

## TAXONOMIC ASSESSMENT OF SOME SPECIES OF POACEAE (GRAMINEAE).

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### ABSTRACT

Taxonomical similarity by using the grains and spikes of 7 gramineous genera belong to tribe Triticeae Dumort and represented by 9 species was studied. These species were; *Elymus fractus* (Viv.) Rurem ex Melderis , *Taeniatherum caput-medusae* Nevski , *Secale cereale* L., Tritical spp, *Hordeum vulgare* L, *H. murinum* L. , *Triticum aestivum* L. , *T. dicoccoides* (Koern. ex Asther.et Graebn.) Aronsohn. and *Aegilops bicornis* (Forssk.) Jaub & Spach.

The objective of this study was to observe the similarity and/or dissimilarity relationships among the studied species by using the whole plant morphological characters as well as the grain surface features of these species using the Scanning Electron Microscope (SEM) technique.

The morphological results of the whole plant, indicated that there were some characters differ among the studied species, e.g.; plant duration, culm length, sheath texture, spike shape, spikelets number/ spike, flowers number/ spikelet, lemma shape and epidermal cell shape.

From the SEM results of the grain surface, it could be concluded that, there were eight features of the grain surface of the studied species as follows; Favulariate-striate in *Elymus fractus*; Sulcate in *Taeniatherum caput-medusae* ; Scrobiculate-striate in *Secale cereale* and *Hordeum vulgare* ; Scalariform-rugose in *Tritical spp.*; Ruminant in *Aegilops bicornis* ; Scalariform in *Hordeum murinum* ; Linear-oblong in *Triticum dicoccoides* and Rugose in *Triticum aestivum*.

The numerical analysis technique showed that , on the similarity level 1.90, the studied species divided into two main groups; one includes species of genus *Elymus* and the other includes the rest of the studied species.

### INTRODUCTION

Family Poaceae (Gramineae), grass plants, is one of the famous largest families of the flowering plants. The family includes about 620 genera and 10000 species (Clayton, 1970). In the Egyptian flora, Täckholm (1974) mentioned that, family Poaceae represented by 93 genera and 224 species, while El-Khanagrey (2000) added few taxa over the above mentioned.

Poaceae is one of the greatest sources as food crops for the human consumption and animals, which included; rice, wheat, corn, barley, millet and sugar cane. In addition , as a forage and grains. Grass plants are used also as aromatic oil (manufacturing soap and perfume); starch and ethyl alcohol and as ornamental plants ( Jones and Luchsinger, 1967).

Poaceae plants are broadly spread and cover nearly all parts of the world; from the equator to adjacent to the poles. Grass plants extend from the sea level up to the highest point on mountains covering different soil patterns; wet, moderate and dry areas ( Clayton and Renvoize, 1986 ).

Taxonomic position of some species of family Poaceae was a subject of argument by taxonomists ( Watson *et al.*, 1985). Therefore, the aim of the present study was to evaluate the similarity or dissimilarity relationships among nine species of Poaceae, handling the morphological description of the spikes and grains of each studied species, surveying the grain surface features by using SEM technique and finally, applying the Single Linkage Clustering technique ( Abbott *et al.* , 1985) to analyze the obtained data. Proposed key using the morphological characters and grain surface features will be constructed.

## MATERIALS AND METHODS

Nine species of family Poaceae representing seven genera were studied (Table 1). The study was based on herbarium specimens and living collections in general field, in addition to the grains of the studied species. The herbarium specimens were obtained through the curtesy of herbarium and Gene bank of the Flora and Phyto-taxonomy Researches Department, Horticultural Research Institute, Agricultural Research Center (CAIM) . Dokki, Giza where, herbarium specimens of the studied species are being kept. The living specimens were gathered from some areas; e.g around Giza and Kafr El-Sheikh.

