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STUDIES OF CHEMICAL COMPOSITION ON SOME SEEDS OF DICOTELEDN PLANTS

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ABESTRACT

The present work is devoted to investigate the chemical composition of some seeds of three different species, each include two varieties or cultivars, representing three genera and three families .

The aim of the present work was to clearify the importance and the significance of the seed chemical composition as critera in taxonomic aspects. The general chemical analysis including lipid content, protein contents, total carbohydrates, mineral constituents, amino and fatty acids were determined in seed plant sample of the studied cultivars and varieties to facilitate the separation of the studied taxa, as well as, their use as criteria in taxonomic treatments.

The results obtained can be summarized as follows:-

1-The percentage of the chemical contents in seeds variel according to cultivars and varieties under study.

2-High values of lipid crude protein and mineral element (i e., K, P, Mg, Fe and Cu) contents in seeds were recorded. While, lower values of carbohydrate contants in seeds of cotton (cv. Giza 86), tomato (var. Grandifolium) and rape (var. Tower) wererecorded ascompared with the other cultivars and varieties under study.

3-Different percentages of some amino acids were noticed between seed cotton cultivars and tomato varieties, high values of Glutamic acid, Asparatic, Arginine, Proline, Leucine, Phenylalanine and Valine were recorded in these seeds. While, the content of their amino acids were nearly the some in both rape seed cultivars.

4- Different percentages of saturated and unsaturated fatty acids were detected between the studied cultivars. Higher values of Palmitic acid and Linoleic acid were recorded in oil seeds of cotton (cv. Giza 66), tomato (var. Grandfolium) and rape (var. Tower) as compared with the other cultivars.

5-High values of Erucic acid in oil rape(var. Tower) and tomato (var. Pyriforme) and also, Linolenic acid in oil rape(var. Pactol) were recorded. On the other hand Palmitoleic acid was not dected in oil seed of cotton (cv. Giza 66)

It is quite clear that, different chemical compositions and their amounts could be considered as diagnostic features that make differentiation between the studied cultivars and varieties easier and more effective.

INTRODUCTION

Plant taxonomy has drawn great attention of many scientists dealing with this scope of study. Different trends dealing with the basis of plant taxonomy, especially, those related to plant families.

That is why we find many researches dealing with the basis of taxonomy, especially, those based on the following characteristics:-

Chemical characters are of importance as all other taxonomic characters, they attain their value through correlation with other characters, and perfect correlation are the exception rather than the rule. Of all the sorts of chemical data, the structure of vital proteins may hold the most promise for helping to establish relationships among major groups of angiosperms. The chemical compounds that have been taxonomically the most useful up to the present time are the secondary metabolites, perhaps simply because there are so many of them. The discovery and exploitation of major groups of new repellents may have played a decisive role in the origin and diversification of major groups of angiosperms (Bisby *et al.,* 1980). Also plant chemistry provides new of information and the development of modern and simplified techniques make the application of chemical tests relatively easier.

The attractiveness of chemical characters is perhaps the possibility that in some cases the chemical evolution of a character as taken place in a particular way and this kind of evidence may help in knowing of evolutionary relationship and taxonomic treatments (Nagaraj & Malik, 1980).

The main objective of the present investigation is to throw light on chemical composition of seeds of three species, included two cultivars or varieties for each specie (representing 3 families and 3 genera) under studies.

Thus, the present work is aimed to apply morphological attributes, as well as, chemical composition to facilitate identification and separaction of the studied taxa, as well as, studying their use as criteria for taxonomic treatments.

MATERIALS AND METHODS

1. Plant materials:

Seeds of three different species of three families [i.e., Malvaceae, Solanaceae and Brassicaceae] were taken as plant materials. For each species; seeds of two economical varieties or cultivars were secured from Seed Bank Of The CAIM-Herbarium of Flora and Phytotaxonomy Department, Horticulture Research Institute (HRI), Agricultural Research Center (ARC), Agricultural Museum, Dokki, Giza. The studied seeds belong to three genera namely: *Gossypium, Lycopersicon* and *Brassica* according to Hutchinson's classification (1973).

Table (1): The different species taken as plant material in the present study.

