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Bioscience Research

Print ISSN: 1811-9506 Online ISSN: 2218-3973

Journal by Innovative Scientific Information & Services Network

RESEARCH ARTICLE BIOSCIENCE RESEARCH, 2019 16(4): 3949-3955. **OPEN ACCESS**

Survey of *amarantheceae* family from Taif Saudi Arabia peninsular

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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 that have positive or negative impact to the environment. The study aims at carrying a survey on weeds of family *Amarantheceae* 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 between December 2018 to August 2019. The study was carried out based on enviromental survey. Diverse number of weeds were identified and collected from the examined study area. Results revealed 10 aggressive weeds species. *hybridus* 407, *Amaranthus viridis 382, Chenopodium murale* ,*Chenopodium album* 142, *Chenopodium vulvaria* 81, *Amaranthus graecizans* 32, *Chenopodium* 39*, Atriplex leucoclada* 30 ,*Chenopodium opulifolium* 15, *Aerva javanica* 3. Similarly, eight agricultural crops were documented from the study area; *Brassica oleracea var*, *botrytis* 159*, Solanum melongena* 54, *Petroselinum sp* 165, *Ficus carica* 178, *Lactuca sativa* 27, *Punica granatum* 12, *Vitis spp* 43 and *Brassica oleracea* 56 respectively*.* Results of the survey obtained from the study would be useful in creating management control and proposing research toward improved new weed control measures. 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: *Amarantheceae;* Taif; weeds

INTRODUCTION

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 (Marshall, 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 weeds 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, Norton, & Reboud, 2008). While in the case of agriculture deals with the application of herbicidal to the management of the weeds (Armengot et al., 2011). 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 (Henckel et al., 2015). 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 (Boutin, Jobin, & Bélanger, 2003). 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 (Bretagnolle & Gaba, 2015). Also, reported by Abdulrahman et al. (2018) in order to understand weeds biodiversity or community composition appropriate key indices most put into considerations. 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 practise 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 were reported to be sole dependant on the period of evaluation (mid or long term). Broadleaf 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 (Belayneh, 1983). Fertilization results in affecting nutrient uptake and soil fertility, though it may in increase yields, at the same time resulting in modifications of weed species communities. Fertilization has been reported to contribute significantly on the diversity and abundance of weeds species in crop field (Gabriel et al., 2005). 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. In the same vain Abdulrahman et al. (2018b) 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 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 (Abdulrahman et al., 2018b). 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 (Mortensen et al., 1993). 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 (Maroyi, 2013). 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 (Abdulrahman et al., 2018a). 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 (Abdulrahman et al., 2018b). 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. The following study aimed conducting research on the survey of *Amarantheceae* 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 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°. 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 (Ali et al., 2014). 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≤0.05 level.

