

LEAF FREE AMINO ACIDS OF SOME MALE  
AND FEMALE DATE PALM TREES

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ABSTRACT

Leaf free amino acids of some date palm males grown at the Central Region of Saudi Arabia were determined. The free amino acids of the leaves of some female cultivars that might be the parent of such males, were also determined.

The total amino acids which were identified in the leaves ranged from 10-17 according to the cultivar and the male. Five amino acids were found to be common in the leaves of both males and females namely; aspartic, glutamic, cystine, arginine and histidine. Glutamic acid was dominant and was present in higher concentrations as compared with other amino acids. The total concentrations of the free amino acids also differed according to the cultivar in both males and females palm tree.

INTRODUCTION

The date palm (*Phoenix dactylifera*, L.) is a dioecious plant. The sex of the plants raised from seeds, cannot be identified, until first flowering when the plants are five to

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seven-years-old (Torres and Tisserat, 1980). Studies on the differences between the amino acids contents of the leaves in most dioecious plants are very rare. This holds true for date palm. In some plant species, determination of the amino acids contents of the leaves, could be used to differentiate between plant species and also between males and females of many plants. In this respect, Dzaparidze and Mikeladze (1969) investigated the amino acids contents of 10 different species of dioecious plants. They found that there were 17 free amino acids in the leaves of both male and female plants. The same amino acids were identified in both forms of each species. The total amino acids contents varies greatly with the species and sex of the plants. In 5 of these species, including pistachio, hop and *Dioscorea*, the leaves of the male plants contained higher total free amino acids; whereas in the other 5 species including persimmon, those of the female plants gave the highest contents.

On the other hand, several investigators studied the amino acids content of the fruits including date palm such as Al-Rawi *et al.* (1967), Salem and Hegazi (1971), Hussein and El-Zeid (1975), and Abdel Hafiz *et al.* (1980).

The aim of the present study, is to investigate the free amino acids content of the leaves of some female cultivars of date palm together with their satellite males, in order to find out if there is a similarity between the leaf amino acids of both females and their satellite males.

#### MATERIAL AND METHODS

This investigation was carried out at the College of Agriculture, King Saud University in 1984.

Seven mature seedling date palm males grown in the Central Region of Saudi Arabia were used. Five similar vigour and disease-free trees were selected from each cultivar. Four leaves, about one year old, were detached from around each tree in October. Similar leaf samples were also taken from the female cultivars grown together with the selected males. These female trees might be the parent of such seedling males since they are similar in some morphological characteristics of the leaves (Shaheen *et al.* 1986).

### Leaf amino acids of date trees.

Each leaf sample consisted of 40 pinnae (10 pinnae from each leaf), taken from the middle part of the leaves. Leaf samples were washed several times with tap water, then with distilled water, oven dried at 70 °C and then ground for amino acid determination (A.O.A.C., 1980).

Composite samples were used in the determination. Five gms of each ground composite sample were treated with 30 ml of 3.5 % 5-sulphosalicylic acid solution. The samples were homogenized and centrifuged for 5 minutes at 3000 rpm. The free amino acids were then determined in the supernatant liquid by using Amino Acid Analyzer (Beckman, 118 CL). The concentrations of the free amino acids were calculated as mg per 100 gm of the leaves on dry weight basis (A.O.A.C. 1980).

### RESULTS AND DISCUSSION

The results of the present investigation showed that 10-17 free amino acids were detected and identified in the leaves of the studied date palm males. Whereas, 9-16 free amino acids were identified in the leaves of the females (Tables 1 to 7).

Date also indicated that five of the detected amino acids were common in both males and females. These amino acids were aspartic, glutamic, cystine, histidine and arginine. The dominant amino acid in the leaves of both males and females was glutamic, with one exception, since its contents were greatly higher than other amino acids (Tables 1 to 7). The concentration of the other amino acids differed greatly according to the cultivar and sex. No such information are available in the literature. On the other hand, few information revealed that, in the date palm fruits, glutamic acid is the predominant amino acid in different date palm cultivars (Hussein and El-Zeid, 1975; Abdel Hafiz *et al.* 1980).

Regarding the total concentration of the free amino acids, data of this investigation indicated that it differed greatly according to the cultivar and sex. The total concentration of the free amino acids was generally higher in the leaves of the males, as compared with that in the leaves of

Table (1): Amino acids contents of the leaves of males and females of "Barhi" cultivar (mg/100 g on dry weight basis).

Amino acids	Male	Female
Asparatic	124.98	25.94
Threonine	19.30	3.93
Serine	14.82	1.26
Proline	19.66	--
Glutamic	138.16	258.65
Glycine	10.44	--
Alanine	14.97	--
Valine	11.60	--
Cystine	16.94	11.10
Methionine		
Isoleucine	25.58	27.15
Leucine		
Tyrosine	6.52	5.45
Phenylalanine	8.91	--
Lysine	197.80	26.31
Histidine	28.39	15.36
Arginine	91.92	9.40
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Total Concentration	729.99	384.55

females with few exceptions (Tables 1 to 7). These results were in general agreement with those obtained by Dzaparidze and Mikeladze (1969).

It could be concluded from the foregoing results that the free amino acids of the leaves of date palm varied qualitatively and quantitatively depending on the males and females. Also, this preliminary study revealed that amino acids content of the leaves of date palm, could be used to differentiate between males and females and that this hypothesis needs to be critically postulated.

## Leaf amino acids of date trees.

Table (2): Amino acids contents of the leaves of males and females of "Nebut Seif" cultivar. (mg/100 g on dry weight basis).

