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A Survey of Weed Species of Barley Crop Fields in Farms of GMR Agricultural Project in Jardina - Soloq Region, Libya.

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Abstract:

The goals of the present work were to document the weed species in barley fields in Farms of GMR agricultural project in Jardina - Soloq region. The present work is based on field research conducted from January 2016 to March 2018 in Farms of Global Monitoring Report (GMR) agricultural project in Jardina - Soloq region. Multiple field visits were performed to investigate weed species in a barley crop. The plants were identified with the help of available literature and through comparison with the already identified plant species. Data inventory has been documented in the form of family, Botanical name, vernacular name, life form, and habit. The total 80 weed species was collected, related to 65 genera and 23 families. Dicotyledons were represented by 68 species, 55 genera, and 20 families, and Monocotyledons were represented by 12 species, 10 genera, and 3 families. The maximum number of species were of family Fabaceae (17 species), followed by family Asteraceae (15 species) and Poaceae (09 species).

Keywords: Weed Species, Barley, GMR Agricultural Project, Jardina, Soloq.

Introduction:

Hordeum vulgare L. As one of the earliest domesticated crops, barley has been one of the most important staple crops in the old world Neolithic agriculture upon which early agriculture was built (*1*, *2*). The domestication of barley is fundamental to understanding the origin and early diffusion of agrarian culture (*3*). A Weed is unwanted plant species growing in domesticated crops (*4*, *5*). Weeds are undesirable due to competitive and allelopathic behavior (*6*). Weed infestation is one of the major hindrances to

wheat yield including diseases, pest and climatic influences. They consume available moistures, nutrients and compete for place and sunlight with crop plants and the results in yield reduction (*7*). They are constant components of our agro-ecosystem and are generally controlled using mechanical methods (*8*). However, many seeds of exotic species are introduced in many regions accidentally and some of them may become the component of the natural flora of the area (*9-11*).

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 project in the desert where it was very difficult to find a single weed in the past (*12*). 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 (*13*). As a result, no systematic research has been done on regular bases. Some experiments, however, carried out during the late 1970s and early 1980s in the agriculture research center, particularly in Tripoli and AL-Jabal AL-Akhdar region. The results of these experiments have been published in a form of reports that remained on the shelves of the library of the agriculture research centers.

Previous studies surveyed the agricultural fields of El-Marj, Zarda, El-Beyda, El-Marj and Al-Abyar, he recorded 25 species of weeds, also surveyed the agriculture fields of Sahel El-Marj, El-Beyda and Derna, and recorded 36 weed species (*14, 15*).

Saleh and El-Garbawi carried out a survey for weed species growing in wheat and barley fields in Fazan region, they recorded a total of 36 species of monocots and dicots. The results of this survey showed that *Lolium multiflorum, Cynodon dactylon, Brassica tournefortii, Chenopodium mural, Polygonum equisetiforme* and *Sonchus oleraceous* were the dominant species in the studied fields (*16*). The same study has also surveyed weed species of 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 dominant species in project fields. They also found that 87.04% of the fields were infested by weeds (*16*). Another study published a report about 294 weed species growing in wheat and barley fields in Libya. The results of this survey showed that *Anagallis Arvensis, Brassica Tournefortii, Bromus Rigidus, Cutandia Dichotoma, Cynodon Dactylon, Lolium Rigidum,* and *Phalaris minor* were present in all studied fields (*14*). In addition, Saleh published a book of weeds in Libya, which included the description,

distribution and control methods of weeds in Libya (17) . Ghanuni published a list of common weed species which were distributed in Libya, with relative distribution, more than 80%, these species included; *Avena fatua, Bromus rigidus, Lolium rigidum, Sonchus oleraceous, Brassica tournefortii, Emex spinosus, Linaria tenuis* and *Chenopodium album.(18)*. The same study has also prepared the country weed list which included nine locations in Libya, Benghazi, EbnZaidon, El-Marj, Erawin, Maknusa, Sarir, Zahra and Abu Sheeba (*18*). The list confined 20 species of monocotyledons and 77 species of dicotyledons. Al-Zerbi conducted a study on weed species in Al-Maltitaiah region and reported a total of 69 weed species (*19*). Also, Al-Aieb and Al-Shiekhy have surveyed weed species in GMR agricultural barley fields in Sirte and recorded a total of 105 weed species (*20*).

