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SURVEY OF *CHENOPODIACEAE* FAMILY FROM TAIF, SAUDI ARABIA PENINSULA

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Abstract

Weeds are consider as a significant important biological indicator of crop production resulting to yield loss of about 50%. Identification of weeds is very difficult from their morphological features. Despite weeds are the real challenge in farming in the developed, developing and underdeveloped countries. Nevertheless, weeds are also part of primary producers. Major constrain of crop production are weeds but they are also consider as important aspect of agricultural system in the world. Weeds are wild plants grow in an environment without the contribution of any human activities that have positive or negative impact to the environment. The aim of the study is to documents weeds of family *Chenopodiaceae* and agricultural crops grown in 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 m, C = Leeih 1500 m, D = AL Gaim and Saisad 1500 m, F = E = Al Shafa 2200 m, F = AL Hada = 2000 m). The study was carried out based on environmental survey. Diverse number of weeds were identified and collected from the examined study area. Results revealed aggressive weeds species. *Atriplex leucoclada, Chenopodium valria, Chenopodium album, Chenopodium murale, Chenopodium vulvaria, Chenopodium mavele, Dysphania ambrosioides* and *Lamb's quarters* with the total number of 1727. *Chenopodium vulvaria*was found with the highest number of species 553, follow by *Chenopodium album* 394 and the least is *Lamb's quarters* 17. The study, similarly, documented 12 agricultural crops weeds from the study area; *Portulaca oleracea, Raphanus sativus, Phoenix dactylifera, Mentha, Rosa damascena, Solanum melongena, Petroselinum* sp, *Zea mays, Cauliflower, Vitis* spp, *Brassica oleracea var. capitate* and *Cucurbita pepo*. Findings from the study will aid management control and proposing research toward improved new weed control measures. Also has provided insight on purposeful weeds control in Taif Area.

Key words: Weeds; *Chenopodiaceae,* Crop, Taif Area; Saudi Arabia.

Introduction

Weeds are consider generally as unwanted, undesirable having significant negative effect when competing with other agricultural crops. The pressure of the weeds is becoming a serious issue (Haris, 1988). Researchers have documented less attention was given to the destruction of weeds habitats in the tropical environments which resulted to damaging of the agricultural crops (Clements *et al.,* 2004). It has been reported more than 31,000 species of plants are weeds. Almost 300 are troublesome weed that has effect on the environments (Kleijn *et al.,* 2004). Significant amount of yield loss was a results of the weed effects on the plants. The goals of a weed scientist are understanding distribution, nature and abundance of weed species within an agroecosystem is an important aspect of the study (Enninful, 2019). Geographical distribution of the weeds species is termed as abundance, understanding the biological life cycle of the weed species is termed as nature and measuring the frequency of the individual weeds species is termed as abundance (Majrashi *et al.,* 2018). Concept of studying the distribution and abundance of weed species in a particular landscape aids in determining how the population affect or change the compositions overtime. Knowledge of abundance, density and distribution of weed in a landscape is paramount or prerequisite for its effective management. It also helps in knowing how the pressure is affecting agricultural activities in the area. Diversity and abundance of weeds

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vary greatly with the location of the environment and agricultural activities (Pimental *et al.,* 2005). Both for biodiversity and agricultural practices needs exact estimation of the weed's population in an area (Marshal *et al.,* 2003). The competition results in the affecting of the quality and quantity of the yield (Marshal *et al.,* 2003). Disease across to the cultivated crops from the infestation of the weeds. Weeds infestation also result in the attraction of insect to the cultivated lands. Reported by Majrshi and Khandaker (2016) weeds are responsible for the loss of more than 50% of annual agricultural products all over the world. Averagely, it has been estimated 10% of loss in agricultural product are documented annually in less developed countries and more than 20% in developed countries. Thus, knowledge of the weed species community composition is an important component of weed strategic management, essential in setting priorities for weeds species management and research purposes.