Amino Acids	Male	Female
Asparatic	28.35	41.25
Threonine	2.14	--
Serine	8.45	7.56
Proline	7.15	--
Glutamic	192.45	341.64
Glycine	--	--
Alanine	--	--
Valine	--	--
Cystine	7.43	7.77
Methionine	2.24	3.35
Isoleucine	1.85	--
Leucine		--
Tyrosine	5.92	--
Phenylalanine	0.84	4.55
Lysine	2.85	5.88
Histidine	2.65	3.12
Arginine	8.20	7.00
Total Concentration	260.52	422.12

Table (3): Amino acids contents of the leaves of males and females of "Khudari" cultivar: (mg/100 g on dry weight basis).

Amino Acids	Male	Female
Asparatic	21.56	21.96
Threonine	--	2.50
Serine	5.04	7.57
Proline	--	17.15
Glutamic	420.20	238.79
Glycine	--	1.90
Alanine	--	8.02
Valine	--	--
Cystine	4.47	6.49
Methionine	0.84	1.34
Isoleucine	Traces	Traces
Leucine	Traces	1.97
Tyrosine	--	Traces
Phenylalanine	--	1.98
Lysine	2.63	4.39
Histidine	1.40	4.19
Arginine	4.18	4.18
Total Concentration	460.32	322.43

## Leaf amino acids of date trees.

Table (4): Amino acids contents of the leaves of males and females of "Sukkari" cultivar. (mg/100 g on dry weight basis).

Amino acids	Male	Female
Asparatic	37.13	21.76
Threonine	13.94	8.93
Serine	21.94	5.99
Proline	47.89	--
Glutamic	648.84	Traces
Glycine	2.32	--
Alanine	12.29	--
Valine	--	--
Cystine	15.86	85.95
Methionine	5.37	8.76
Isoleucine	1.34	16.06
Leucine	--	4.05
Tyrosine	2.77	1.69
Phenylalanine	2.97	3.71
Lysine	--	20.61
Histidine	2.00	46.45
Arginine	3.45	2.09
Total Concentration	818.11	226.05

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Table (5): Amino acids contents of the leaves of males and females of "Sefri" cultivar. (mg/100 g on dry weight basis).

Amino Acids	Male	Female
Asparatic	8.78	66.68
Threonine	--	N.D.
Serine	--	Traces
Proline	15.37	21.05
Glutamic	342.96	152.28
Glycine	--	--
Alanine	--	--
Valine	--	--
Cystine	5.82	14.02
Methionine	1.34	4.47
Isoleucine	Traces	Traces
Leucine	Traces	Traces
Tyrosine	Traces	1.63
Phenylalanine	Traces	1.49
Lysine	16.66	5.26
Histidine	Traces	0.93
Arginine	3.66	2.61
Total Concentration	394.59	270.42

N.D. : Not detected.



## Leaf amino acids of date trees.

Table (6): Amino acids contents of the leaves of males and females of "Dekheini" cultivar. (mg/100 g on dry weight basis).

Amino Acids	Male	Female
Asparatic	14.77	49.88
Threonine	--	3.68
Serine	--	11.34
Proline	--	19.32
Glutamic	179.65	336.80
Glycine	--	0.90
Alanine	--	7.48
Valine	--	--
Cystine }	11.04	2.34
Methionine }	--	--
Isoleucine	--	2.36
Leucine }	--	--
Tyrosine }	Traces	3.80
Phenylalanine	Traces	3.96
Lysine	5.14	8.33
Histidine	1.40	2.33
Arginine	5.17	5.54
Total Concentration	218.17	458.06

Table (7): Amino acids contents of the leaves of males and females of "Serry" cultivar. (mg/100 g on dry weight basis).

Amino Acids	Male	Female
Asparatic	43.12	21.56
Threonine	1.79	2.86
Serine	2.84	5.99
Proline	N.D.	6.21
Glutamic	116.00	244.53
Glycine	N.D.	--
Alanine	N.D.	--
Valine	--	--
Cystine	6.02	33.61
Methionine		
Isoleucine		1.97
Leucine	1.80	--
Tyrosine	1.25	3.26
Phenylalanine	1.98	2.97
Lysine	3.07	5.39
Histidine	0.47	1.86
Arginine	2.09	4.18
Total Concentration	180.52	334.39

N.D. : Not detected.

## Leaf amino acids of date trees.

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الاحماض الامينية الحرة فى اوراق بعض ذكور  
واناث اشجار نخيل البلح

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قدرت محتويات أوراق بعض ذكور نخيل البلح النامية فى  
المنطقة الوسطى من المملكة العربية السعودية من الاحماض الامينية  
الحرة . وقدرت كذلك الاحماض الامينية الحرة فى أوراق بعض  
الأصناف المؤنثة والتي يعتقد انها الأم التي نشأت منها هذه الذكور .

وقد وجد أن الاحماض الامينية الحرة الموجودة فى الاوراق  
يتراوح عددها من ١٠ - ١٧ حمض امينى حسب صنف الذكور والاناث .  
ووجد كذلك أن هناك خمسة احماض امينية مشتركة فى أوراق كل من  
الذكور والاناث وهى : الأسبارتيك ، الجلوتاميك ، السيستين ،  
الأرجنين ، الهستيدين .

ووجد أن حمض الجلوتاميك هو الحمض السائد وكان بتركيزات  
أكبر فى معظم التقديرات التي أجريت . وقد اختلفت أيضاً التركيزات  
الكلية للاحماض الامينية حسب الصنف فى كل من الذكور والاناث  
المستخدمة .