Family	Genera	Varieties or Cultivars
Malvaceae	*Gossypium*	*barbadense* L. cv. Giza 86
	Gossypium	*barbadense* L. cv. Giza 66
Solanaceae	*Lycopersicon*	*esculentum* Mill. var. Pyriforme
	Lycopersicon	*esculentum* Mill. var. Grandifolium
Brassicaceae	*Brassica*	*napus* L. cv. Pactol
	Brassica	*napus* L. var. Tower

2. Methods :

2.1- Chemical composition

2.1.1- Extraction of oils from the seeds:

The oils were extracted from the crushed seeds according to A.O.A.C. (1990).

2.1.2- Determination of fatty acids:

Methylation of the triglycerides content of the crude extracted oils was carried out by using methanolic-base (0.5 N) in iso-octane at room temperature as reported by Daun *et al.* (1983).

2.2- Total nitrogen and crude protein:

Total nitrogen was determined according to Piper (1947), by using micro-kjeldahl as described by Horneck and Miller (1998). The crude protein was calculated according to the following equation:

Crude protein = total nitrogen x 6.25.

Except in cotton seed was calculated as,

Crude protein = total nitrogen x 5.30. (A.O.A.C., 1990).

2.3- Minerals constituent :

2.3.1 - Phosphorus: according to Sandell (1950).

2.3.2- Potassium and sodium content: were determined by the flame photometer Model carl-Zeiss according to Horneck and Hanson (1998).

2.3.3- Calcium and magnesium: were determined by using versenate method according to Richard (1954).

2.3.4- Cupper, iron, manganese and zinc: were determined according to the method described by Rowe (1973) by using Pye Unicam Atomic Absorption Spectrophotometry Sp 457.

2.4- Total carbohydrates:

Total carbohydrates were determined as glucose (unless other wise specified), by the phenol-sulfuric acid method according to Dubois *et al.*(1956).

2.5- Total amino acid were

determined according to Moore *et al.*, (1958), using high performance amino acid analyzer, Model Beckman, System 7300 and data system 7000, Column Na-A/B/D 25-cm column and sample volume 50µ1.

RESULTS AND DISCUSSION

Seeds of angiosperms most often have food reserves consisting largely of secondary metabolites which are the chemical compounds that have been taxonomically considered the most useful items-up till now- perhaps simply this is due to the presence of because so many of them.

They form a great horde of chemically unrelated substances that do not appear to be necessary for ordinary metabolic functions. They include such diverse compounds as amino acids, fatty acids, carbohydrates, tannins, poly-acetylenes, flavonoids....etc. Each kind of secondary metabolite, and each set, occurs in some quantity in alinited array of plant taxa, and is wanting (or nearly so) from others. The distribution is not at all random, but shows varying degrees of correlation with groups recognized on other bases. We don't know of any perfect correlations occur at all levels up to and including the two classes (monocots and dicots).

Like other chemical features, secondary metabolities had their greatest acceptance as taxonomic characters when they have been used in conjunction with other characters as part of a comprehensive re-evaluation. Taxonomy depends on multiple correlations, and we want assure that any new scheme shows a better set of correlations and fewer anomalies than the one it replaces. In this respect, the present work is intended to apply chemical compositions to facilitate the separation of the studied taxa.

The general chemical analysis including lipid content, protein contents and total carbohydrates were determined in seed plant sample of cotton seeds (2 cultivars), tomato (2 varieties) and rape (1 cultivar and 1 variety) are presented in Table (1).

Chemical composition of cotton cultivars:-

Two samples of whole cotton seed, were analyzed for chemical composition. The results are shown in Table (2).

Lipid content:-

Lipid contents of cotton sampels (Table,2) ranged from 17.50% (Giza 66 cullivar) and 25.35% (Giza 86 culivar). The present results are in agreement with those obtained by Pondey and Thejappa (1977) and Galal (1997).

Crude protein contents:

Crude protein contents of cotton Giza 86 cultivar contains 34.63%, while Giza 66 cultivar contains 29.50%. These results are slightly lower than those reported by Pondey and Thejappa (1977).

The obtained data disagreed with those reported by Abu-Foul *et al.*, (1992), Zein El-Dein (2000).

Total carbohydrates:-

Total carbohydrates in cotton cultivars ranged from 37.83% (Giza 86) to 45.08% (Giza 66) these results are in agreement with those obtained by Pondey and Thejappa (1977) and El-Sayed (1987).

Chemical composition of tomato varieties:-

It could be noticed in Table (2) the chemical composition of both tomato seed varieties and their meals.