Weeds compete for natural resources with crops, such as nutrients light and water (Thorp and Lynch, 2000). 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. Weed 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. The goals of a weed scientist are understanding distribution, nature and abundance of weed species within an agroecosystem is an important aspect of the study (Abdullah *et al.,* 2017; Majrashi *et al.,* 2014). Geographical distribution of the weeds species is termed as abundance, understanding the biological life cycle of the weed species is termed as nature and measuring the frequency of the individual weeds species is termed as abundance. Concept of studying the distribution and abundance of weed species in a particular landscape aids in determining how the population affect or change the compositions overtime (Fried *et al.,* 2009). Knowledge of abundance, density and distribution of weed in a landscape is paramount or prerequisite for its effective management (Andreasen and stryhn, 2008). It also helps in knowing how the pressure is affecting agricultural activities in the area (Marshal, 2004). Diversity and abundance of weeds vary greatly with the location of the environment and agricultural activities. Both for biodiversity and agricultural practices needs exact estimation of the weed's population in an area (Jobin *et al.,* 1997). Biodiversity deals with the abundance, relationship of the species with other living species in the environment; human, animals and other plants species (Fried *et al.,* 2008). While in the case of agriculture deals with the application of herbicidal to the management of the weeds. One of the major threats of the world agriculture are weed; it tremendously reduced the quality and yield of agricultural products. Similarly, they also served as interacting components of the ecosystem.

Weeds paused a serious challenge all over the world in respect to the agricultural products. Weeds if left unmanaged results to the yield loss of more than 70% of the planted crop. Studies has to be established, principles of integrated management of weeds. Group of populations interacting together in a particular place is known as a community (Dachler *et al.,* 2004). Agricultural system is currently undergoing uprising in political social shift to form a sustainable agricultural system with the aim of providing adequate ecological biodiversity and food production. Weeds are wild plants grow in an environment without the contribution of any human activities that have positive or negative impact to the environment. The relationship or correlation existed among the community and diversity stability, bring the needs to conserve the biological richness within the environments. Weeds species can be influenced in a cropland by fertilization treatments and tillage system. Environmental conditions have also been taken into account. In order to document and evaluate various agricultural land scape, variety of agricultural indices most put in place (Daehler *et al.,* 2004). It also reported that in order to understand weeds biodiversity or community composition appropriate key indices most put into considerations. The following study aimed conducting research on the survey of *Chenopodiaceae* family 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) Fig. 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°.

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

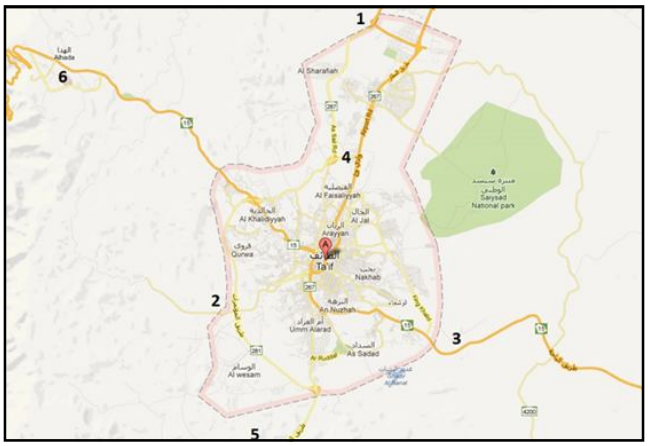

Fig. 1: Taif, Saudi Arabia kingdom.

elevation level of (Area A = Al sail 1700 m, Area B = Al Wahat and Al Watit 1500 m, C = Leeih 1500 m, D = AL Gaim and Saisad 1500 m, E = Al Shafa 2200 m, and F = AL Hada 2000 m) Fig. 1. The weed survey from the different areas of Taif was carried out between the 2017 and 2019. 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 invasion extent of crops by weeds, the level of intensity of various weed species were based on arbitrary observations. The finding of the study of Mandarille (1990). was used as reference point for identification of weed species Fig. 1.

The diversity and determination of the species were carried out based on the methods described by Majrashi and Khandaker, (2016). Weed species of different crop fields and areas were collected according to the experimental design shown in above Fig. 2.

