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Weeds documentation of *poaceae* family from Saudi Arabia Taif area, Saudi Arabia

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Weeds are wild plants grow in an environment without the contribution of any human activities that that have positive or negative impact to the environment. The study aims at carrying a survey on weeds of family Poaceae grown in cultivated environment with purpose of recording and identification. The study was conducted in the Taif region of Saudi Arabian kingdom in a mountain with an elevation level of (Area A = Al sail 1700 m, Area B = Al Wahat and Al Watit 1500, C = Leeih 1500, D = AL Gaim and Saisad 1500, F = E = Al Shafa 2200 m, F = AL Hada = 2000 m). The study was conducted during December 2017 to December 2018. The study was carried out based on environmental survey. Diverse number of weeds were identified and collected from the examined study area. Results revealed 23 species of weeds from the family in the study field. *Rosa damascene* have the highest number of abundances with 656, followed by *Digitaria sanguinalis* 618, *Cynodon dactylon* 562 and *Minuartia filifolia* with least abundance 17 among all the documented species. The study provided the base line information on the diversity and distribution of weeds from the family Poaceae which will be used for the control of weeds in the area to enhance agricultural productivity in terms of quality and yield. Also has provided insight on purposeful weeds control in Taif Area. The study recommends further studies on order types of weeds in the area.

Keywords: Weeds; Poaceae; Taif Area; Saudi Arabia

INTRODUCTION

Weeds compete for natural resources with crops, such as nutrients light and water (Armengot et al., 2011). Promotion of diseases problems are also associated to weeds, slow down harvesting, weed serve as alternative hosts to insects and many harmful diseases, leads to increase in production cost, devaluate the crop value in the market and also increase the chances of fire outbreak before harvesting. Weeds also reproduce similar to order species of plants. Thus, the weeds quantity and quality in the soil are the sole responsible for the determination of the situation within the arable land. The term weeds are interchanging as a plant grown in a place not required for utilisation (Armengot et al., 2011). Reported by Armengot et al., (2011) in the

process of describing weeds from attock district of Hazara that some weeds positive impacts but nevertheless they also possess negative consequences to the environment. Like damage of the agricultural crops, plants of medicinal value and pest. Thereby, living farmers with no option rather to take measures in order to overcome them. Weeds are plants species that are difficult to control as a result of their rapid growth and production (Fuente et al., 2010). Germination of weeds is always earlier than any cultivated crop, similarly to the growth, flowering and long lifespan (Andreasen & Stryhn, 2012). Weeds are aggressive in terms acclimatization to the environment; which make them to be dominant in area if allowed for a certain period without control (Sullivan et al., 2009). Weeds are naturally

design that their seeds are protected even in the absence of water and distributed. They possess potential of germination under critical conditions. Their characteristics vary greatly depending on their types and season. Weeds dispersal is achieved through many ways; natural agents birds, winds, animal grazing and by the farmers through transportation of the harvested cereals. Weeds can invade reserved environment meant for cultivation. Weeds have negative effect on the abundance, diversity and pollination of permanent plants and cultivated crops. It has been reported the world total annual loss of food production due to the weeds is 11% annually. In crop production, weed control is paramount and important due to its effect on the quality and quantity of the yields at the end of the cultivation. All over the world weeds has been considered as the most threat to the conservation of economical plants. It is paramount to control and managed weeds in a reserved cultivated environment, unreserved to avoid overpowering of the economical plants. Therefore, there is need for specialized personnel to be enlightening the farmers and the populace on how to manage weeds around their farms and community. Measures has to put in place, such as cultural, mechanical, integrated cultivation, chemical, biological control and or combination of both methods in order to economically and effectively control the weeds. In order to effectively control weeds, there is also needs for the flowing study in a period of interval of time, there is need phenology study, periods of flowering and fruiting, methods of dispersal. The geographical location of Middle East is a region with a complex diverse display of topography with high peak mountains above 5000m with 400 m depression below the sea level, plateaus with elevation, Foothills Mountain and plains alluvial. The region contrast climates vary greatly from mild continental Mediterranean type to extremely type subtropical weather. Desert rainless to high plateaus extremely cold. The vegetation composed of humid dense forest, moist and dry steppes, Park Forest and semi deserts. Based on the phytogeographical and geological history of the Middle East, it has been reported as early as period of Pleistocene human being has strongly influence the vegetation and flora which results in domestication of the native animals and plants in the area. Quite number of on the vegetational type and ecological aspect of Saudi Arabia (Majrashi et al., 2018). Others studies covered some regional aspect of Saudi kingdom. The vegetational type of