The present work is an attempt to explore weeds diversity in barley fields in Farms of GMR agricultural project in Jardina - Soloq region. The main purpose of the study was to achieve knowledge about the availability of the total number of species present in this region, because survey, identification, and documentation of weed diversity are necessary before solving the menace of weeds in a particular region.

Materials and Methods:

The study was extended for three seasons period from (2016 to 2018). Study areas were illustrated in Figure 1. The field trips were more frequently done from January to April, where most of the plants are in flowering conditions. The plant specimens were collected in flowering or in fruiting the condition.

For drying, the presser containing the specimens was placed in the sun. After that, the specimens were examined individually, rearranged, transferred to a fresh sheet, and again tightly bonded in the presser. The specimens were changed to dry the sheet every 24 or 48 hours, until they were completely dry.

When specimens were completely dry they were mounted on herbarium sheet with stander size (27 x 42 cm) with the aid of adhesives. On the lower right hand corner of the herbarium sheet, a label was glued and all information from the field notebook was transferred to it. First, the family of the plant was determined by the use of the artificial key to the families. The genus and species were identified by the utilization of available taxonomic literature (*21-25*).

After drying, specimens were flooded with poisoning solution (Mercuric chloride 15 gm, Ammonium chloride 35 gm, in 1000 ml ethanol 96%) to protect them from fungi and pests (*15*). Or placed in the oven at 60º C for 4-6 hours, which is enough to kill eggs of insects.

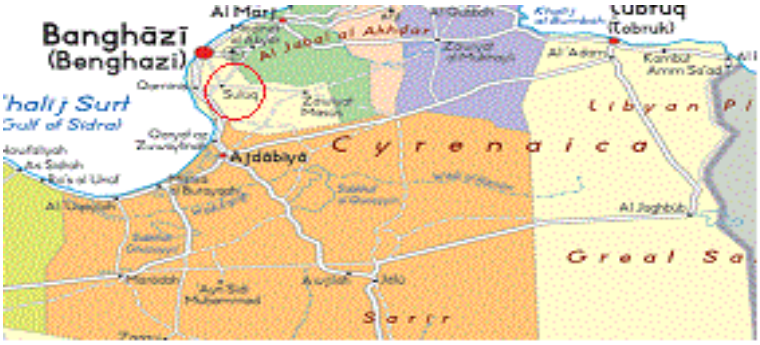

Figure 1: Study Area

Results and Discussion

Enumeration of Species:

Data collected from the study area are enumerated here. For the arrangement of families is according to Engler's syllabus der pflazen families (*26*) were used. The circumscription of the families is the same as in the flora of Libya. The genera and species in each family are arranged alphabetically (Table 1).

Table (1): Weed species, their vernacular names, and life forms of barley crop recorded in the study area. (a) Dicotyledons

Species	Vernacular name	Family	Life Forms
Emex spinosus (L). Camped	Dors el-azouz& El-Enzab	Polygonaceae	Ann.
Polygonum equisetiforme Sibth. And Sm.	Gurdab	Polygonaceae	Per.
Paronychia arabica (Linn.) Dc.	Tifun	Illecebraceae	Ann.
Bassia muricata (L.) Aschers.	Chouleta , Ghabbir	Chenopodiaceae	Ann.
Chenopodium murale L.	Effena	Chenopodiaceae	Ann.
Amaranthus viridis L.	Buzinzir	Amaranthaceae	Ann.
Adonis dentata Delile	Zeghalil	Ranunculaceae	Ann.
Papaver hybridum L.	Bugraun, Garaun, Talma	Papaveraceae	Ann.
Papaver rhoeas L. Var *rhoeas.*		Papaveraceae	Ann.
Brassica tournefortii Gouan	Al-Harra	Brassicaceae	Ann.
Capsella bursa-pastoris (L.) Medik.		Brassicaceae	Ann.
Didesmus aegyptius (L.) Desv.	Lesless	Brassicaceae	Ann.
Diplotaxis muralis (L.) Dc. ssp. *Muralis*		Brassicaceae	Ann.