Data analysis

Analysis of the data collected from different areas of Taif were converted to $\log^{+1}$ prior to statistical analysis

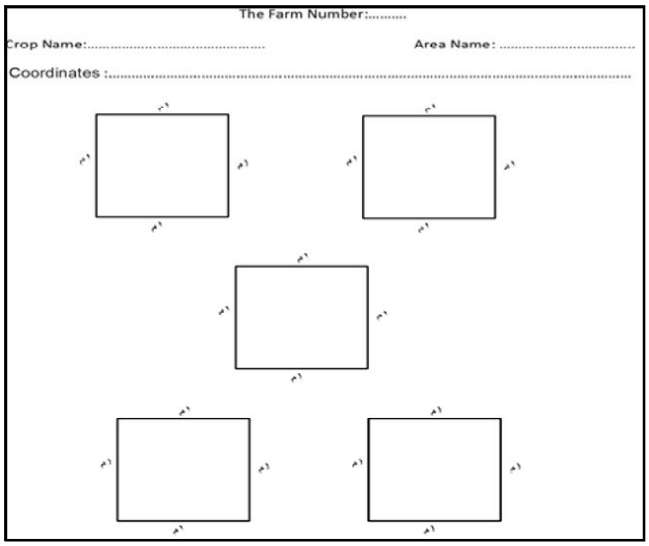

Fig. 2: Experimental design and quadrats arrangement of weeds in Taif crops at Six Areas.

and further subjected to one-way ANOVA means were tested for signiflcant difference, data with significant difference were further subjected to t-tests. A similar analysis was used previously by Juan *et al.,* (2010) and Levi *et al.,* (2011).

Results

The study documents 8 species of weed from the *Chenopodiaceae* family in six of the study areas in Taif, Saudi Arabia Peninsular table 1. The survey shows that *Chenopodium vulvaria* was found with highest number of species (389) from study area 3 table 1, followedby *Chenopodium alba* and *Chenopodium murale* with a number weed 200 and 81 which was found in the study area of 1 and 3 table 1. The highest *Atriplex leucoclada* was found in area 4; 66, area 1; 51, area 2; 24, area 3; 20 and the least was documented from area 6; 1 table 1. *Chenopodium valria* abundant was higher in area 2 with a weed number of 36 but in area 5 was none. From the data, it was observed that *Chenopodium murale* is only weed that was abounded in all six areas equally. The highest density of this weed recorded in area 2 (97) followed by area 3 and 1 with a weed number of 81 and 77, respectively table 1. Table 1 also shows that the species *Chenopodium mavele*, *Dysphania ambrosioides* and *Lambs quarters* abounded were lower than the other five species. *Lambs quarteys* documented in study area of 1, 2 and 3 with a weed number of 4, 5 and 2, respectively. The species was not found in area of 4, 5 an r6, respectively.

Table 1: Weeds species documented from Taif, Saudi Arabia Peninsula.

Species Name	Weed number						Total
	Area1	Area2	Area3	Area4	Area5	Area6	
Atriplex leucoclada	51	24	20	66	2	1	164
Chenopodium valria	21	36	19	30	-	2	108
Chenopodium album	200	58	84	49	3	-	394
Chenopodium murale	77	97	81	62	29	29	375
Chenopodium vulvaria	30	50	389	70	6	8	553
Chenopodium mavele	8	9	19	16	4	-	56
Dysphania ambrosioides	10	14	17	16	2	-	59
Lambs quarters	4	5	2	-	-	-	17
Total							1727

Area A = Al sail 1700 m, Area B = Al Wahat and Al Watit 1500 m, C = Leeih 1500 m, D = AL Gaim and Saisad 1500 m, E = Al Shafa 2200 m, and F = AL Hada 2000 m.

