SURVEY OF CHENOPODIACEAE FAMILY FROM TAIF, SAUDI ARABIA PENINSULA

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Abstract
Weeds are considered 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 capitata 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...
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
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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.

Analysis of the data collected from different areas of Taif were converted to log+1 prior to statistical analysis

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

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
<th>Area 5</th>
<th>Area 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atriplex leucoclada</td>
<td>51</td>
<td>24</td>
<td>20</td>
<td>66</td>
<td>2</td>
<td>1</td>
<td>164</td>
</tr>
<tr>
<td>Chenopodium alba</td>
<td>21</td>
<td>36</td>
<td>19</td>
<td>30</td>
<td>-</td>
<td>2</td>
<td>108</td>
</tr>
<tr>
<td>Chenopodium album</td>
<td>200</td>
<td>58</td>
<td>84</td>
<td>49</td>
<td>3</td>
<td>-</td>
<td>394</td>
</tr>
<tr>
<td>Chenopodium murale</td>
<td>77</td>
<td>97</td>
<td>81</td>
<td>62</td>
<td>29</td>
<td>29</td>
<td>375</td>
</tr>
<tr>
<td>Chenopodium vulvaria</td>
<td>30</td>
<td>50</td>
<td>389</td>
<td>70</td>
<td>6</td>
<td>8</td>
<td>553</td>
</tr>
<tr>
<td>Chenopodium mavele</td>
<td>8</td>
<td>9</td>
<td>19</td>
<td>16</td>
<td>4</td>
<td>-</td>
<td>56</td>
</tr>
<tr>
<td>Dysphania ambrosioides</td>
<td>10</td>
<td>14</td>
<td>17</td>
<td>16</td>
<td>2</td>
<td>-</td>
<td>59</td>
</tr>
<tr>
<td>Lambs quarters</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1727</td>
</tr>
</tbody>
</table>

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.

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, followed by 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 abunded 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 quarters 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.
Survey of Chenopodiaceae family from Taif, Saudi Arabia Peninsula

The study documents 8 species; Atriplex leucoclada, Chenopodium vulvaria, 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. capitata 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 pepocrops 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>
<thead>
<tr>
<th>Agricultural crops</th>
<th>Species name</th>
<th>English name</th>
<th>Area 1</th>
<th>Area 2</th>
<th>Area 3</th>
<th>Area 4</th>
<th>Area 5</th>
<th>Area 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portulaca oleracea</td>
<td>Pursley</td>
<td>32</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>Raphanus sativus</td>
<td>Radish</td>
<td>16</td>
<td>6</td>
<td>-</td>
<td>43</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>65</td>
</tr>
<tr>
<td>Phoenix dactylifera</td>
<td>Date palm</td>
<td>19</td>
<td>-</td>
<td>85</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>Mentha</td>
<td>Mint</td>
<td>253</td>
<td>95</td>
<td>26</td>
<td>62</td>
<td>3</td>
<td>8</td>
<td>447</td>
<td></td>
</tr>
<tr>
<td>Rosa damascena</td>
<td>Flower</td>
<td>-</td>
<td>26</td>
<td>-</td>
<td>-</td>
<td>29</td>
<td>29</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Solanum melongena</td>
<td>Eggplant</td>
<td>30</td>
<td>56</td>
<td>18</td>
<td>70</td>
<td>-</td>
<td>-</td>
<td>174</td>
<td></td>
</tr>
<tr>
<td>Petroselinum sp.</td>
<td>Parsley</td>
<td>-</td>
<td>-</td>
<td>379</td>
<td>35</td>
<td>-</td>
<td>-</td>
<td>414</td>
<td></td>
</tr>
<tr>
<td>Zea mays</td>
<td>Maize</td>
<td>-</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Courgette</td>
<td>24</td>
<td>36</td>
<td>20</td>
<td>67</td>
<td>-</td>
<td>-</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>Vitis spp</td>
<td>Grape</td>
<td>48</td>
<td>-</td>
<td>10</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Brassica oleracea var. Capitata</td>
<td>Cabbage</td>
<td>15</td>
<td>-</td>
<td>41</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Cucurbita pepo</td>
<td>Courgette</td>
<td>8</td>
<td>6</td>
<td>78</td>
<td>39</td>
<td>-</td>
<td>-</td>
<td>129</td>
<td></td>
</tr>
</tbody>
</table>

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.
by crop field of *Rosa damascena* 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 must 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
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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