**Table (1): Name and habit of the studied species.**

Genus	Species	Habit	Locality
1- <i>Elymus</i> L.	<i>Elymus fractus</i> (Viv.) Rurem ex Melderis	Wild	Kafr El-Sheikh
2- <i>Taeniatherum</i> Nevski.	<i>T. caput-medusae</i> (L.) Nevski	Wild	Siani
3- <i>Secale</i> L.	<i>S. cereale</i> L.	Wild	Giza
4- <i>Tritical</i>	Tritical spp. (hybrid between Tritical and Secale )	Cult.	Giza
5- <i>Hordeum</i> L.	<i>H. vulgare</i> L. <i>H. murinum</i> L.	Cult. Wild	Giza Kafr El-Sheikh
6- <i>Triticum</i> L.	<i>T. aestivum</i> L. <i>T. dicoccoides</i> (Koern.ex Asther. et Graebn. ) Aronsohn.	Cult. Wild	Giza Giza
7- <i>Aegilops</i> Jaub. & Spach.	<i>Aegilops bicornis</i> (Forssk.) Jaub. & Spach	Wild	Kafr El-Sheikh

Ten herbarium specimens, two living ones and in addition to the grains representing each studied species were used to describe the taxonomic relationships among these species. Many morphological features, especially for spike, were examined using the binocular stereo-microscope. The detailed grain surface features were examined by using Scanning Electron Microscope (SEM) with different magnifications at 10-30 KV and (X) between 15 to 1400 according to the grain size. SEM-micrographs were obtained after mounting the dry grain with SPI supplies on copper stubs and coated with a thin layer of gold palladium in Edwards Sputter Coater Unit, S 150 B. Scanning was carried out using JEOL-JSM T 100 Model Scanning

Electron Microscope at National Information and Documentation Center (NIDOC), Dokki, Giza, Egypt. All descriptive terminology of grain surface scan according to that of Murley (1951).

Single Linkage Clustering technique (Sneath and Sokal, 1973) was applied and the Operational Taxonomic Unit (OUT) will be the individual specimens of each species. The number of morphological characters and character states of the whole plant and grains was 33 and represented in Table (2 a & b).

## RESULTS AND DISCUSSION

The present study was carried out to evaluate the relationships among nine species belong to seven genera of Poaceae. All the studied characters were presented and illustrated in tables, plates, photographic pictures and phenogram in order to achieve the goal of this study.

Results of this study were concentrated on the morphological description of the whole plant, especially spikes, in addition to the grain surface features observed by SEM technique for the studied species. These results presented in Table (2 a & b) and illustrated in Figure (1) and plates (1-3).

### I- Morphological description:

#### 1- *Elymus fractus*

Perennial grass. Culms erect, up to 80 cm, internodes solid, other hollow, glabrous, nodes pubescent. Sheath rigid, glabrous. Ligule up to 2 mm; blade rigid, rolled, upper surface hairy, lower glabrous. Auricle absent. Spike lanceolate, compressed, up to 35 cm, up to 15 spikelets, one on each node. Flowers 3-9 per spikelet. Glume rigid, up to 18 mm, lanceolate-obtuse, awn absent, keel along the glume, up to 9 nerves. Lemma linear, obtuse, up to 20 mm, glabrous, awn absent. Palea outer surface hairy, dentate. Caryopsis adherent to lemma and palea.

#### 2- *Taeniatherum caput-medusae*

Annual grass. Culms erect- ascending, up to 55 cm, lower internodes solid, glabrous, nodes glabrous. Sheath weak, glabrous, margin hairy, membranous. Ligule up to 2 mm; blade flat, hairy. Auricle present, up to 2 mm. Spike oblong, cylindrical, glabrous, up to 7 cm, up to 7-12 spikelets, 2 on each node. Flowers 2 per spikelet, fertiles and fragil. Glume up to 60 mm, linear-acute, glabrous, keel absent, 3 nerves, awn up to 2 cm. Lemma lanceolate, up to 12 mm, outer surface hairy; 5 nerves, awn up to 15 cm. Palea surface hairy, keel ciliated, tip hairy. Caryopsis adherent.

#### 3- *Secale cereale*

Annual grass. Culms erect, rigid, up to 140 cm, internodes solid, nodes pubescent. Sheath coriaceous, hairy, margin hairy, membranous. Ligule up to 2 mm, blade flat, hairy. Auricle up to 2 mm. Spike lanceolate, compressed, up to 15 cm, 12 spikelets, one on each node. Flowers 2-3, fertiles. Glume rigid, up to 15 mm, lanceolate- acute, awn present, keel along the glume and scarbid, up to 5 nerves, glabrous. Lemma lanceolate-acute, up to 17 mm, symmetrical in spikelets with 5 nerves, surface hairy, one awn present at the tip, up to 6 cm. Keel hairy, dentate. Palea glabrous. Caryopsis free.

