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## Survey and Evaluation of the Weeds Associated with Winter Crops at Some Areas of Qalyubia Governorate, Egypt



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**<sup>1\*</sup>Safwat A. Azer, <sup>1</sup>Fatma S. Mohammad**

*1. Flora and Phytotaxonomy Researches Department,  
Horticultural Research  
Institute, Agricultural Research Center, Giza, Egypt.*

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### ABSTRACT

This research aims to survey and evaluate the weeds associated with winter crops at some areas of Qalyubia governorate. Two hundred and eighty six quadrates were selected to represent the distribution of weed species among the studied crops and areas. At Al Gabal Al Asfar area, the highest frequency ratio 55% of *Cyperus rotundus* was recorded while; the lowest 2.5 % was noticed for *Leucaena leucocephala*, *Sesbania sesban* and *Solanum tuberosum*. Similarly, the ratio 2.5 % was observed for *Brassica nigra*, *Desmostachya bipinnata*, *Medicago polymorpha* and *Rumex dentatus* at Abu Zaable area. The highest abundance ratio 38% of dominant weed species were recorded at Shibin El Qanater while; the lowest 4.76% was noticed at Qalyub area. Based on similarity values of weed species among the studied areas, Al Khankah and Al Gabal Al Asfar showed the highest value 0.700 while; the lowest 0.373 was noticed between Qaha and Al Gabal Al Asfar. Moreover, the similarity values of weed species among studied crops showed that Egyptian clover and lettuce had the highest value 0.646 while; the lowest 0.167 was recorded between cauliflower and strawberry. The total ratios of weed species per crop were varied among the studied areas and crops. At Qalyub area, the highest ratio 30.63% was recorded at wheat while; the lowest 14.41% was noticed at cauliflower.

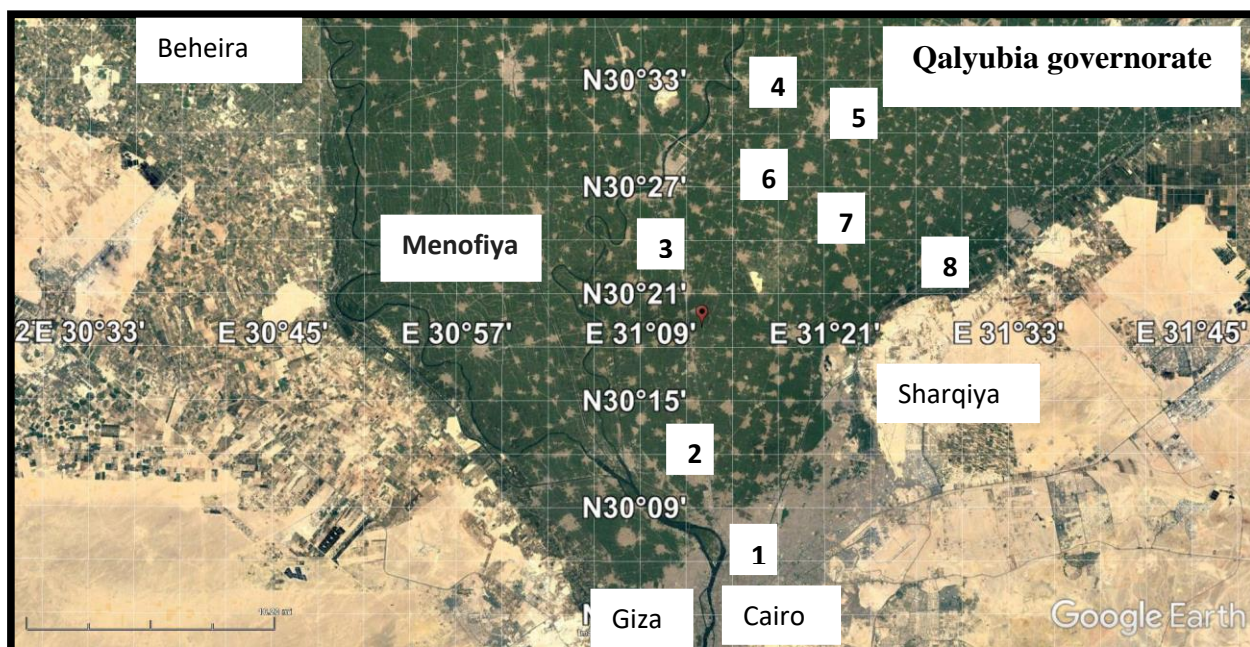
## INTRODUCTION

Understanding abundance and distribution of weed species within the landscape of an agro-ecosystem is an important goal for weed science. Abundance is a measure of frequency of individuals in an area. Distribution is a measure of the geographical range of a weed species [1]. Weeds represent a biologically important component of their environments [2]. The invasive species in the agricultural lands cause serious problems that require attention to the negative impacts of plant invasions on ecosystems [3]. The increase in human population of Egypt necessitates the expansion of the cultivated lands. This was achieved during the last few decades by the reclamation of desert areas [4]. This human interference causes the weed species to replace the wild plant species in these reclaimed areas, which are considered as transitional habitats between the old cultivated land and desert [5]. Changes in environmental conditions result in a continuous change of the native plant cover. Some native plants that were once common are now rare due to impact of human activities. Moreover, several exotic species are now stabilized and almost naturalized [6]. Globally, several studies described the effects of agronomic factors on weed biology and ecology [7-9]. In Egypt, many studies [10-18] were concerned with the description of the floristic composition rather than considering the relations of the weed communities with other environmental variables. Knowledge of the interrelationships between the environmental conditions, agricultural practices and floristic composition of the weed communities would help in proposing future integrated weed control strategies. This study was carried out to survey and evaluate the weeds associated with the winter crops at Qalyubia governorate among six studied areas namely; Shubra El Kheima; Qalyub; Qaha; Toukh; Shibin El Qanater; Abu Zaabal; Al Khankah and Al Gabal Al Asfar.

