

# EARLY RIPENING OF DATES USING ETHREL

Sulafa Khalid Musa

Food Research Centre, PO. Box 213 Khartoum North, Sudan

## ABSTRACT

Dates (*Phoenix dactylifera*) is grown predominately in northern parts of the Sudan where rainfall is scarce. In the last ten years due to flooding of the Nile many trees were destroyed. Hence it was deemed necessary to grow it in other areas such as Khartoum. In Khartoum the rainfall starts at the middle of July and peaks in the middle of August till end October. Early ripening is a necessity to avoid rotting and fermentation. Use of ethrel (2-chloroethylphosphonic acid) by two methods was tried at the beginning of June (when the fruits starts to change color) and two weeks later. The first method by making a small pit on the peduncle and injecting into it 2ml of ethrel (480g/l) then cover it with cellotape. The other method by spraying by 1000ppm ethrel. There was significant increase in fruit ripening especially by the first method. However, the ripening did not exceed 70% in Mishrigi Wadlagi cultivar by mid august. On the other hand, Mishrigi Wad Khatib ripening percentage could exceed 90% by beginning of August i.e. before the heavy rains starts. Hence, It is recommended that Mishrigi Wad Khatib should be grown in Khartoum area since it ripens earlier and applying ethrel by the pit method.

## INTRODUCTION

Dates (*Phoenix dactylifera*) is grown predominately in northern parts of the Sudan where rainfall is scarce. In the last ten years due to flooding of the Nile many trees were destroyed. Hence it was deemed necessary to grow it in other areas such as Khartoum. In Khartoum the rainfall starts at the middle of July and peaks in the middle of August till end October. Hence early ripening is a necessity to avoid rotting and fermentation .As a mean to hasten ripening before the peak of rainfall ethrel (2-chloroethylphosphonic acid) was tried. It is widely used as preharvest spray for hastening and even ripening of a wide fruits range such as tomatoes, peppers, table grapes also it has other uses e.g. to increase yield in cucurbits, tomatoes (Abeles *et al* 1992, AttaAly *etal* 1998). Ethrel as postharvest treatment is not yet cleared but some time is used on experimental level .It had been reported that it hasten ripening in dates (Mollud and Ibrahim 1992) Also it was used for thinning of dates fruits

El-Hamady *etal* (1982). Mishrigi wad Lagi and Mishrig wad Khatib are the predominant semi soft dates in Sudan.

During 1998 season ethrel was tested for hastening ripening of Mishrigi wad Lagi dates in form of latex formulation at 10% concentration. It was applied as drops in a pit made in the peduncle. The results showed an increase in the rate of ripening as a result of ethrel use (74.6% 46.9% and 43.2% for ethrel in pit, pit without ethrel and control treatments respectively, Musa 1998). Hence in 1999 the experiment was repeated, but applying ethrel in the pit and as spray twice. Also in 2000 season Mishrigi wad Khatib cultivar which is known to ripen earlier was treated with ethrel to enhance its ripening

## **MATERIALS AND METHODS**

### **1999 season**

Four trees of Mishrigi wad Lagi were chosen randomly in Hag Beshir Farm in Geiref Gharb (suburb of Khartoum). On 15th June when fruits just started to change color and two weeks later The following treatments were applied in 1999 season on five bunches of the four trees:

- 1-Untreaed control
- 2-Making a small pit by a sharp knife about 20 cm away of the peduncles
- 3-Making a pit the same way and injecting into it 2 ml. of ethrel (480g/l a.v.) by a syringe and covering the pit with cellotape
- 4-Spraying with ethrel at concentration of 1000ppm.

After the treatments rings made of palm fronds were put in the middle of the bunch to improve aeration. Then the bunches were bagged in green net bags, (yellow ones were attacked by birds in previous seasons)

### **2000 Season**

Mishrigi wad Khatib were treated first time on 7th June when the fruits started to change color and then two weeks later. Five bunches of similar maturity in four randomly chosen trees were treated as previous season. However one tree ripened earlier than the rest, so it was excluded in the final calculations.

Every week starting beginning of July six peduncles were harvested from each of the five bunches. Each treatment was harvested in different colored polythene bags and the person who was harvesting was

asked to harvest three peduncles from the out side and three from the inside without looking at the bunch. The peduncles of similar treatment in same tree were grouped together. Then the fruits were categorized to green, greenish yellow, yellow and ripe (any degree of softness was considered as ripe). Yellow fruits were left at ambient for two days and any soft fruits were included in the ripe fruits category. Percentage of yellow and ripe fruits was calculated.