Table (2 a): Morphological descriptions of the vegetative and reproductive characters of the studied species.

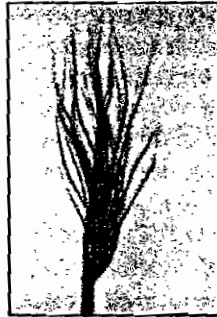
Characters	<i>Elymus fructus</i>	<i>Taeniatherum caput-medusae</i>	<i>Secale cereale</i>	<i>Triticum spp.</i>	<i>Hordeum vulgare</i>	<i>Hordeum murinum</i>	<i>Triticum aestivum</i>	<i>Triticum dicoccoides</i>	<i>Aegilops bicornis</i>
<b>Vegetative characters:</b>									
1- Plant duration	Perennial	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
2- Culm position	Erect	Erect-ascending	Erect-rigid	Erect-rigid	Erect-rigid	Erect-ascending	Erect-rigid	Erect-rigid	Erect-cylindrical
3- Culm length, cm	Up to 80	Up to 55	Up to 140	Up to 180	Up to 130	Up to 50	Up to 140	Up to 100	Up to 45
4- Internode status	Solid / hollow	Solid	Solid	Hollow	Hollow	Hollow	Hollow	Hollow	Hollow
5- Sheath texture	Glabrous	Glabrous	Coriaceous or hairy	Coriaceous hairy	Scattered hairy	Scattered hairy	Coriaceous	Hairy	Scattered hairy
6- Sheath margin	Glabrous	Hairy	Hairy	Hairy	Glabrous-coriaceous	Hairy	Hairy	Hairy	Hairy
7- Ligule length, mm	2	2	2	4	2	2	4	2	2
8- Blade status	Rigid-rolled	Flat	Flat	Flat	Flat	Flat	Flat	Rigid-rolled	Flat
9- Blade upper surface	Hairy	Hairy	Hairy	Glabrous	Glabrous	Hairy	Hairy	Hairy	Hairy
10- Blade lower surface	Glabrous	Hairy	Hairy	Glabrous	Glabrous	Hairy	Hairy-glabrous	Hairy	Hairy
11- Auricle presence	Absent	Present (2 mm)	Present (2 mm)	Present (2 mm)	Present (5 mm)	Present (4 mm)	Present (2 mm)	Present (4 mm)	Present (2 mm)
<b>Reproductive characters:</b>									
12- Spike shape	Lanceolate	Oblong-cylindrical	Lanceolata	Oblong	Lanceolate-cylindrical	Oblong-lanceolate	Oblong-cylindrical	Lanceolate	Lanceolate-cylindrical
13- Spike length, cm	35	7	15	15	12	7	20	10	8
14- Spikelet No. /spike	15	7-12	12	14	84	108	26	18	16
15- No. of flowers/spikelet	3-9	2	2-3	3-5	1	1	3-9	2-3	2-3
16- Glume length, mm	18	60	15	15	30	30	11	15	Vary
17- Glume shape	Lanceolate-obtuse	Linear-Acute	Lanceolate-acute	Lanceolate-acute	Linear-Acute	Linear-acute	Ovate-truncate	Lanceolate-truncate	Elliptic-oblong-truncate
18- Awn presence	Absent	Present	Present	Present	Present	Present	Present	Present	Present
19- No. of nerves/keel	9	3	5	5	5	1	1	9	5
20- Lemma shape	Linear-obtuse	Lanceolate	Lanceolate-acute	Lanceolate-acute	Ovate-acute	Lanceolate-acute	Lanceolate-acute	Lanceolate-acute	Elliptic-acute
21- Lemma length, mm	20	12	17	15	10	15	12	11	8
22- Lemma texture	Glabrous	Hairy	Hairy	Scarious-ciliate	Glabrous	Hairy	Hairy	Hairy	Hairy
23- Awn on lemma	Absent	Present	Present	Present	Present	Present	Present	Present	Present
24- Palea surface texture	Hairy	Hairy	Glabrous	Glabrous	Glabrous	Hairy	Hairy	Hairy	Hairy
25- Carvopsis	Adherent	Adherent	Free	Adherent	Adherent	Adherent	Free	Adherent	Adherent

Table (2 b): Morphological description of the grain surface of the studied species by using SEM.