Enarthrocarpus clavatus Del. ex Goder.	Shultam	Brassicaceae	Ann.
Erica sative Mill.	Gargeer Barry	Brassicaceae	Ann.
Matthiola fruticulosa (L.) Maire		Brassicaceae	Ann.
Sisymbrium irio L.		Brassicaceae	Ann.
Argyrolobium uniflorum (Dence.) Jaub. &Sapach	Ergah , Kherta	Fabaceae	Per.
Astragalus asterias Stev , ex Ledeb		Fabaceae	Ann.
Astragalus boeticus L.	Grambushia	Fabaceae	Ann.
Astragalus cabrinus L.	Shaewit Erraie	Fabaceae	Per.
Astragalus peregrinus Vahl		Fabaceae	Ann.
Hippocrepis multisiliquosa L.		Fabaceae	Ann.
Lotus cytisoides L.		Fabaceae	Per.
Lotus halophilus Boiss & Spruner.	Nafel , Gurn al – Ghazzal	Fabaceae	Ann.
Medicago disciformis Dc.		Fabaceae	Ann.
Medicago littoralis Rohde ex Lois	Nafal	Fabaceae	Ann.
Medicago sativa L.	Gadb, safsafa, Berseem.	Fabaceae	Ann.
Medicago minima (L.) Bart.	Nafal	Fabaceae	Ann.
Melilotus indicus (L.) All	Hadegog	Fabaceae	Ann.
Trigonella maritimta Delile ex Poiret	Kherta , Garat	Fabaceae	Ann.
Vicia monantha Retz.		Fabaceae	Ann.
Vicia sativa L.	Jilban.	Fabaceae	Ann.
Vicia villosa Roth	Jelbana –Hmam	Fabaceae	Ann.
Erodium cicutarium (L.) L' Herit	Dahmiyet el-ghazl.	Geraniaceae	Ann.
Erodium malacoides (L.) L' Herit		Geraniaceae	Ann. or Bi
Euphorbia terracina L.	Lebbena	Euphorbiaceae	Per.
Malva parviflora L. var *parviflora*	Khobaiz	Malvaceae	Ann.
Malva sylvestris L.	Khobaiz, Hobbess	Malvaceae	Bi. or Per.
Pituranthos tortuosus (Desf.) Benth.	Gazzah.	Apiaceae	Per.
Anagallis arvensis var. *caerulea* (L.) Gouan	Ain Algatuus	Primulaceae	Ann.
Convolvulus althaeoides L.	Ullak	Convolvulaceae	Per.
Convolvulus arvensis L.	Ullak	Convolvulaceae	Per.
Echium angustifolium Mill.	Henna alagrab, abatelgula	Boraginaceae	Per.
Echium horridum Batt		Boraginaceae	Per.
Gastrocotyle hispida (Forsk) Bunge		Boraginaceae	Ann.
Heliotropium ramosissimum (Lehm.) De.	Tahaunna, tahenna	Boraginaceae	Per.
Salvia lanigera Poir.	Sag en naga	Lamiaceae	Per.
Solanum nigrum L. var. *Nigrum*	Anab ed. Deeb	Solanaceae	Ann.
Nicotiana glauca R.C. Graham	Akkuzemusa.	Solanaceae	Per.
Linaria		Scrophulariaceae	Ann.
Orobanche schultzii Mutel.		Orobanchaceae	Ann.
Plantago lagopus L.	Aenm.	Plantaginaceae	Ann.
Anacyclus monanthos (L.) Thell.	Tagrefta ,Serat elkabesh.	Asteraceae	Ann.
Anthemis secundiramea Biv.		Asteraceae	Ann.
Calendula tripterocarpa Rupr.		Asteraceae	Ann.
Carduus getulus Pomel		Asteraceae	Ann.
Centaurea alexandrina Delile	Mrrier.	Asteraceae	Ann. or Bi
Chrysanthemum coronarium L.	Gahwan	Asteraceae	Ann.
Conyza bonariensis (L.) Cornq.	Ashbet Zamora	Asteraceae	Ann.
Cynara carunculous L	Kharshofe	Asteraceae	Per.