Makkah Jeddah and Madinah Badr road was described by (Dogara et al., 2017). Elaborated investigation was carried out on Aseer Mountains based on the change in relation to the mountain elevation and analysis on the diversity of the species Hijaz central mountain (Majrashi et al., 2018). Studies of the mountain in Taif area in relation to environment revealed that salinity and soil water table are responsible for the discontinuities in the vegetational area. The vegetation and floristic diversity of Raud in the central part of Saudi Arabia has been analysed by Majrshi & Khandaker, (2016). Comparative studies of Riyadh in the central region of Saudi Arabia was also conducted (Majrshi & Khandaker 2016). Nevertheless, not much studies have been carried out on the diversity, distribution and analysis of plants species in Saudi Arabia. Investigation on weeds based on different elevation levels will provide baseline information needed on determination the level of competition of weeds with economical crops. In Taif Area agricultural activities create source of income in places like floricultural, Ornamental, horticultural crops cultivation and Ornamental. In Saudi Arabia agricultural activities are aspect with economical values. In Arabian Peninsular the Saudi Arabian flora is one with the riches diversity. The flora also has many endemic species from Africa, Asia and Mediterranean region. Gymnosperms and pteridophytes with total no of 2250 species represented the flora of Saudi Arabia in 142 families. 600 are endangered and rare while 242 are endemic species. The cultivated crops in the region are mostly documented to have stunted growth with poorly development of canopy at their early stage. Therefore, the environment exposes them susceptible to compete with other natural plants like weeds with negative effect to growth and yields of the crops. The following study aimed conducting research on the survey of weeds in area of Taif Saudi Arabia. To our knowledge no research has been previously carried on the area. Results of the study we hope will address the lingering issues of how to manage weeds toward agricultural importance in Saudi Arabia.

MATERIALS AND METHODS

The Study Area (Taif Area) Figure 1 on the Sarwat Mountains eastern slopes at the altitude of 1700 m above sea level of the Mountains with increases toward the head to the south and west up to the level of 2500 m, located around N 20-22° and E 40-42°.



Figure 1; Poceace flora in Taif Saudi Arabia kingdom

The Farm Number:.....

Crop Name:..... Area Name:

Coordinates :.....

A diagram showing the arrangement of six quadrats in a 2x3 grid. Each quadrat is a rectangle with a small 'x' mark at its center. The quadrats are arranged in two rows and three columns. The top row has two quadrats, and the bottom row has two quadrats. The middle quadrat is centered between the two quadrats in the top row. The quadrats are arranged in a 2x3 grid.

Figure 2: Experimental design and quadrats arrangement of weeds in Taif crops at Six Areas.

The vegetation of the Taif is famous in agricultural activities among the communities of Saudi Arabia Kingdom. With the total preserved area for agricultural activities of more than 594 000 hectares and approximately 594 000 farms. The study was carried at mountain at an elevation level of (Area A = Al sail 1700 m, Area B = Al Wahat and Al Watit 1500, C = Leeih 1500, D = AL Gaim and Saisad 1500, F = E = Al Shafa 2200 m, F = AL Hada = 2000 m) Figure 2. The collected sample where identified and herbarium sample was prepared for further identification and deposition in herbarium. The weed was collected in an area where cultivation is taking place. The diversity and determination of the species were carried out based on the methods described by Majrshi & Khandaker, (2016).