## MATERIALS AND METHODS

Qalyubia governorate is located on the southeast of Nile Delta. It bordered by the following governorates: Dakahlia and Gharbia from the north; Cairo and Giza from the south; Sharqiya from the east and Menofiya from the west (Figure 1). The governorate located between latitudes 30° 04' 46" N - 30° 34' 31" N and altitudes 31° 04' 32" E. - 31° 18' 10" E. Several visits were performed to cover all the studied areas from September 2017 to September 2018. The studied areas were carried out to survey and evaluate the weeds associated with winter crops. The recorded species were arranged alphabetically (Tables 1-8). The identification of the collected species was according to [19-26] and updated by [27-29]. Ninety four plant specimens were collected and prepared as herbarium sheets at Flora and Phytotaxonomy

Research Department (CAIM), Agricultural Research Center. A total of 8 areas (5 crops per each area) and 286 quadrates have been chosen to cover the recorded weed species at Qalyubia governorate. The total number of quadrates was: 28 at Shubra El Kheima, 35 at Qalyub, 34 at Qaha, 38 at Toukh, 36 at Shibin El Qanater, 40 at Abu Zaabal, 35 at Al Khankah and 40 at Al Gabal Al Asfar. The size of the sample quadrate varied from one crop to another, depending on weeds distribution among the studied crops. Frequency ratio of weed species (F %) was calculated as the number of quadrates where the species was recorded divided by the total number of quadrates at each crop [13], [18], [30]. The species reported within each crop were classified into three categories according to [31-32] and modified by the authors as following: dominant  $\geq 30\%$  frequency, common  $> 10-30\%$  frequency and rare  $\leq 10\%$  frequency. Dominant, common and rare species were based on frequency ratios of the recorded species among the studied crops at different areas. Statistical analyses of weed species among the studied areas and crops were based on hierarchical cluster analysis. The data were treated as a binary character using SPSS version 22 [33]. The output was plotted in the form of dendrogram to construct the similarity values of weed species among the studied areas and crops.



**Fig.1.** Map shows the locations of the studied areas; (1) = Shubra El Kheima, (2) = Qalyub, (3) = Qaha, (4) = Toukh, (5) = Shibin El Qanater, (6) = Abu Zaabal, (7) = Al Khankah, (8) = Al Gabal Al Asfar at Qalyubia governorate, Egypt

## RESULTS AND DISCUSSION

### Frequency ratios of weed species among studied areas

Frequency ratios of weed species were generally varied among the studied areas (Tables 1-8). At Al Gabal Al Asfar area (Table 8), *Cyperus rotundus* recorded the highest frequency ratio 55% followed by 50% at Abu Zaabal area (Table 6). On the other hand, the lowest ratio 2.5% was noticed for *Brassica nigra*, *Desmostachya bipinnata*, *Medicago polymorpha* and *Rumex dentatus* at Abu Zaable and for *Leucaena leucocephala*, *Sesbania sesban* and *Solanum tuberosum* at Al Gabal Al Asfar area. At Shubra El Kheima area (Table 1), *Cynodon dactylon* recorded the highest frequency ratio 50% while; the lowest one 3.57% was noticed in the following weed species: *Ammi visnaga*, *Avena fatua*, *Avena sativa*, *Cuscuta campestris*, *Lamium amplexicaule*, *Mentha longifolia* subsp. *typhoides*, *Orobancha ramosa* and *Setaria verticillata*. At Shibin El Qanater area, (Table 5), *Chenopodium album*, *Convolvulus arvensis* and *Cynodon dactylon* recorded the same highest ratio of frequency 36.11% while; the lowest 2.78% was mentioned in *Leucaena leucocephala*, *Lycopersicon esculentum* and *Oxalis corniculata*. At Qaha area (Table 3), the highest frequency ratio 32.35% was recorded in *Polypogon monspeliensis* while; the lowest 2.94% was noticed in *Fumaria densiflora*. The findings from this study showed the distribution of weed species showed notable variation among the studied areas. The high diversity of weed species could also be due to the differences in seed production, dispersal, germination and seedling establishment which promote high levels of co-existence among the recorded weed species [34-35]. The seeds of annual weed species survive in unfavorable conditions and they have able to complete their life cycle from seed to seed in one season [36-37].

