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An Assessment of Knowledge Level of Date Palm (*Phoenix dactylifera L*) Farmers in Dutse Local Government Area of Jigawa State, Nigeria

Sanusi Mohammed Kabiru[1,*], Omokhudu Collins Abiodun[1], Bello Oladele Gafaru[2], Yahaya Sadiq Abdulrahman[1]

[1]Nigerian Institute for Oil Palm Research (NIFOR), Date Palm Sub-Station P.O.BOX. 13, Dutse, Jigawa State, Nigeria
[2]Department of Agricultural Economics and Extension, Federal University of Dutse, Jigawa State, Nigeria
*Corresponding author: sanusimk2004@gmail.com

Abstract Despite the comparative advantages that Nigeria has in the production of Date palm, the production is still low. It is on this backdrop, that an assessment of the knowledge level of date palm farmers in the country particularly Dutse Local Government Area of Jigawa State, Nigeria was embarked on to know their knowledge level in order to develop an appropriate technology for the date palm industry in the country that will bring about increase in production. Multi-stage sampling techniques were used to select one hundred fifteen respondents for the study. The study revealed that Date palm farmers in the study area were in the age bracket of between 41-50 years with a mean of 53.1. All the farmers (100.0%) were male and were of the Islamic faith. The average household size is 10 person/ household. Many of the farmers (52.2%) had no formal education and had put up between 1-20 years of farming. The sources of knowledge on date palm practices were from friends and relatives and they fell into the moderate category of knowledge level of 14.3-18.8.The test of relationship shows that education (X^2=22.313; $p<0.05$) and farm size ($r=0.223$; $p<0.05$) are significant with the knowledge level. Research should be emphasized in the area of processing and value addition on the fruits to stimulate production. The extension system in the date palm growing areas should be strengthened to include date palm component in their mandate and the farmers' group meetings should be used to disseminate date palm technology.

Keywords: *date palm, knowledge level, assessment, value addition, production, date palm technology*

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1. Introduction

In order to get a vivid understanding of this topic, it will be proper to discuss some of the words that made up the subject matter. Assessment is the process of making a judgment or forming an opinion, after considering something or someone carefully [26]. It is the process of identifying, gathering and interpreting information about someone. [27]. Assessment is usually in a measurable terms like knowledge, skills, attitudes and beliefs. Knowledge is "the facts, feelings or experiences known by a person or group of people" [9]. It includes familiarity, awareness and understanding gained through experience or study, and results from making comparisons, identifying consequences, and making connections. In organisational terms, knowledge is generally thought of as being "know how", "applied information", "information with judgement" or "the capacity for effective action" [18].

An individual farmer's knowledge is made up of the understandings that inform his or her practice, helping the farmer to solve problems and make decisions. As it is accumulated, this professional knowledge becomes part of his or her "knowledge base" for practice. It is important to note that Knowledge is not static, it grows and evolves as those who create and use it search through new information to identify what is useful. [12]

Assessment therefore, helps the trainers or extension agents to determine what the farmers know or can do. Through this process, the knowledge level of the farmers or what the local people called the indigenous knowledge can be determined. Indigenous knowledge refers to what indigenous people know and do, and what they have known and done for generations, practices that evolved through trial and error and proved flexible enough to cope with change [17]. Indigenous knowledge can be described as knowledge which has been accumulated by a people over generations by observation, experimentation, and by handing on old people's experience and wisdom in any particular area of human endeavour [19].

Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with people's cultural values. Indigenous knowledge is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, to provide for shelter or to achieve control of their own

lives. Indigenous knowledge is part of the lives of the rural poor; their livelihood depends almost entirely on specific skills and knowledge essential for their survival. Indigenous knowledge can be preserved, transferred, or adopted and adapted elsewhere [13].

The indigenous knowledge or knowledge level is very important in the agricultural knowledge system since it is the basis through which appropriate technology can be generated by research institutes that will suit the people socially, culturally, economically and environmentally friendly. These knowledge can be used to produce simple, cheap, traditional technology that produced immediate results and could be integrated into existing cropping systems, as well as can be replicated using local labour.