Grain Characters	<i>Elymus fructus</i>	<i>Taeniatherum caput-medusae</i>	<i>Secale cereale</i>	<i>Triticum spp.</i>	<i>Hordeum vulgare</i>	<i>Hordeum murinum</i>	<i>Triticum aestivum</i>	<i>Triticum dicoccoides</i>	<i>Aegilops bicornis</i>
1- Grain surface texture	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth
2- Grain apex texture	Hairy	Hairy	Hairy	Hairy	Glabrous	Glabrous	Hairy	Hairy	Hairy
3- Grain shape	Linear	Linear	Linear-oblong	Linear-oblong	Lanceolate-ovate	Linear	Elliptic	Linear-oblong	Linear
4- Grain length, mm	11.0	10.5	6.0	9.0	7.5	4.5	6.5	7.0	5.0
5- Grain width, mm	1.7	1.0	2.0	2.0	1.0	1.0	3.5	1.5	0.5
6- Grain girdle (L x W) mm <sup>2</sup>	18.7	10.5	12.0	18.0	22.5	4.5	22.8	10.5	2.5
7- grain colour	Brown	Creamy-brown	Creamy	Creamy	Whitish-creamy	Grey	Creamy	Brown	Yellow
8- Epidermal cell shape	Favariate-shate	Sulcate	Scrobiculate-shate	Scabrous-ropose	Scrobiculate-shate	Scabrous-ropose	Rugose	Linear-oblong	Ruminata



*Elymus fractus*



*Taenatherum caput-medusae*



*Secala cereale*



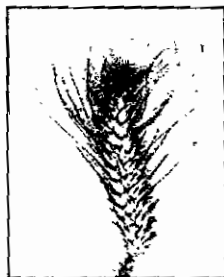
*Tritical spp.*



*Hordeum vulgare*



*Hordeum murinum*



*Triticum aestivum*



*Triticum dicoccoide*



*Aeglops bicornis*

**Plate (1): Spike shapes of the studied species.**

**4-Tritical spp.**

Annual grass. Culms erect , rigid , up to 180 cm , internodes hollow , glabrous , nodes pubescent. Sheath coriaceous , hairy , margin membranous and hairy. Ligule up to 4 mm, blade flat , glabrous , margin rough not membranous. Auricule up to 2 mm. Spike oblong , compressed , up to 15 cm , 14 spikelets , one on each node. Flowers 3-5 , fertiles. Glume rigid , up to 15 mm , lanceolate-acute , awn up to 1 cm, keel along the glume , 5 nerves , margin scarious. Lemma lanceolate-acute , up to 15 mm , symmetrical with 5 nerves , margin scarious ciliate, awn up to 10 cm. Keel scarbid , hairy. Palea glabrous. Caryopsis adherent.

**5-A. *Hordeum vulgare***

Annual grass. Culms erect-rigid, up to 130 cm , internodes hollow , glabrous, nodes glabrous. Sheath coriaceous, glabrous to hairy, margin membranous. Ligule up to 2 mm., blade flat , glabrous. Auricule up to 5 mm. Spike lanceolate-cylindrical, up to 12 cm, 84 spikelets , 3 spikelets on each node, one flower. Glume linear-acute, up to 30 mm, awn up to 30 mm, keel along the glum. Lemma ovate-acute, up to 10 mm, 5 nerves, margin scarious, awn up to 15 cm. Keel hairy. Palea glabrous. Caryopsis adherent.

**5-B. *Hordeum murinum***

Annual grass. Culms ascending to erect, up to 50 cm, internodes hollow, glabrous, nodes glabrous. Sheath scattered hairy, margin membranous. Ligule up to 2 mm., blade flat, hairy. Auricule up to 4 mm. Spike oblong-lanceolate, compressed, up to 7 cm, 108 spikelets, 3 spikelets on each node, one flower, Glume linear-acute, up to 30 mm., awn up to 5 mm., keel not clear, one nerve. Lemma lanceolate-acute, up to 15 mm., hairy, awn up to 2 cm. Palea hairy. Caryopsis adherent.