### **Cultivars maturity**

On 12th August 2000 to test the cultivars maturity difference in the same season two trees of Mishrigi wad Lagi and two of Mishrigi wad Khatib close to each other and subjected to similar cultural practices were chosen. From each tree four bunches were harvested and their fruits were categorized as above.

### **Total soluble solids**

On 27th July and 3rd of august 2000 total soluble solids Mishrigi wad Khatib was determined using hand refractometer. Yellow part of rutab from thirty fruits of the different treatments in each tree were diced and the average of three reading was taken

### **Experimental Design and Statistical Analysis**

Experiments were of a complete randomized blocks design, they were analyzed for significant statistical differences using LSD test at 5 % level (Little and Hill 1978)

## Results and Discussion

Tables 1&2 indicate that ethrel using the pit method is very effective in hastening ripening, before the peak of raining, in case of Mishrigi wad Khatib. However, in case of Mishrigi wad Lagi ripening was 68.5% at the peak of rainfall. Actually after August, the 12th rotting and fermentation started to set in, between 15-20% of produce was rotted by 23rd of August, The pit method was much easier to conduct since the sprayer used was awkward to handle. The one used was shoulder carried type. It seems, that the spraying could not be done properly. On the other hand, making a pit by sharp knife could be done while other cultural practices are performed i.e. at the stage of lowering of the bunches or at covering them with net bags stage .The other advantage of the pit method is that the chemical is not sprayed directly on the fruits. However, preharvest spraying of the fruits is cleared by Food and Drug Administration (USA) for other fruits

The tree that ripened earlier was treated differently at pollination time, since the inflorescence was wrapped. Khalfan *et al* (1995) recommended this treatment in Arab Emirate State for early ripening of dates.

**Table 1 % Soft fruits of Mishrigi Wad Khatib (W.K.) and Mishrigi Wad Lagi (W.L.)**

Date	20 <sup>th</sup> July		27 <sup>th</sup> July		3 <sup>rd</sup> August		12 <sup>th</sup> August
	M.K.	M.K.	M.L.	M.K.	M.L.	M.L.	
<b>Treatments</b>							
<b>Control</b>	<b>16.1 a</b>	<b>31.2a</b>	<b>7.7a</b>	<b>40.5a</b>	<b>45.4a</b>	<b>59.7a</b>	
<b>Pit</b>	<b>22.6 ab</b>	<b>33.9a</b>	<b>19.3b</b>	<b>54.6b</b>	<b>41.5a</b>	<b>57.1a</b>	
<b>Ethrel sprayed</b>	<b>30.6 b</b>	<b>38.5a</b>	<b>17.9b</b>	<b>50.2b</b>	<b>48.6a</b>	<b>68.5b</b>	
<b>Ethrel in pit</b>	<b>61.9 c</b>	<b>77.3b</b>	<b>15.8b</b>	<b>90.3c</b>	<b>58.4b</b>	<b>66.0b</b>	