Figure 1: Taif Saudi Arabia kingdom

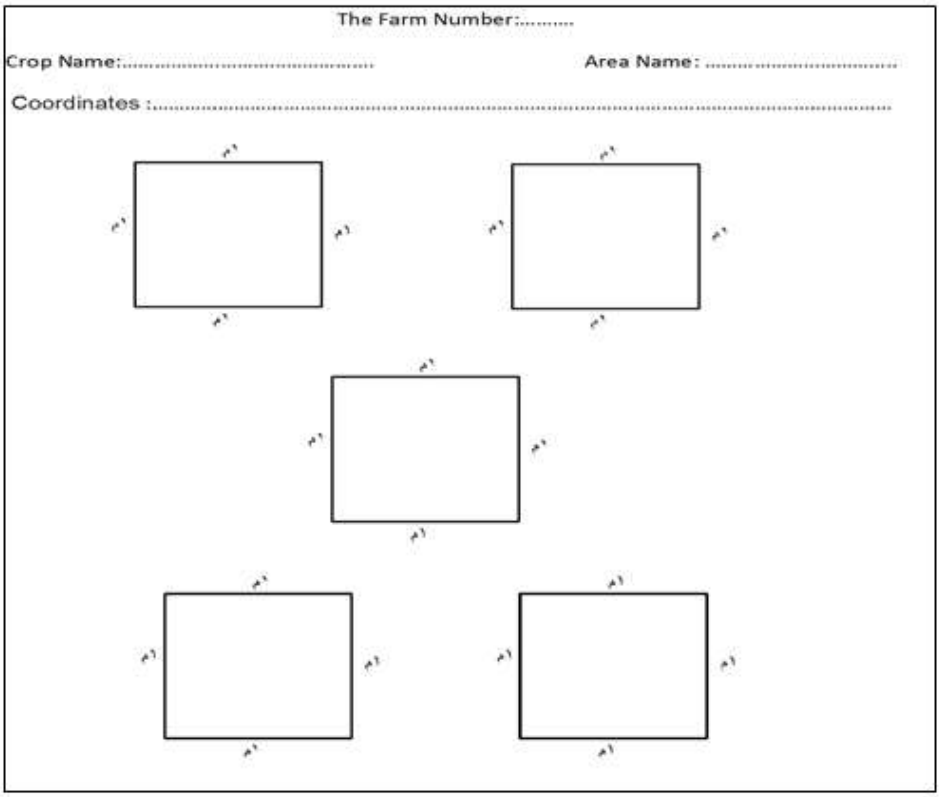

Figure 2: Experimental design and quadrats arrangement of weeds in Taif crops at Six Areas

RESULTS

The study documents 10 species (Table 1) of weed from the *Amarantheceae* family in six of the study areas in Taif Saudi Arabia Peninsular. *Amaranthus hybridus* 407 was found with highest number of species from study area 2, 5 and 6 (Table 1), followed by *Amaranthus viridis 382* which was found in all the study area except in area 1 (Table 1), highest *Amaranthus viridis* was found in area 3; 165, area 5; 84, area 7; 74, area 2; 32 and the least was documented from area 4; 27 (Table 1). *Chenopodium murale* was found to be third most abundant species in the six study area with the total number of 237 but was only found in area 5 and 6 with 163 and 74 respectively. *Chenopodium album* was found to be significant in the study area but only found in area 4; 142. Similarly, *Chenopodium vulvaria* was found only in study area 1; 81. *Amaranthus graecizans* was documented in two study area; 1 and 6, 22 and 18 respectively (Table 1).

39 were identified only in area 5 of *Chenopodium. Atriplex leucoclada* 30 were documented from area 3. 15 of *Chenopodium opulifolium* were documented from area 6 and least species was *Aerva javanica* from area 1 with total of 3 species (Table 1).

Table 2 revealed nine agricultural crops identified from the study area; *Brassica oleracea var*, *botrytis* 159, *Solanum melongena* 54, *Petroselinum sp* 165, *Ficus carica* 178, *Lactuca sativa* 27, *Punica granatum* 12, *Vitis spp* 43 and *Brassica oleracea* 56 respectively. The most abundant agricultural crop is *Ficus carica* 178 which was found in area 2, 5 and 6 respectively (Table 2). *Brassica oleracea var. botrytis* is the second most abundant agricultural crop found in the study area with total number of 159 found only in area 2 and 4 17 and 142 respectively (Table 2). The agricultural crop found with the least number was found *Punica granatum* 12 and found only in area 2 (Table 2).

