not fertile and we did not get good results. The trees grew about 18 inches per year. The only fertilizing I did was continuous cover cropping. Four years ago we started in with commercial fertilizer, and we put on roughly the equivalent of one pound of nitrogen, 2¾ pounds of phosphoric and 2¾ pounds of potash per palm until this year. The result being that these same palms are now making 30 inches of growth per annum. We at first plowed under the cover crops in the usual way, about seven inches deep, with the result that during the summer months the intense heat burnt out the humus. This season we plowed a full eleven inches and intend to put in a summer cover crop of Brabham peas so as to keep the soil covered from the sun. This summer cover cropping can, however, only be done if one is assured of ample water to take care of both the palms and the cover crop. I hope to report at next Institute meeting the result of this experiment on the amount of humus in the ground. The availability of commercial fertilizers is largely governed by the bacterial activity of the soil and without a proper supply of humus bacterial activity is low or absent, hence the necessity of manure or cover crops or preferably both.

Mr. Haywood of the Model date gardens put on possibly more fertilizer than most of us could afford. If you have a couple acres you can apply twenty tons of manure to the acre, but if you have a large acreage and not much money it is a different problem, as manure costs money. There must be some particular point where proper economy can be reached in the application of manure and commercial fertilizer.

In the analysis of sugar of fruit from Mr. Haywood's gardens, I think Mr. Smith stressed the sucrose question too hard. Every day the analysis changes, the sucrose being inverted to fruit sugar. The figures should be reduced to dry weight, because that is the only way a comparison can be made between different berries or samples. I have the results of the analysis of the samples of dates referred to by Mr. Smith as

made by the State Department of Agriculture. These analyses show the moisture content of the various samples and also the total sugars. For comparison from these figures I have calculated the total sugars to dry weight and they are as follows:

No. 1 where 50 lbs. fertilizer was used per palm the total sugar content is 90% of dry weight of pulp or date meat.

No. 2 with no fertilizer, total sugar content is 88.5%.

No. 3 with 25 lbs. fertilizer per palm, total sugar content is 92%.

All of these analyses show an extremely high sugar content, much higher than obtained by any other authorities I can find on Deglet Noor dates. The highest result obtained by Dr. Vinson of Arizona was 88%. The highest I have ever tested showed 86%.

J. E. Pippin: We have set a program at our gardens that we have been trying to follow the past few years. It has not been confined to any particular line of fertilizer, but particularly to cover crops, alfalfa hay and plenty of water. Cover crops have improved the condition of our soil very materially, and alfalfa hay has also helped and I think it is very necessary in carrying out a fertilizing program to see that the agricultural properties of the soil are kept up. To produce proper re-

sults water and fertilizer must go hand in hand. Our growth has been very satisfactory, particularly since carrying out our fertilizing program, the set of fruit is larger and better than before. This garden was poorly cared for for a number of years, but since acquiring it, and with the attention just stated, we are getting good average crops, and if you know nothing about commercial fertilizers, manure is the safest type of fertilizer to use. I do not think you can use too much unless you use more than you can afford to buy. Humus is very necessary in the soil and if you have humus you are sure to have some available nitrogen, which will insure you good results. There was originally a small section of our garden that was very poor and the trees were impoverished. I dug holes around those palms, also trenches, and filled them with manure on one side and alfalfa hay on the other; also I dug several holes with a post-hole digger, in which I put a mixture of nitrogen from sulphate of ammonia and soil from another part of the garden. The palms responded very quickly, and they are now in a very healthy condition. Therefore I am led to believe the trouble was one of nutrition. I used ten times the fertilizer on them that I did on the rest of the garden. However if there are poisonous elements in the

soil of that spot they may be hard to overcome—time will tell.

D. G. Sniff: I planted some of my best offshoots on one acre of sand dune land. They grew faster the first year than any of the palms I planted in the heavy soil. The second year they began to get sick and turn yellow. The third year I took the advice of some of the older growers, and put, I don't know how many pounds, of manure to each basin around the trees. The palms continued to be sick, although some began to grow. Then I got to doing some digging, and I found I had nothing but blow sand anywhere from 5 to 8 feet under the palms. The roots were all bunched up in the basins where the manure was. Two years ago last winter I started in with all the trees that were still sick—about 30 of them—and bored auger holes down to soil. Underneath this sand, that was from 5 to 8 feet deep, there was 3 to 4 feet of very rich black soil. I put rich manure in the auger holes. Half of the palms responded from that treatment and made very good growth, but where the sand layer was too great I could not get results. I dug up two trees and found that a very thick mass of roots had filled these holes and had followed the manure down into the good soil. I am pleased with the results of my experiments thus far.

Date Fertilizer Trials In the Coachella Valley

By M. M. Winslow, Agricultural Extension Service, University of California

MANY date growers in the Coachella Valley have been using fertilizers of various kinds for several years, hoping to increase yields and improve quality. While every grower is of the opinion that organic material in some form as cover crops, alfalfa hay, or manure is essential if the trees are to be maintained in good vigor, yet there is the feeling that something additional is needed to bring about the desired increase in yield and better quality. While various commercial fertilizers have been used there is a wide difference of opinion as to their value. This is due largely to the fact that these materials have been applied in a hit and miss fashion without careful check of what has been done and results secured.

The Citrus Experiment Station be-

came interested in this problem, as well as others, when at the 1927 Date Growers' Institute a resolution was passed asking assistance from the Station. The writer discussed the fertilizer problem at the 1928 Institute and asked for co-operators in conducting tests. In response several growers offered their co-operation in furnishing palms for these tests. These men were visited by Dr. L. D. Batchelor, Professor of Orchard Management, Citrus Experiment Station, and myself and each garden gone over carefully as to its adaptability for test plots. Three were selected as follows:

B. H. Hayes garden, 2½ miles west of Indio.

Geo. M. Beach garden, 3½ miles south of Coachella.

Dr. D. E. Hunter garden, 7 miles west of Indio.

These field trials are designed and laid out in such manner as to determine the effect of the following elements; nitrogen, phosphorus, and potash, singly and in combination, upon (1) the growth of the palms, (2) the fruit production of the palms, and (3) the quality of the fruit.

By using the following fertilizer ingredients we believe the effect of the above mentioned chemical elements may be most effectively studied. Nitrogen supplied by urea; phosphorus supplied by triple superphosphate, potash from muriate of potash, sulphur from ordinary flowers of sulphur, calcium from gypsum.

The above materials are used because they furnish the elements desired in a form that will not compli-

cate or mask the results secured. As an example: If nitrate of lime were applied to furnish the element Nitrogen there is a possibility that the results obtained on the Nitrogen plot might be influenced by the lime. However, if nitrogen gives a measurable increase in yield in the test plots, nitrate of lime, sulphate of ammonia or other nitrogen carriers can be recommended for general field use by growers.

It is planned to use these materials in the following combinations in the case of two of the gardens under experimentation, namely the Hayes and the Hunter gardens, whereas the size of the garden available in the case of the Beach experiment necessitates some modification. The following is a chart showing the combining of these elements in the above mentioned fertilizer experiments.

Key to Smybols

- N - nitrogen
- P - phosphorus
- K - potash

CHART I

1.	N	-	-
2.	N	P	-
3.	N	P	K
4.	N	-	K
5.	-	P	-
6.	-	P	K
7.	-	-	K
8.	-	-	-

The amounts of the fertilizer materials to apply was arrived at after a careful study of the work done in the fertilization of other fruits, consideration of soil type in the Coachella Valley, and discussions with

local growers as to their experiences in fertilization. Old world practice had little to offer as a guide.