### Abundance ratios of weed species among the studied areas

The abundance of weed species in this investigation may be interpreted as dominant, common or rare species and varied among the studied areas. The highest ratio 38.00% of dominant species was recorded at Shibin El Qanater area (Figure 3) followed by 23.08% at Abu Zaabal area (Figure 3) while; the lowest one 4.76% was noticed at Qalyub area (Figure 2). Concerning the common weed species, the highest ratio 57% was observed at Al Khankah area (Figure 3), followed by 47.83% at Al Gabal Al Asfar area (Figure 3) while; the lowest one 24% was recorded at Shibin El Qanater area (Figure 3). The abundance ratio of rare weed species showed notable variation among the studied areas. The highest ratio 57.14% was

noticed at Qalyub area (Figure 2) followed by 50% at Toukh (Figure 2). On the other hand, the lowest ratio 30% of the rare weed species was recorded at Al Khankah area (Figure 3). Species with wide ecological amplitude are often caused by phenotypic plasticity and heterogeneity [38]. The restricted distribution of some rare weed species, among different areas can be attributed to the habitat preference phenomenon. In line with this, [39-40] discussed this phenomenon in the farmlands of the different Egyptian habitats.

### **Major similarity of weed species among the studied areas**

The data presented in dendrogram (Figure 3), showed the recorded weed species among eight studied areas at Qalyubia governorate were separated into four groups (G1, G2, G3 and G4). First group included Al Khankah, Al Gabal Alasfar and Abu Zaabal areas. Second group contained Qalyub and Shubin El Qanater areas. Third group included Qaha and Toukh; while group four contained Shubra El Kheima. Based on degree of similarity values among the studied areas (Table 9), Al Khankah and Al Gabal Alasfar areas showed the highest degree of similarity value 0.700 followed by 0.667 between Qaha and Toukh then 0.569 between Qalyub and Shin El Qanater areas. On the other hand, the lowest degree of similarity value 0.373 was noticed between Qaha and Al Gabal Al Asfar areas. The current investigation is in agreement with [41-42]. They studied the relationship between weed populations among different habitats.

### **Major similarity of weed species among the studied crops**

The data presented in dendrogram (Figure 4), showed the recorded weed species among 15 studied crops were separated into 7 groups (G1, G2, G3, G4, G5, G6 and G7). Group 1 included Egyptian clover, lettuce and garlic crops. Group 2 contained onion crop. Group 3 included cabbage and wheat. Group 4 contained tomato and tora crops. Moreover, group 5 included the flowing crops: strawberry, zucchini and chamomile. Group 6 contained the flowing crops: broad beans, green beans and common beats while; group 7 included cauliflower. Based on similarity values among the studied crops (Table 10), Egyptian clover (C6) and lettuce (C9) showed the highest degree of similarity value 0.646 followed by 0.638 between garlic (C7) and lettuce (C9), then 0.614 between lettuce (C9) and onion (C10). On the other hand, the lowest degree 0.167 was recorded between cauliflower (C3) and strawberry (C11). This study supports the distribution of weed flora among different cultivated land in Egypt [43-45].

### **Dominant weed species among the studied crops**

Eleven weed species were recorded among 15 studied winter crops at Qalyubia governorate (Table 11). *Cynodon dactylon* and *Cyperus rotundus* were noticed at all the studied crops (Table 11). *Convolvulus arvensis* was recorded at 14 crops except cauliflower. In addition, *Chenopodium album* was noticed at 13 crops except broad beans and common beet. Similarly, *Polypogon monspeliensis* was noticed at all studied winter crops except cauliflower and green beans. Ten dominant weed species, except *Cynanchum acutum*, were noticed at cabbage, Egyptian clover and Onion crops. Nine dominant weed species, except *Cichorium endivia* subsp. *divaricatum* and *Sonchus oleraceus* were recorded at tomato and tora crops. Cauliflower was infested by two weed species namely: *Cynodon dactylon* and *Cyperus rotundus*. This current investigation supports the diversity of weed species varies in their ecological aggressiveness, and seasonal preference [46-47].

### **Total ratios of weed species per crops**

The total ratios of weed species varied from one crop to another. Type of crop is the most important gradient in weed species composition. The highest weed ratios 30.63% and 28.09% per wheat crop was observed at Qalyub and Qaha areas; respectively. On the other hand, the lowest weed ratios 14.41% per cauliflower was recorded at Qalyub area (Table 12). Differences in number and type of the weed species were clearly observed among different crops and mainly affected by crop type, seasonal preference, and ecological factors [48-49]. The winter weed species represent the main bulk of the recorded species within each crop. Winter and summer crops are usually grown in a seasonal sequence. It is accompanied by a weed–flora rotation [50]. However, the using of pesticides and high techniques in cultivation had adverse effects on total ratio of weed species among the studied crops.