Date palm (*Phoenix dactylifera* L.) is one of the oldest cultivated crops grown in the desert and semi-desert area, extending from North- West Africa and Asia principally between 15°N and 30°N. Date palm is a multi-purpose tree, being highly regarded as a national heritage in many countries. It provides food, shelter, timber products and all parts of the palm can be used. Dates are produced in hot arid regions of the world and marketed worldwide as a high value confectionery. This tree is believed to have originated in Africa or Asia [24]. The tree can usually withstand hot temperatures and generally does not wither when placed in direct sunlight. The skin of this fruit is typically very thick and wrinkled with a shiny appearance to it. Dates usually have a very sweet taste when eaten fresh. Even so, they are often dried as a method of preserving and for snacking. They are common ingredients in many Middle Eastern dishes and might also be used in making dessert [10].

In the Northern part of Nigeria, the fruits are used as high energy food. The fruits are also used in confectioneries, syrup, and baker's yeast production. The leaves are used for making bags, baskets, beds calf muzzles, hats, while the trunk are used as buoyancy blocks for boats, windows and door frames and ladders. Because of the economic importance of the product of date palm to the people of the date growing region of the country in particular and the country in general, Nigerian Institute For Oil palm Research (NIFOR) was given the mandate in 1964 to carry out research and development work on the date palm and all other palms of economic importance in the country in addition to Oil palm. Date palm is grown extensively in the arid region of the Northern parts of the country from latitude 10°N in the Sudan savanna to the Sahel regions. The major limitation in Nigeria to date palm cultivation and exploitation is rainfall duration as date palm produce good quality fruits only in areas where there is little or no rainfall during the flowering and fruiting seasons [21].

1.1. Problem Statement

The Date palm has been in cultivation for over 400 years in Nigeria, however, no information is available on the production capacity as well as its cost and returns structure in the country [14]. This is due to the facts that annual date production statistics in the country remain unknown and has made Nigeria unrecognized among the date producers in the international market. The date palm industry has not been able to fully perform its expected role in Nigeria economy which includes supplying raw materials to the industrial sector, providing employment, generating foreign exchange and ensuring food security as well as economic growth of the nation. The Nigeria Date industry has the potential of exporting date fruits and it by- products to the international market but Nigeria is more of a consumer and importer of date fruits and the non-availability of plantations and production data level hinders the country from becoming one of the top exporters of date products and earning foreign exchange. So far Nigerian Institute for Oil Palm Research have carried out studies on annual date production level in some states in the country, which will provide information for research planning, growth and development of the industry [10].

The statistics of annual Dates production in the country from the studied states deduce so far is over 21,000 MT from the available data. This figure is insignificant compared to local demand in the country. As a result, the nation resort to Dates import to meet local demand [1]. This is a clear indication that date palm production in the country is low. The low Date palm production in Nigeria can also be attributed to lack of information on indigenous knowledge or knowledge level existing in the date palm growing area of the country. If this information were available, it would form basis for planning for date production in the country by the policy makers.

It was observed by [2] that despite the fact that Nigerian rural communities (which produce the greatest amount of food for the country and excess for export) have produced their own food, made their own farm implements, and conducted their own farming activities, the role of indigenous knowledge (IK) used has not been appreciated. [16] claims that rural people to which all research development efforts are directed have their own body of knowledge that enables them arrive at decisions which would better their lots. [8] had warned "to ignore rural people's knowledge, otherwise known as indigenous knowledge, which respects the expertise of indigenous people has come to be regarded as a major contribution to development thinking [22]. Researchers have observed that indigenous agricultural practices are cost-effective and pose less production risks and environmental degradation [6].

Similarly, the indigenous knowledge or knowledge level will enable the researchers to know what is on ground or bench mark and to know new areas of research or technology to embark on in order to generate new knowledge for onward transmission to the farmers to bring about the desired result of increase in productivity. Much as local knowledge is invaluable for advancing scientific knowledge and vice versa, caution is given against over estimating the role of indigenous knowledge in developmental activities. It is important to encourage proper integration of all knowledge systems in creating new paradigms for sustainable development in Nigeria [3]. Therefore, it is on this background that the assessment of the knowledge level of date palm farmers in Dutse Local Government Area of Jigawa State will be based in order to integrate them and generate appropriate technology for the Date palm industry to ensure sustainable development of Nigeria.