In the cases of the Hunter and Beach gardens 2 pounds of actual nitrogen, 4 pounds of phosphate and 4 pounds of potash are applied per palm. The Hunter palms are 6 years old, whereas the Beach palms are 10 years old and are already in full production.

In the case of the Hayes palms, which are now 2 years old, a smaller amount of fertilizer is to be applied for the first few years, one-half of the amount applied on the Hunter and Beach properties being the initial application.

The amounts indicated above will be applied yearly for a period of at least three years. In addition to the commercial fertilizers each plot will receive a blanket treatment of some organic material in the form of alfalfa hay, manure, or cover crops. Every grower we have talked with is of the firm opinion that the use of organic material is fundamental and absolutely essential. In the location of these test plots, the matter of soil types was kept in mind as it was highly desirable to have them on soils that were typical of the date growing sections of the valley.

The two soil types which prevail throughout the greatest part of the cultivated area in the Coachella Valley are the Indio series and the Coachella series mentioned in probable order of importance so far as the present cultivation is concerned. The Hayes and Beach properties are located on the Indio very fine sandy

loam, while the Hunter grove is located on the Coachella fine sand. However, judging by the outcropping of the Indio sandy loam in the close proximity to the Hunter property and the further fact that the Coachella fine sand is a wind-blown soil, it is probable that the Hunter property is underlaid at some depth between a few feet and possibly 20 feet from the surface with the Indio series of soil which as a whole are more productive than the coarser wind-blown Coachella series.

The plots at each garden will be plainly marked row by row as to the treatment given to each. In this way visitors to the plots can see for themselves how the trees may be responding to the materials. The amounts applied will not be indicated upon the markers, but this can be determined by referring to this article. It is hoped that local growers will follow the progress of these tests.

The crops will be carefully harvested under the direction of Dr. Batchelor, who has charge of the tests, and accurate yield data secured and grade determined. The results secured will be evaluated according to the best scientific methods. It is desirable and it is planned to continue this work for a period of at least five years. The longer the plots are continued the more valuable the information secured. However, there should be sufficient data available after several years upon which recommendations may be made as to general fertilizer practice for date growers in the Coachella Valley.

Pollination Experiments In 1927

By Roy W. Nixon, Assistant Horticulturist, U. S. Department of Agriculture

EVIDENCE of the direct effect of pollen on the size of both fruit and seed and on the time of ripening of the date has been reported at previous Institutes. The methods of experimentation have also been described. Continuing the work in 1927 the chief object was to test as many new and likely males as possible with a view of finding others which in variation produced might equal or exceed those previously tested. This was done by comparing the pollen to that of the two dactylifera seedling males at the U. S. Experiment Date Garden which had

previously produced consistently the most diverse effects—Mosque, which produced large fruit and seed and late ripening, and Fard No. 4, which produced small fruit and seed and early ripening.

A total of 82 pollens were tested. Only 11 were *Phoenix dactylifera* seedlings which had previously been tested. The others were also *dactylifera* seedlings except 3 *P. canariensis*, 1 *P. Roebelinii*, 1 *P. reclinata* and 3 hybrid *canariensis x dactylifera*. Twenty-three of these pollens were from the U. S. Experiment Date Garden; 29 from other date gardens

in Coachella Valley; 9 from Bard, Calif.; 9 from Hawaii; 5 from Sacaton, Ariz.; 4 from the Salt River Valley, Ariz.; 1 from Riverside; 1 from Santa Barbara, and 1 from Florida. Most of the experiments were at the Indio station, but tests were also made in ten commercial gardens in various parts of the Coachella Valley, in four gardens in the Salt River Valley, Ariz., and at the U. S. Experiment Station, Sacaton, Ariz.

As might be expected, in a few instances no conclusive readings were obtained. A few of the pollens proved sterile, or at least under the

conditions of the experiments produced no dates or too few to permit any conclusion. But most of the results were sufficiently definite for an estimate of the character of the pollen.

The average difference in time of ripening between fruit produced by Mosque and Fard No. 4 pollens for three years has been about ten days or two weeks, a little more or less depending upon seasonal and other factors. By far the greater number of males gave results intermediate between these two. No *dactylifera* males tested for the first time in 1927 appeared to exceed this range of variation. While of course slight differences could not be finally determined in a small number of experiments, which were necessarily limited because of the large number of pollens tested, at least twelve were comparable to Mosque. There were fewer producing early-ripening, including several of the pollens received from Hawaii, as to the exact identity of which the sender was in doubt. Two additional Fard seedling males tested this season deserve special mention for they gave results almost identical with Fard No. 4 and with the five others previously reported. Such uniformity does not appear so far to characterize the seedling males of other varieties.

The use of Mosque and Fard No. 4 pollens in the 1927 experiments, in practically all of which they were side by side on the same bunch, gave for the third consecutive season abundant proof from a biometric standpoint of the direct effect of pollen. As a climax to the accumulation of evidence, these two pollens were applied with extra precautions to different parts of the same strands in two experiments on the same bunch. In the resulting fruit there were typical differences in coloring and ripening as well as in size, although the relative position of the two sets of dates on the strands in one experiment was the reverse of that in the other.

To demonstrate the possibility of expanding or contracting the ripening season by the use of different pollens a selection was made of two Deglet Noor palms in full commercial bearing, approximately the same size and subject to the same field conditions. On one the early inflorescences were pollinated with Fard No. 4 to produce early ripening; the mid-season ones with an intermediate pollen; and the late ones with Mosque to produce late ripening. On

the other palm the precedence was reversed—that is the early inflorescences were pollinated with Mosque and the late ones with Fard No. 4. Later two bunches of each set of pollinations were selected for observation, choosing them so that as nearly as possible the series on each palm would be comparable as to the dates of pollination. At the end of the season it was found that the palm used for contraction had begun to ripen its fruit about two weeks later and completed ripening about two weeks earlier than the palm on which the ripening was expanded.

That there may occasionally be a variation in the quality of pollen produced by different blooms on the same male was indicated by the fact that the first bloom of Fard No. 4, which appeared a few weeks before any of the others and which was used in a number of experiments early in the season, gave a very poor setting and produced an unusually large proportion of abnormal seed. For instance, in one experiment only ten dates were set on four strands and six of these were abnormal. The appearance of one or more abortive blooms on a male whose other flowers are entirely normal is not uncommon, but in this instance a bloom of normal appearance with apparently normal pollen proved different from other normal blooms on the same palm.

Pollens from three hybrid palms grown from Rhars seed pollinated with pollen of *Phoenix canariensis* gave very poor, almost negative settings of fruit on both Deglet Noor and Rhars. In some of their seed there appeared a tendency to be intermediate in size and shape between those produced by *canariensis* and those produced by *dactylifera*. Pollens from three males of *Phoenix canariensis* tested for the first time in 1927 produced small fruit and seed and late ripening. The seed also possessed the same peculiar tapering base which has been noted from pollens of the same species in previous years. No setting resulted from one lot of pollen of *P. reclinata*. Pollens from two species of *Cocos* and one of *Areca*, not included in the total above, also gave negative results.

