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Weed Flora of Man-Made river agriculture project (Masiklo)

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Highlights

- **Identify weed species naturally occurring in agricultural Wheat fields.**
- **Showed dominant species in studied fields.**

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ABSTRACT

The goals of the present work were to document the weed species in *Triticum aiestivum* L. (Wheat) fields in MR agricultural project Masiklo and to provide quantitative data that could be used to estimate losses due to weeds, also to attract the attention to the economically important weeds in MR agricultural project Masiklo and to develop methods for their control.
In this study, a survey was conducted to identify weed species naturally occurring in MR agricultural Wheat fields in Masiklo Libya. A checklist including 41 species was prepared. The checklist includes the scientific name for each species. Reported species were belonging to 37 genera and 19 families of angiosperms. Dicotyledons were represented by 32 species, 30 genera, and 17 families, and Monocotyledons were represented by 9 species, 7 genera, and 2 families. The dominant families according to the number of species were Poaceae (8 species), Fabaceae (6 species), Asteraceae and Brassicaceae (5 species), and Apiaceae (3species). The results of this survey showed that *Lolium rigidum, Fumaria officinalis, Hordeum murinum* **ssp.** *glaucum, Medicago polymorpha, Bromus madritensis, Bromus rigidus* and *Sinapis flexuosa* were the dominant species in studied fields.

1. Introduction

In no other parts of the world does uncontrolled weed growth cause a great reduction in crop yields as it does in dry areas where soil moisture is the limiting factor and weeds compete significantly with the crop for available moisture (Robson, 1992). Weeds grow profusely in the rice fields and reduce crop yields drastically. Normally the loss in yield ranges between 15-20%, yet in severe cases the yield losses can be more than 50%, depending upon the species and intensity of weeds (Sureshkumar *et al.*, 2016). No special environmental requirements for seed germination of weeds (Rana and Rana, 2018). Weeds, like all plants, require sunlight, nutrients, and water for life. In agricultural systems, desirable crops face competition by these weedy species for a limited quantity of these resources (Kelton and Price, 2015). Weeds have certain characteristics that distinguish them from other plants; specifically, they are successful colonizers, survive in a wide range of environmental conditions, are prolific seed producers, and grow rapidly. These characteristics aid them in effectively competing with crops for resources such as light, nutrients, and water (Karla and Lauren, 2019).

Weed problems in Libya have become very important not only in the coastal belt with its higher rainfall but also in the newly established irrigation projects in the desert where it was very difficult to find a single weed in the past (Robson, 1992). In Libya, however, the recognition of weed science as a discipline with the same position as other crop protection disciplines, such as entomology and plant pathology, has been neglected (Kukula and Ghanuni, 1992). The infestation of some weed species in field crops, particularly on irrigated cereals projects, is getting worse because of cropping intensities, poor cultural practices, and the lack of a crop rotation system. Grass weeds, in particular, are becoming a serious problem because of the continuous use of herbicides for the control of broad-leaved weeds. One of the most dominant weeds in cereals is *Avena sterilis.* Other grass weeds that have become established including *Lolium, Bromus,* and *Phalaris.* The original infestation of these weeds is suspected to have been caused by their introduction in contaminated crop seeds (Kukula and Ghanuni, 1992). Saleh *et al.* (1983) have surveyed agricultural fields of El-Marj, Zawia, El-Beyda, and Al-Abiar in 1975, and 25 species of weeds were recorded. Also surveyed agriculture fields of Sahel El-Marj, El-Beyda, and Derna in 1978, and recorded 36 weed species. Saleh and El-Garbawi (1979) recorded a total of 205 species of monocots and dicots weeds in the survey of North-weastern of Libya. The results of their survey showed that *Lolium rigidum, Bromus rigidus, Fumaria parviflora, Anagalis arvensis, Brassica tournefortii, Cutandia dichotoma, Cyndon dactylon*, and *Phalaris minor* were the dominant species in the studied fields. Saleh *et al.* (1979) have, also, reported 134 weed species growing within wheat and barley fields in eastern region of Libya. The results of this survey showed that *Avena sterilis, Lolium rigidum, Brassica tournefortii, Anagalis arvensis* and *Bromus rigidus* were the common weed species in the studied fields.