The general objective of the study is to assess the knowledge level of Date palm farmers in Dutse Local

Government Area of Jigawa State, Nigeria. The specific Objective are;

(1) To determine the personal characteristics of the respondents,

(2) To determine the Knowledge level of the Date palm farmers in Dutse L.G.A,

(3) To determine the respondents' farm characteristics,

(4) To determine their sources of knowledge on Date palm practices.

1.2. Hypotheses of the Study

Ho1: there is no significant relationship between the personal characteristics of the respondents and their knowledge level.

Ho2: there is no significant relationship between the farm characteristics of respondents and their knowledge level.

Ho3: there is no significant relationship between the sources of information used by the Date palm farmers and their knowledge level.

2. Methodology

2.1. Study Area

Dutse L.G.A. is one of the L.G.A. in Jigawa State of Nigeria. It is located between latitudes 11^0.42"N and 11^0.04"N and between longitudes 9^0 20"E and 9^0 31"E. The local government area is bounded in the North by Taura L.G.A, in the South Birnin Kudu L.G.A, and East Kiyawa L.G.A all of Jigawa state and in the west by Kano state. It has a population estimated figure of 17,697 (NPC 2007)[25]. The major languages spoken in the local government area are Hausa, Fulfude and Banawa. The people of the Local Government are predominantly Muslims. The major occupation of the people in the L.G.A is farming. Some of the crops grown in the L.G.A are maize, millets, beans, sorghum, rice, groundnuts, cotton, sesame, and the tree crops are Date palm, cashew, citrus, mangoes and Guava [15]. NIFOR Date palm Sub-station is located in Dutse town which double as the headquarters of the local Government.

2.2. Sampling Procedure and Sample Size

The population of study comprises all the Date palm farmers in Dutse local Government area of Jigawa State. Multi – stage sampling techniques was used to select the respondents for the study, to get a true representative of the population. There were fifty two (52) date palm farmers who were registered by the Jigawa State Agricultural and Rural development Agency (JARDA). 90% of these registered Date palm farmers were randomly selected numbering forty – seven (47) respondents. Another sixty - eight (68) respondents were also selected using the snowball sampling techniques to arrive at the total number of One hundred and fifteen (115) Date palm farmers representing the sample size.

2.3. Data Collection

The instrument used for data collection was a pre-tested structured interview schedule guide. This was used to collect information on the various aspects relating to the research objectives. The data collected was subjected to both descriptive and inferential statistics. The descriptive statistics used were frequency counts, means, and percentages while inferential statistics such as chi squares (χ^2) test and Spearman rho test of significant of relationship between some selected independent variables and dependent variables were used as well.

3. Results and Discussion

Table 1, shows that 39.1% of the respondents were between 41-50 years and 23.5% were between 50-60 years. The modal class for the age distribution is 41-50 years of age. The figures reveal that the larger proportions of 53.0% of the respondents are between 31 and 50 years, representing the middle age group constitutes the bulk of the date palm farmers. Table 1 also shows that all the respondents (100.0%) in the study area were male. The reason could be that male farmers have easy access to land than their female counterparts. [20].

With regards to religion, Table 1 reveals that all the respondents (100.0%) in the study area were of Islamic faith. In Nigeria, the Muslims use the date palm to breakfast. Table 1 also reveals that 99.1% of the respondents were married while 0.9 percent were widower. This finding agrees with [23] who reported similar higher percentage value of 100% for married respondents in a similar geographical location of Northern Nigeria. [11] also noted that marriage was perceived as a very essential factor facilitating household farming and processing activities in an area.

Table 1. Personal characteristics

Farmers age group	Frequency	Percentage
Up to 30	2	1.7
31 – 40	16	13.9
41 – 50	45	39.1
51 – 60	27	23.5
61 – 70	17	14.8
71 – 80	8	7.0
Sex		
Male	115	100
Religion		
Islam	115	100
Marital status		
Married	114	99.1
Widower	1	.9
Number of wives		
One	42	36.5
Two	56	48.7
Above 2	17	14.8
Family size		
0 – 5	15	13.0
6 – 10	41	35.7
11 -15	45	39.1
>15	14	12.2
Education status		
No formal education	68	59.1
Primary education	31	27.0
Secondary education	9	7.8
Tertiary education	7	6.1
	115	100

Source: Field survey 2012.