Table 1: *Amarantheceae* family from Taif Saudi Arabia Peninsular

Species Name	Weed number						Total
	Area1	Area2	Area3	Area4	Area5	Area6	
Aerva javanica	**3**						**3**
Amaranthus graecizans	**22**					**18**	**40**
Amaranthus hybridus		**70**			**279**	**58**	**407**
Amaranthus viridis		**32**	**165**	**27**	**84**	**74**	**382**
Atriplex leucoclada		**30**					**30**
Chenopodium album				**142**			**142**
Chenopodium murale					**163**	**74**	**237**
Chenopodium opulifolium						**15**	**15**
Chenopodium sp					**39**		**39**
Chenopodium vulvaria	**81**						**81**

Table 2: Agricultural crops identified from Taif Saudi Arabia Peninsular

Species Name	English name	Agricultural crop number						Total
		Area1	Area2	Area3	Area4	Area5	Area6	
Brassica oleracea var. botrytis	**Cauliflower**		17		142			159
Solanum melongena	**Eggplant**	28	26					54
Petroselinum sp.	**Parsley**			165				165
Ficus carica	**Common fig**		62			56	60	178
Lactuca sativa	**Lettuce**				27			27
Punica granatum	**Pomegranate**		12					12
Vitis spp.	**Grape**		43					43
Brassica oleracea	**Cabbage**		36			20		56

DISCUSSIONS

Weeds species are consider as one of the major constraints to cultivation of crop; resulted in yield loss based according to the composition and density of the species in the field. Studies on weeds species composition, distribution and biological life cycle it provides the needed information for employing management strategies. Also, it gives the idea or insight of changes occurring overtime in weeds composition in a particular environment (Ali et al., 2014; Majrshi & Khandaker, 2016). Competitions exist between the cultivated crops and weeds species for the limited resources available in the field or provided for the sake of the cultivated crops. The competition results in the affecting of the quality and quantity of the yield. Disease arose 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 Ali et al. (2014) 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. The results of the study documented 10 wees species from the study area and eight agricultural crops with economical value with different composition in the six study area. The following weeds species were documented *Amaranthus hybridus* 407, *Amaranthus viridis 382, Chenopodium murale* ,*Chenopodium album* 142, *Chenopodium vulvaria* 81, *Amaranthus graecizans* 32, *Chenopodium* 39*, Atriplex leucoclada* 30 ,*Chenopodium opulifolium* 15, *Aerva javanica* 3. The agricultural crops are *Brassica oleracea var*, *botrytis* 159*, Solanum melongena* 54, *Petroselinum sp* 165, *Ficus carica* 178, *Lactuca sativa* 27, *Punica granatum* 12, *Vitis spp* 43 and *Brassica oleracea* 56 respectively. Results of the study revealed occurrence of *Amarantheceae* flora in altitude with medium range recorded more weed species compositional

than the altitude with the highest and the lowest location. In most scenario, the high altitude weed species diversity in fields was more different with medium altitude and the lower altitude weed flora. It has already established if the similarity index is 60 % below; therefore, both the examined altitude has different composition of weeds species (Bretagnolle et al., 2015). The following study found similarity index of the documented weeds species to be below 20% (Romagni et al., 2000). Therefore, different composition of weeds specs from different genus were found in both the altitude. The high frequency of *Amaranthus hybridus* is as a result resistance ability of the species to the conventional management control. Presence of these weeds species in high frequency of the agricultural land pose a serious challenge to the quality and quantity of the yield. *Chenopodium album* has been previously reported to be as an aggressive weeds species that is difficult to manage in cultivated fields (Fried et al., 2008). Previous studies report some aggressive weeds species (Bretagnolle & Gaba, 2015). Heavy infestation of weeds species will results in the killing of agricultural crops in a field. In addition, weeds species were reported producing allelo-chemicals responsible for retardation agricultural crop growth and further reduced yields. Majrshi and Khandaker, (2016) reported dominancy of a particular species in agricultural land will led to disappearance of order economical crops in the overtime. Manual management of weeds by farmers results in skin irritation, asthma, fever and itching (Holzschuh et al., 2008). Some of these aggressive weeds are weeds are reported to be present throughout the year. The following studies observed most of the weeds are in flowering stage resulting to production of more seeds in the following season. Romagni et al., (2000) reported the following scenario will results in experiencing larger number of weeds in the following seasons are added to the seed bank of the cultivated field. 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.