**6-A. *Triticum aestivum***

Annual grass. Culms erect-rigid, up to 140 cm. , internodes hollow , glabrous. Sheath coriaceous, glabrous, margin membranous, hairy . Ligule up to 4 mm, blade flat, hairy. Auricule up to 2 mm. Spike oblong-cylindrical, up to 20 cm, 26 spikelets, one on each node, 3-9 flowers. Glume rigid, ovate-truncate, up to 11 mm., keel at apex only, awn up to 5 mm., one nerve, Lemma lanceolate-acute, up to 12 mm, 7-11 nerves , awn up to 16-20 cm. Keel glabrous. Palea hairy, Caryopsis free.

**6-B. *Triticum dicoccoides***

Annual grass. Culms erect-rigid, up to 100 cm, internodes hollow, glabrous. Sheath rigid, hairy. Ligule up to 2 mm., blade rolled-rigid, hairy. Auricule up to 4 mm. Spike lanceolate, up to 10 cm, 18 spikelets, 2-3 flowers. Glume lanceolate-truncate, up to 15 mm., awn up to 5 mm. Lemma lanceolate-acute, up to 11 mm., 9 nerves, awn up to 20 cm. Palea hairy. Caryopsis adherent.

**7-*Aegilops bicornis***

Annual grass. Culms erect-cylinder, up to 45 cm, internodes hollow , glabrous. Sheath weak, hairy membranous margin. Ligule up to 2 mm, blade flat, hairy surfaces. Auricule up to 2 mm. Spike lanceolate -cylindrical to compressed, up to 8 cm, 16 spikelets, one on each node, 2-3 fertile flowers. Glume rigid, elliptic-oblong, truncate, awn present and short, keel not clear, 5 nerves, entire margin. Lemma lanceolate-elliptic, acute, up to 8 mm, 3

nerves, one awn up to 6 mm. Palea hairy , apex untoothed. Caryopsis adherent.

**II-Results of SEM on grain:**

**1-*Elymus fractus***

Grain surface smooth , apex hairy , linear shape, 11.0 x 1.70 mm in dimensions , brown colour. Epidermal cells favulariate-striate, with the surface finally ribbed , ribs separated by zigzag furrows.

**2-*Taeniatherum caput-medusae***

Grain surface smooth, apex hairy, linear shape, 10.5 x 1.0 mm in dimensions, creamy colour with brown apex. Epidermal cells sulcate with elongated shallow depressions , smooth and glossy.

**3-*Secale cereale***

Grain surface smooth, apex hairy, linear-oblong shape, 6.0 x 2.0 mm in dimensions, creamy colour. Epidermal cells quite scrobiculate-striate, with elongated shallow depressions, smooth and glossy.

**4-*Triticum spp.***

Grain surface smooth, few hairs at apex , linear –oblong shape , 9.0 x 2.0 mm in dimensions, creamy colour. Epidermal cells scalariform-rugose ( intermediate between scalariform and rugose scalipture ) with small fairly regular cross-band markings, rugose with very small wrinkles.

**5-A. *Hordeum vulgare***

Grain surface smooth, apex glabrous, lanceolate-ovate shape , 7.5 x 3.0 mm in dimensions, whitish creamy colour. Epidermal cells weak scrobiculate-striate( intermediate between striate and scrobiculate scalipture), striate with wider lines than a lineate surface, scrobiculate with elongated shallow depressions, smooth and glossy.

**5-B. *Hordeum murinum***

Grain surface smooth, apex glabrous, linear shape, 4.5 x 1.0 mm in dimensions, grey colour. Epidermal cells scalariform with small fairly regular cross-band markings suggesting the steps of a ladder.

**6-A. *Triticum aestivum***

Grain surface smooth, hairy near apex, elliptic shape, 6.5 x 3.5 mm in dimensions, creamy colour . Epidermal cells rugose, wrinkled, the irregular elevation making up the wrinkles and running mostly in one direction.

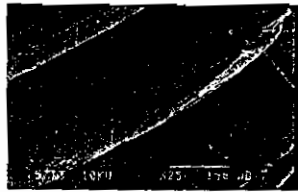
**6-B. *Triticum dicoccoides***

Grain surface smooth, hairy apex ( in pair ), linear-oblong shape, 7.0 x 1.5 mm in dimensions, brown colour. Epidermal cells linear-oblong, marked with series of fine narrow parallel bands.

**7- *Aegilops bicornis***

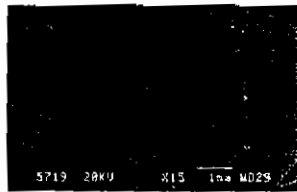
Grain surface smooth, hairy at apex, linear shape, 5.0 x 0.5 mm in dimensions, yellow colour. Epidermal cells ruminant, penetrated by irregular channels giving an oroded appearance and running in different directions.