Table 1 show that about 63.5% of the respondents have more than one wife which is a predominant feature in the study area. The number of wives that a respondent have is another important variable in rural areas because it shows individual's social status in that society and also contributes to the number of family labour for increase in productivity. The results in Table 1 show that 39.1% of farm households had 11-15 members followed by 35.7% for households of 6-10. The average household size of the farmers in the study area is 10 person/ household. This large household size shows the real African tradition that allows for other member of the extended family to stay with them.

Table 1 show that the respondents with no formal education were in the majority with 59.1%, while others with formal education of primary, secondary and tertiary were 27.0%, 7.8% and 6.1% respectively. This could be attributed to the fact that in the study area many people acquire Quranic education to formal education. Education in which ever form is essential for any knowledge to be learnt, acquired and possibly the utilization.

From Table 2, the study shows that majority of the respondents representing 95.7% in the study area have a farm size of less than 4 hectare while 4.3% of them cultivate 5 hectares and above it agrees with [4] that noted that palm farmers cultivate less than 4 hectares of land (93.4). The farm size affects the ability to seek for knowledge. Table 2 also shows that majority 94% of the farmers have less than 40 date palm trees while 6% have more than 40 date palm trees per farmer. This indicated that date palm production in the country is low.

The finding from Table 2 also shows that majority of the respondents representing 69.6% have farming experience of 11 years and above. The result is in agreement with [4], who reported 68.9% of respondents in the same range of years of farming experience. The number of years a farmer had spent in the farming business could give an indication of the practical knowledge which he has acquired. [7].

Table 2, shows that the respondents that used family labour are 63.5%, hired labour are 12.2% while those that used both hired and family labours are 24.3%. This high number of family labour utilization can be attributed to the large household size as well as small farm size. The result from Table 2 also shows that 52.2% of the respondents owned their land, 36.5% of them inherited their land, 10.4% hired their land and 0.9% is community owned. This shows that 88.7% of the lands in the study area are under the absolute control of the owner hence new knowledge are learnt and these innovations can be tried in their farms. Land ownership is a very important variable for the production of tree crops like date palm because a farmer cannot plant a tree crop on a land which he hired or do not have control of.

The results from Table 2, further revealed that majority of Date palm farmers in the study area use their personal savings (82.6%) to finance the operations in their farms. While 9.6% of the respondents source for money from friends and relatives, 0.9% from commercial banks and 2.6% from cooperative society, This account for the low production level of date palm in the country because the farmers are not getting assistance from Government and the commercial banks in term of credit to increase their farm size and buy inputs. Date palm production requires lot of finance to acquire large land for plantation and inputs to increase productivity.

The result from Table 2 shows that 91.3% of the respondents are producing between 0 – 2 tonnes and 7.0% are producing between 3 – 4 tonnes. This result shows that Date palm production in the study area is low since majority of the farmer produced less than 2 tonnes per annual. This shows the level of production of Date palm in the country to be low.

Table 2. Farm characteristics

Farm size	Frequency	Percentage
Less than 2ha	64	55.7
2 – 4 ha	46	40.0
5 – 7 ha	5	4.3
Total number of palm trees		
1-20	65	56.5
21-40	43	37.4
41-60	2	1.7
Above 60	5	4.3
Years of farming		
1-5 years	18	15.6
6 – 10 years	17	14.8
11 – 15 years	14	12.2
16 – 20 years	34	29.6
Above 20 years	32	27.8
Source of labour		
Family	73	63.5
Hired	14	12.2
Both	28	24.3
Land Ownership		
Lease	12	10.4
Inherited	42	36.5
Owned	60	52.2
Community owned	1	0.9
Source of finance		
Commercial bank	1	0.9
Cooperative society	3	2.6
Money lenders	5	4.3
Relatives	11	9.6
Personal	95	82.6
Output or yield/annual		
0 – 2 tons (Low)	105	91.3
3 – 4 tons (Moderate)	8	7.0
5 – 6 tons (high)	2	1.7
Total	115	100

Source: Field survey 2012.