The most pronounced effect that has yet been produced resulted from the use of a small lot of *Phoenix Roebelinii* pollen from a palm at Oneco, Fla. This is the small, ornamental species, more or less common in gar-

dens on the Pacific Coast where it usually blooms in late summer or early fall. The pollen was received on April 25th and applied to an entire Deglet Noor inflorescence. Nothing unusual was observed about the fruit until the ripening of Deglet Noor dates in the garden was well advanced, when it began to attract attention because of its delayed maturity. On November 19 only about 5% of the fruit was estimated to be ripe, while on another bunch on the same palm, pollinated with mixed pollen on April 21, 4 days previous, all of the fruit was full ripe. On December 5 out of a total of 317 dates (the bunch was a small one and the setting below normal for *dactylifera* pollen) 18% were ripe, 33% partly ripe and 49% immature. How long it would have taken for all of the dates to ripen can only be conjectured. The bunch was cut off by mistake by a Mexican laborer who was removing the season's fruit stalks. The fruit did not appear different from that produced by other pollens on Deglet Noor, but the seed were very different. They were somewhat irregular in size and proportions, with a smaller germ pore than normal seed from other pollens and 35% of them possessed a peculiar dorsal depression of which the germ pore was the center. This depression varied in size and shape, with a tendency to be somewhat circular, and was apparently produced by some inhibition in the development of the endosperm in the embryo. Such a striking peculiarity has never appeared on any of the thousands of date seeds of all varieties examined by the writer in the past five years.

DISCUSSION

Dr. W. T. Swingle: I would like to call attention to the fact that Mr. Nixon's experiments show clearly the possibility of extending the ripening season by differential pollination. This would have the effect of meeting the menace of rain injury in two ways; by extending the ripening season so that a single rain storm would injure only a small part of the crop, or by contracting the ripening season, permitting the grower to protect the ripening fruit by bag, umbrellas or other methods used in this Valley to prevent rain injury.

Mr. T. J. Gridley: I would like to ask Mr. Nixon whether or not the pollen he has been using in his experiments has been generally taken

from palms having offshoots available for propagating purposes?

Mr. Nixon: In practically every case I was careful to take pollen only from young palms with offshoots.

Dr. Swingle: Mr. Nixon pointed out that pollen from early males causes early ripening of fruit. A large proportion of our male trees in the Valley are early and the use of them may be the cause of so much early ripening.

Mr. Nixon: Pollen used from a large proportion of the males that have been grown from Fard seed seems to cause the early ripening.

Dr. Swingle: The early or late ripening, which do we want?

Mr. Nixon: I am not prepared to say. Some people want a later ripening, some change their minds. Mr. Smith said these late bunches failed to mature properly. It will vary in different localities in this valley. Some gardens are well known to be several weeks earlier than others. This effect of pollen seems to be independent of other facts such as might be secured by variations in the manner of irrigation, the application of fertilizer or cutting back of leaves or in the soil itself. All of these

may have some influence. It is independent of variety.

A Member: What have you learned as to moisture affecting the virility of the pollen?

Mr. Nixon: If the pollen molds it loses its virility.

Mr. Gridley: Mr. Smith said he had found the earliest blooms to be best. I have found in our own garden that the earliest blooms invariably put out long slender spaths, like fish poles. These tend to kink very badly at their junction with the trunk and very often the circulation of sap is stopped. We have always considered that those first blooms were not as good as the mid-season blooms, and that the real late blooms were not as good as the mid-season blooms. So we usually cut off both the early and the late ones and try to save only the mid-season blooms.

Dr. Webber: Suppose you saw that the tree did not carry too much fruit would the later blooms then be inferior?

Mr. Gridley: Some seasons we found the fruit from these to be excellent but it usually matures quite late. The last season or two there has been a tendency for the fruit of the lower or later blooms to dry up

before maturity. What causes it I do not pretend to say. Our intermediate blooms are those that come out with strong spaths, turned on edge, that do not kink and that usually carry their weight of fruit without props.

Dr. W. R. Faries: I want a mid-season date. I don't want a date before the middle of September. The early dates are poor because they ripen too soon, and the late dates—I am going to throw a bomb shell into this discussion. I will say it now, the late date spaths are infested at the base by Marlott Scale, and the scale checks their development. I do not want any of them. The fruit does not ripen properly and does not have the proper sugar content. We want the fruit to be heavy with sugar, and we can get our best dates soon after the middle of September.

Dr. Swingle: In this valley the mid-season pollen is satisfactory. It does not follow that it is the same in Death Valley or in Arizona where the later ripening is preferable.

A. R. Heineman: How may Marlott Scale be controlled?

Dr. Swingle: Spray three times a year.

Fifth Annual Date Growers Institute

AFTERNOON SESSION

Dean J. J. Thornber, Director University of Arizona Experiment Station, Presiding

Before introducing the speakers of the afternoon, the chairman, Dr. J. J. Thornber, dean of the Agricultural College of the University of Arizona, said in part:

It affords me great pleasure to attend this date growers conference, and to preside over this session. If there is one problem that Arizona and California can get together on it is the date industry and its problems. It can never be stolen or copyrighted by any other state. It is ours by virtue of our climate.

I was astounded this morning when I heard you talking about a ton of manure per tree. I do not know what you would use if you lived in Arizona where you can get manure for fifty cents a load. I was even more astounded when one of

your speakers said he was using 18 acre feet of water per year. I suppose he means per acre but he did not say that. We think three acre feet of water a year is a good deal, and I can see now why it is that you California people want our Colorado river water!

I am glad to bring to you greetings from Arizona, and to report to you that our growth and development during the past six years has been phenomenal. Many thousands of acres of land have been added to the cultivated areas, and capacity of dams and reservoirs has been considerably increased. The population has also increased from 334,000 to 475,000, principally in the five agricultural counties.

It is interesting to know that twen-

ty years ago Florida grew thirty to thirty-five thousand acres of lettuce, and the entire Southwest fifteen thousand. Today Florida is growing less than a thousand and the Southwest is growing more than forty thousand acres. Arizona boasts of its hard, crisp lettuce. We also have a new variety of wheat that we believe in a few years will grow everywhere in the Southwest. It is a hard wheat that remains hard. The cotton industry is likewise growing very rapidly. In fact we have many industries in common with California, which binds us more closely to the west coast; and while we are just back of you, nevertheless you are and will be the consumers of our products.

Prevention of Rain Damage to Fruit Clusters

By C. L. Cudebec, Manager D. E. Hunter Date Garden

MANY date growers who are present today have a vivid recollection of the damage by rain to the crop of Deglet Noors during the harvest season of 1925. Well do we remember how, at the close of some thirty hours of downpour, we literally waded out and hurried over into the Indio Heights district, to see what the growers there were doing about it.

Upon our arrival we found others already ahead of us. With these we went from garden to garden. As I remember it, our first question always was, "How badly are you hurt?" and next, "What are you doing about it?" One said he was shaking the bunches out so they would dry. Another was picking off the split and lined fruit and throwing them away in order that the rest might dry more quickly. Another said, "I am not doing a thing, —just waiting." Of these three, perhaps the man who simply shook out

the bunches was the best off for we have since learned that quite a percentage of lined and not too badly rain-split dates will, if left alone, dry down into a pretty fair second grade fruit. Also if such fruit be removed and taken to the Association we are now better prepared to salvage a good percentage of it by quick dehydration.