Lipid content:-

lipid contents of tomato varieties were 20.35% (*Pyriforme*) and 26.30% (*grandifolium*).

The data are in well agreement with those mentiond by Moharram and Messalam (1980) and Attia *et al.*, (2000) while slightly differed from that reported by Tsatsaranis and Boskou (1975).

Crude protein content:-

The total protein content which comprises the most important nutritional ingredient of the meal ranged from 27.67% (*pyriforme*) to 33.33% (*grandifolium*).

These results go with those reported by Moharram *et al.*, (1984) and Lazos and Kalathenos (1988).

Total carbohydrates:

The total carbohydrates in tomato seed varieties ranged from 22.75% (*grandifolium*.) to 25.21% (*pyriforme*.)
These results are within the range of those obtained by Lazos and Kalathenos (1988) and Attia *et al.* (2000).

Chemical composition of rape seed cv. Pactol and var. Tower (Table 2):-
Lipid content:-

Lipid contents of rape seed (Table,2) ranged from 34.31% (Pactol) to 41.95% (Tower). The obtained results slightly differed from those obtained by El-Nockrashy *et al.*, (1977), Bell and Shires (1983), Farag *et al.*, (1986), Marianchuk *et al.*, (1987), Mills *et al.*, (1987) and DeClereq *et al.*, (1992).

Crude protein contents:

Results in (Table,2) show that of crude protein contents rape cv. Tower contains 29.83%, while cv. Pactol contains 25.33% which as lower than our obtained results that are similar to those reported by Ahmed (2004).

Total carbohydrates:-

Total carbohydrates in rape seeds (Table,2) ranged from 16.81% (Tower) to 26.36% (cv. Pactol). These results agree with those obtained by DeClereq *et al.*, (1992) and El-Samanody (1998), while these results disagreed with those reported by Ahmed (2004).

These variations may be due to the variety of seeds, climatic conditions,agricultural conditions and the methods used for determination.
The previous results indicated that seeds of angiosperms mostly have food reserves consisting largely of oil or fat, carbohydrates, and commonly some proteins. Differences in the quantity of these proximate chemical compositions frequently have strong taxonomic correlation and of good features that make the separation between the studied species being easier.

Mineral constituents:-

Mineral constituent of cotton seed cultivars:-

The ashes of different cotton seed cultivars are presented in Table (3). The determined minerals included K, P, Ca, Mg, Na, Fe, Cu, Mn and Zn with values 1.73, 1.62, 0.03, 0.26, 0.023, 0.024, 0.0017, 0.016 and 0.010 %, respectively For cotton seed cv. Giza 86 meanwhile, in case of Giza 66 values were 1.15, 1.30, 0.20, 0.15, 0.025, 0.098, 0.0097, 0.020, and 0.009 % respectively .
These results represent that cv. Giza 86 are relatively high in its content of K, P, Mg, Zn and Cu. While cv. Giza 66 contains high percentage amount of Ca, Na, Fe and Mn. These results are almost in agreement with those reached by Weber and Neumann (1980) and Abu-Foul *et al.*, (1992). Such differences might be attributed to the different varieties.

Minerals constituent of tomato seed varieties:-

Data in Table (3) indicate that mineral constituents of tomato seed ash as K, Ca, Mg, P, Cu, Fe, Zn, Na and Mn their values 0.94, 1.42, 0.103, 0.472, , 0.012, 0.106, , 0.0017, 0.037 and 0.0085 %, respectively for pyriforme. Meanwhile, their percentages in the grandifolium were 1.36, 1.34, 0.076, 0.306, 0.014. 0.167, 0.016, 0.019 and 0. 106 %, respectively. These results are in agreement with those reported by Shams El-Din and Madiha (1997) and slightly differed from these reported by Moussa (1990).

The variations may be due to the variety of seeds. Also, it can be noticed that the major minerals in both varieties of seeds are K, P, Ca, Mg and Fe. While the other minerals are found in low quantities are (Na, Cu, Mn and Zn).

Mineral constituent of rape seed (cv. Pactol and var. Tower):

The mineral content of rape seed meal samples are presented in Table (3) showed that Tower and cv. Pactol samples were relatively rich in P, K, Ca, Mg and Na. However, Fe and Zn were present in moderate values, while Cu and Mn contents were found in relatively trace amounts. Such values were similar to those reported by Shabana *et al.,* (1990) and El-Samanody (1998).