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 toavoid 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 plantsavoid 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

CONFLICT OF INTEREST

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

ACKNOWLEGEMENT

The authors wish to acknowledge the support of Universiti Sultan Zainal Abidin (UniSZA) of Malaysia and Kaduna State University (KASU) of Nigeria.

AUTHOR CONTRIBUTIONS

All authors contributed equally in all parts of this study.

REFERENCES

Abdullah, M. A., AL-Yasee, H., AL-Sudani, Y., & Moneruzaman, M. (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.

Abdulrahman, M. D., Ali, A. M., Fatihah, H., Khandaker, M. M., & Mat, N. (2018a). b. Morphological and anatomical Studies of Syzygium polyanthum(Wight)

Walp.(Myrtaceae). *Mal. Nat. J, 70*(3), 309-322.

Abdulrahman, M. D., Ali, A. M., Fatihah, H., Khandaker, M. M., & Mat, N. (2018b). Traditional medicinal knowledge of Malays in Terengganu, Peninsular Malaysia. *Malayan Nature Journal, 70*(3), 349-364.

Abdulrahman, M. D., Ali, A. M., Fatihah, H. N. N., & Nashriyah, M. Chemotaxonomic Discrimination of Syzygium polyanthum cultivars (serai kayu and serai kayu hutan) based on FTIR Spectroscopy.

Ali, M., Mohammad, M. K., Baki, B., Md, S. J., & Amru, N. B. (2014). Quantitative growth patterns of Scirpus grossus under fertilized and unfertilized peat soils. *Australian Journal of Basic and Applied Sciences, 8*(17), 328-335.

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

Armengot, L., José-María, L., Blanco-Moreno, J. M., Romero-Puente, A., & Sans, F. X. (2011). Landscape and land-use effects on weed flora in Mediterranean cereal fields. *Agriculture, ecosystems & environment, 142*(3-4), 311-317.

Belayneh, H. (1983). Highland oil crops production and research in Ethiopia. *Oil Crops*, 3-8.

Boutin, C., Jobin, B., & Bélanger, L. (2003). Importance of riparian habitats to flora conservation in farming landscapes of southern Québec, Canada. *Agriculture, ecosystems & environment, 94*(1), 73-87.

Bretagnolle, V., & Gaba, S. (2015). Weeds for bees? A review. *Agronomy for sustainable development, 35*(3), 891-909.

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

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

Gabriel, D., Thies, C., & Tscharntke, T. (2005). Local diversity of arable weeds increases with landscape complexity. *Perspectives in Plant Ecology, Evolution and Systematics, 7*(2), 85-93.

Henckel, L., Börger, L., Meiss, H., Gaba, S., & Bretagnolle, V. (2015). Organic fields sustain weed metacommunity dynamics in farmland landscapes. *Proceedings of the Royal Society B: Biological Sciences, 282*(1808), 20150002.

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

Jobin, B., Boutin, C., & DesGranges, J.-L. (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.

Majrashi, A., Khandaker, M. M., Bakar, B., & Boyce, A. N. (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.

Maroyi, A. (2013). Use of weeds as traditional vegetables in Shurugwi District, Zimbabwe. *Journal of ethnobiology and ethnomedicine, 9*(1), 60.

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

Mortensen, D. A., Johnson, G. A., & Young, L. J. (1993). *Weed distribution in agricultural fields.* Paper presented at the Proceedings of soil specific crop management: a workshop on research and development issues, April 14-16, 1992, Minneapolis, MN, USA.

Romagni, J. G., Allen, S. N., & Dayan, F. E. (2000). Allelopathic effects of volatile cineoles on two weedy plant species. *Journal of Chemical Ecology, 26*(1), 303-313.

Thomas, A. G. (1985). Weed survey system used in Saskatchewan for cereal and oilseed crops. *Weed science, 33*(1), 34-43