Arab Organization for Agriculture Development (1981) reported 134 of important weed species recorded in agriculture fields in Libya. These species belong to 29 families, 27 species of monocotyledons, and 107 species of dicotyledons. Paratov and El-Gadi (1981), surveyed the pasture zone in the northern part of Libya south of Sirte and they recorded 306 species, 66 species, of which were weeds. Saleh and Saleh (1981), surveyed for weed species growing in wheat and barley fields in Fezzan region, they recorded a total of 36 species of monocots and dicots. The results of this survey showed that *Lolium multiflorum, Cyndon dactylon, Brassica tournefortii, Chenopodium murale, Polygonum equisetiforme,* and *Sonchus oleraceous* were the dominant species in the studied fields. Saleh and Saleh (1983) have also surveyed weed species of

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wheat and barley fields at El-Kufra project and found a total of 24 weed species. The results of the survey showed that *Brassica tournefortii* was the most dominant species in project fields. They also found that 87.04% of the fields were infested by weeds. Saleh *et al.* (1983) published a report that included about 294 weed species growing in wheat and barley fields in Libya. The results of this survey showed that *Anagalis arvensis, Brassica tournefortii, Bromus rigidus, Cutandia dichotoma, Cyndon dactylon, Lolium rigidum,* and *Phalaris minor* were present in all studied fields. In addition, Saleh (1988), published a book of weeds in Libya, which included the description, distribution and control methods of weeds in Libya. Nasef *et al.* (2017) and Naseef *et al.* (2019) published a list of a common weed species which distributed in Libya, about 58 species were presented, including; *Chrysanthemum coronarium* L., *Bromus rigidus* Roth., and *Plantago lanceolata* L. Ghanuni (1998) has prepared country weed list which included nine locations in Libya, Benghazi, Ebn Zaidon, El-Marj, Erawin, Maknusa, Sarir, Zahra and Abu Sheeba. The list confined 20 species of monocotyledons and 77 species of dicotyledons. Cultural and crop management techniques provide a healthy crop to best compete with weeds. Crop competition can be an inexpensive and effective aid to weed management if used to its fullest advantage (Dwight and Nathan, 2013). The goals of the present survey were to document the weed species in barley fields in MR agriculture project Masiklo and to attract attention to the economically important weeds in MR agriculture project Masiklo and to develop methods for their control.

2. Materials and Methods

The study area is located about 35 Km South East of Benghazi City adjacent to the Jardinah village at approximately 31^0 50$^{'}$ N latitude and 20^0 15$^{'}$ E longitudes (Fig. 1). The area rises about 85 m above the sea level. The study area lies within the border of agriculture fields which belongs to the Man-Made River Water Utilization Authority. The total area of which is approximately 3000 hectares. The study was in one season's period of 2017. The field trips were more frequently made from January to late March, where most of the plants are in flowering conditions. The plant specimens were collected in flowering or fruiting conditions. The agriculture management of this Project (Masiklo) used two types of herbicides called Brominal W 24% EC and Antilope. First, the family of the plant was determined by the use of a key to the families of flora of Libya (Erteb, 1994). The genus and species were identified by the utilization of available taxonomic literature (Ali and Jafri, 1976-1977; El-Gadi, 1988-1989; Jafri and El-Gadi, 1977-1986).