We, however, decided that the watchful, waiting policy did not appeal to us, so we hurried home, and getting our men together set to work picking and throwing down the badly lined and split dates. It didn't take long, in this manner, to put a couple of thousand pounds of our choicest pre-rain fruit, on the ground. While thus occupied we kept thinking that there must be some way to prevent this loss or at least a great part of it.

A day or two later, upon taking some more or less sorry fruit to the Association we learned of a grower

who was bringing in fruit practically unharmed by the rain. All the receiving clerk could tell us was that this grower had "sacked his bunches." That sounded interesting, so we hunted up this "lucky grower" and asked him all about it. To our query his answer was, "I guess I was just lucky. I put gunny sacks over my bunches to keep the birds off and when the rain came, they kept that off also." He shot at the birds and hit the rain.

This grower did not, however, get 100% protection from the water, due principally to the fact that he did not use care in applying gunny sacks as he did, there was not enough of the material to make, what we have since found out to be, a proper application of the burlap. Even so, he believed that his rain loss was not much over 10%.

During the spring and summer of 1926 we spent considerable time looking up and testing various kinds

of cloth with the view of using it for date bunch protection. We finally decided on ten ounce burlap, forty inches wide. This we cut into sixty inch lengths, which was found to be about the proper size for most bunches.

When the dates were fully pink, but before any sign of end-sugar appeared, we applied the burlap. This was during the first week of August, 1926. The method of applying the burlap more easily demonstrated than told. Perhaps the most important point is to make sure of a water proof fit of the burlap about the stem above the bunch by folding and wrapping and cinching with a strong cord. This folding and wrapping gives the equivalent of several thicknesses of cloth, where it is most needed, at the top and part way down the bunch. A lap of six to twelve inches or even more, according to the size of the bunch, is made on the outer and upper side of the bunch. This lap we fastened with a single No. 4 safety pin. A date thorn will serve the purpose but is not quite as handy when raising the cover for picking.

It might appear from the above that the applying of the burlap was quite a task but such is not the case. Once a man is shown how to go about it he quickly becomes expert and applies the covers very rapidly. We covered upward of 1,000 bunches during the first day or two of August, 1926, using but two men. (This was an early season, as our records show we picked some 400 pounds of fruit on August 24).

A week or so after having applied our coverings we were visited by a heavy downpour which, according to our irrigation record, lasted from 2:15 to 4:30 P. M., during which period our gauge showed that no less than one and one-half inches of rain fell. This storm extended scarcely two miles south and east of our place. It came down from the mountains on the north with a roar of thunder which we remember to this day.

We were considerably worried, for already some dates were showing soft-nose toward ripening. An examination immediately after the rain showed that the burlap had done its work so well that only the extreme outer layers of fruit were moist and the bunches were full of the sulphur dust with which we had sprayed. The dampness on the outside soon disappeared for the burlap dried very quickly and in so do-

ing seemed to draw or syphon the moisture away from the fruit. Later in this same season we were visited by other more or less severe showers but without damage. Incidentally we were much gratified during the latter part of this same season not to be bothered with the birds pecking the soft mature fruit. In our isolated location the loss from this source during the previous season had been considerable.

The covers used during 1926 were packed away and held for use in 1927. Using the same method we again applied the burlap and added a few hundred more. What happened last fall is very fresh in our minds. The heavy rain of October 25th struck a hard blow to many a date grower. The loss in some sections was severe.

The next day after this storm we made careful examination of our fruit and were much gratified to find almost an absence of damage. Bunches, however, that we had left uncovered for test purposes, were damaged up to, we would estimate, as high as 50%.

On the day after the rain, October 26, 1927, we were visited by Mr. Gridley. He knew we had covered our fruit and wanted to see results for himself. We called his attention to the uncovered bunches as against those with protection. We believe he will bear us out in our estimate of practically no rain damage to the covered fruit.

The harm from humidity, often following a rain, is a separate and distinct thing. It cannot be combated by any method we are personally aware of and constitutes a hazard which we believe will always be with us as date growers.

There is another subtle and real damage caused by rain to uncovered dates, namely,—where the fruit touches one another the water collects and does not drain out or evaporate readily. If humid weather follows, as it often does, it is only a matter of a day or two when the spots where the fruit come together, become soft and break down into decay. With properly covered bunches this difficulty is practically eliminated. The fruit does not run and drip throughout the bunch and, with the return of fairly dry air, they are quickly free of moisture.

We have talked with a number of growers who have covered their fruit and some who have not. Naturally we find those for and those against the practice. Some who have

used paper as protection from the rain condemn it because of the fact that there is more or less sunburn to the stringers lying immediately beneath the paper. Also it has been shown that the paper must be kept above the fruit as a sort of umbrella for, if it is lowered and left down, the excess heat and probably humidity, injure the fruit. Lowering the paper in time of rain is impractical, especially so, since the rain has a mean habit of arriving mostly at night.

Some advance the excuse that the burlap covering is considerable of a nuisance in picking. We have not found it so. If properly applied in the beginning, the total time for raising and lowering it for picking is not over one quarter of a minute per bunch.

It is true that a driving, blowing rain will go through the burlap wall about the bunch but it is not this type of storm that has caused most of past damage. The steady soaking downpour plays the mischief. Burlap of proper weight and rightly applied catches most of the moisture and syphons it off through the fibres. The bunching up and lapping of the material at the top means everything to the success of its use.

We had one grower who told us that the fruit on his covered bunches fell off by the bucketful. In our two years' experience with over 1,000 bunches per season we have seen no signs of any fall which we could attribute to the covers.

The matter of cost for covering with burlap is one of paramount interest. Quotations received by us during the past week show the forty inch ten ounce burlap to cost 11¼c per yard in bale lots, with a slight reduction for larger amounts.

Using sixty inches or one and two-thirds yards per bunch means about 20c. Adding to this the cost of application, which we have figured from three to four cents, together with the one large pin used by us, brings the total to about 25c per bunch. The second year's use naturally cuts this about in half and the third year makes still another reduction. Our burlap seems in good condition for a third season's use.

It may be of interest to know that the manufacturers of the burlap offer to cut the cloth in sixty inch lengths and hem it for a very small additional charge. We believe this procedure well worth the difference.

The use of lighter than ten ounce material we do not believe advisable. There is a vast difference between eight ounce and ten ounce burlap, both in wear and in rain turning qualities. Burlap has the peculiar quality of opening rather than closing its meshes when first wet and allowed to dry. Second and subsequent wettings do not seem to change it much.

As we see it today the situation is something like this: The weather is forever with us and rain has the unlikable habit of visiting us uninvited and out of season. We cannot write rain or hail insurance on our crop. The next best thing seems to be to place at least a measure of insurance by covering our fruit. To date we have tried several varieties of cloth side by side and of them all burlap seems the best, the cheapest and the most durable and easily applied. It is not 100% protection but, considered from every standpoint, we believe it the best material so far commercially used. The cost is not prohibitive even for one year's use and when the material is used for two or even three years, it becomes a very moderate insurance premium.

DISCUSSION

Bryan Haywood: We have found that the covering of the date clusters has made a wonderful difference in the saving of our fruit from rain. In the fall of 1926 we buried 9,000 pounds of great big luscious Deglet Noors. The next season we covered with burlap but had little rain and no loss. Last fall we had considerable rain and many of the gardens lost heavily. I am glad to say our loss was negligible, the loss coming, not from the berry that was next to the burlap, as you would naturally think would be the case, but coming on the inside of the bunch which happened to be fully ripe and full of juice. The date is a very hygroscopic. If rain happens to strike at the psychological moment the fruit will often absorb moisture from the atmosphere.