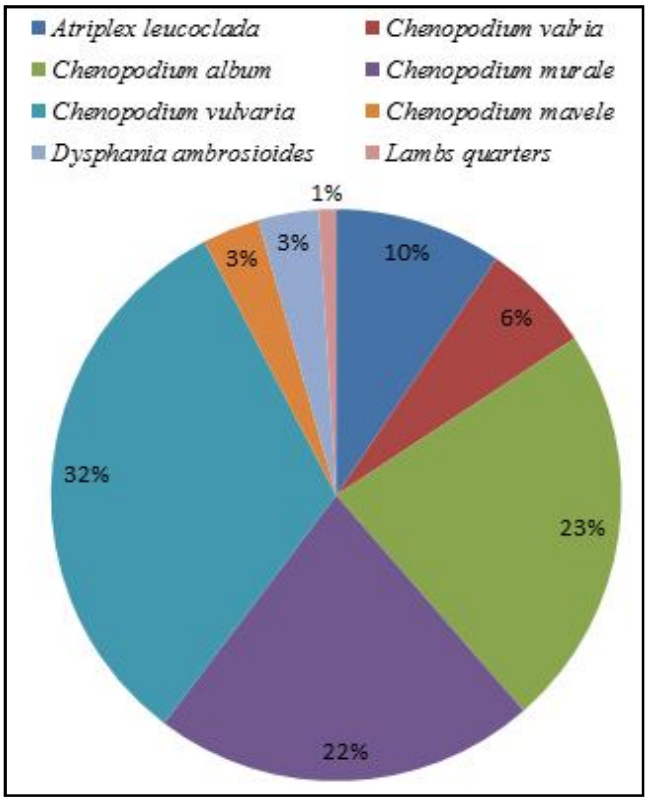

Fig. 3: Total weed species in different areas of Taif, Saudi Arabia Peninsular.

The study documents 8 species; *Atriplex leucoclada, Chenopodium valria, Chenopodium album, Chenopodium murale, Chenopodium vulvaria, Chenopodium mavele, Dysphania ambrosioides and Lambs quarters* with the total number of 1727. *Chenopodium vulvaria*was found with highest number of species 553, follow by *Chenopodium album* 394 and the least is *Lambs quarters* 17.

Fig. 3 prescribed the percent densities of weed species in six areas of Taif. From the above pie chart, it can be seen that the highest weed density (32%) recorded for *Chenopodium vulvaria* species followed by *Chenopodium alba and Chenopodium murale species* with a value of 23 and 22 %, respectively. Medium weed densities (3 -10%) were found for another four species. The lowest weed density (only 1%) was recorded for *Lambs quarters species* Fig. 3.

The study, similarly, documented 12 agricultural crops from the study area; *Portulaca oleracea*, *Raphanus sativus, Phoenix dactylifera, Mentha, Rosa damascena, Solanum melongena, Petroselinum* sp, *Zea mays, Cauliflower, Vitis* spp, *Brassica oleracea var. capitate* and *Cucurbita pepo* as shown in table 2.

Table 2 prescribed the densities of weed in different agricultural plant field of Taif Saudi Arabia Peninsular. From the survey of area 1, it can be reported that the highest density of weeds (253) found in Mentha crops, followed by *Vitis* spp, *Portulaca oleracea* and Cauliflower crops with a weed value 48, 32 and 24, respectively table 2. In case of area 2, the highest weed density also recorded in Mantha crop (95) followed by *Solanum melongena, Cauliflower and Rosa damascene* crops with a weed number of 56, 36 and 26, respectively table 2. The number of weeds in *Phoenix dactylifera* and *Cucurbita pepo*crops were almost double than the weeds number of other crops in case of area 3. As can be seen from the table 2, weeds number was the highest (379) in *Petroselinum* sp. crop field of area 4 compared to others areas of Taif. The weed density in area 4 was medium except the crop field of *Rosa damascene* table 2. The highest weed density (35) was recorded in *Petroselinum* sp. crop field of area 5 followed

Table 2: Agricultural crops documented from Taif, Saudi Arabia Peninsular.