Finally, it is quite clear from the previous mentioned results of mineral constituent of the seeds of the studied cultivars and varieties that different mineral elements are accumulated by some kinds of plants in quantities greater than those usually required for ordinary metabolism, these minerals have attracted more than minimal taxonomic attention, because these have a direct morphological expression that has already been considered in classical taxonomy and is considered as diagnostic features that make the differentiation between the studied cultivars and varieties easier and more effective.

Amino acids composition:-

Seeds of angiosperms mostly have food reserves consisting largely of protein. Differences in the kind of amino acids and their amounts making up the proteins frequently have a strong taxonomic correlation, (Bisby, *et al.* 1980). Also, it is considered as good diagnostic feature that makes the differentiation and separation between the studied cultivars and varieties easier and more effective.

Amino acids composition of cotton seed cultivars:-

The data of the amino acids composition of cotton seed cultivars (Table,4), clearly indicate that Essential Amino Acids (E.A.A.) of cotton seed meal (cv. Giza 86) Lys., Leu., Iso-Leu., Cys., Met., Phe., Tyr., Thr., Val. and Try. were 3.80, 7.10, 4.43, 1.60, 2.70, 4.20, 4.23, 2.80, 5.60 and 2.15 g/100g protein, respectively, while None-Essential Amino Acids (None-E.A.A.) His., Arg., Asp., Glu., Ser., Pro., Gly. and Ala. were 3.45, 7.76, 9.12, 19.43, 5.43, 3.20, 6.78 and 5.36 g/100g protein, respectively.

On the other hand, the essential amino acids composition of cotton seed (cv. Giza 66) were Lys. (3.85), Leu. (8.35), Iso-Leu. (4.63), Cys. (0.65), Met. (1.92), Phe. (5.49), Tyr. (5.06), Thr. (3.57) Val. (4.84) and Try. (0.78) g/100 protein, while non E.A.A. were His (2.33), Arg. (8.07), Asp. (8.90), Glu. (21.65), Ser. (4.93), Pro. (5.09), Gly. (5.60) and Ala. (4.59) g/100 g protein, respectively.

The results indicated that both cotton seed cultivars relatively high levels of (Glu.), (Asp.), (Arg.), (Leu.) and (Gly.) and contain low values of (Ala.), (Pro.), (Ser.), (Val.), (Phe.) and (Tyr.) while, the content of there amino acids were nearly the same in both cultivars. These results are relatively in agreement with those obtained by Ali (1987).

Table (2): Chemical composition of seeds of the cultivars and varieties under study.

Species \ Chemical composition	Oil (%)	Crude protein (%)	Total carbohydrates (%)
Gossypium barbadense L. cv. Giza 86	25.35	34.63	37.83
Gossypium barbadense L. cv. Giza 66	17.50	29.50	45.08
Lycopersicon esculentum Mill. var. Pyriforme	20.35	27.67	25.21
Lycopersicon esculentum Mill. var. Grandifolium	26.30	33.33	22.75
Brassica napus L. cv. Pactol	34.31	25.33	26.36
Brassica napus L. var. Tower	41.59	29.83	16.81

Table (3): Seeds minerals constituent of the of the studied cultivars and varieties.

Species \ Elements %	K	P	Ca	Mg	Na	Fe	Cu	Mn	Zn
Gossypium barbadense L. cv. Giza 86	1.73	1.62	0.03	0.26	0.023	0.024	0.0017	0.016	0.010
Gossypium barbadense L. cv. Giza 66	1.15	1.30	0.20	0.15	0.025	0.098	0.0097	0.020	0.009
Lycopersicon esculentum Mill. var. Pyriforme	0.94	1.42	0.103	0.472	0.012	0.106	0.0017	0.037	0.0085
Lycopersicon esculentum Mill. var. grandifolium	1.36	1.34	0.076	0.306	0.014	0.167	0.0016	0.019	0.106
Brassica napus L. cv. Pactol	1.90	1.53	0.80	1.08	0.018	0.126	0.0013	0.078	0.011
Brassica napus L. var. . ower	2.28	1.54	0.10	1.92	0.025	0.122	0.0018	0.024	0.0077

From the previous results, it could be clearly noticed that there were large differences in the amounts of amino acids found in the investigated cultivars.

These differences could support and help in the study of taxa delimitation and may solve or facilitate many of taxonomical classification problems.