D. G. Sniff: My experience in this matter has been rather limited. Last year I bagged about one-third of my bunches, using paper bags, folded back underneath, acting as umbrellas, and the other two-thirds went unbagged. When the rain came I had only about 3,000 pounds of dates left. I did not go out and pull the bags down when the rain came, because I did not know much about the hand-

ling of this type of bag. The fruit that was uncovered was practically a total loss. It spotted and cracked and dropped off, while the fruit under the bags, which was probably not over a thousand pounds, reached the packing house in good condition, and the percentage of culls was practically nothing. They say that the paper burns the stems worse than the burlap. On 15 or 20 bunches I used old burlap sacks, and I burned some of the strands clear in two. Two years ago I had newspapers on and I burned a good many strands in two, and the dates dropped off. I had more burning with burlap than with paper. Has any one else had that experience?

J. C. Farrow: I am glad to show you a cover that we have been using for three years and that has proven very successful. It is made of light waterproofed muslin. The waterproofing contains no ingredients harmful to dates. You will notice there are two wires, one fastened at the bottom and the other in the middle. When placed around a bunch, the top is folded around the stem and tied very tightly, then the ends of the wires are brought around and hooked together, thus entirely wrapping the bag around the dates, with the lower end open. You will notice how completely the bunch is protected from the rain. These covers cost us about 32 cents, including the wires, laid down in Los Angeles—can be bought for less now. They are made in Cincinnati, Ohio. We do not know how long the waterproofing preparation will last, but we have the formula and we can treat them ourselves when necessary. The cover I now exhibit has been used for three years. No rain blows onto the fruit to speak of, and ample air is let in below. Its service is much better than we anticipated. I am now illustrating how it is applied. The Mexicans who do this become expert. When we put the covers away after the season is over, we remove the wires and carefully pack the cloths; and with proper care they will last many years. They will not burn the stems. They have been in service three months and twenty days or more each year and during that time we discovered no burned stems. They also act as a protection from the birds.

T. J. Gridley: I shall not argue the merits of any particular form of protector. We are here to show you what is being used in different parts of the Valley by the date growers.

I now show you the device we have used in our own garden. It is a paper protector made in the form of a sleeve or cylinder and the upper end is tied very tightly around the stem, being careful not to leave any cup or loose places above the string to collect rain. It should be tied only in one place—around the stem. After being tied around the fruit stem the entire bag should lay as smooth as possible from the top to the bottom. When we began this work several years ago we used a double ply bag with an inner layer of black gum or asphaltum. We soon discovered that, although this bag shed the water well, it also burned the stems and threads of the bunch rather badly. The next year we looked for something better, and we found this single ply bag with no waterproofing layer. Oil or paraffine on these bags is dangerous. When the palms were young we got along nicely by leaving the bags down full length and raising them occasionally. We knew if we left the bags down too long the fruit would get sticky and mold. They are easy enough to handle on the younger palms, but when trees get taller it is a different story. Now we apply the bag about the middle of August and immediately fold the lower half back and tuck it under, giving an umbrella like effect.

This bag I show you has been used two seasons; at least fifty per cent of them have lasted two seasons. After three years use they are not worth very much. Along in November when the weather has cooled down and the bunches have become thinned out and the fruit has attained its maximum content of sugar, then it is permissible to pull the bags down and keep them down until the picking is finished, but in the beginning of the season it is dangerous to have the bag down over the fruit for very long at a time. A driving rain will sometimes blow in under the bags and wet the lower end of the bunch, but the fruit in the top half of the bunches, which is usually the best quality, has in our case been undamaged through several seasons use of these bags. We have had none of the spotting, or so-called Arizona rot, under these bags. If a bunch gets thoroughly wet and the fruit becomes sticky this spotting or rot seems to always develop in about ten days or two weeks after the rain is over. In 1925 we had applied the bags to but seven rows before the rain caught us. From the seven rows we picked good dates clear up

to Christmas, but we lost practically everything on the other rows. I am not here to urge the superior merits of the paper bag, but I know that if you put paper bags on your bunches you can surely save your crop from loss through rain. As to the cost of the paper bag. I recently had quotations on this type. They should not be less than 40 inches long by 36 inches wide, sewed up one side and open at both ends. These bags will cost \$7.60 per hundred laid down here this year. Several years ago these paper bags cost 18c each. You cannot count on a 100% carry-over but with good care in collecting and bunching up and storing during the off-season you can count on about 75% the first season, 50% the second and perhaps 25-30% the third.

This type of bag, unlike those demonstrated by Mr. Cudebec and Mr. Farrow, does not fully protect the fruit clusters from bird damage. Where birds are troublesome it may be necessary to provide a piece of burlap or muslin to protect the lower portion of the fruit cluster. A date thorn or two will hold it in place.

Several years ago when our palms were young we tried having a closed bag made of light tough paper which would not tear in wetting or in a wind, but it was a failure. We found in a dry season, with very hot weather occurring in late September and October, that these bags were a great advantage for a time but as the season advanced they were dangerous on account of causing fermentation to develop inside of the fruit clusters. We tried to compromise by cutting holes in the bottoms, but finally gave them up entirely. We use cloth if we have to have bird protection. The cloth costs eight or nine cents a yard and one yard is usually enough for one bunch. The material is ordinary muslin, heavier than cheese cloth. The method of putting on any type of paper rain protector over the wire supporting hook, used in conjunction with date palm props was quite a problem to work out. It takes considerably longer to put paper on than burlap, where the supports are used. You have to make a different type of fold, and you must tie in two places. I am asked if I use props on all trees. Not on the older ones—mostly on younger palms.

Mr. Cudebec: We found the burlap gave additional trouble where we

had to put it on over the date hooks. We had originally something over 600 props, but last year we cut down their use by early trimming of the bunches and later on we used only fifty props. Unless the prop is set at a very big angle, you can push it back far enough to make a single twist around the stem with the burlap and it does not add anything to the expense of the application.

W. L. Paul: In the early days when there was very little fruit in the valley the birds were very bad. The first thought of protecting the dates was from the birds more than anything else. For this we used cheese cloth, but where the cloth rested against the dates the birds would pick holes through it. We used various kinds of covers. A burlap heavier than that shown here was used when the rain came, for we soon found we had to use something to keep the dates dry. I used to be, and am yet, connected with the sugar beet industry in Mexico and we began using sugar bags lined with water proof paper, and we have used them ever since. We also discovered that where the sack was not shaded by the tree there was a certain amount of scorching, depending on how long the bunch would hang in the sun, and we know of nothing to prevent this. We are willing to take a certain amount of loss for the sake of protecting the greater part in the shade where burning does not occur. You should not wait until it commences to rain to put on the sacks. At the proper time I apply all the sacks regardless of the location of the bunch. Of the bunches that hang in the shade I do not consider that I have ever had one per cent loss of dates on account of rain. The others made culls for which a low price had to be taken. I would rather take that loss and protect the bunch that is in the shade.