Agricultural crops Species name	Weeds number							
	English name	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Total
Portulaca oleracea	Pursley	32	11	-	1	-	-	44
Raphanus sativus	Radish	16	6	-	43	-	-	65
Phoenix dactylifera	Date palm	19	-	85	-	2	-	106
Mentha	Mint	253	95	26	62	3	8	447
Rosa damascena	Flower	-	26	-	-	29	29	58
Solanum melongena	Eggplant	30	56	18	70	-	-	174
Petroselinum sp.	Parsley		-	-	379	35	-	414
Zea mays	Maize		-	4	6	4	-	14
Cauliflower	Courgette	24	36	20	67	-	-	147
Vitis spp	Grape	48	-	10	2	-	2	62
Brassica oleracea var. Capitata	Cabbage	15	-	41	11	-	-	67
Cucurbita pepo	Courgette	8	6	78	39	-	-	129

Area A = Al sail 1700 m, Area B = Al Wahat and Al Watit 1500 m, C = Leeih 1500 m, D = AL Gaim and Saisad 1500 m, E = Al Shafa 2200 m, and F = AL Hada 2000 m.

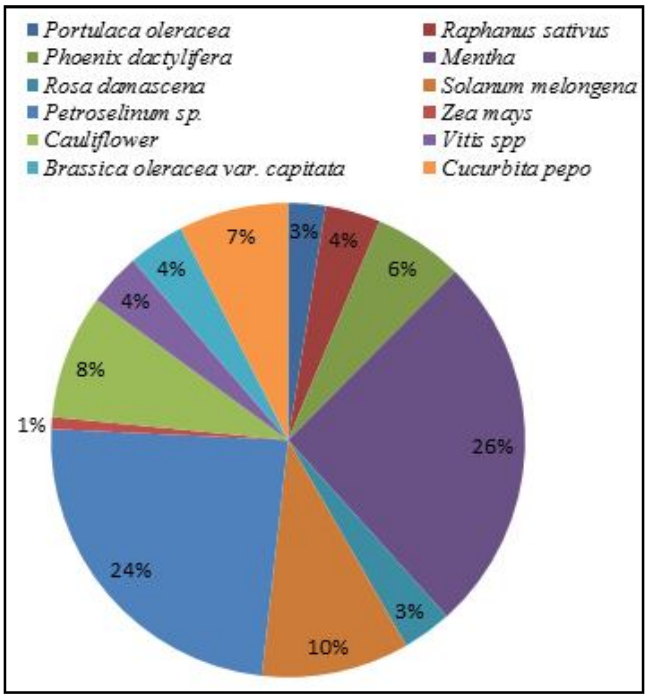

Fig. 4: Weeds density in different types of agricultural crops of Taif, Saudi Arabia Peninsular.

by crop field of *Rosa damascene* and *Zea mays* with a weed number of 29 and 4, respectively. Weed density was very low in the crop field of area 6 and only found in *Rosa damascena, Mentha* and *Vitis spp* field with a weed number of 29, 8 and 2, respectively table 2.

Fig. 4 represents the weeds number in twelve agricultural crops area of Taif, Saudi Arabia Peninsular. Pie chart indicates that weed numbers are highest in Mentha crops with 26 % followed by *Petroselinum sp* and *Solanum melongena* with a value of 24 and 10 %. The lowest percentage of weed density was found in *Zea mays* crops with only 1%.

Discussion

Weeds are plants always competing with the other organisms around them. Weeds council pathogens and insect directly or indirectly leading to damage to the crops (Jabran *et al.,* 2015). The negative damage caused by weeds species vary from species likewise vis crop to crop (Johnson *et al.,* 2009). The environment also determines the magnitude of the lost caused by the weeds in an area. All over the world, it has recorded approximately more than 14% of the agricultural lost was caused by different species of weeds (Pimental *et al.,* 1992). Weeds are always becoming aggressive despite the control putting in place by the government and all other stake holders. It has been previously reported if no serious majors were taken against the unwanted crops (Pimental *et al.,* 2005). The agricultural loss will be above 40% as a result of weeds attack. It has been documented agricultural production (Zimdahl, 2018). Developed countries reported 5% loss in agricultural production yearly. Less developed countries documented 10% yearly on their crop production as a result of attacks by the weeds (Liebman *et al.,* 1997). Least developed nations only realised 70% of agricultural product and 30% loss due to weeds attack (Iyagba, 2010). Developed countries invest much in weeds control than any other pest attacking agricultural product. While the other part of the world less and least developed countries spend a lot of money in weeding of their agricultural land (Pimental, 1996). It has been previously report 50% time spend in farming is for land clearing. Agricultural crop protection against attack from the weeds is the most important aspect of farming activity by the farmer. Allowing weeds to be grown in the cultivated land during the early development of the crop resulted in poor performance of the plants. Rotation farming is likely to serve as good alternative to the management of weeds in a particular environment. In addition, comprehensive and intensive investigation of the weeds most be carried on in relation to the diversity and abundance in every community. Moreover, all agricultural practice decreases or increases the potentiality to influence the presence of a particular weed species in the area (Holzschuh *et al.,* 2008).