Amino acids composition of tomato seed varieties:-

Data concerning the amino acids composition of tomato seed varieties in Table (4) indicate that Isoleu. (4.01), Leu. (4.96), Lys. (7.10), Phe. (3.54), Tyr. (2.67), Cys. (0.49), Met. (1.45), Thr. (4.35) Try. (1.91), Val. (2.53), His. (12.25), Arg. (13.40), Asp. (21.05), Glu. (5.80), Ser. (4.65), Gly. (5.70) and Ala. (3.80) in pyriforme variety. On the other hand, the amino acid values were 4.70, 9.30. 6.90, 5.91, 2.41, 0.25, 0.64, 0.84, 1.06, 5.90, 2.50, 7.70, 16.87, 13.29, 1 70, 6.60 and 4.15 g/100 g protein, respectively in grandifolium. These results are in agreement with those reported by Moussa (1990). From the previous results it could be concluded that in general glutamic, asparatic and argnine acids are the most abundant amino acids in *pyriforme* variety. followed by lysine, Glycine, Leucine, Proline and isoleucine. Cystine is present in minute quantity with a value of 0.49 g/100 g protein. On the other hand. Asparatic, Glutamic, Serine and leucine acids are the most abundant amino acids in the grandifolium variety, followed by argnine. lysine, Glycine, phenylalanine and valine. While, cystine, methionine and threonine are present in small quantities with values of 0.25, 0.64 and 0.84 g/100 g protein, respectively.

The obtained data also indicate that there were great differences in the amounts of amino acids in the investigated varieties. These differences give a good trial to clarify the differentiation, similarities, interrelationships and characterization among the studied varieties.

Amino acids composition of rape seed (cv. Pactol and var. Tower):-

The data of the amino acids composition of rape seed (cv. Pactol and var Tower) in Table(4), clearly indicate that glutamic, aspartic and argnine acids are the most abundant amino acids followed by leucine in both rapeseed varieties.

Cystine is present in very small quantities in both varieties with average ranged from 1.2 (cv. Pactol) to 1.5 (var. *Tower*) g/ 100g protein.

The reported data for the relative amino acids composition of rape seed varieties agreed with those reported by Tzeng *et al.*, (1988) and differed from those reported by Barbour and Sim (1991), Zuprizal *et al.*, (1993), Hafermann *et al.*, (1993) and El- Samanody (1998).

The variations may be due to the variety of seeds, climatic conditions and the applied methods. Differences in the amounts of amino acids could be a major significant diagnostic. That may be attributes to clear separation of taxonomic units. especially at the specific level.

Fatty acids composition:-

Fatty acids composition of cotton seed cultivars:-

GLC analysis of the individual fatty acids of the two cultivars of cotton seeds under investigation are presented in Table (5).

Table (4): Amino acids composition of the cultivars and varieties under study.

Varieties / Amino acids g/100g protein	*Gossypoum barbadense* L cv. Giza 86	*Gossypium barbadense* L. cv. Giza 66	*Lycopersiecon esculentum* Mill. var. *Pyriforme*	*Lycopersicon esculentum* Mill. var. *Grandifolium*	*Brassica napus* L. cv. Pactol	*Brassica napus* L. var. *Tower*
Essential Amino Acida (E.A.A.)						
Lysine (Lys.)	3.80	3.85	7.10	6.90	3.51	3.90
Leucine (Leu.)	7.10	8.35	4.96	9.30	7.32	7.50
Iso-Leucine. (Iso-Leu.)	4.43	4.63	4.01	4.70	4.38	4.20
Cystine (Cys.)	1.60	0.65	0.49	0.25	1.20	1.50
Methionine (Met.)	2.70	1.92	1.45	0.64	2.27	2.34
Phenylalanine (Phe.)	4.20	5.49	3.54	5.91	4.97	4.80
Tyrosine (Tyr.)	4.23	5.06	2.67	2.41	1.42	1.44
Threonine (Thr.)	2.80	3.57	4.35	0.84	3.50	3.65
Valine (Val.)	5.60	4.84	1.91	5.90	4.23	4.76
Tryptophane (Try.)	2.15	0.78	1.07	1.06	3.20	3.30
Non essential Amino Acids (none -E.A.A.)						
Histidine (His.)	3.45	2.33	2.53	2.50	2.50	2.70
Arginine (Arg.)	7.76	8.07	12.25	7.70	8.10	8.10
Asparatic acid (Asp.)	9.12	8.90	13.40	16.87	7.90	8.30
Glutamic acid (Glu.)	19.43	21.65	21.05	13.29	19.80	19.50
Serine (Ser.)	5.43	4.93	5.80	9.52	4.30	4.40
Proline (Pro.)	3.20	5.09	4.65	1.70	4.80	4.70
Glycine (Gly.)	6.78	5.60	5.70	6.60	5.30	5.40
Alanine (Ala.)	5.36	4.59	3.80	4.15	4.20	4.40

