شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومـــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قَسَـــم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

Taxonomic studies on the grains of some wild and cultivated taxa of Poaceae

By
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B.Sc. (Agriculture),
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ABSTRACT

The aim of this study was to produce a classification reflecting the relationships between the wild and cultivated species (taxa) of Poaceae by using the morphological features and Scanning Electron Microscope (SEM) characterizations of the grain surface of these species. To provide a background and to clarify the relationships among the studied taxa, the taxonomic histories of the family Poaceae (Gramineae) and genera were reviewed. The phenetic method of analysis (Single Linkage Clustering) were used to analyze the morphological features and surface scan of grain surface characteristics.

Taxonomic relationships using the grains of 14 gramineous wild and cultivated species belong to 5 tribes and 6 genera of Poaceae were studied. Plants were Wild oat (*Avena fatua* L.), Common oat (*Avena sativa* L.), Animated oat (*Avena sterilis* L.), Sudan-grass (*Sorghum x drummondii* Nees ex Stendel), Sorghum (*Sorghum virgatum* (Hack.) Stapf., Rye-grass (*Lolium multiflorum* Lam.), Rye-grass (*Lolium perenne* L.), Boarded Rye-grass (*Lolium temulentum* L.), Wild millt (*Echinochloa colona* (L.) Link.), Barnyard-grass (*Echinochloa crus-galli* (L.) P. Beauv.), Bristle-grass (*Setaria pumila* (Poiret) Roemer & Schultes), Cannary-grass (*Phalaris canariensis* L.), Lesser cannary-grass (*Phalaris minor* Retz.), Hood Cannary-grass or White-grass (*Phalaris paradoxa* L.).

Taxonomic evidences for establishment the relationships among the above mentioned species included; 1) morphological descriptions of these species, 2) Scanning Electron Microscope survey on the grain surfaces of the studied species and 3) numerical analysis for the data obtained from 1 and 2.

Morphological description results indicated that the two species; *Sorghum x drummondii* and *Sorghum virgatum* are more close to each other than to any of the other species and could be categorized to the tribe level. While the other twelve species ranked in a separate tribe levels. These species of the following of each genus are; *Lolium* (*Lolium multiflorum, Lolium perenne* and *Lolium temulentum*); genus *Phalaris* (*Phalaris canariensis, Phalaris minor* and *Phalaris paradoxa*); genus *Avena* (*Avena fatua, Avena sativa* and *Avena sterilis* and the two of genus *Echinochloa* (*Echinochloa colona* and *Echinochloa crus-galli*) in addition to genus Setaria (*Setaria pumila*).

The scanning electron microscope on the grain surface and the numerical analysis results revealed that there are eleven features of the grain surface could be recognized on the studied species. Through these studies, it was possible to trace the taxonomical relationships among the studied species through the morphological and scanning electron microscope of grain surface features. The proposed keys and classification to species are presented.

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INTRODUCTION

Family Poaceae (Gramineae) comprises about 620 genera and 10000 species, constitute a natural and homogeneous family. Widely dispersed in all parts of the world where plants can survive. Grass plants occur from the equator to near the poles, often dominating the vegetation in savannas, prairies, steppes and meadows. They extend from sea level to the limit of permanent snow on mountains. They grow in wet and dry regions, from brackish and fresh water to deserts with all situations between the two extremes (Clayton and Renvoize, 1980).

Grass differs markedly from the rest of any plants. They resemble the sedges (Cyperaceae) superficially, but grasses could be distinguished by their usually round (terete) stems, with conspicuous nodes and usually with hollow internodes, their alternate two ranked distichously leaves and the structure of the spikelets with flowers borne within two bracts. In the Cyperaceae the stems are usually triangular and solid, with leaves borne in three ranks, and flowers borne in the axile of a single bract (Walters, 1988).

Poaceae are one of the large families of the flowering plants, the number of species only being exceeded by the families Orchidaceae, Asteraceae and Fabaceae. If judged by the number of individuals, the area, which they are covered and the great variety of habitats they are frequent, the grasses are among the most successful of all the angiosperms (Cronquist, 1981).