Number of studies have reported the negative and positive impacts of reduction on tillage intensity of diversity and abundance of weeds. Generally, increases in weed abundance have reported on the practice of tillage system conservation. Generally, conservation of tillage systems reported to be associated with higher weeds species diversity and richness, as the elimination of tillage creates more enhancing conditions for some weeds in a crop field. While in the case of diversity, no clear record to make proper explanation (Romagni *et al.,* 2000). Though, weeds diversity was reported to be sole dependant on the period of evaluation (mid or long term). Broad leaf annual species were mostly reported to be abundant frequently in conventionally tillage disturbed system. Absence of disturbance in conventionally tillage system reported presence of perennial weeds species. Nevertheless, some studies in vegetable fields using reduced tillage reported increase of the density of the weeds in the area. Composition and structure of weeds species community can be greatly influenced by application of different form of fertilizer and management practice. Differentiation in the availability and concentration of plant nutrients may affect the population of weeds in an environment. Fertilization results in affecting nutrient uptake and soil fertility, though it may in increase yields, at the same time resulting in

modiflcations of weed species communities. Fertilization has been reported to contribute significantly on the diversity and abundance of weeds species in crop field. Very few researches reported increase in nitrogen in the fertilization significantly reduced the abundance and changes in the composition of the weeds species in the cultivated field. Some studies reported decreases in the weeds species with the increases in nitrogen concentrations in the cultivated area. In opposite, increase in phosphorus in fertilization reported to increase the abundance and diversity of the weeds in the field. Other studies reported abundance of weeds species on the increase of the potassium concentrations. Studies reported weed species communities have a tendency to be more less diversified in high as compare to the low than input systems. In the same Fried *et al.,* (2009) reported no significant difference on weed diversity and abundance regarding fertilization application in low or high field.

Traditionally, study of weeds is to examine their management or control not to examine their significant positive or negative to the ecosystem. Therefore, strategy need to put in place for the ecological awareness outside scope of examining individual weed species is necessary. However, in order to address ecological or agronomic hypotheses regarding weed species distribution and abundance in a particular field or environment all weeds need to be carefully study from family to species level. Investigation on weeds based on different elevation levels will provide baseline information needed on determination the level of competition of weeds species with economical crops (Thomas, 1985). In Taif Area agricultural activities create source of income in places like Ornamental, floricultural, 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 (Throp and Lynch, 2000). 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 (Zimdahl, 2018). The cultivated crops in the region are mostly documented to have stunted growth with poorly development of canopy at their early stage. Presently, weeds species are playing significant aspect of making of pest diseases complex. One of the major challenges to date by farmers is effective management of weed control in cultivated field. Therefore, the environment exposes them susceptible to compete with other natural plants like weeds with negative effect to growth and yields of the crops. Composition of weed flora is strongly determined by the regional soil characteristics, climate, method of the management and types of crop cultivated in the area. However, detailed knowledge and information about the occurrence, distribution, and quantitative assessment of the individual weed flora of is lacking in Saudi Arabia Peninsular cultivated fields.