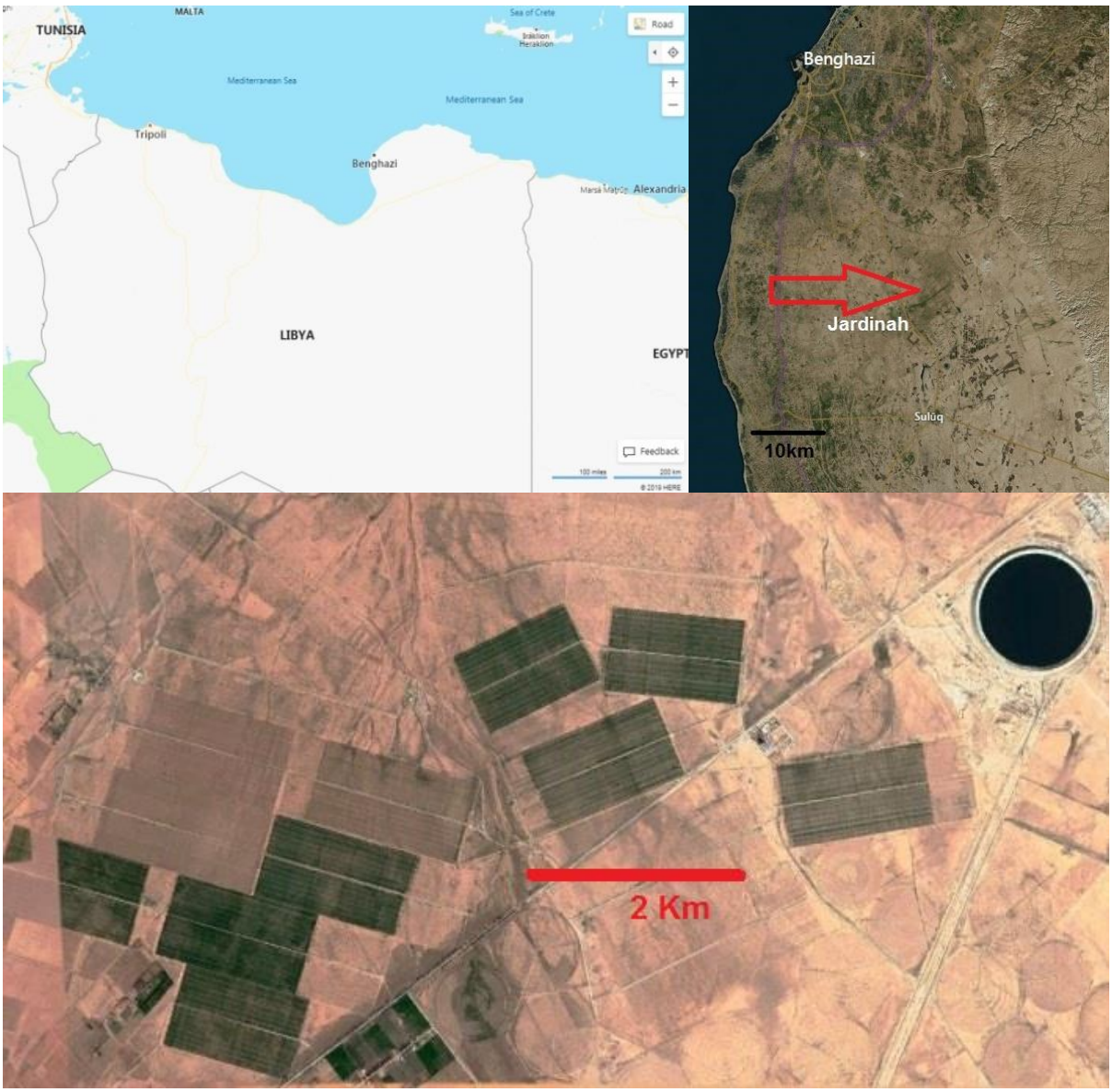

Fig. 1. The study area and location (source: Bing maps and Google Earth)

3. Results and Discussion

Enumeration of species:

Taxa collected from the study area are enumerated here. Families were arranged according to Engler's syllabus der pflazen families, 12th edition (Melchoir, 1964) were used. The circumscription of the families is the same as in flora of Libya. The genera and species in each family are arranged alphabetically (Table 1, Table 2).

Table 1

The genera and species in each family of Dicotyledons.

Species	family
Rumex bucephalophorus L.	*Polygonaceae*
Silene apetala Willd.	*Caryophllaceae*
Paronychia Arabica (Linn.) DC.	*Illecebraceae*
Beta vulgaris L.	*Chenopodiaceae*
Chenopodium album L.	*Chenopodiaceae*
Adonis dentate Delile	*Ranunculaceae*
Papaver hybridum L.	*Papaveraceae*
Fumaria officinalis L.	*Fumariaceae*
Cardaria draba L.	*Brassicaceae*
Didesmus aegyptius (L.) Desv.	*Brassicaceae*
Eruca longirostris Uechtr.	*Brassicaceae*
Rapistrum rugosum (L.) All.	*Brassicaceae*
Sinapis flexuosa Poir.	*Brassicaceae*
Astragalus hamosus L.	*Fabaceae*
Medicago polymorpha L.	*Fabaceae*
Medicago truncatula Gaertn.	*Fabaceae*
Melilotus sulcatus Desf.	*Fabaceae*
Trigonella stellata Forsk.	*Fabaceae*
Vicia sativa **var.** *cordata* Arch.	*Fabaceae*
Erodium cicutarium (L.) L'Herit.	*Geraniaceae*
Malva parviflora L.	*Malvaceae*
Malva sylvestris L.	*Malvaceae*
Ammi majus L.	*Apiaceae*
Ammi visnaga (L.) Lam.	*Apiaceae*
Torilis nodosa (L.) Gaertn.	*Apiaceae*
Anagallis arvensis L.	*Primulaceae*
Galium verrucosum Huds.	*Rubiaceae*
Calendula arvensis L.	*Asteraceae*
Centaurea alexandrina Delile	*Asteraceae*
Cynara cornigera Lindley	*Asteraceae*
Glebionis segetum (L.) Fourr. (1869) *Syn.=Chrysanthemum segetum*L.	*Asteraceae*
Senecio gallicus Chiax	*Asteraceae*