Echinops galalensis Schweinf	Shembet Elgatoos, Libid	Asteraceae	Per.
Launaea resedifolia (L.) O. Kuntze	Adeeda.	Asteraceae	Per.
Onopordum arenarium (Desf.) Pomel	Libid. Bairoff	Asteraceae	Bi.
Reichardia tingitana (L.) Roth.	Sahani.	Asteraceae	Ann.
Rhantterium suaveolens Desf.		Asteraceae	Per.
Senecio gallicus Chiax	Daraita ,Mourare.	Asteraceae	Ann.
Sonchus oleraceus L.	Tefaf.	Asteraceae	Ann.

... continued (b) Monocotyledons

Asphodelus fistulosus L.	Lehiat ettaes	Liliaceae	Ann.
Muscari comosum (L.) Mill.	Keltout , Katout	Liliaceae	Ann.
Allium nigrum L.		Alliaceae	Ann.
Avena fatua L.		Poaceae	Ann.
Avena sterilis L.		Poaceae	Ann.
Bromus rigidus Roth.		Poaceae	Ann.
Cutandia dichotoma (Forsk.) Trabut	Zewahn , bu 'rukba	Poaceae	Ann.
Cynodon dactylon (L.) Pers.	Najem , Najieel	Poaceae	Ann.
Hordeum murinm L.		Poaceae	Ann.
Lolium rigidum Gaud.	Bomanjor.	Poaceae	Ann.
Phalaris minor Retz.	Zewan	Poaceae	Ann.
Stipa capensis Thunb.	Behma	Poaceae	Ann.

Ann. = Annual. Bi.= Biennial. Per. = Perennial.

From this study of a total of 80 species of flowering weed plants representing 65 genera and 23 families have been collected. Dicotyledons were represented by 20 families, 55 genera and 68 species whereas; Monocotyledons were represented by three families, ten genera and 12 species (Table 2). The ratio of Dicotyledons to Monocotyledons is roughly 6: 1. Out of the 80 weed species, three were 59 annuals, Four biennials and 17 perennials.

Table (2): Different taxonomic groups present in the study area.

Plant group	No. of families	No. of Genera	No. Species
Dicotyledons	**20**	**55**	**68**
Monocotyledons	**3**	**10**	**12**
Total	**23**	**65**	**80**

Two families were considered as largest families with respect to the number of their species, (more than 15 species), Fabaceae with 17 species and Asteraceae with 15 species. The next largest family was Poaceae with nine species, followed by Brassicaceae with eight species. Boraginaceae represented by four species (Table 3).

Seven families namely, Polygonaceae, Chenopodiaceae, Papaveraceae, Geraniaceae, Malvaceae, Convolvulaceae and Liliaceae included two species each. Alliaceae, Primulaceae, Orobanchaceae, Illecebraceae, Amaranthaceae, Ranunculaceae, Apiaceae, Scrophulariaceae, Plantaginaceae, Lamiaceae and Euphorbiaceae were represented by only a single species each.