Table (5): Fatty acids composition of the cultivars and varieties under study.

R. T.	Fatty acids		*Gossypium barbadense* L. cv. Giza 86	*Gossypium barbadense* .L cv. Giza 86	R. T.	Fatty acids		*Lycopersicon esculentum* Mill. var. Pyriforme	*Lycopersicon esculentum* Mill. var. grandifolium	R. T.	Fatty acids		*Brassica napus* L. cv. Pactol	*Brassica napus* L. var. Tower
			Area %	Area %				Area %	Area %				Area %	Area %
2.77	$C_{12:0}$	Lauric acid	0.083	0.084	4.31	$C_{14:0}$	Myristic acid	0.167	0.045	10.03	$C_{16:0}$	Palmitic acid	5.640	6.824
5.14	$C_{14:0}$	Myristic acid	0.790	0 87	10.16	$C_{16:0}$	Palmitic acid	11 578	12.784	19.63	$C_{18:0}$	Stearic acid	1.451	1.359
10.20	$C_{16:0}$	Palmitic acid	23.837	26.351	20.10	$C_{18:0}$	Stearic acid	2.967	4.704	21.68	$C_{18:1}$	Oleic acid	21.864	32.773
11.31	$C_{16:1}$	Palmitoleic acid	0.971	N.D.	22.12	$C_{18:1}$	Oleic acid	36.618	23.723	26.28	$C_{18:2}$	Linoleic acid	26.424	27.673
19.79	$C_{18:0}$	Stearic acid	3.116	0.858	26.82	$C_{18:2}$	Linoleic acid	42.538	54.287	33.03	$C_{18:3}$	Linolenic acid	30.479	10.066
21.97	$C_{18:1}$	Oleic acid	26.427	33.242	33.07	$C_{18:3}$	Linolenic acid	2.970	2.180	38.32	$C_{20:0}$	Arachidic acid	0.527	0.684
26.79	$C_{18:2}$	Linoleic acid	35.947	36.393	38.72	$C_{20:0}$	Arachidic acid	0.493	0.456					
33.13	$C_{18:3}$	Linolenic acid	7.715	1.421	42.04	$C_{22:1}$	Erucic acid	2.652	1.825					
38.09	$C_{20:0}$	Arachidic acid	0.417	0.050										
41.76	$C_{22:0}$	Behenic acid	0.721	0.730										

N. D. = Not detected. R. T. = Retention time.

The predominant saturated fatty acid was palmetic acid ($C_{16:0}$). Its amount ranged from 23.837% (cv. Giza 86) to 26.351% (cv. Giza 66).

Similar values were reported by Mahmoud (1995). Steric acid ($C_{18:0}$), was found in amounts ranged from 0.858% (cv. Giza 66) to 3.116% (cv Giza 86), while other saturated fatty acids e.g., lauric acid ($C_{12:0}$), myristic acid ($C_{14:0}$), arachidic acid ($C_{20:0}$) and behenic acid ($C_{22:0}$) were found in low amounts. These results are in agreement with those reported by Badami *et al* ., (1978) and Zeitoun *et al.* (1991).

Also, the major constituents of unsaturated fatty acids in oils extracted from cotton seed cultivars were $C_{18:1}$, $C_{18:2}$ and $C_{18:3}$. It is clear that linoleic acid ($C_{18:2}$) was the most prevalent unsaturated fatty acid that ranged from 35.947% (cv. Giza 86) to 36.393% (cv. Giza 66). Oleic acid ($C_{18:1}$) was the second major unsaturated acid, its content ranged from 26.427% (cv. Giza 86) to 33.242% (cv. Giza 66). Linolenic acid ($C_{18:3}$) was the third major unsaturated fatty acid, its amount ranged from 1.421% (cv. Giza 66) to 7.715%(cv. Giza 86).