The sources of knowledge on any Agricultural practice are characterized by its credibility, reliability and accessibility which in turns affects individual's level of acceptance and utilization. So the source of knowledge on date palm production practices is very important variable in the study of assessment of date palm knowledge level. Table 3 shows that 73% of the respondents made the most use of friends and relatives as a major source of obtaining information on date palm practices followed by extension agents 66.1%, radio 50.4% and television 2.6%.While training, extension bulletins by NIFOR, newspapers and visit to NIFOR were not used. The result disagrees with the conventional order of radio, extension agents, television and friends/relatives as sources of information on improve practices. It is an indicated that date palm is not getting enough publicity in the study area. The study shows the important of social network in the rural area and established that the best way to disseminate date palm

technologies in the study area is through organizing farmers' group meeting where such knowledge will be passed, which will then trickle down among friends and relatives. This flow of information is enhanced by the strong tie that existed in the rural areas. The method could prove a better means of disseminating information when looking at the inadequacy of extension service to cover all villages or even everybody in the village and the cost of sponsoring a radio programme which may be very expensive.

Table 3. Sources of knowledge on data palm practices

	Frequency	Percentage
Radio	57	50.4
Television	3	2.6
Extension agents	76	66.1
Agric. Show	9	7.8
Trade fairs	23	20.0
Friends/relations	84	73.0
Contact farmers	4	3.5
Farmers group	5	4.3
Total	351	

*Multiple responses. Source: Field survey 2012.

The test of knowledge from Table 4 shows that more of the respondents in the study area falls into the moderate score category 60% while 20.9% falls into the high score category and 19.1% falls into the low score category. This result shows moderate to high knowledge level 80.9% in the study area. This could be attributed to the passion and love that the respondents have for date palm. So they tend to seek for knowledge to improve their date palm practices, hence the moderate to high score obtained by the farmers. Though it may not be true always as reported by [5] who said that most farmers' knowledge tend to be low due to their lower status. The trend observed in the study area can also be attributed to the fact that date palm is a kind of household thing that everybody in the study area knows most of the basic and traditional knowledge about Date palm production. However, there was limited knowledge on the post-harvest handling methods such as processing and forms which the fruits can be converted.

Table 4. Test of knowledge

	Frequency	Percentages	Score range
Low	22	19.1	11-14.2
Moderate	69	60.0	14.3-18.8
High	24	20.9	18.9-21.0
Total	115	100.0	

Source: field survey 2012.

Hypothesis 1: There is no significant relationship between the selected respondents' personal characteristics with the knowledge level. Table 5 shows the chi square test (x^2) of the relationship between selected personal characteristics with knowledge level, only the educational status was significant with the knowledge level. The educational status has a positive relationship with the knowledge level. The higher the educational level attained, the higher the knowledge level. This is so because a person with higher educational qualification has many sources of information hence the higher knowledge level attained. He/she can search for knowledge through many means like papers, journals, textbooks, internet and other print media. The fact that the other personal characteristics have no significant relationship with the knowledge level shows that the study area is a closed system where there is no inflow of knowledge on date palm practices. It probably means that there was no date palm component in the extension service of the area or the extension service is not working well in the direction of date palm.

Table 5. Chi- square test (x^2) between demographic characteristics and knowledge level

Demographic characteristics	x^2 - value	df	p - value	Remarks
Educational status	22.313	6	0.001	Significant

S – Significant, $p \leq 0.05$.

Hypothesis 2: There is no significant relationship between selected farm characteristics with knowledge level. Table 6 shows the spearman rho correlation of selected enterprise characteristics with the knowledge level, only the farm size was significant with the knowledge level. Farm size has positive relationship with the knowledge level. This is so because the larger the farm size, the more the farmer will seek for knowledge on date palm practices, hence the higher knowledge level the farmer will attained. The reason why other farm characteristics were insignificant could be because there was no assistance from Government and commercial banks in term of finance to help the farmers to acquire farm inputs thereby creating the impetus needed to seek for knowledge on how to improve their practices on date palm production.

Table 6. Spearman rho correlation between farm characteristics and knowledge level

Farm characteristics	r - value	p – value	Remarks
Farm size	0.223	0.017	Significant

S – Significant $p \leq 0.05$.

Hypothesis 3: There is no significant relationship between the sources of knowledge on date palm and the knowledge level. Table 7 shows the spearman rho correlation between sources of knowledge and knowledge level. The table revealed that there was no significant relationship between the sources of knowledge on date palm and the knowledge level. This is so because the main sources of knowledge on date palm practices in the study area is through relatives and friends. So there can never be any defined direction of flow. The people in the study area are doing things the same way over a long period of time.