Data analysis

Analysis of the Data collected were converted to log+1 prior to statistical analysis and further subjected to one-way ANOVA. Means were tested for significant difference, data with significant difference were further subjected to t-tests. The mean difference was significant at $p \leq 0.05$ level.

RESULTS AND DISCUSSION

The major constraints in agricultural production are weeds, and still consider as primary producers within the agricultural biodiversity (Marshall et al., 2003). Weeds were known to have ecological role in biodiversity. Studying weeds competitiveness and their mode of growth will aid in identification and proposing a management control which will aid in vegetational control (Andreasen & Stryhn, 2012). Recently there is prioritization on sustainability of agricultural environment or landscape achieved by reliance on the ecological management and services (Fried et al., 2014). Looking at the said context, management of biodiversity is paramount in a view as a important strategy for coping against the risk of agricultural future uncertainty (Fried et al., 2009; Peters et al., 2014). The biodata found in an ecosystem, weeds contribute significantly either positively or negatively in supporting the diversity in the ecosystem (Marshall et al., 2003). Taif vegetation analysis was conducted to know the diversity of weeds species in the landscape. As it has been previously reported to determine or propose a better management of weeds strategy largely depends on the available knowledge of the diversity and distribution of the weeds in the vegetational area (Fried et al., 2004; Marshall et

al., 2003). (Fried et al., 2008) also reported that cultivated crop status has to be access in order to ascertain or determine the composition and dominance of weeds species in an experimental area. Knowing the status of weeds species in agricultural environment will greatly help in strategy management in overtaking the cultivated crop in the area (Baessler & Klotz, 2006). Weed abundance and distribution and distribution have reported to be changing overtime with either increase or decrease depending on the situation (Fuente et al., 2006). Weeds from family Poaceae grow to a height of 4 to 31 cm in cultivated and uncultivated environment. Their leaves are curved and crinkled. The leaf blades are in pointed view with an average long 14cm and maximum wide 15mm. the parallel vein are present in the leaf sheath and blade with two auricles (Weber et al., 2008). The stalks in the flowering spread wide, triangular in shape with maximum growth of up to 8cm. The followers are evergreen at times with purple tinged. Members of the family Poaceae are wind pollinated, which makes the weeds not to possess showy petals and sepals (Daehler, 1998). The weed flowers possess typically possess 4 to 7 stamens. Three united carpels in the ovary forming one single chamber. There fruits are called berry, anchene and caryopsis because they are single seed. The flowers are housing in a modified leaf named bracts. Weeds from the family tolerate almost all the weather and environment. Weeds from the family Poaceae have the ability and potentials to reproduce through rhizome, seeds, stems, node, roots or any parts of the weeds (Majrshi & Khandaker, 2016). The status of vegetation with weed in Taif area was carried out in six experimental cultivation environments based on their dominance pattern, density and distribution was determined. In order to achieved success in management of weeds; knowledge of the fields, types and nature of the weeds grown in the area must be determine to the present knowledge (Majrshi & Khandaker, 2016). From the results *Rosa damascene* was found to have highest density in all examined different level of the strata with the highest abundance in area 369 followed by area 6 237, then area 2 50 while area 1, 3 and no species of *Rosa damascene* was found (Table 1). The findings are in agreement with Aldrich (1984) documented is not very common to find a single weed species dominant in all over area of agricultural activities.