**Table 1. List of recorded species with their frequency ratios at Shubra El Kheima area, Qalyubia governorate**

Taxa	Number of quadrates recorded by weeds per crop					T	F ratio
	Cabbage	Egyptian Clover	Garlic	Lettuce	Taro		
<b>DOMINANT SPECIES</b>							
<i>Chenopodium album</i> L.	1	2	1	1	4	9	32.14
<i>Convolvulus arvensis</i> L.	2	1	2	2	2	9	32.14
<i>Cynodon dactylon</i> (L.) Pers.	3	2	3	3	3	14	50.00
<i>Cyperus rotundus</i> L.	3	3	2	2	2	12	42.86
<b>COMMON SPECIES</b>							
<i>Anagallis arvensis</i> L.	1	1	0	1	0	3	10.71
<i>Beta vulgaris</i> L.	0	2	1	0	1	4	14.29
<i>Chenopodium murale</i> L.	0	2	1	0	2	5	17.86
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	0	3	0	1	2	6	21.43
<i>Euphorbia helioscopia</i> L.	1	0	1	2	1	5	17.86
<i>Euphorbia heterophylla</i> L.	1	1	1	2	0	5	17.86
<i>Euphorbia peplus</i> L.	1	2	2	0	1	6	21.43
<i>Laphangium luteoalbum</i> (L.) Tzvelev	1	1	0	1	1	4	14.29
<i>Lepidium didymum</i> L.	1	2	1	0	0	4	14.29
<i>Melilotus indicus</i> (L.) All.	1	1	0	1	0	3	10.71
<i>Poa annua</i> L.	1	2	1	1	2	7	25.00
<i>Polypogon monspeliensis</i> (L.) Desf.	1	0	0	1	1	3	10.71
<i>Portulaca oleracea</i> L.	1	1	1	1	1	5	17.86
<i>Rumex dentatus</i> L.	1	3	0	0	1	5	17.86
<i>Sonchus oleraceus</i> L.	1	1	1	1	1	5	17.86
<i>Trifolium resupinatum</i> L.	1	3	1	0	1	6	21.43
<i>Urtica urens</i> L.	0	1	1	1	1	4	14.29
<b>RARE SPECIES</b>							
<i>Ammi majus</i> L.	0	1	0	1	0	2	7.14
<i>Ammi visnaga</i> (L.) Lam.	1	0	0	0	0	1	3.57
<i>Avena fatua</i> L.	1	0	0	0	0	1	3.57
<i>Avena sativa</i> L.	0	0	0	0	1	1	3.57
<i>Capsella bursa-pastoris</i> (L.) Medik.	0	0	1	1	0	2	7.14
<i>Cenchrus biflorus</i> Roxb.	0	0	0	1	1	2	7.14
<i>Cuscuta campestris</i> Yunk.	0	1	0	0	0	1	3.57
<i>Cyclospermum leptophyllum</i> (Pers.) Sprague	1	0	0	0	1	2	7.14
<i>Fumaria densiflora</i> DC.	0	1	0	0	0	1	3.57
<i>Lamium amplexicaule</i> L.	0	0	0	0	1	1	3.57
<i>Lycopersicon esculentum</i> Mill.	0	0	0	1	1	2	7.14
<i>Malva parviflora</i> L.	0	1	1	0	0	2	7.14
<i>Mentha longifolia</i> (L.)	0	0	0	0	1	1	3.57

Huds. subsp. <i>typhoides</i> (Briq.) Harley							
<i>Orobancha ramosa</i> L.	0	1	0	0	0	1	3.57
<i>Phoenix dactylifera</i> L.	0	1	0	1	0	2	7.14
<i>Polygonum aviculare</i> L.	0	1	1	0	0	2	7.14
<i>Setaria verticillata</i> (L.) P.Beauv.	0	0	1	0	0	1	3.57
<i>Sisymbrium irio</i> L.	0	1	0	1	0	2	7.14
<i>Solanum americanum</i> Mill.	1	0	0	0	1	2	7.14
<i>Triticum aestivum</i> L.	0	1	0	0	1	2	7.14
<b>N. of weeds recorded per crop</b>	<b>21</b>	<b>28</b>	<b>19</b>	<b>21</b>	<b>25</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (**28**). \***Abundance ratios** = (D = dominant  $\geq 30\%$  frequency), (C= common  $> 10- 30\%$  frequency), (R = rare  $\leq 10\%$  frequency). **T** = Total weed species recorded per quadrates

**Table 2. List of recorded species with their frequency ratios at Qalyub area, Qalyubia governorate**

Taxa	Number of quadrates recorded by weeds per crop					T	F ratio
	Cauliflower	Common beet	Onion	Wheat	Zucchini		
<b>DOMINANT SPECIES</b>							
<i>Cynodon dactylon</i> (L.) Pers.	2	3	2	3	2	12	34.29
<i>Cyperus rotundus</i> L.	3	2	3	2	1	11	31.43
<b>COMMON SPECIES</b>							
<i>Anagallis arvensis</i> L.	0	1	2	2	1	6	17.14
<i>Brassica nigra</i> (L.) K. Kothch	1	1	1	3	0	6	17.14
<i>Cenchrus biflorus</i> Roxb.	1	0	0	3	1	5	14.29
<i>Chenopodium album</i> L.	0	1	1	1	2	5	14.29
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	1	1	1	1	0	4	11.43
<i>Convolvulus arvensis</i> L.	0	1	0	3	1	5	14.29
<i>Eruca vesicaria</i> (L.) Cav.	0	1	1	2	0	4	11.43
<i>Euphorbia peplus</i> L.	0	1	1	2	1	5	14.29
<i>Lolium perenne</i> L.	0	0	1	3	0	4	11.43
<i>Malva parviflora</i> L.	1	0	1	1	1	4	11.43
<i>Medicago sativa</i> L.	0	1	1	3	0	5	14.29
<i>Melilotus indicus</i> (L.) All.	1	0	0	2	1	4	11.43
<i>Phoenix dactylifera</i> L.	1	1	1	1	1	5	14.29
<i>Plantago major</i> L.	0	0	0	2	2	4	11.43
<i>Poa annua</i> L.	1	1	0	2	1	5	14.29
<i>Polypogon monspeliensis</i> (L.) Desf.	0	1	1	3	0	5	14.29
<b>RARE SPECIES</b>							