What we must do, in my opinion, is to get away from any loss and I think it can be done. The fruit must be kept from dampness. If the rains come down on it, and the covering is porous, like a sack, it must get damp, and the humidity in there will help keep it damp. If the bunches hang in the shade of the trees we never take our sacks up. We put them on and let them stay the whole season right where they are, and we never have any trouble with molding or with spoiled dates. Next year I have decided to put paper sacks on

all the fruit that is in the shade inside of the trees, as they have proven to save practically 100 per cent of the fruit, and then use burlap, or something similar on the outside bunches where loss occurs from burning. I have had my eye on the Cowgill sack, demonstrated by Mr. Farrow, something that is waterproof, and that stands out from the bunch. You might put wires under the burlap to keep it away from the dates but unless it is waterproof the rain will pound through and let in the moisture. So next year I want to use something other than paper that is waterproof, on the outside bunches and use the paper on the inside.

Some people say they do not get much loss from rains. I believe that the greatest thing that the Coachella Valley needs to do is to grow a high grade date without blemishes that will bring fancy prices. That is what the people want. It behooves us to take care of the crop so that we do not get so many culls and spotted fruit.

J. W. Newman: I want to learn a method of protecting date bunches that have short stiff spathes and do not have the drooping appearance.

Mr. Gridley: We successfully protect our Tazizao'on fruit clusters, which have very short thick stems and do not droop to any extent, by opening out the regular paper date bags and placing them canopy-like over the fruit, tying them to convenient leaves where necessary. We utilize some of the older bags, as a rule, for this particular purpose.

Mr. Paul: I wonder if any of you conceived the idea of having a real umbrella made that could be put over the stem, and fitting with a clasp, made out of heavier material, that does not sag down, and then using a cloth lined with waterproof paper underneath, something like a cap?

W. S. Howell: I have in mind an umbrella similar to the one Mr. Paul speaks of, and I corresponded with a paper concern in the East. I hope some day to have some paper cones of that kind with a light muslin protector underneath.

Mr. Paul: I have grown Tazizao'ot dates and never protected them except with cloth to keep the birds away. I never lost five per cent and they have gone through all kinds of rains at all times.

Picking Platforms for Tall Palms

By J. E. Pippin, Manager Schell Date Gardens

THE deeper we plunge into the science of date culture, the more we learn about date growing, and while the mysteries of this ancient industry as regards proper cultural methods are being unveiled, slowly but surely, as the years go by, one can not help feeling proud of the fact that he is a charter member of the small group of pioneer date growers of America, and I believe this distinction unquestionably belongs to the growers engaged in the industry up to at least five years ago. To those of us who have been struggling to succeed in the development of the date industry, progress may seem slow. Yet, during the past eight years, we have advanced in our understanding of date culture by leaps and bounds. I think we are justified in claiming the most advanced methods and the best general understanding of the industry that can be found anywhere in the date growing sections of the world.

There is a much closer cooperation among the various growers; the problems of every grower are practically the same, and all are engaged in reaching the best solution. Experience has stored a fund of knowledge and information in the minds of the different growers of the valley. Much of this knowledge has been acquired by hard toil and heavy expense. Cooperation is an important factor in finding a solution of our local cultural problems. The gardens of men who have really good ideas, and who practise what they preach in them, always stand out as the most convincing proof as to the soundness of their ideas.

The title of this address, as scheduled by the Date Committee, is "Picking Platforms for Tall Palms." Eight years ago I stood on the ground, yes, and sat on the ground, and picked with ease the dates from the bunches on the palms in our garden. This last season, dates could not be reached from a sixteen foot step ladder on a few trees. I am not much of a steeple jack myself, but consider myself a far better one than the average Mexican. I can spot my ladder firmly, and in the best position for picking, without first having to climb the ladder to determine whether it will topple over, or whether I am too close or too far

away for a convenient position. I have never had a Mexican in my employ to whom I could teach this art, with any degree of success. He simply does not feel at home standing on top of a high ladder picking dates, especially if it is a little shaky. Though he is willing and will make an honest effort to pick a few dates while holding to a leaf stem with one hand and picking with the other, no efficiency can be expected from labor working under such a handicap. I came to the conclusion two years ago, that proper care and attention can not efficiently be given to the fruit during the growing season, and to the picking of the fruit at harvest time, using a step ladder more than twelve feet high. If we are to get the greatest amount of efficiency from the type of labor we must depend on in caring for our growing crop on the high date palms, and cut our production expense in this particular phase of the cultural program to the minimum, then we must remove, as far as possible, the handicaps and inconveniences in performing such labor as necessary for the production of maximum crops and quality fruit. Of course, our production cost is bound to mount, as our palms increase in height. We can not pollinate, get the bunches down through the limbs, thin the bunches, fight the mite, bag the fruit and harvest the crop, as cheaply as we could when we stood on the ground, or worked from step ladders of reasonable height.

However, I am very agreeably surprised to find that my cost of producing and harvesting the past year's crop is less per pound than at any time in the past. This is principally due to the fact that the palms are now in full bearing, probably carrying as heavy a crop as they ever will. Thus, while more time was consumed in carrying on the various operations during the growing and harvesting period, the greater volume of fruit which was handled more than made up for the extra time, when computing the cost on a poundage basis. A further saving was made by the use of the stationary platform on twenty of our highest trees. By the aid of this platform we were able to pick the fruit at almost half the cost, as compared with the picking

cost from palms of a similar height from a step ladder. There was always a scramble among the pickers as to who would get to pick from the platform, as the picking could be done with the ease with which it was done when they stood on the ground, or sat on a box a few years ago. I constructed very simple platforms that cost about five dollars each, having in mind something light, substantial yet inexpensive, and these served their purpose very well.

I have given a great deal of thought and study to the construction of a stationary platform, and have found that it is not an easy matter to build something desirable in this line, and yet keep within the financial limits of a date grower. Mr. Smith, of the Haywood Date Garden, and I have been working together on the idea. Through Mr. Smith, the services of a draftsman were procured, who has designed a platform that can now be seen by anyone interested, and in my opinion will be hard to improve upon. Although it may not be perfect in every detail, I am well enough sold with the idea that I expect to have all our high palms equipped with this type in the very near future. This is a steel structure that is very simple in design, strong and substantial, and can be purchased at a reasonable figure, in quantities, and will last a lifetime. Once the platform is erected on the tree in proper position, no further attention is necessary for at least three years, when it will be necessary to move it up to a convenient position, which feat can be accomplished very quickly and at small expense. I am convinced that with the first three years' use of this platform on high palms, enough will be saved on labor to pay for the platform.

Now I wish to state that I have given the portable type of platform considerable thought, but have abandoned the idea as impracticable. In gardens of any size, many of this type would be necessary. Many teams or tractors of some power would be necessary for moving them. Our ground is not always in shape for a wheel type on account of furrows or borders, so the idea is, in my opinion, impracticable.

DISCUSSION

T. J. Gridley: During the past two or three years I have used a 4-legged platform having steps on two sides, enabling two men to work to the platform. It is so arranged that they can work standing either on the rungs of these ladders or on top. So far these have worked very satisfactorily. But our trees are about 12 years old and getting taller each year. The tallest platform is 12 feet high and rather unsteady at the top. A man fell from one of them the other day and although no bones were broken he had to go to the doctor. I am wondering how much longer we will be able to use them. Unless the foundation is solid the platforms are apt to tip and spill the men. I am now thinking of using two portable platforms with staging across, enabling the men to work on one side of a palm at a time, but with the constant growth of the trees, in due time even that will have to be discontinued. After that I don't know what next. I have thought some of putting platforms on wheels, but I doubt the practicability of this, for whether drawn by horse or truck you can see there would be many difficulties connected with using this sort of device. We may be able in time to train our more agile Mexican boys to climb the palms as is done in the old country.