Table 2

The genera and species in each family of Monocotyldons.

Species	family
Allium ampeloprasum L.	*Alliaceae*
Avena barbata Pott ex Link	*Poaceae*
Bromus madritensis L.	*Poaceae*
Bromus rigidus Roth	*Poaceae*
Hordeum murinum **ssp.** *glaucum* (Steud.) Tzvelev	*Poaceae*
Lolium rigidum Gaud.	*Poaceae*
Lophochloa cristata (L.) Hyl.	*Poaceae*
Phalaris brachystachys Link	*Poaceae*
Triticum aestivum L.	*Poaceae*

From this study of a total of 41 species were prepared. The checklist includes the scientific name for each species. Reported species belong to 37 genera and 19 families of angiosperms. Dicotyledons were represented by 32 species, 30 genera and 17 families, and Monocotyledons were represented by 9 species, 7 genera, and 2 families. The dominant families according to the number of species were Poaceae (8 species), Fabaceae (6 species), Asteraceae and Brassicaceae (5 species), and Apiaceae (3species). (Table 3).The ratio of Dicotyledons to Monocotyledons is 4:1.

Table 3

Different taxonomic groups present in the study area.

Plant group	No. of families	No. of Genera	No. species
Dicotyledons	17	30	32
Monocotyledons	2	7	9
Total	19	37	41

Two families were considered as the largest families with respect to the number of their species, (more than 5 species), Poaceae with 8 species, and Fabaceae with 6 species. The next largest families were Asteraceae and Brassicaceae with 5 species each, followed by Apiaceae with 3 species. The families which include 2 species were Chenopodiaceae, Malvaceae. Wheres, Polygonaceae, Caryophllaceae, Illecebraceae, Ranunculaceae, Papaveraceae, Fumariaceae, Geraniaceae, Primulaceae and Rubiaceae were represented by only a single species each. In comparison with the six largest families in the flora of Libya Poaceae is the largest family in the study area while Asteraceae is the largest in the flora of Libya. The second-largest family in the study area was Fabaceae whereas Asteraceae is the largest in the flora of Libya. Asteraceae and Brassicaceae have the same number of species represented by 5 species each. The Asteraceae come in third place in the study area whereas it is the largest in the flora of Libya. Brassicaceae has 5 species that come in fourth place in the study area as well in the flora of Libya. Apiaceae has three species come in fifth place in the study area as well in the flora of Libya. (Table 4).

Table 4

The six largest families in the study area and flora of Libya.

Libyan family	No.of species	Study area	No.of species
Asteraceae	237	Poaceae	8
Poaceae	228	Fabaceae	6
Fabaceae	208	Asteraceae	5
Brassicaceae	90	Brassicaceae	5
Apiaceae	80	Apiaceae	3

According to the number of species in each genera, in the study area, *Medicago*, *Malva*, *Ammi* and *Bromus* were the only four genera represented by two species each. The rest thirty-three genera were represented by only one species each. In addition, 27 weed species were recorded in the study area were not recorded in the Man-Made River Agriculture Project of Sirte (Alaib and Ihsaeen, 2008). From the obtained data and the comparison of these data with published surveys, one might say that there were seven species considered to be the most dominant in agricultural fields in all parts of Libya. These species were: *Lolium rigidum, Fumaria officinalis, Hordeum murinum* **ssp.** *glaucum, Medicago polymorpha, Bromus madritensis, Bromus rigidus* and *Sinapis flexuosa.*

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