Table 7. Spearman rho correlation between sources of knowledge and knowledge level

	r – value	P - value	Remarks
Sources of knowledge	-0.92	0.327	Not significant

S – Significant $p \leq 0.05$.

4. Conclusion and Recommendation

The major finding of the study is that the date palm farmers fall into the category of moderate knowledge level. The farmers show lot of skills in the area of nursery and plantation maintenance but lack knowledge in the area of post-harvest handling and processing techniques. This leads to loss of tonnes of date palm fruits every year during the peak of the season. Research in the area of value addition and processing of date palm fruits should be prioritized and disseminated to the farmers to serve as a kind of boost for date palm production in Nigeria. This will help to reduce the losses and increase their income,

thereby stimulating the increase in production in the study area and date palm growing areas of the country.

The source of knowledge on date palm practices is got from friends and relatives which mean that there is no inflow of knowledge from the research institutes and the universities into the system. The use of farmers' group meeting should be used to disseminate Date palm technology. The extension system in the study area and date palm growing area of the country must be strengthened through better collaboration between the research institutions and the extension agencies and incorporation of date palm component into the mandate crops of the extension system.

The level of education in the study area is low. Effort should be made to sensitize the people in the study area to go to school. This is so because of the positive correlation of education and knowledge level. The higher one's educational status, the better he/she's ability to search for information, sieves it and acquires more knowledge for his/her personal use and the betterment of the society where he/she lives. Enlightenment campaign on date palm production should also be carried out particularly in the study area to create awareness of date palm production and its economic potentials.

The financing of date palm activities in the study area is solely done by the farmers. This is a serious issue that needs to be addressed. Date palm plantation establishment involves lot of capital to achieve. Lot of money is needed to sink a borehole, to buy large acreages of land, buy improved seedlings, acquired enough labour to work on the farm, buying of pesticides and fertilizers or farmyard manure. Government and commercial banks should initiate programmes that will give out loans and other forms of assistant to the farmers who want to establish date palm plantation. Governments in the date palm growing areas should establish tree crop commission that will cater for tree crops that have economic importance like date palm, Gum Arabic, Citrus, mango etc.

Lastly, if there is any means by which date palm production in Nigeria can be improved, we need to work on the passionate socio-cultural attachment of the people to date palm trees. The psychology of the people in the date palm growing areas can be worked on in term of encouraging them to go into date palm plantation in order to bring about increase in production and sustainable development in the study area in particular and Nigeria in general.

Some Indigenous knowledge on date palm discovered during the study are:

Date palm in the study area is regarded as a heritage crop. Lot of values is attached to date palm tree. For instance, a date palm tree that is found on a piece of land sold to someone is still regarded as being owed by the former owner who sold the land to the present owner. Similarly, this value is still been held till today in Jigawa State. Date palm tree is seen in almost all the logos that are associated with the state. It is a common sight to see it on the state, Local Government Area and Emirate logos. Secondary and primary school badges, the state owed polytechnic and University including the newly established Federal university Dutse has Date palm tree on their logos.

The issue of nursery practices may not be common in the study area, but from the study there is knowledge of selection of date palm seeds for planting. It is common in the olden days that the farmers on market days or by any means if they come across any date fruit that possess any desired characteristics that they want, they will eat the fleshy part and retain the seed and bring it home. They will plant it at a place where the seed will receive more water to germinate and continue to take care of it till it start to produce. This is a kind of breeding technique which ensures the planting of seeds that have desirable quality.

The issue of sex identification is a serious issue affecting date palm production in the world. The local people in the study area have devised means of sex identification. For instance, they use date palm woven mat to cover a growing seedling, if the seed penetrate through the mat, it is regarded as a male while if it coils below the mat it is considered a female palm. Similarly, any date palm seedling that coils around its base is regarded as a female. They believed that male date palm seedling is expected to be strong and grow vigorously to penetrate through the mat.

Date palm farmers in the study area are aware of assisted pollination in date palm field maintenance. They harvested male inflorescent flowers, tear them into strands and dry under room temperature. They used these dry strands to pollinate the female date palm flowers. The remaining pollens are preserved for another season. They do pruning and protect their fruits with jute bags to prevent birds from eating the fruit. The fruits are preserved in air tight cartoons to prevent post-harvest pest from infecting them. This helps them to preserve the fruits for a very long time.

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Competing Interests

The Authors have no competing interest.

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