According to the number of species in each genera, in the study area, *Astragalus* and *Medicago* were the only two genus represented by four species each. Only one genus namely *Vicia* has three species. Seven genera namely, *Papaver*, *Lotus*, *Erodium*, *Malva*, *Convolvulus*, *Echium* and *Avena* were represented by two species each in the study area. The rest fifty-five genera were represented by only one species each.

Table (3): The four largest families in the flora of the study area and flora of Libya.

Libyan family	No. of species	Study area	No. of species
Asteraceae	237	Fabaceae	17
Poaceae	228	Asteraceae	15
Fabaceae	208	Poaceae	9
Brassicaceae	90	Brassicaceae	8

Comparison between the distribution of weed species in the study area with that recorded for other regions in Libya, showed that there were 43 species recorded in the study area, were not recorded in GMR agricultural project of Sirte (*20*).

Moreover, 67 weed species were recorded in the study area were not recorded in Al Milaytaniyah region in AL-Jabal AL-Akhdar (*19*). Furthermore, 87 weed species were recorded in the study area were not recorded in the southern region of Libya (Fazan) (*16*). In addition to, 93 weed species were recorded in the study area were not recorded in the El-Kufra agricultural project (*14*). Finally, from the obtained data and the comparison of these data with published surveys one might say that there were six species considered to be the most dominant in agricultural fields in all parts of Libya. These species were: *Bromus rigidus, Lolium rigidum, Anagallis arvensis, Brassica tournefortii, Melilotus indicus,* and *Emex spinosus.*

Conclusion

The present work was showed that many species of weeds with respect to habitat, habit and edaphography, are infesting the barley crop in Jardina – Soloq regions. These weeds cause heavy losses to the yield of wheat crop. In order to obtain a better yield, it is necessary to employ appropriate and sustainable management strategies including biological, mechanical, and chemical, for weed control. And this information can be a useful tool for the selection of weed control methods.

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مسح لانواع الحشائش المنتشرة في حقول محصول الشعير بمزارع مشروع استثمار مياه النهر الصناعي بمنطقة جردينة وسلوق - ليبيا

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الملخص العربي

تهدف هذه الدراسة لتسجيل أنواع الحشائش في حقول الشعير بمزارع اجهار استثمار مياه النهر الصناعي (جاردينة - سلوق) لتوفير قاعدة بيانات يمكن استخدامها في تقدير الخسائر التي تسببها الحشائش بالإضافة إلى لفت الانتباه إلى الأضرارالاقتصادية التي تسببها الحشائش في المشروع الزراعي وتطوير طرق مقاومتها. تم إجراء زيارات ميدانية متعددة لاستقصاء أنواع الحشائش الضارة النامية طبيعيا في محصول الشعير في الفترة من يناير 2016 إلى مارس 2018 . تم التعرف على النباتات بمساعدة مراجع الفلورا المتاحة ومن خلال المقارنة مع الأنواع النباتية المحفوظة بالمعشبة. تم إعداد سجل للبيانات على هيئة اسم الفصيلة والاسم العلمي والاسم المحلي واشكال الحياة وطبيعة النبات . القائمة تضمنت 80 نوعاً من الحشائش تنتمي إلى 65 جنساً و 23 فصيلة . ذوات الفلقتين تمثلت بـ 68 نوعًا و 55 جنسًا و 20 فصيلة بينما ذوات الفلقة الواحدة تمثلت بـ 12 نوعًا و 10 أجناس و 3 فصائل. بناء على عدد الأنواع النباتية تم حصر ثلاث فصائل سائدة في منطقة الدراسة وهي الفصيلة البقولية (Fabaceae) 17 نوعًا تليها الفصيلة المركبة (Asteraceae) 15 نوعًا ثم الفصيلة النجيلية (Poaceae) تسعة أنواع .

الكلمات المفتاحية: أنواع الحشائش. مشروع زراعي, جاردينا و سلوق