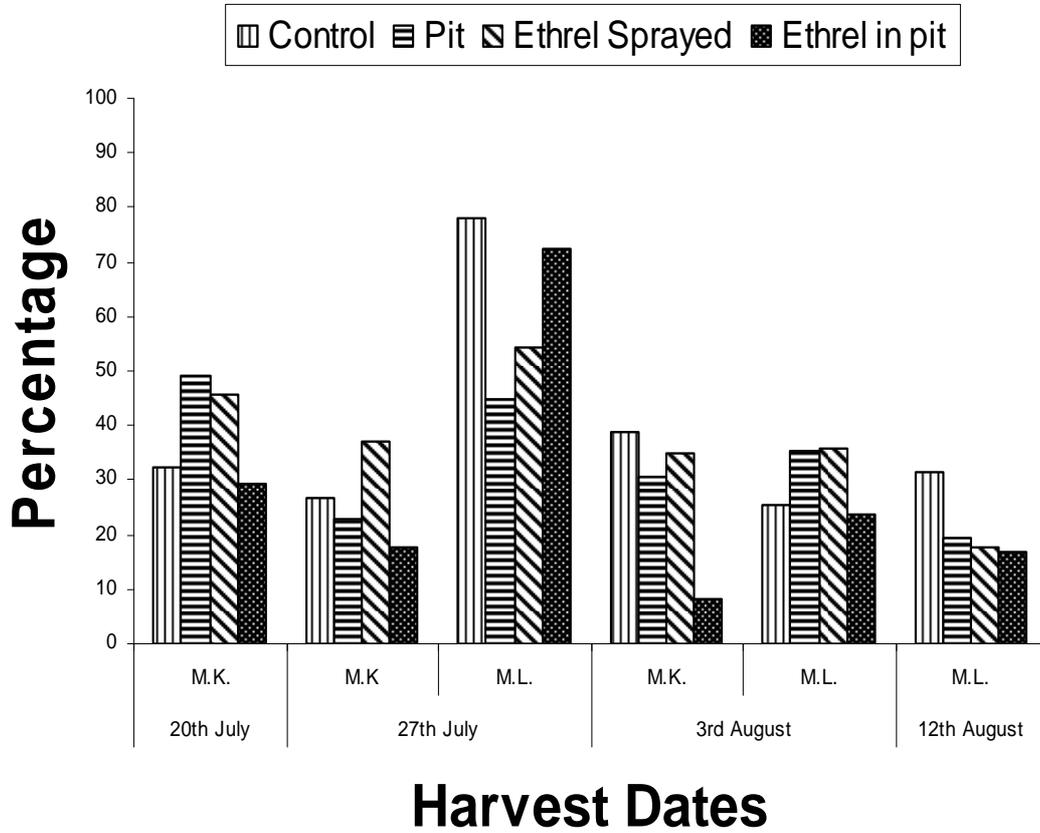
**Means within each column followed by the same letter are not statistically different at the 5% level.**

**Table 2 % Yellow fruits Of Mishrigi Wad Khatib (W.K.) and Mishrigi Wad Lagi (W.L)**

Date	20 <sup>th</sup> July	27 <sup>th</sup> July		3 <sup>rd</sup> August		12 <sup>th</sup> August
	M.K.	M.K.	M.L.	M.K.	M.L.	M.L.
<b>Treatments</b>						
<b>Control</b>	<b>32.3a</b>	<b>26.8a</b>	<b>78.0a</b>	<b>38.9a</b>	<b>25.3a</b>	<b>31.4a</b>
<b>Pit</b>	<b>49.0b</b>	<b>22.7ac</b>	<b>44.8b</b>	<b>30.6a</b>	<b>35.4b</b>	<b>19.5b</b>
<b>Ethrel sprayed</b>	<b>45.9b</b>	<b>36.9a</b>	<b>54.3c</b>	<b>34.8a</b>	<b>35.7b</b>	<b>17.7b</b>
<b>Ethrel in pit</b>	<b>29.1a</b>	<b>17.5c</b>	<b>72.4a</b>	<b>8.0b</b>	<b>23.6a</b>	<b>17.0b</b>

