

Harvesting Sap from Date Palm and Palmyra palm in Bangladesh

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ABSTRACT

A study was carried out to identify the different parameters regarding the harvesting of sap from date and palmyra palm trees. Different parameters such as climbing techniques, cutting methods, harvesting and sap collection methods, yield of sap and effect of temperature and humidity on yields were ascertained. Cost comparison for the collection of sap from date and palmyra palm are indicated. Statistical analysis was done to find out the effect of temperature, relative humidity and days of harvest on yield. Date palm tree discharges sap in the winter and palmyra palm tree in the summer.

Additional Index Words: Date palm, Palmyra palm, Sap, Yield, harvesting, cutting, climbing.

INTRODUCTION

Palm is one of the important horticultural crops in many countries (James, 1980 and Kamal, 1969). The most common types of palm tree available in Bangladesh are date palm, palmyra palm and coconut palm. Presently these trees are scatteredly grown all over Bangladesh. In Bangladesh very little attention is paid for the systematic cultivation of palm for better yield. A significant economic return is possible from the cultivation of palm. In Bangladesh wild date palm is grown and it is very popular. The important date palm producing countries are Saudi Arabia, Egypt, West Africa, Algeria, Tunisia, Iran, Iraq, UAE etc. Important varieties are Khodraes, Heloyee, Fard, Deylet, Noor, Zahida, etc (Blatter, 1978). Palm is grown in Jessore, Faridpur, Kustia, Khulna and Rajshahi districts of Bangladesh and palmyra palm is widely grown in the districts nearby the sea-shore and also available all over Bangladesh. Many literatures are available on the harvesting of nut and fruits (Blatter, 1978; Dowson, 1982 and Naik, 1963) but very little information is available on harvesting of sap from palm trees. This study was conducted with the following objectives:

- (i) to identify the existing method of sap harvesting
- (ii) to identify the climbing techniques
- (iii) to find out the effect of meteorological conditions on yield
- (iv) to find out the effect of type of cut on yield
- (v) to find out the economics of harvesting.

MATERIALS AND METHODS

Information collection, interviews with the farmers, information on climbing techniques, harvesting technique, time of harvesting, tool used for harvesting, age of the trees, processing method, cost and income of sap collection and overall yield- a pre exercise was done. This study was carried out at Dinajpur, Khulna, Joydebpur and Mymenmsingh districts. Information on yield was collected from 10 trees at each place. The records of age of trees and yield in different years was obtained from the farmers. Daily discharge of sap was determined by weighing procedure. Bamboo with side branches was used to climb up the palmyra palm trees and in case of date palm side grooves was used to climb the trees. In both cases, the climber used a rope to fasten his body with trees for easy climbing and to avoid accident. Knife and sickle was used to cut the surface of date palm and panicles of palmyra palm tree. Earthen pots (pitcher) were used to collect sap. A thermo-hygrometer was used to measure the temperature and relative humidity at the time of sap collection.

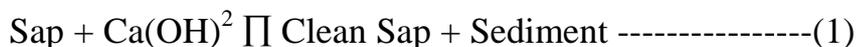
CLIMBING TECHNIQUE

Bamboo with side branches was attached with the palm trees for climbing. Sometimes, the climber used a rope for fastening his legs which helped in easy climbing the trees. This method is mainly used for palmyra palm tree and for date palms, old grooves of leaves are used. In this method harvesting was difficult, laborious and time consuming. Sometimes the climber used spike shoes for easy climbing. Besides, ladder could be used for climbing dwarf trees. Generally, a climber can easily climb date trees by using the steps which were cut in the previous year. Climbing technique is shown in Fig.1.

CUTTING AND SAP COLLECTION

Date palm: Matured date palm trees were selected for collection of sap. After cleaning the tree, a V shaped surface was cut by cutting a thin slice on the head of the stem and a hollow circular bamboo stick was embedded into the lower angular point of the V shaped cut. A clean container (pitcher) was placed under outer end of the bamboo stick. The V shaped cut surface was periodically cleaned by cutting a very thin slice on the V shaped surface to allow sap flow into the earthen pot. Generally, sap was collected from one side of the tree in one year and the following year, sap must be collected from the opposite side of the previous years cut. Sometimes,, one to two years of gap is given for attaining proper growth of the trees. The cutting and collecting method of sap from date palm are shown in fig.2.

Palmyra palm: Collection of sap from a palmyra palm is not done by cutting the surface of the tree. Sap is collected by cutting the panicles grown at the head of the tree. Panicle is an outgrowth found at the apex of the tree. They grow every year between the two leaves. Sap collector cut the outer end of the panicles for collecting sap. The method of cutting the panicle and collection of sap are shown in Fig. 3. Each panicle was 25 cm to 30 cm in length and 2- 2.5 cm in diameter. Sap was collected thrice a day from each panicle. Panicle was cut at its tip with a very sharp sickle or knife. Two to three cuts were done in each day. Each cut was about 0.3 cm of thickness. At the beginning, the panicles were rubbed with bamboo splinter to initiate the flow of sap. The same process was repeated thrice a day. Three to six panicles were tied together and inserted into a suitable container for the collection of sap, the inner surface of the container was wiped with lime water (Ca(OH)_2) to clean and neutralize sap. Clean sap was obtained in the following way at ambient temperature.



This method of sap cleaning was maintained every day. This sap is used for drinking. But for making molasses cleaning with lime water is not done. After each harvesting season, panicles were removed by using sickle or knife to allow new panicles to grow. Therefore, the maintenance and tree training are necessary.