Therefore, this study confirmed aggressive weed species are the major environmental, social and economic threats in the study area for agricultural crops. Special strategic and attention plan required for the control and management of these aggressive weed species. These aggressive are problematic to the agricultural crops as a result of the allelochemicals released by the aggressive weeds. Yusoff *et al.,* (2017) reported that the leaf litter leachate and leaf volatilization of *Passiflora foetida* showed the highest allelopathic activity compared to some other species. Nornasuha and Ismail (2017) reported that allelochemicals from the donor plants can stimulate and/or inhibit the germination and growth of the receiver plants. It has been also reported that allelochemicals greatly reduced the radical and hypocotyl length of seedlings (Saad *et al.,* 2018). Alam *et al.,* (2018) reported that allelopathic properties of crop plants may allow us to use lower amounts of herbicides with benefits for the environment and human health.

Conclusion

The study has documented weeds composition in relation to different altitudes in Taif Saudi Arabia Peninsular Malaysia in association with agricultural crops found in the area. The study has identified some aggressive weeds in the area. The information provided the information needed in the management of weeds in the Taif area in other avoid the effect of allelochemicals of the agricultural crop in the area. The following weeds can also be utilised in the production of herbicides. Further studies should be carried out on the chemical contents of the plants.

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References

Alam, M.A., M.A. Hakim, A.S. Juraimi, M.Y. Rafii, M.M. Hasan and F. Aslani (2018). Potential allelopathic effects of rice plant aqueous extracts on germination and seedling growth of some rice field common weeds. *Italian Journal of Agronomy,* **13:** 1066.

Abdullah, M.A., H. AL-Yasee, Y. AL-Sudani and M. Moneruzaman (2017). Developing Weeds of Agricultural Crops At Different Levels of Heights, In Taif Area Of Saudia

Arabia. *Bulgarian Journal of Agricultural Science,* **23(5):** 762-769.

Andreasen, C. and H. Stryhn (2008). Increasing weed flora in Danish arable fields and its importance for biodiversity. *Weed research,* **48(1):** 1-9.

Clements, D.R., A. DiTommaso, N. Jordan, B.D. Booth, J. Cardina, D. Doohan and C.J. Swanton (2004). Adaptability of plants invading North American cropland. *Agriculture, ecosystems and environment,* **104(3):** 379-398.

Daehler, C.C., J.S. Denslow, S. Ansari and H.C. Kuo (2004). A risk assesment system for screening out invasive pest plants from Hawai2 i and other Pacific Islands. *Conservation Biology,* **18:** 360-368.

Enninful, R. (2019). Physiological characterization of parents of sorghum mapping populations exposed to water-deficit stress. K-State Electronic Theses, Dissertations and Reports: 2004.

Fried, G., S. Petit, F. Dessaint and X. Reboud (2009). Arable weed decline in Northern France: crop edges as refugia for weed conservation? *Biological Conservation,* **142(1):** 238-243.

Fried, G., L.R. Norton and X. Reboud (2008). Environmental and management factors determining weed species composition and diversity in France. *Agriculture, ecosystems and environment,* **128(1-2):** 68-76.

Harris, P. (1988). Environmental impact of weed-control insects. *Bio. Science,* **38(8):** 542-548.

Holzschuh, A., I. Steffan-Dewenter and T. Tscharntke (2008). Agricultural landscapes with organic crops support higher pollinator diversity. *Oikos,* **117(3):** 354–361.

Iyagba, A. (2010). A review on root and tuber crop production and their weed management among small scale farmers in Nigeria. *ARPN Journal of Agricultural and Biological Science,* **5(4):** 52-57.

Jabran, K., G. Mahajan, V. Sardana and B.S. Chauhan (2015). Allelopathy for weed control in agricultural systems. Crop protection, **72:** 57-65.

Jobin, B., C. Boutin and J.L. Des Granges (1997). Effects of agricultural practices on the flora of hedgerows and woodland edges in southern Quebec. *Canadian Journal of Plant Science,* **77(2):** 293-299.

Johnson, W.G., V.M. Davis, G.R. Kruger and S.C. Weller (2009). Influence of glyphosate-resistant cropping systems on weed species shifts and glyphosate-resistant weed populations. *European Journal of Agronomy,* **31(3):** 162-172.