<i>Amaranthus lividus</i> L.	1	0	1	1	0	3	8.57
<i>Anethum graveolens</i> L.	0	1	0	1	0	2	5.71
<i>Avena fatua</i> L.	0	0	0	3	0	3	8.57
<i>Avena sativa</i> L.	0	0	0	3	0	3	8.57
<i>Brachiaria mutica</i> (Forssk.) Stapf	1	0	1	1	0	3	8.57
<i>Capsella bursa-pastoris</i> (L.) Medik.	0	0	0	2	1	3	8.57
<i>Chenopodium murale</i> L.	0	0	1	1	1	3	8.57
<i>Cynanchum acutum</i> L.	1	0	0	0	0	1	2.86
<i>Euphorbia heterophylla</i> L.	0	1	1	1	0	3	8.57
<i>Fumaria densiflora</i> DC.	0	0	0	1	1	2	5.71
<i>Laphangium luteoalbum</i> (L.) Tzvelev	1	0	0	0	1	2	5.71
<i>Lepidium didymum</i> L.	0	0	0	1	1	2	5.71
<i>Lycopersicon esculentum</i> Mill.	0	1	0	0	1	2	5.71
<i>Medicago polymorpha</i> L.	0	0	0	2	0	2	5.71
<i>Mentha longifolia</i> (L.) Huds. subsp. <i>typhoides</i> (Briq.) Harley	0	1	0	0	0	1	2.86
<i>Oxalis corniculata</i> L.	0	0	0	2	0	2	5.71
<i>Phoenix dactylifera</i> L.	0	0	0	1	1	2	5.71
<i>Rumex dentatus</i> L.	0	0	1	2	0	3	8.57
<i>Sisymbrium irio</i> L.	1	0	0	1	0	2	5.71
<i>Solanum americanum</i> Mill.	1	0	0	0	1	2	5.71
<i>Sonchus oleraceus</i> L.	0	0	1	1	1	3	8.57
<i>Trifolium alexandrinum</i> L.	1	0	1	0	0	2	5.71
<i>Trifolium resupinatum</i> L.	0	1	1	1	0	3	8.57
<i>Urtica urens</i> L.	0	0	0	2	1	3	8.57
<b>N. of weeds recorded per crop</b>	<b>16</b>	<b>18</b>	<b>21</b>	<b>34</b>	<b>22</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (35). \***Abundance ratios** = (D = dominant  $\geq$  30% frequency), (C= common > 10- 30% frequency), (R = rare  $\leq$ 10% frequency). **T** = Total weed species recorded per quadrates

**Table 3. List of recorded species with their frequency ratios at Qaha area, Qalyubia governorate**

Taxa	Number of quadrates recorded by weeds per crop					T	F ratio
	Egyptian Clover	Garlic	Onion	Tomato	Wheat		
<b>DOMINANT SPECIES</b>							
<i>Cynodon dactylon</i> (L.) Pers.	1	2	3	2	3	11	32.35
<i>Cyperus rotundus</i> L.	2	3	2	2	3	12	35.29
<i>Polypogon monspeliensis</i> (L.) Desf.	2	2	2	3	2	11	32.35
<b>COMMON SPECIES</b>							
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	3	1	0	0	1	5	14.71
<i>Convolvulus arvensis</i> L.	1	1	1	1	2	6	17.65
<i>Digitaria sanguinalis</i> (L.) Scop.	1	0	0	1	2	4	11.76
<i>Emex spinosa</i> (L.) Campd.	1	0	0	1	2	4	11.76
<i>Euphorbia peplus</i> L.	1	1	1	1	1	5	14.71
<i>Lolium perenne</i> L.	0	1	1	0	3	5	14.71
<i>Medicago sativa</i> L.	2	0	1	1	1	5	14.71
<i>Melilotus indicus</i> (L.) All.	1	1	1	2	1	6	17.65
<i>Poa annua</i> L.	2	2	1	1	3	9	26.47
<i>Portulaca oleracea</i> L.	1	1	2	3	2	9	26.47
<i>Sonchus oleraceus</i> L.	2	0	1	0	1	4	11.76
<i>Trifolium resupinatum</i> L.	1	0	1	0	2	4	11.76
<b>RARE SPECIES</b>							
<i>Avena fatua</i> L.	0	0	0	0	3	3	8.82
<i>Brachiaria mutica</i> (Forssk.) Stapf	0	1	1	0	0	2	5.88
<i>Brassica nigra</i> (L.) K. Kothch	1	0	0	0	1	2	5.88
<i>Capsella bursa-pastoris</i> (L.) Medik.	0	0	1	0	1	2	5.88
<i>Chenopodium murale</i> L.	1	0	1	0	1	3	8.82
<i>Cuscuta campestris</i> Yunck.	1	0	0	0	0	2	2.94
<i>Cynanchum acutum</i> L.	0	0	1	0	1	2	5.88
<i>Fumaria densiflora</i> DC.	0	0	0	0	1	1	2.94
<i>Phoenix dactylifera</i> L.	0	1	0	0	1	2	5.88
<i>Plantago major</i> L.	0	0	1	1	1	3	8.82
<i>Ricinus communis</i> L.	0	0	1	1	0	2	5.88
<i>Setaria verticillata</i> (L.) P. Beauv.	0	1	0	1	1	3	8.82
<i>Sisymbrium irio</i> L.	1	0	0	1	1	3	8.82
<b>N. of weeds recorded per crop</b>	<b>18</b>	<b>13</b>	<b>18</b>	<b>15</b>	<b>25</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (34). \***Abundance ratios** = (D = dominant  $\geq 30\%$  frequency), (C= common  $> 10- 30\%$  frequency), (R = rare  $\leq 10\%$  frequency). **T** = Total weed species recorded per quadrates