**Means within each column followed by the same letter are not statistically different at the 5% level.**

**Fig. 1: Percentage Of Yellow Fruits at Different Dates for Mishrigi Wad Khatib(MK) and Mishrigi Wad Lagai(ML)**



**Fig. 2: Percentage Of Soft Fruits at Different Dates for Mishrigi Wad Khatib(MK)and Mishrigi Wad Lagai(ML)**

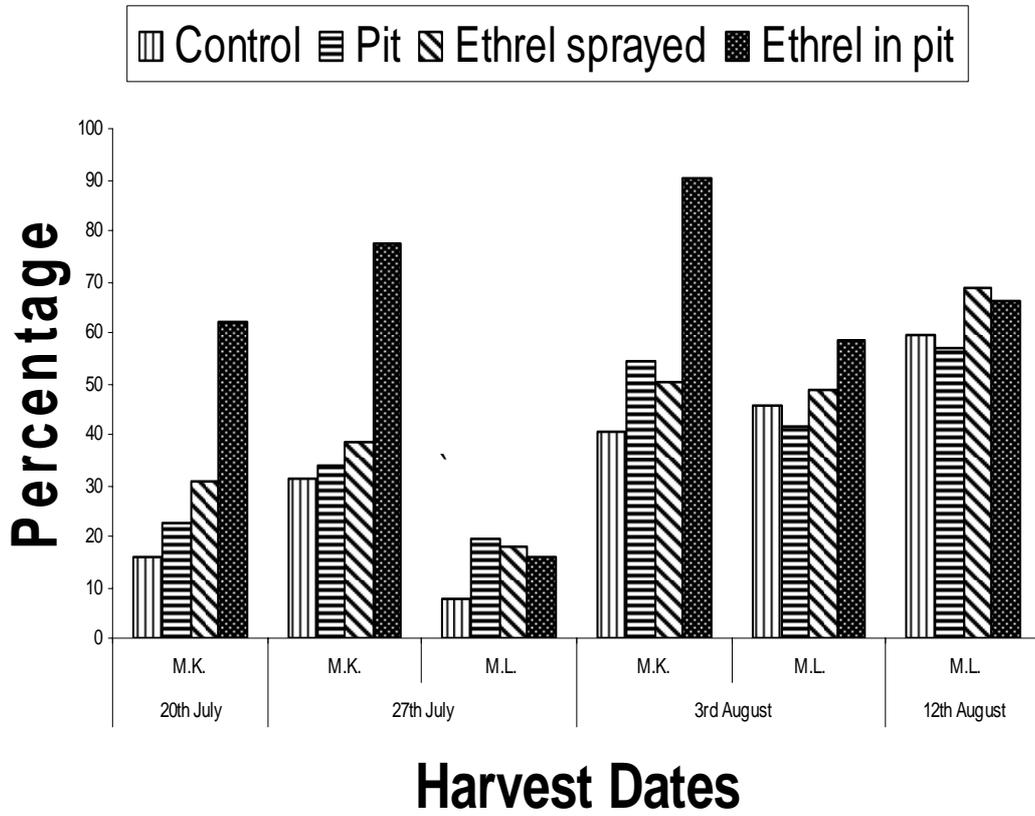


Table 3 indicates there a significant increase in total soluble solids as fruits ripened which expected, as there is more accumulation of sugars with more advanced maturity. However, there is no significant difference between the treatments except the control

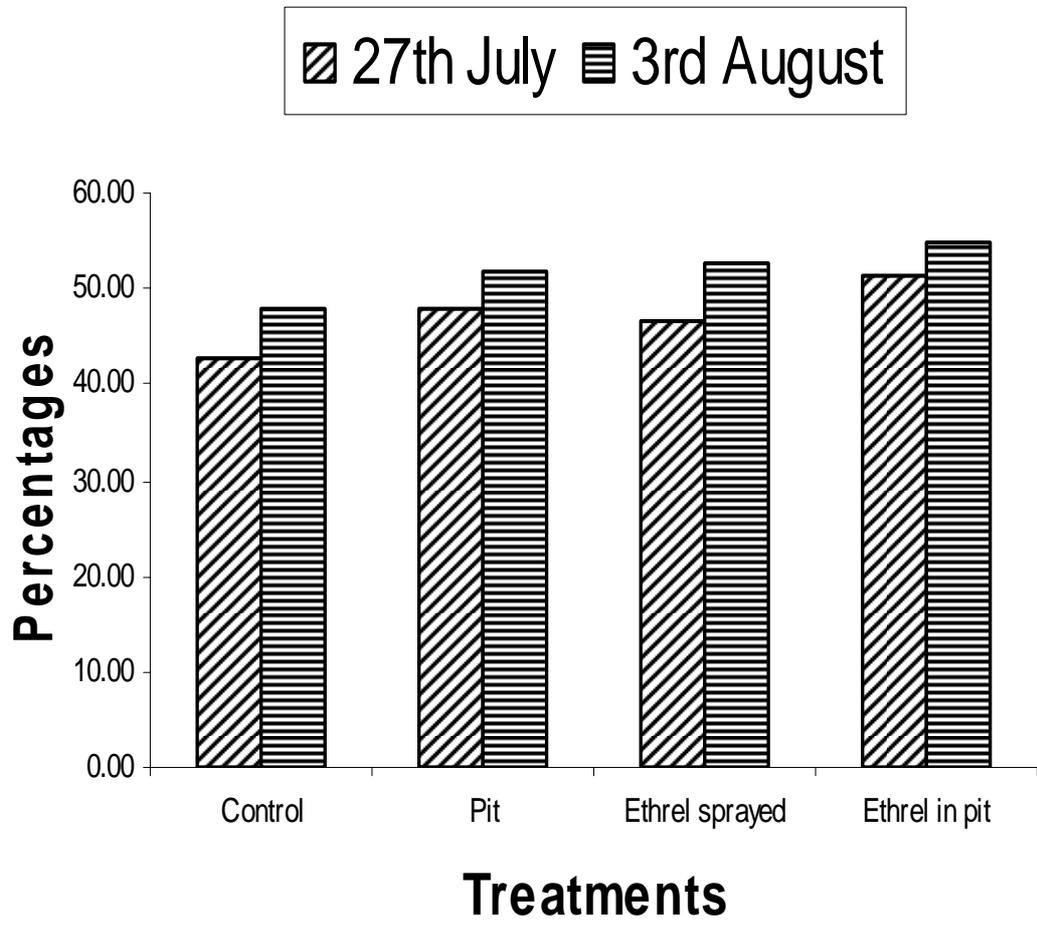
**Table 3 Total soluble solids of Mishrigi Wad Khatib**