RESULTS AND DISCUSSION

Sap was collected from date palm and palmyra palm trees for about a period of one month. At the beginning of sap collection, the yield of date palm was 6.14 kg/day and the amount increased to 7.42 kg/day after a month of collection. In case of palmyra palm the initial harvest and the final harvest were 5.66 kg/day and 7.32 kg/day, respectively. During the experimentation, sap from the date palm was collected at night and for palmyra palm sap was collected at day and night.

To estimate the effect of number of days of harvest, temperature and relative humidity on yield, the technique of multiple regression was applied taking the yield as dependent variable and the following equations were obtained.

$$Y_1 = 7.05676 + 0.0704D^{***} - 0.156 T_1^{**} - 0.0113H_1^* \text{ ----- (2)}$$

(0.0208) (0.0687) (0.0247)

$$R^2 = 0.637$$

$$Y_2 = 4.6933 + 0.0837D^* + 0.0252 T_2 + 0.0034H_2 \text{ -----(3)}$$

(0.0108) (0.0351) (0.0134)

$$R^2 = 0.92$$

Where, Y_1 = yield of sap from date palm (kg/day)

Y_2 = yield of sap from palmyra palm (kg/day)

T_1 and T_2 = temperature ($^{\circ}$ C)

H_1 and H_2 = relative humidity (%)

R_2 = multiple correlation coefficient

Figures in the parentheses indicate the standard error of estimate.

*** significant at 1% level

* significant at 10% level

From equation (2) it appears that with temperature and humidity remaining constant, the effect of days of harvest is highly significant at 1% level. From equation (2) that both temperature and humidity have negative effect on yield of date palm sap but both are significance at 10% in increasing the yield of sap from palmyra palm trees (equation 3). During

sap collection, the temperature and humidity were 15.5 – 31.1 °C and 72-89%, respectively. The equation indicates that if temperature and humidity are low, the date palm will give high discharge. On the other hand the palmyra palm gives high discharge at high temperature and humidity. So the cultivation of palmyra palm in the UAE region will be more profitable in comparison to South East Asia.

The age of date and palmyra palm trees had influence on the yield of sap. The yield curves were drawn on the basis of the information provided by the palm growers. The result is shown in Fig.4. Both the trees discharged lower yield at the young age and the yield increased with age and then the yield decreased from the age of 35 years for date palm trees and 45 years for the palmyra palm trees. Old palmyra palm tree was very valuable for engineering works like house construction, country boat, irrigation equipment etc. The average yield of sap collected from date and palmyra palm trees in different districts are shown in Fig.5. Normally type I cut was used for date palm trees and palmyra palm trees. The yield per day was not same in different districts due to variation of soil type and condition. The yield figures were collected by actual measurement in those areas. Cost analysis is shown in table 1.

Table 1. Cost comparison of sap harvesting per tree

Type of tree	FC/day (Tk)	VC/day (Tk)	Total cost/day (Tk)	Total income/day (Tk)	Net profit/day (Tk)
Date palm	10	40	50	200	150
Palmyra palm	25	40	65	200	135

* Note, FC, Fixed cost; VC, Variable cost; 1US\$, Tk. 55.00

Effect of types of cut in date palm was studied to ascertain the amount of sap yield. Four trees of the same age, height, diameter were selected for the study. Sap was collected from each cut for ten days. The average yield obtained from each type of cut is shown in Table 2. A comparative higher yield was obtained in Type-I cut than the other three types of cut. Moreover, Type-I cut was easier to make than the other types. Type-I cut was practiced among the palm owners in Bangladesh. In Type-I cut, more surface area could be utilized to collect the sap which in other types it was not possible. In case of palmyra palm, three types of cut were studied to collect sap. The

yield of sap was same for Type-I and Type-I cuts and was higher than the third type cut.

Table 2. Effect of types of cut on yield of sap

Date palm		Palmyra palm	
Type of cut	Average sap yield(kg/day)	Type of cut	Average sap yield (kg/day)
Type I	7.03	Type I	7.10
Type II	6.55	Type II	7.10
Type III	6.23	Type III	6.58
Type IV	5.80	-	-

* note: For Date palm: Type I, ▽; Type II, ∪; Type III, □; Type IV, ○

For Palmyra palm: Type I, = ; Type II, = ; Type III, ⊃

Using the present method, the quality of sap can not be maintained because of pollution from birds, insects etc. Some techniques should be developed to protect the quality of sap and to reduce the energy and cost requirement. Beyond this work, the following tasks are recommended to improve the harvesting technique and to maintain the quality of sap.

- (i) The raising of young tree should be done in the nursery for obtaining optimum structure of the tree for easy access in harvesting. Research on palm tree training should be undertaken.
- (ii) Proper education and training program should be arranged for the cultivation of palm. Proper time of sap collection should be ascertained through research and experience. Satisfactory yield depends on the proper way of cutting and maintenance of the tree.
- (iii) A long plastic pipe having arrangements of receiving sap may be used to reduce the energy requirement and to avoid natural pollution of sap.
- (iv) Self propelled hydraulic lift or belt pulley system may be developed for efficient collection of sap and cutting trees and to avoid accident during climbing.

- (v) Netting system can be used to protect sap from birds, ants and other insects etc.
- (vi) Improve spray technology should be used to protect fruits and sap from pest and diseases.

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