**Table 4. List of recorded species with their frequency ratios at Toukh area, Qalyubia governorate**

	Number of quadrates recorded by weeds per crop						
Taxa	Common beet	Egyptian Clover	Garlic	Lettuce	Wheat	T	F ratio
DOMINANT SPECIES							
<i>Convolvulus arvensis</i> L.	2	2	3	2	3	12	31.58
<i>Cynodon dactylon</i> (L.) Pers.	4	2	3	3	3	15	39.47
<i>Cyperus rotundus</i> L.	3	2	4	4	2	15	39.47
<i>Polypogon monspeliensis</i> (L.) Desf.	2	1	2	3	4	12	31.58
COMMON SPECIES							
<i>Beta vulgaris</i> L.	1	3	0	1	1	6	15.79
<i>Brassica nigra</i> (L.) K. Kotch	0	2	1	0	3	6	15.79
<i>Chenopodium murale</i> L.	1	2	2	2	1	8	21.05
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	0	4	1	1	2	8	21.05
<i>Cyclospermum leptophyllum</i> (Pers.) Sprague	1	2	1	0	1	5	13.16
<i>Euphorbia peplus</i> L.	2	1	1	2	1	7	18.42
<i>Lolium perenne</i> L.	0	1	1	1	2	5	13.16
<i>Malva parviflora</i> L.	2	2	1	1	2	8	21.05
<i>Medicago sativa</i> L.	1	2	1	1	1	6	15.79
<i>Melilotus indicus</i> (L.) All.	2	1	1	1	2	7	18.42
<i>Phalaris minor</i> Retz.	1	0	1	1	2	5	13.16
<i>Poa annua</i> L.	2	1	1	1	2	7	18.42
<i>Portulaca oleracea</i> L.	2	1	3	2	2	10	26.32
<i>Raphanus raphanistrum</i> L.	0	2	1	1	2	6	15.79
<i>Sisymbrium irio</i> L.	2	1	1	1	1	6	15.79
<i>Sonchus oleraceus</i> L.	1	3	2	1	1	8	21.05
<i>Trifolium resupinatum</i> L.	0	1	1	2	1	5	13.16
RARE SPECIES							
<i>Amaranthus lividus</i> L.	0	1	1	1	0	3	7.89
<i>Avena fatua</i> L.	0	0	0	0	2	2	5.26
<i>Bidens pilosa</i> L.	0	0	0	1	0	1	2.63
<i>Brachiaria mutica</i> (Forssk.) Stapf	0	0	1	1	2	4	10.53
<i>Coriandrum sativum</i> L.	0	0	1	0	0	1	2.63
<i>Cuscuta campestris</i> Yunck.	0	2	0	0	0	2	5.26
<i>Cynanchum acutum</i> L.	1	0	1	1	1	4	10.53
<i>Dactyloctenium aegyptium</i> (L.)	1	0	0	1	1	3	7.89

Willd.							
<i>Digitaria sanguinalis</i> (L.) Scop.	0	0	1	0	1	2	5.26
<i>Emex spinosa</i> (L.) Campd.	1	1	1	0	1	4	10.53
<i>Eruca vesicaria</i> (L.) Cav.	1	0	1	1	1	4	10.53
<i>Euphorbia heterophylla</i> L.	1	1	0	1	1	4	10.53
<i>Fumaria densiflora</i> DC.	0	0	0	0	1	1	2.63
<i>Leucaena leucocephala</i> (Lam.) de wit	1	0	1	0	0	2	5.26
<i>Lycopersicon esculentum</i> Mill.	0	0	1	1	0	2	5.26
<i>Phoenix dactylifera</i> L.	0	0	0	1	1	2	5.26
<i>Ricinus communis</i> L.	1	0	0	0	0	1	2.63
<i>Salix tetrasperma</i> Roxb.	1	0	1	0	1	3	7.89
<i>Sesbania sesban</i> (L.) Merr.	0	1	0	1	0	2	5.26
<i>Setaria verticillata</i> (L.) P. Beauv.	0	1	0	1	1	3	7.89
<i>Solanum americanum</i> Mill.	1	1	0	0	0	2	5.26
<b>N. of weeds recorded per crop</b>	<b>25</b>	<b>27</b>	<b>31</b>	<b>30</b>	<b>33</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (38). \***Abundance ratios** = (D = dominant  $\geq 30\%$  frequency), (C= common  $> 10- 30\%$  frequency), (R = rare  $\leq 10\%$  frequency). **T** = Total weed species recorded per quadrates