Tantawy and Rabie (2000) considered grain colour is a good taxonomic character for identifying taxa. While, Hussein (1995) considered it with a limited value , since the fluctuation occur from one side to another. Karakus (1996) supported Hussein result and mentioned that the appearance of this character depends on the interaction between the plant metabolic activities and the environmental conditions.



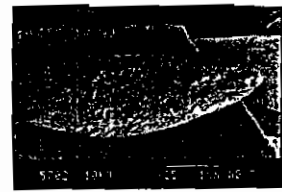
*Elymus tractus*

X25



*Taenatherum caput-medusae*

X15



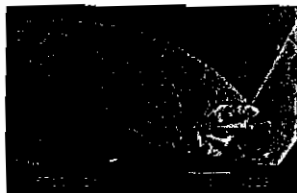
*Secale cereale*

X25



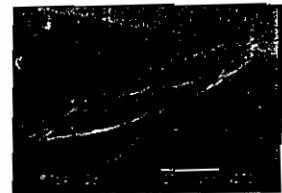
*Tritical spp.*

X25



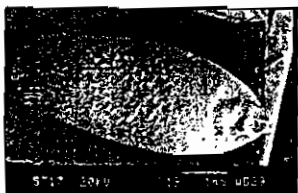
*Hordeum vulgare*

X18



*Hordeum murinum*

X27



*Triticum aestivum*

X19



*Triticum dicoccoides*

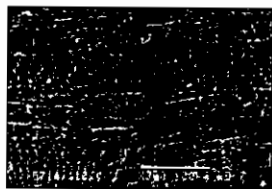
X25



*Aeglops biornis*

Plate (2): Grain shapes of the studied species as shown by SEM.

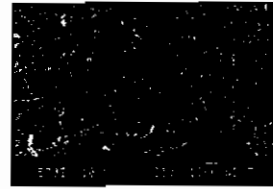




*Elymus fractus*  
X300



*Taenatherum caput-medusae*  
X900



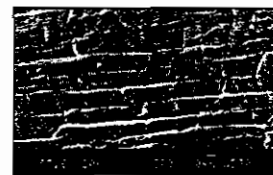
*Secale cereale*  
X550



*Triticum spp.*  
X330



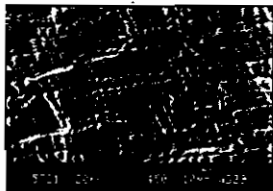
*Hordeum vulgare*  
X1000



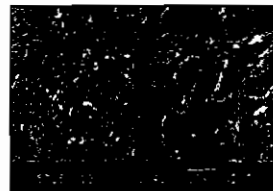
*Hordeum murinum*  
X500



*Triticum aestivum*  
X120



*Triticum dicoccoides*  
X450



*Aegilops biocomis*  
X1400

Plate (3): Grain surface patterns of the studied species as shown by SEM.

Voughan (1968) stated that the grain surface considered the most useful taxonomic character to distinguish taxa, this was in harmony with Yeh and Kakuma (1990), who suggested that this character is a good criteria for identification.

**III-Numerical analysis:**

The morphological and grain surface data (33 characters) were analyzed using Single Linkage Clustering technique to represent the similarity and/or dissimilarity among the studied species in a form of phenogram (Fig.1).