Table 1: Inventory of weeds in Taif Area of Saudi Arabia

Species Name	Weed number						Total
	Area1	Area2	Area3	Area4	Area5	Area6	
<i>Agropyron repons</i>	8	21	40	104	0	0	173
<i>Astrebala pectinata</i>	70	149	33	65	2	0	319
<i>cynodon dactylon</i>	272	37	155	40	20	38	562
<i>Digitaria sanguinalis</i>	5	43	33	0	369	168	618
<i>Eleusine indica</i>	0	0	0	0	10	8	18
<i>Minuartia filifolia</i>	8	2	4	3	0	0	17
<i>Polypogon monsepeliensis</i>	40	70	65	32	7	17	231
<i>Saccharum officinarum</i>	49	55	80	83	0	20	287
<i>Setaria viridis</i>	143	87	122	20	7	7	386
<i>Stipagrostis bemralri</i>	44	34	17	29	0	0	124
Grand total							2735

Table 2: inventory of weeds in Taif Area of Saudi Arabia

Species Name	Weed number						Total
	Area1	Area2	Area3	Area4	Area5	Area6	
<i>Rosa damascena</i>	0	50	0	0	369	237	656
<i>Cucurbita pepo</i>	12	13	83	40	10	12	170
<i>Brassica oleracea var. capitata</i>	4	31	11	9	0	28	83
<i>Brassica oleracea var. botrytis</i>	50	68		89			207
<i>Lactuca sativa</i>	33		35	28	21	12	129
<i>Allium cepa</i>	29	40		72			141
<i>Vicia faba</i>		12	23				35
<i>Solanum melongena</i>		40	12				52
<i>Zea mays</i>	3		58	31			92
<i>Phoenix dactylifera</i>	48		36	44			128
<i>Ficus carica</i>	220	21			78	100	419
<i>Punica granatum</i>	122	61	90				273
<i>Vitis spp.</i>		137	124	89			350
Grand total							2735

From the result (Table 2) *Digitaria sanguinalis* was found as the second most abundant species with highest abundance in Area 5 369, Area 6 168, area 2 43, area 3 33, and area 1 only 1 while 4 no species of *Digitaria sanguinalis* was observed. The study is also in agreement with Aldrich (1984). Table 1 also revealed *Cynodon dactylon* as the third most abundant species in the study area with the total abundance of 562 across the six study area with high abundance in area 1: 272, followed area 3: 155, area 4: 40, area 6: 38, area 4: 37 and lastly area 5: 20. This supported

the findings Majrshi & Khandake, (2016).

Among all the examined species *Minuartia filifolia* was found to have list abundance and distribution with total number of 17 in an area 1: 8, area 3: 4, area 4: 3 and area 2; 2. Followed by *Eleusine indica* with total abundance of 18. *Vicia faba* 35 distributed only in area 2 and 3 with density of 12 and 23 respectively (Table 2). *Solanum melongena* 52 distributed in area 2; 40 and area 3: 12. Similar results was reported by Majrshi & Khandake, (2016). In a cultivated environment, the density of weeds has never been constant (Abdullah et al., 2017). As a result

of climates, environmental changes, growing season, cropping system, composition of weed seed bank, cultural practices animal and human activities they in a dynamic state flux (Abdullah et al., 2017). Majrashi & Khandake, (2016) previously reported the diversity and compositional pattern of weeds changes with time with human activities. Daehler, (1998) reported weed as an ecological complex entity that need to be revisiting at interval of time. The abundance of weeds in a cultivated area is in relation with type of plants planted or cropping system in the area (DiTomaso, 2000). Different flora of weeds is reported from different levels of the strata of the investigation (Richardson et al., 2000). Application of different types of fertilizer sometimes determine the distribution and abundance of weeds in an environment (Abdulrahman et al., 2018). In order to have effective weeds management patterns and dominance distribution of weeds is paramount in order to fully propose a management pattern.

CONCLUSION

The study concluded that *Digitaria sanguinalis*, *Cynodon dactylon* and *Minuartia filifolia* are more densely populated among the examined from the family Poaceae at all the different in Taif area of Saudi Arabia. The study provided the base line information on the diversity and distribution of weeds from the family Poaceae which will be used for the control of weeds in the area to enhance agricultural productivity in terms of quality and yield. Also has provided insight on purposeful weeds control in Taif Area. The study recommends further studies on order types of weeds in the area.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

The author contributed to all parts of the research.

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