**Table 5. List of recorded species with their frequency ratios at Shibin El Qanater area, Qalyubia governorate**

Taxa	Number of quadrates recorded by weeds per crop					T	F ratio
	Cabbage	Egyptian Clover	Onion	Strawberry	Wheat		
<b>DOMINANT SPECIES</b>							
<i>Chenopodium album</i> L.	4	2	3	2	2	13	36.11
<i>Chenopodium murale</i> L.	3	3	2	3	1	12	33.33
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	2	4	1	2	2	11	30.56
<i>Convolvulus arvensis</i> L.	2	2	4	1	4	13	36.11
<i>Cynodon dactylon</i> (L.) Pers.	3	2	3	2	3	13	36.11
<i>Cyperus rotundus</i> L.	4	2	3	2	3	14	38.89
<i>Euphorbia peplus</i> L.	3	2	1	2	3	11	30.56
<i>Melilotus indicus</i> (L.) All.	2	2	2	2	3	11	30.56
<i>Polypogon monspeliensis</i> (L.) Desf.	3	1	2	2	3	11	30.56
<b>COMMON SPECIES</b>							
<i>Anagallis arvensis</i> L.	0	1	1	1	2	5	13.89
<i>Avena fatua</i> L.	0	0	1	0	5	6	16.67
<i>Capsella bursa-pastoris</i> (L.) Medik.	1	1	1	0	2	5	13.89

<i>Cynanchum acutum</i> L.	2	1	1	1	2	7	19.44
<i>Digitaria sanguinalis</i> (L.) Scop.	1	1	0	0	2	4	11.11
<i>Lolium perenne</i> L.	1	0	0	0	4	5	13.89
<i>Malva parviflora</i> L.	1	1	1	0	1	4	11.11
<i>Medicago sativa</i> L.	2	2	2	1	1	8	22.22
<i>Phalaris minor</i> Retz.	0	1	1	0	2	4	11.11
<i>Plantago major</i> L.	0	0	1	1	2	4	11.11
<i>Poa annua</i> L.	2	0	1	1	3	7	19.44
<i>Portulaca oleracea</i> L.	1	1	1	1	2	6	16.67
<i>Rumex dentatus</i> L.	0	1	1	0	2	4	11.11
<i>Sonchus oleraceus</i> L.	2	2	1	1	1	7	19.44
<i>Trifolium resupinatum</i> L.	1	1	1	1	2	6	16.67
<b>RARE SPECIES</b>							
<i>Anethum graveolens</i> L.	1	0	0	1	0	2	5.56
<i>Bidens pilosa</i> L.	0	0	1	1	0	2	5.56
<i>Cenchrus barbatus</i> Schum.	0	0	1	0	1	2	5.56
<i>Cuscuta campestris</i> Yunck.	0	2	0	0	0	2	5.56
<i>Desmostachya bipinnata</i> (L.) Stapf	0	0	1	1	1	3	8.33
<i>Lepidium didymum</i> L.	0	0	0	1	1	2	5.56
<i>Leucaena leucocephala</i> (Lam.) de wit	0	0	0	1	0	1	2.78
<i>Lycopersicon esculentum</i> Mill.	0	0	1	0	0	1	2.78
<i>Medicago polymorpha</i> L.	0	1	0	1	1	3	8.33
<i>Oxalis corniculata</i> L.	0	1	0	0	0	1	2.78
<i>Phoenix dactylifera</i> L.	0	0	1	1	0	2	5.56
<i>Ricinus communis</i> L.	1	0	0	1	1	3	8.33
<i>Salix tetrasperma</i> Roxb.	1	0	0	0	1	2	5.56
<i>Sesbania sesban</i> (L.) Merr.	1	0	1	0	0	2	5.56
<i>Solanum americanum</i> Mill.	0	0	1	1	1	3	8.33
<b>N. of weeds recorded per crop</b>	<b>23</b>	<b>23</b>	<b>29</b>	<b>26</b>	<b>31</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (**36**). \***Abundance ratios** = (D = dominant  $\geq 30\%$  frequency), (C= common  $> 10- 30\%$  frequency), (R = rare  $\leq 10\%$  frequency). **T** = Total weed species recorded per quadrates