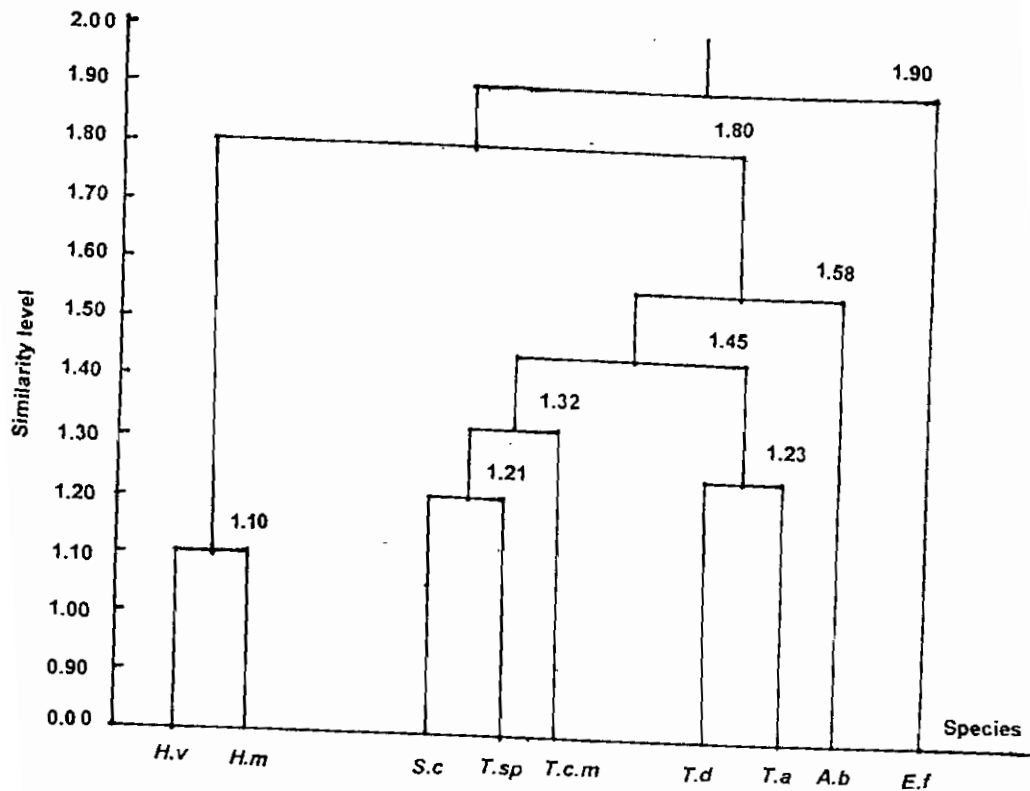


Fig. (1): Phenogram of nine poaceae species based on similarity matrix using Single Linkage Clustering analysis technique.

Key: *E.f*: *Elymus fractus*      *T.c.m*: *Taeniatherum caput-medusae*  
*S.c*: *Secale cereale*      *T.sp*: *Triticum spp.*  
*H.v*: *Hordeum vulgare*      *H.m*: *Hordeum murinum*  
*T.a*: *Triticum aestivum*      *T.d*: *Triticum dicoccoide*  
*A.b*: *Aegilops bilcornis*

The highest average taxonomic similarity value was at 1.90 level. At this level, the studied species were divided into two groups. The first group, which was distinguished at that level, included all the specimens of *Elymus fractus*. The second group was split into two sub-groups at level 1.80. One distinguished at level 1.10 and includes all the specimens of both species *Hordeum vulgare* and *Hordeum murinum*. The other sub-group which was distinguished at similarity level at 1.58, where specimens of *Aegilops bicornis* were linked with three clusters; one includes both *Triticum dicoccoides* and *Triticum aestivum* at level 1.23; one has both *Tritical spp.* with *Secale cereale* at level 1.21, where joined with third cluster *Taeniatherum caput-medusae* at level 1.32.

Results of numerical analysis were in harmony with those obtained by Airyshow (1985), Albina (1999), Khattab (2002) and Youssef *et al.* (2003) on Poaceae species.

The following key was suggested to identify and distinguish the studied species. This key based on the most posterior taxonomic characters.

- A- Perennial grass, auricle absent, awn on lemma absent.....*Elymus fractus*
- AA- Annual grass, auricle present, awn on lemma present.....
- B- Culm solid, sheath glabrous, epidermal cell sulcate.....*Taeniatherum caput-medusae*
- BB- Culm vary, sheath scattered hairy or coriaceous, epidermal cell vary...
- C- Epidermal cell scrobiculate-striate.....
- D- Grain shape linear-oblong, grain hairy, grain medium- sized (12mm<sup>2</sup>).....*Secale cereale*
- DD- Grain lanceolate-ovate, grain smooth, grain large- sized (22.5 mm<sup>2</sup>).....*Hordeum vulgare*
- CC- Epidermal cell vary.....
- E- Spike lanceolate-cylindrical, lemma elliptic-acute, grain colour yellow.....*Aegilops bicornis*
- EE- Spike shape vary, lemma lanceolate-acute, grain colour vary....
- F- Grain linear, epidermal cell scalariform, glume linear-acute....*Hordeum murinum*
- FF- Grain shape vary, epidermal cell vary, glume shape vary.....
- G- Glume ovate- truncate, grain shape elliptic, grain creamy, spike oblong-cylindrical.....*Triticum aestivum*
- GG- Glume shape vary, grain linear-oblong, grain brown or creamy.....
- H- Spike lanceolate, epidermal cell linear-oblong, culm length up to 100 cm.....*Triticum dicoccoidae*
- HH- Spike oblong, epidermal cell scalariform-rugose, culm length up to 180 cm.....*Tritical spp.*