Prof. S. C. Mason: Having observed the methods practiced in Egypt and the Soudan, I have become convinced that the most efficient and practical platform in the date industry is the human tree climber. The Egyptian tree climber is in a class by himself among the laborers. He arrives on the scene of action late in the day, and he goes home when he feels inclined and draws the biggest wages of anybody in the date industry. The most proficient climbing I have even seen was done by a little black in the Soudan. They only wear a breach clout and go to the tallest palms with not even a jack knife to cut the spines—they do the pollinating and all necessary work, and how they get by the spines I do not know; but the Egyptian climber wears a wide girdle of about twenty strands made of hand twisted fine cord, very strong and evenly twisted. At one end is an eye and the other a three-quarter inch rope made of same material. He throws it around the tree, leaving space enough to get his feet against the tree and lift himself, leaning back at an angle of thirty degrees. He jerks his body forward and up he goes faster than a cat. He

then stations himself in the tree top with the cord, picks what dates are proper and lowers them down to his mate. He will stay up there for an hour and work around the tree until all the ripe dates are picked and then go to the next one. I have been trying to convince our Valley growers that that is what we are coming to. They keep on procrastinating, but the platform idea is simply out of the question with trees much higher than those now found here. I measured trees 92 feet 6 inches high in the Nile Valley. Working on a platform or ladder is a very dizzy operation on even a fifty foot tree. I got Fred Johnson to climb a tree with one of these girdles, and he is the first one in this valley to climb a date palm for pollinating or picking dates, and he was rather proud of himself. Mr. Cook also practiced and he said it was play for an active man. Get your men ready. I recommend light weight agile fellows who will learn this work quickly. The only trouble is they might get independent and want to strike about harvest season.

Dr. W. T. Swingle: I have a solution to offer. If you leave one offshoot at the base of each trunk you can renew your palms without difficulty. They need never grow for more than 25 years. So you do not need to use more than a 12 foot ladder. I have been watching this for some years. The offshoot when it reaches about 8 or 10 feet high also goes into bearing, and bears heavier and heavier. The offshoot will bear half of the crop. It is possible to renew the palm by cutting off the mother tree without much difficulty, and at no great expense and these palms can be renewed in the same way for several generations, roughly every twenty years.

Dean J. J. Thornber: This suggestion appeals to me as being very practical. I cannot imagine an Anglo Saxon learning to climb a tree like Dr. Mason tells us the Egyptians can. I think they have us beaten. Dr. Swingle has a very simple solution, as to look at it from a practical viewpoint; that is, to leave an offshoot at the base of the tree, and just one. You let that grow and ultimately it will take the place of the main trunk, which can be cut away. I do not know of anything that is simpler myself. When Dr. Swingle first suggested it, I said it is so sensible that we should have seen it a long time ago.

Dr. Swingle: There is no difficulty about leaving a last offshoot. The

difficulty is how to cut the mother tree off, and prevent rot. There are many details to be worked out. It will be a hard looking sight when you begin cutting the old trees down. I am asked what position these offshoots will grow up in, whether crooked or straight. A Thoory palm at the Indio station has an offshoot that angles away six or seven feet from the trunk and its top 10 feet lower than that of the mother tree.

Dr. W. R. Faries: The idea of planting a young date palm in between many other palms is rather a difficult operation. It is difficult in a vineyard and I rarely ever got a good vine. My orchard will go the way Dr. Swingle suggests. I will leave it that way now. I have a lot of offshoots in the old orchard and we will not have any model date garden at my place.

A. J. Shamblin: I want to say this in connection with what Dr. Swingle has said: In order to always have a 20 foot tree, and another tree five feet high at the same time you must start in by leaving three offshoots. If you do not you will later have a date tree without any offshoots on it, because after a tree grows up five or six feet, if it is pruned, and all the offshoots cut away you will not have any offshoot to go up from the second palm with.

Bryan Haywood: I want to make an amendment to Dr. Swingle's motion. I seem to visualize tall trees with one offshoot sticking up in the blue sky, and also the kind that Mr. Shamblin speaks of. Why not carry the idea still further and leave four offshoots, and build a platform among them and let it grow up with the tree?

Dr. Swingle: About the renewal. It is possible to hold the offshoot in storage. By pruning back you will control it. You can make it grow or stand still. You can have a small offshoot on a big tree or a big offshoot on a small tree. We never had occasion to do that before. We got \$20 apiece for them. Now there is no reason why we should not produce them and hold them where we want them. At 50 feet the tops of palms are difficult to reach. The whole tree moves in the wind. I myself have spent as much as three weeks watching the pollination work in the old country and it made me dizzy to see the men waving back and forth in the air. I do not think the people of this country would do it for very long. If they did they would demand a high price for it.

Dean Thornber: There is one thing we can do, insure them before we send them up the tree, as we would hardly expect them to come back alive.

Co-operation As Applied to the Date Industry

By B. H. Hayes, Proprietor Hayes Date Garden

I MUST commence my paper with an apology; an apology for coming before you for the purpose of discussing a subject with which my own experience is decidedly limited; an apology on the part of a layman for assuming the role of a preacher in attempting to interpret a quotation from the Bible so that it may apply to the conduct of an industry in which we are all vitally interested. If there are those among you who think it ill befits a layman to attempt such a discussion, or draw a comparison from the Bible for purely business purposes, then I must humbly apologize. My only excuse is, I feel strongly that the teachings and admonitions set forth in the Bible were recorded and preserved in order that we might have some true guide to appeal to, and rely on, whenever we find ourselves groping in the dark, uncertain and vacillating in the method we should pursue. I still further submit, that these teachings and admonitions were recorded, not so much for the preparing and inspiring of our minds for religious worship, as for the governing of our actions and practices in our social and business relations with one another. Therefore, I believe I am justified in resorting to the Bible for inspiration, and in elaborating on a quotation that may help us all in solving a problem that is vital to every one of us.

The subject assigned to me today is "Co-operation as Applied to the Date Industry."

The inspiration, which has given me the courage to discuss this subject, is taken from the Bible, and found in Chapter 13, Verse 13, St. Paul's First Epistle to the Corinthians: "And now abideth Faith, Hope and Charity, these three; but the greatest of these is Charity."

Some thirty or more years ago it was discovered that dates would grow in certain arid sections of the Southwest. This lovely valley happened to be one of the favored spots.

One by one pioneers drifted into the Coachella Desert. These men and women had Faith in God. Faith in their own ability to cope with and overcome the rigors of the desert.

They had Hope in God. They had

the hope that the new industry of date culture would bring them success and happiness.

Their lack of knowledge of date culture has brought them sore discomfort and heavy financial distress, but those of the old pioneers who still remain, and who have had the courage to stand steadfast, have come now to the period where they may realize the fulfillment of that Faith and Hope. The pioneer of this valley, old and new, will still see the fulfillment of his dream, provided, only, that he practices and holds "Charity" for his neighbor.

Charity means Love. Charity means Help. Charity means temperance of speech and tolerance for honest opinions of others. Charity means Co-operation.

If my interpretation is correct, and I believe it is, then we must strive to enrich our hearts and minds with the true spirit of Charity before we can really approach the question of "Co-operation in the Date Industry."