<b>Date</b>	<b>27<sup>th</sup> July</b>	<b>3<sup>th</sup> August</b>
<b>Treatments</b>		
<b>Control</b>	<b>42.7a</b>	<b>48.0a</b>
<b>Pit</b>	<b>48.0b</b>	<b>51.7ab</b>
<b>Ethrel sprayed</b>	<b>46.7b</b>	<b>52.7b</b>
<b>Ethrel in pit</b>	<b>51.3b</b>	<b>54.7b</b>
<b>Mean</b>	<b>47.2</b>	<b>51.8</b>

**L.S.D. 5% Date 3.2**

Means within each column followed by the same letter are not statistically different at the 5% level.

Fig. 3: Total soluble solids of Mishrigi Wad Khatib 2000 Season



In comparing the maturity of both cultivars percentage of ripe fruits for Mishrigi wad Lagi was 33.6 % and for Mishrigi wad Khatib was 71.8 %, which was significantly higher on 12th of August 2000 (LSD at 5% was 18.9). This shows clearly that Mishrigi wad Lagi matured later than Mishrigi wad Khatib. Actually this was observed all through the orchard. If a comparison is made between this result and 1999 season; the natural difference of maturity of the same cultivar i.e Mishrigi wad Lagi could be observed. Controls in the treated trees was much advanced in maturity (59.7 % table 1) this could be due to many factors such as seasonal changes and cultural practices.

It is highly recommended to avoid growing Mishrigi wad Lagi in Khartoum area.

Also beside ethrel treatment other cultural practices should be tried such as wrapping of inflorescence and frequency of watering after maturation. Less frequently watered trees ripened earlier and the quality of fruits was better. They could withstand harvesting with minimum damage.

## REFERENCES

- Abeles FB, Morgan PW, Saltveit ME (1992) Ethylene in Plant Biology. Academic Press INC, New York, 2nd Ed.
- Atta-Aly, M.A.; G.S. Riad ; Z. El-S. Lacheene and A.S. El-Beltagy 1998 Early ethrel application extends tomato fruit cell division and increases fruit size and yield with ripening delay. World Conference on Horticultural Research. International Society for Horticultural Science. 17-20 June 1998. Rome, Italy.
- El-Hamady, M.M., A.S. Khalifa and A.M. El-Hammady. 1982 Fruit thinning in date palms with Ethephon. First symposium on the date palm held at King Faisal University, AlHassa, Saudi Arabia.
- Khalfan, M.R.; Shabana, H.A.; Awadalla, M.R., ElHumudi, A.H. and ElSafd W.M 1995
- Date palm in Arab Emirate State. Improvement of date palm project. Arab Organization for Agricultural Development Publication (Arabic)
- Little, T.M, Hills, F.J. (1978) Agricultural Experimentation. John Wiley & Sons Inc.pp31-65
- Moulood, I.A. and Ibrahim T.K 1992. Effect of Ethrel and temperature on storability date palm fruits Zahdi cultivar. Arab Conference for preparation and handling of horticultural products, Amman, Jordan. Arab Organization for Agricultural Development (Arabic)
- Musa,S.K. 1998. Early ripening of dates using ethrel. Technical report of Date palm. Postharvest Physiology Department Food Research Centre.