Concerning the palmitoleic acid ($C_{16:1}$) content, the obtained results show that cv. Giza 86 contains 0.971% of palmitoleic acid.

On the other hand, palmitoleic acid ($C_{16:1}$) was not detected in the oil of cv. Giza 66. These results are almost in agreement with those found by FAO/WHO (1977) and El-Sadik (1999).

From the previous mentioned results, we can notice that the fatty acid analysis is very important to differentiate and separate between the two studied cotton seed cultivars.

Fatty acids composition of tomato seed varieties:-

Fatty acids analysis. Data in Table (5) show that the major constituents of unsaturated fatty acids were $C_{18:1}$, $C_{18:2}$, $C_{18:3}$ and $C_{22:1}$. It is clear that Linoleic acid, was the most prevalent unsaturated fatty acid ranged from 42.538% (var. pyriforme) to 54.287% (var. grandifolium) Followed by oleic acid that ranged from 23.723% (var. grandifolium) to 36.618% (var. pyriforme), then linolenic acid which ranged from 2.180% (var. grandifolium) to 2.97% (var. pyriforme).

Concerning the erucic acid contents, the data show that, *grandifolium* var. contains a little amount of erucic acid (1.825%) while, *pyriforme* var contains 2.652%.

Palmitic acid was the predominant saturated fatty acid in the two varieties. Its amount that ranged from 11.578% (var. *pyriforme*) to 12.784% (var. *grandifolium*), followed by stearic acid ranged from 2.967% (var. *pyriforme*) to 4.704% (var. *grandifolium*).

Concerning the myristic acid contents, the obtained results show that *pyriforme* and grandifolium have traces (< 1 %) of myristic acid while the same varieties contain a very small amount of arachidic acid 0.493, 0.456% respectively.

These results are in agreement with those reported by Kamel *et al* ., (1982) & Shams – El-Din and Madiha (1997) but differed from those reported by Moussa (1990) and Galal (1997).

These variations could be due to the variety of seeds. From the previous mentioned results we can notice that the variation of fatty acids percentages is considered a good diagnostic character that make's the differentiation and separation between the studied varieties easier and more effective.

Fatty acids composition of rape seed (cv. Pactol and var. Tower):-

The fatty acids composition of rape seed oil for (cv. Pactol and var. *Tower*) were analyzed by GLC Table (5) show that the predominant saturated fatty acid was palmetic acid ($C_{16:0}$). Its amount ranged from 5.64% (cv. Pactol) to 6.824% (var. *Tower*).

Similar values were found by El-Samanody (1998) and Ahmed (2004). stearic acid ($C_{18:0}$) was found in amounts ranged from 1.359% (var. *Tower*) to 1.451% (cv. Pactol) while, other saturated fatty acids e.g., arachidic acid ($C_{20:0}$) were found in low amounts. On the other hand, myristic acid ($C_{14:0}$) was not detected in the oil under investigation. These results are in agreement with those reported by Mahmoud (1995), El-Samanody (1998) and Ahmed (2004).

The obtained results show that the major constituents of unsaturated fatty acids in oils extracted from rape seed varieties were $C_{18:1}$, $C_{18:2}$, $C_{18:3}$ and $C_{22:1}$. It is clear that oleic acid ($C_{18:1}$) was the most prevalent unsaturated fatty acid that rangd from 21.864% (cv.pactol) to 32. 773% (var. *Tower*). Linolenic acid ($C_{18:3}$) was the second in order major unsturated acids, its content ranged from 10.066% (var. *Tower*) to 30.479% (cv. Pactol). Linoleic acid ($C_{18:2}$) was the third major unsatuated fatty acid, its content ranged from 26.424% (cv. Pactol) to 27.673% (var. *Tower*). These results are in agreement with those reported by El-Samanody (1998). Concerning the erucic acid content ($C_{22:1}$), the obtained data show that var. *Tower* contains the higher amount of erucic acid 20.593% than cv. Pactol which contains 13.591%. It is quite clear from the previous mentioned data that rapeseed oils of different varieties under investigation contained appreciable quantities of fatty acids with chain lengths greater than the usual eighteen carbon atoms, and significant amounts of polyunsaturated acids were also present. A clea. linear relationship between linolenic and erucic acid may originate in the seed oil of the studied varieties. In other words, a high linolenic acid content in cv. Pactol o.e. 30.479% was accompanied by a low erucic acid (13.591%). While, var. *Tower* exhibited high erucic acid Its contents 20.593% of erucic acid accompanied with a low level of linolenic acid (C18:3) reached to 10.066%. Obviously , the elongation of linolenic acid to erucic acid was the main pathway of biosynthesis of the latter acid. This deduction agrees with those reported by Jonsson(1977) who suggested that the addition of two carbon atoms to the carboxyl group of linolenic from eicosenoic acid, followed by second addition of another two carbon forming erucic acid.