Juan, A.O., M.S. Jose and V. Rafael (2010). Fall fertilization of holm oak affects N and P dynamics, root growth potential, and post-planting phenology and growth. *Annal. of Forest Science,* **68:** 647-656.

Kleijn, D., F. Berendse, R. Smit, N. Gilissen, J. Smit, B. Brak and R. Groeneveld (2004). Ecological effectiveness of agri environment schemes in different agricultural landscapes in the Netherlands. *Conservation biology,* **18(3):** 775-786.

Liebman, M., E.R. Gallandt and L. Jackson (1997). Many little hammers: ecological management of crop-weed interactions. *Ecology in agriculture,* **1:** 291-343.

Levi, M.B., C.T. Giles, S. Steve, M. Kerry and M.C. Ragan (2011). Disturbance, resource pulses and invasion: short-term shifts in competitive effects, not growth responses, favour exotic annuals. *Journal of Applied Ecology,* **48:** 998-1006.

Majrashi, A., M.M. Khandaker, B. Bakar and A.N. Boyce (2014). Influence of fertilizer regimes and water depths on clonal growth, phenology and chlorophyll content of Scirpus grossus in paddy soil. *Asian Journal of Biological Sciences,* **7(5):** 187-197.

Majrashi, A., T. Dalorima, K. Mahmud and M.M. Khandaker (2018). Weeds growth in valley of Leeyh, south of Taif area, Saudi Arabia. *Asian Journal of Agriculture and Biology,* **6(4):** 566-575.

Mandarille, J.P. (1990). Flora of Eastern Saudi Arabia. Kegan Paul International Ltd. London, pp: 482.

Majrshi, A.A. and M.M. Khandaker (2016). Introductory study of weeds with developing Taif Rosa crops in Al-Hada and Al-Shafa Area. *Advances in Environmental Biology,* **10(12):** 18-26.

Marshall, E. (2004). Agricultural landscapes: field margin habitats and their interaction with crop production. *Journal of Crop Improvement,* **12(1-2):** 365-404.

Marshall, E., V. Brown, N. Boatman, P. Lutman, G. Squire and L. Ward (2003). The role of weeds in supporting biological diversity within crop fields. *Weed research,* **43(2):** 77-89.

Nornasuha, Y. and B.S. Ismail (2017). Sustainable Weed Management Using Allelopathic Approach. *Malaysian Journal of Applied Biology,* **46(2):** 1–10.

Pimentel, D. (1996). Green revolution agriculture and chemical hazards. *Science of the Total Environment,* **188:** S86-S98.

Pimentel, D., U. Stachow, D.A. Takacs, H.W. Brubaker, A.R. Dumas, J.J. Meaney and D.B. Corzilius (1992). Conserving biological diversity in agricultural/forestry systems. *Bio. Science,* **42(5):** 354-362.

Pimentel, D., R. Zuniga and D. Morrison (2005). Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological economics,* **52(3):** 273-288.

Romagni, J.G., S.N. Allen and F.E. Dayan (2000). Allelopathic effects of volatile cineoles on two weedy plant species. *Journal of Chemical Ecology,* **26:** 303-313.

Sa'ad, N.A., N. Yusoff, N.H. Hashim, I. Sahid and Y. Fujii (2018). Evaluation for Allelopathic Activity of Selected Tree Species Grown in BRIS soil. *Journal of Agrobiotechnology,* **9(1S):** 260–268.

Thomas, A.G. (1985). Weed survey system used in Saskatchewan for cereal and oilseed crops. *Weed Science,* **33:** 34-43.

Thorp, J.R. and R. Lynch (2000). 'The determination of weeds of national significance.' (National Weeds Strategy Executive Committee: Launceston, Tas.

Yusoff, N., I.S. Johari, N.F.M. Shahidi, N. Mat, B.S. Ismail and Y. Fujii (2017). Allelopathic Assessment of Selected Weed Species from BRIS Soil in Terengganu, Malaysia. *International Journal of Science and Applied Technology,* **2(2):** 1-9.

Zimdahl, R.L. (2018). Fundamentals of weed science: Academic press.