Is Co-operation, or a Co-operative Association of Date Growers, essential at the present time?

The mere fact that you have come to me, — a comparatively new comer to this valley, — and have asked me to lead a discussion on a co-operative movement, is an earnest in itself that you have read "the handwriting on the wall," and that you believe the time has come.

You have manfully come to the conclusion that all the petty jealousies and acrimonious bickerings that have transpired in years gone by, emanated from ignorance; and ignorance is simply another form of "Death by slow torture."

And, finally, you have realized that production of marketable dates is increasing so rapidly that we shall soon be overwhelmed by mounting costs and destructive sales competition unless some fair method can be found that will permit one and all to obtain a legitimate and fair return on his labor and capital invested.

Our problem is not a new one. We are passing through a period of economic evolution in the date industry, that has confronted every other worth-while industry, and now we are coming to the "parting of the

highways" and must make a decision. Which path are we going to follow, — that marked "Wasteful Competition to Ruin" or "Wise Co-operation to Success?" Shall we try to emulate the orange and walnut growers of California, or are we just going to worry along, like any other old bunch of farmers, and slowly die of dry rot?

Don't think for one instant that all our troubles will be over if we do decide that a Co-operative Association is wise. I assure you that our troubles will have just begun, — economic ones of vast import to the whole industry, — and it is at this point, above all others, that I adjure you to stand fast, co-operate, practice "Charity."

There are no valid arguments against a co-operative organization. The burden of proof is really against those who contend otherwise. Consolidation, co-operation, and Co-operative Associations have been found to be the most successful form of business practice in recent years. New and better ways may be discovered in years to come, but at this time we must build along the lines of present day successful methods.

The following — briefly — are some of my reasons for believing that a Co-operative Association is vital at this very moment:—

1. The date crop for 1927-28 yielded approximately 1,250,000 pounds. It is figured that the yield will be increased each year, for the next five years, at the rate of approximately 25% to 50%.

2. It is figured that such of the crop as has been marketed, was sold chiefly by two associations and some six or eight other independent and recognized packers. The cost of "overhead" involved is not warranted, and can be severely cut down and the savings thus made distributed to member growers, if a Valley-wide Co-operative Association is formed.

3. Many thousands of pounds of dates, improperly processed, or not processed at all, were shipped out of, or sold in, this Valley. This resulted in fermenting and infested dates being purchased by an unsuspecting public. Nothing could be more unethical or do more injury to the date

industry than a continuance of this condition. The formation of a Valley-wide Co-operative Association would insure a standard package of a quality date, that has been processed in the most approved manner.

4. Every pound of dates grown, has a potential food value for man or beast. Tons of dates are discarded each year, or should be, either because they have not matured or because they have been processed improperly. These are a potential source of profit rather than loss. Were a Valley-wide Co-operative Association formed, the tonnage of such dates coming to the packing houses would be of such size that it would warrant the employment of a competent chemist. He, in turn, could very quickly discover profitable methods of manufacturing by-products, fit for human and animal consumption. An enterprise of this character is impossible under present conditions because the volume of culls delivered to any one packing house, as the industry is now conducted, would not warrant the cost of manufacturing and marketing of by-products.

5. I believe the statement made by one who, I think, knows more about the date industry than anyone else in the Valley, that the importation of "Quantity" dates from foreign sources will not seriously interfere with the marketing of "Quality" dates, grown in this Valley, for some time, is a true one. But what about this foreign competition in years to come? Particularly if they find the date industry of this country disorganized and the growers squabbling among themselves. Don't forget that a large and powerful American corporation is planting large areas of date palms in Mesopotamia; that students from foreign date raising countries are studying our present day methods of growing and processing in this state and valley. The time will come when this competition for a Quality Date market will prove to be a serious menace to us here.

So much, now, for some of the production and economic aspects.

What about the practical problems with which we are confronted,—the knowledge that should be at our command, if we are to grow dates successfully?

A number of years ago, while traveling through one of our western states, I was astonished at the remarkable growth, and the large yield promised, in a field of grain that I was passing. I stopped and asked

the farmer what kind of fertilizer he used on that field to produce such a wonderful crop.

"My friend," he said, "we don't use fertilizer, the ground is fertile enough itself. We just plant our seed and rely on God to do the rest. He has never gone back on us."

Was not that a fatuous policy, and is not that exactly the same policy we have all followed here?

How many of us have a knowledge of soil chemistry that is really worth anything?

How many of us have a knowledge of horticulture, plant pathology, entomology, or any other of the sciences that are vital to us in the problems pertaining to date culture?

Have we not just been shooting at random into the air, trusting that we might hit some method, some day, that would prove to be a cure-all and bring us great success and prosperity? I think so.

Has any single one of you, in the past, received any practical assistance from any government or state agency that has really helped you in solving your problems, your problems of date culture or date processing?

For my part, I say, "No."

But why should we have received this assistance in the past?

So far as I am able to find out, there has not been a single year, until this one, in the history of date culture in the United States where any group could truthfully say they represented the majority of date growers, and could go to the federal, or their state government, and ask for assistance or remedial legislation. Faith and Hope were struggling for an existence, but Charity was absent.

Don't for one moment think that we shall ever be able to make a strong plea for pest control, or for protective legislation, from either federal or state government until we do get together in an organization that will represent at least 80% or 90% of the date industry of this country. We have come to the point where we must stand on our own two feet, and co-operate among ourselves in growing, processing, and marketing dates, if we ever desire to have co-operation from federal and state governments.

There would be a great deal of humor in the situation, as it exists here at the present time, were it not for the sweat and blood that many

of you have had to endure. I am minded of two wise quotations that seem very apt:—"God helps those who help themselves," and "May the Devil take the hindmost." So I say to you, "Put your shoulder to the wheel and co-operate."

I believe the time is not far distant when you men, engaged in date culture, will sit down together in a faithful, hopeful, charitable frame of mind to discuss your mutual problems, and eat dates without rancor. "Co-operation" will be the watchword, and "Quality" the slogan.

A great contest will soon be staged between a big fellow named "Increased Production" and a miserable little fellow named "Parlatoria."

It will be a fight to the finish.

Should "Parlatoria" win there will be nothing left of "Increased Production."

But I have great Faith and Hope and—Charity, for "Increased Production," provided we co-operate.

Federal forces and state reserves are rushing to the battle front. Big guns, liquid fire, and all the hell of modern chemical warfare will be utilized, if necessary, to exterminate the Little Fellow. He will be made to feel that his existence on earth will be far harder than the temperature ascribed to Yuma and that, after all, the nether regions may be a more fertile field and a far more comfortable place for him to carry on his nefarious work of propagation and extermination, than here.

During this fight, and after the fight is over, what are you going to do—co-operate, police the battlefield, and join in the constructive work? Are you going to be men, and shoulder your own burdens?

I call to your attention an old military axiom, "Disseis of your forces in the face of an intelligent enemy, means defeat."

Remember also that "In Union there is Strength."

If by any chance this paper should prove to be of any value to you, in helping you make up your minds as to what you shall do, then I shall feel happy.

In closing I recommend that you read the whole of Chapter 13, St. Paul's Epistle to Corinthians, because of the sound wisdom contained therein, and burn into your minds the 13th verse:—"And now abideth Faith, Hope and Charity, these three; but the greatest of these is Charity."