It is quite clear from the previous data that differences in the kind of fatty acids making up the fats or oils, frequently, have a strong taxonomic correlation, as does the introduction of starch or hemicellulose as major storage product. Also it is noted that erucic acid is a major characteristic component of the seed fats of the Brassicaceae, and appears to be of very limited occurrence outside papaverales.

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دراسات كيميائيه لبذور بعض نباتات ذوات الفلقتين

علـــى حســـن شاهين* ، احمد لطفى ونـــس* ، فـــاتن حســـن محمـــود إســـماعيل* ، عبدالمجيد على عبدالمجيد** و محمد محمد عبدالعال*
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**معهد بحوث البساتين – وزارة الزراعة

يهدف هذا البحث إلى إجراء دراسة المكونات الكيميائية لبذور القطن (صنف جيزة ٨٦ وصنف جيزة ٦٦) والطماطم (صنف بيرفورم وصنف جراندفوليم) والكانولا (باكتول وصنف توير). بغرض إلقاء الضوء على المكونات الكيميائية فى عمليات التمييـــز والتعريـــف للوحـــدات التصنيفية تحت الدراسة. كما تؤكد على تسهيل أهمية استعمال المكونات الكيميائية كمعايير ودلائل فى الدراسات التصنيفية.وقد تم تقدير المكونات الكيميائية لبذور الأصناف المدروسة وذلك بتقـــدير نسبة الزيت، البروتين، الكربوهيدرات، المحتوى من العناصر، الأحماض الأمينيـــة والأحمـــاض الدهنية لتسهيل الفصل بين الوحدات المدروسة. كما تؤكد على أهميتها كمعايير فـــى المعـــاملات التصنيفية.

وأهم النتائج المتحصل عليها هى:-

١-اختلفت النسبة المئوية لمحتوى المكونات الكيميائية فى بذور الأصناف تحت الدراسة.

٢-أظهرت النتائج أعلى قيم فى محتوى الدهون والبروتين والعناصر المعدنية (مثل البوتاسيوم- الفوسفور- الماغنسيوم- الحديد و النحاس) بينما سجلت أقل قيم لمحتوى الكربوهيـــدرات فـــى بذور القطن (صنف جيزة ٨٦) و الطماطم (صنف جراندفوليم) و الشلجم(صنف توير) مقارنتا بالأصناف الأخرى تحت الدراسة.

٣-اختلفت النسبة المئوية للأحماض الأمينية بين أصناف القطن والطماطم وســجلت أعلـــى قـــيم لحمض الجلوتاميك- الاسبارتيك - الأرجينين - البرولين- الليوسين- الفينيل ألآنين و الفالين في بذور القطن والطماطم بينما كانت القيم متقاربة فى كلا صنفى الشلجم

٤- اختلفت النسبة المئوية للأحماض الدهنية المشبعة والغير مشبعة بين الأنواع تحـــت الدراســـة. وأظهرت النتائج أعلى قيم فى حمض البالميتيك و اللينوليك فى زيت بذرة القطن (صنف جيزة ٦٦) و الطماطم (صنف جراندفوليم) والشلجم (صنف توير) مقارنتا بالأصناف الأخرى.

٥-سجلت النتائج أعلى قيم فى حمض الإيروسيك فى زيت بذرة الشلجم(صنف توير) و الطماطم (صنف بيرفورم) وأيضا حمض اللينولينك فى الشلجم (صنف باكتول). بينما لم تســـجل قـــيم لحمض البلميتوليك فى زيت القطن (صنف جيزة٦٦).

ولقد تبين أن المكونات الكيميائية المختلفة ونسبها تعتبر صفات تشخيصية رائدة حيـــث تجعل التفريق بين الأصناف المختلفة المدروسة أسهل وأكثر فاعلية.