The importance of grass plants as principal sources of food was a milestone in human development thousands years ago in South Western Asia and Middle East. Wild species as *Triticum spp.* and *Hordeum spp.* yielded the cereals wheat and barley for human consumption. With the wide spreading of agriculture through the temperate European and Asian regions, various grasses were domesticated as oats (*Avena sativa*). Rice (*Oryza sativa*) became the principal cereal of tropical Asia, while in Africa, the main indigenous cereals were *Sorghum* (*Sorghum bicolor*) and Pearl

millet (*Pennisetum glausum*). Maize (*Zea mays*) was the indigenous American cereals.

The second faced of man's dependence on the grasses springs from the domestication of animals: until recent time live-stock rearing was based upon natural grasslands, although the preservation of fodder as hay had been introduced by the Roman era. Bamboos provide an ideal building material in many parts of the world. Grass was employed also for building construction in the form of mats. Many species were used for paper manufacturing. Aromatic oil distilled from the leaves of lemon grass (*Cymbopgon* spp.) importing a citronella scent to soap and other perfumery. Among a host of minor uses may be mentioned necklace beads from the inflorescence of *Coix* spp., brush bristles from the inflorescence branches of *Sorghum*, edible bamboo shoots and clarinet reed from stems of *Arundo donax* and fishing rods (*Bamboos* spp.).

Benson (1970) suggested that the family Poaceae are divided into two sub-families. The first sub-family; Festucoideae with 10 tribes, three of them are Phalarideae, Aveneae and Hordeae. The second sub-family; Panicoideae contain 3 tribes; two of them are Paniceae and Andropogoneae.

Albina (1999) also divided the family into two sub-families. The first; Panicoideae contain two tribes; Paniceae (with *Setaria* and both *Echinochloa* species) and Andropogoneae (with both *Sorghum* species). The other sub-family; Festucoideae with eight tribes; Aveneae (contain the 3 *Avena* species); Hordeae (with *Lolium* species) and Phalarideae (with all species of *Phalaris*).

While, Radford *et al.* (1974) and Jones and Luchsinger (1987) mentioned that, family Poaceae are divided into 6 sub-families; Festucoideae included 9 tribes; 2 of them are Festuceae (with genus *Lolium*) and Aveneae (with genera *Avena* and *Phalaris*); Panicoideae included 2 tribes, Paniceae (with genera *Echinochloa* and *Setaria*) and Andropogoneae (with genus *Sorghum*); Eragrostoideae (8 tribes);

Bambusoideae (2 tribes); Oryzoideae (one tribe) and Arundinoideae (3 tribes).

Cronquist (1981) reported that, the taxonomic organization of the grasses into sub-families and tribes is in a state of flux. The family is divided into a minimum of 3 sub-families. These are the Bambusoideae, Pooideae and Panicoideae. While, another view is that Eragrostoideae, Oryzoideae and Arundinoideae should be recognized as additional sub-families.

The taxonomic position of family Poaceae was a subject of argument by many taxonomists for a long time. Therefore, the present study hopefully to be an effort to trace the taxonomical relationships among some species of Poaceae that may be support or argument the idea, which suggested that these taxa were ranked in two or more sub-families.

The objective of this study was to find out a proposed classification reflecting the taxonomical relationships among 14 species represent 6 genera of Poaceae using modern taxonomic technique. The study comprised of three parts each is dealing with particular taxonomic evidence as follows:

1) Morphological descriptions of each species,
2) Scanning Electron Microscope on the grain surface of each, species,
3) Analyzing the data obtained from the previous two points by using the numerical analysis technique.

The reasons for chosen these species of Poaceae are; the great economic importance of these plants in human consumption or as animals feeds; the necessity of grain identification for Gene Bank purposes, *e.g.* grains of *Lolium temulentum* considered poisonous and it is very important to distinguish these from the other editable grains of *L.perenne*, *L.multiflorum, Triticum spp.* and many other Poaceae grains and finally, the taxonomic position problems of some species under some genera, *e.g.* the two species under *Sorghum* and the great similarity