### Conclusion

All the results obtained either from the morphological and grain surface features or from the numerical analysis indicated that:

- 1- The species of the same genus are more close and related to each other than to the species of other genera, due to the resemblance in most of the studied characters ,e.g. both species of *Hordeum* and *Triticum*.
- 2- Species represent genera *Secale* and *Triticum* are sharing many of the studied characters , so both linked together early on similarity level. Then joined these species the one represent genus *Taeniatherum* forming one cluster at 1.32 similarity level.
- 3- The previous cluster linked with the cluster includes both species of genus *Triticum* at similarity level of 1.45.
- 4- *Aegilops bicornis* , as a result of character variation from the species of the previous two clusters , it joined them late at 1.58 similarity level.
- 5- Because *Elymus fractus* has many different characters from the rest of studied species , e.g. perennial plant , number of nerves/keel , lemma length and favulariate-striate epidermal cell ,it remained unlinked with them till the final similarity level at 1.90. At that level all the studied species linked together in one large cluster , because all belongs to Poaceae.
- 6-Grain surface features as observed by SEM are considered a diagonal characters to distinguish the under studied species.

The present study is considered a survey on the morphological and grain surface features for some Poaceae species ,which could be handling in many other taxonomic fields.

### Acknowledgement

The authors express their special thanks to Dr. Adel M. A. Khattab , Professor of Botany , Botany Department , Faculty of Agriculture, Cairo University for his guidance and suggestion.

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دراسات تقسيمية على بعض أنواع الفصيلة النجيلية  
شريف شكرى الخناجرى<sup>(1)</sup>، عاطف زكريا سبع<sup>(2)</sup>، محمد أسامة السجاعي<sup>(1)</sup> و  
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أجريت دراسة للعلاقات التصنيفية بين تسعة أنواع من الفصيلة النجيلية و كانت الأنواع تمثل  
سبعة أجناس و هي:

*Elymus* L., *Taeniatherum* Nevski., *Secale* L., *Trical*, *Aegilops* (Forssk.)  
Jaub. & Spach.

(نوع واحد من كل جنس) بالإضافة إلى *Triticum* L., *Hordeum* L. (نوعين من كل جنس).  
و يهدف هذا البحث الى معرفة العلاقات التصنيفية المتشابهة أو الغير متشابهة بين الأنواع  
(الوحدات التصنيفية) تحت الدراسة باستخدام الصفات المورفولوجية و خصائص سطح الحبوب (٢٣ صفة)  
للأنواع المدروسة باستخدام المجهر الماسح الإلكتروني و التحليل العنقودي العنقودي.  
أوضحت نتائج الوصف المورفولوجي للأنواع تحت الدراسة إلى وجود اختلافات بين الأنواع  
المدروسة في عدد من الصفات، منها على سبيل المثال: طبيعة نمو النبات، طول الساق، ملمس الغمد،  
شكل السنبل، عدد السنيبلات بالسنبل، عدد الأزهار لكل سنبل، شكل العصافة، شكل سطح خلايا البشرة  
للحبوب.

وقد لوحظ باستخدام المجهر الإلكتروني الماسح لسطح الحبوب ان هناك ثمانية أشكال مختلفة  
لسطح الحبوب للأنواع المدروسة.

و قد أظهر التحليل العنقودي العنقودي أنه عند مستوى تشابه ١,٩٠ أنقسمت الأنواع تحت الدراسة  
إلى مجموعتين رئيسيتين: مجموعة اشتملت على النوع الممثل للجنس *Elymus* و الاخرى اشتملت على  
بقية الأنواع تحت الدراسة.

و قد اقترح مفتاح على اساس الصفات المورفولوجية و المظهرية للحبوب و المسح السطحي لها.