**Table 6. List of recorded species with their frequency ratios at Abu Zaabal area, Qalyubia governorate**

Taxa	Number of quadrates recorded by weeds per crop					T	F ratio
	Chamomile	Strawberry	Tomato	Tora	Zucchini		
<b>DOMINANT SPECIES</b>							
<i>Chenopodium album</i> L.	3	2	3	2	3	13	32.50
<i>Chenopodium murale</i> L.	3	2	4	1	2	12	30.00
<i>Convolvulus arvensis</i> L.	2	2	4	3	2	13	32.50
<i>Cynanchum acutum</i> L.	1	2	2	4	3	12	30.00
<i>Cynodon dactylon</i> (L.) Pers.	4	5	3	2	4	18	45.00
<i>Cyperus rotundus</i> L.	5	3	4	3	5	20	50.00
<i>Euphorbia peplus</i> L.	2	3	2	2	4	13	32.50
<i>Melilotus indicus</i> (L.) All.	2	3	3	2	2	12	30.00
<i>Polypogon monspeliensis</i> (L.) Desf.	3	3	2	2	2	12	30.00
<b>COMMON SPECIES</b>							
<i>Anagallis arvensis</i> L.	1	1	1	2	1	6	15.00
<i>Bidens pilosa</i> L.	1	1	1	0	2	5	12.50
<i>Capsella bursa-pastoris</i> (L.) Medik.	1	2	1	1	1	6	15.00
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	2	1	2	0	0	5	12.50
<i>Corchorus olitorius</i> L.	3	0	1	2	0	6	15.00
<i>Digitaria sanguinalis</i> (L.) Scop.	1	1	1	1	1	5	12.50
<i>Emex spinosa</i> (L.) Campd.	1	0	2	1	1	5	12.50
<i>Eruca vesicaria</i> (L.) Cav.	1	2	0	1	1	5	12.50
<i>Euphorbia helioscopia</i> L.	3	0	1	1	2	7	17.50
<i>Malva parviflora</i> L.	1	1	2	1	1	6	15.00
<i>Medicago sativa</i> L.	3	2	2	1	1	9	22.50
<i>Plantago major</i> L.	3	2	1	0	2	8	20.00
<i>Portulaca oleracea</i> L.	5	0	0	3	2	10	25.00
<i>Raphanus raphanistrum</i> L.	1	1	1	2	0	5	12.50
<i>Trifolium alexandrinum</i> L.	1	2	0	1	1	5	12.50
<i>Trifolium resupinatum</i> L.	3	1	2	2	2	10	25.00
<b>RARE SPECIES</b>							
<i>Brassica nigra</i> (L.) K. Kotch	0	0	1	0	0	1	2.50
<i>Cenchrus barbatus</i> Schum.	0	0	1	0	1	2	5.00
<i>Desmostachya bipinnata</i> (L.) Stapf	0	0	0	1	0	1	2.50
<i>Fumaria densiflora</i> DC.	0	1	1	0	0	2	5.00
<i>Lamium amplexicaule</i> L.	1	0	1	0	1	3	7.50
<i>Lolium perenne</i> L.	0	0	1	1	0	2	5.00

<i>Medicago polymorpha</i> L.	0	0	1	0	0	1	2.50
<i>Phalaris minor</i> Retz.	1	0	0	0	1	2	5.00
<i>Phoenix dactylifera</i> L.	1	0	1	1	0	3	7.50
<i>Rumex dentatus</i> L.	0	1	0	0	0	1	2.50
<i>Setaria verticillata</i> (L.) P. Beauv.	0	0	1	0	1	2	5.00
<i>Solanum americanum</i> Mill.	0	0	1	0	2	3	7.50
<i>Triticum aestivum</i> L.	0	0	1	0	1	2	5.00
<i>Urtica urens</i> L.	0	1	0	0	2	3	7.50
<b>N. of weeds recorded per crop</b>	<b>28</b>	<b>22</b>	<b>32</b>	<b>25</b>	<b>29</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (**40**). \***Abundance ratios** = (D = dominant  $\geq 30\%$  frequency), (C= common  $> 10- 30\%$  frequency), (R = rare  $\leq 10\%$  frequency). **T** = Total weed species recorded per quadrates

**Table 7. List of recorded species with their frequency ratios at Al Khankah area, Qalyubia governorate**

Taxa	Number of quadrates recorded by weeds per crop					T	F ratio
	Egyptian Clover	Green beans	Onion	Tomato	Wheat		
<b>DOMINANT SPECIES</b>							
<i>Chenopodium album</i> L.	1	4	0	3	3	11	31.43
<i>Chenopodium murale</i> L.	2	2	2	2	3	11	31.43
<i>Convolvulus arvensis</i> L.	1	2	2	2	5	12	34.29
<i>Cynodon dactylon</i> (L.) Pers.	1	3	4	2	2	12	34.29
<i>Cyperus rotundus</i> L.	2	1	3	5	2	13	37.14
<b>COMMON SPECIES</b>							
<i>Amaranthus lividus</i> L.	0	1	2	1	1	5	14.29
<i>Ammi majus</i> L.	2	1	0	1	2	6	17.14
<i>Avena fatua</i> L.	0	0	0	0	4	4	11.43
<i>Beta vulgaris</i> L.	1	2	1	1	2	7	20.00
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	5	1	0	0	0	6	17.14
<i>Emex spinosa</i> (L.) Campd.	2	0	0	1	2	5	14.29
<i>Eruca vesicaria</i> (L.) Cav.	1	0	1	2	2	6	17.14
<i>Euphorbia peplus</i> L.	3	1	2	1	1	8	22.86
<i>Lepidium didymum</i> L.	0	1	1	2	2	6	17.14
<i>Lolium perenne</i> L.	0	1	0	1	3	5	14.29
<i>Malva parviflora</i> L.	0	1	1	2	4	8	22.86
<i>Medicago sativa</i> L.	2	0	2	1	3	8	22.86
<i>Melilotus indicus</i> (L.) All.	2	3	1	1	2	9	25.71
<i>Phalaris minor</i> Retz.	0	0	0	1	3	4	11.43

<i>Plantago major</i> L.	1	1	1	1	2	6	17.14
<i>Poa annua</i> L.	1	2	1	1	3	8	22.86
<i>Polypogon monspeliensis</i> (L.) Desf.	1	2	2	2	3	10	28.57
<i>Portulaca oleracea</i> L.	2	3	2	1	0	8	22.86
<i>Raphanus raphanistrum</i> L.	1	0	0	0	3	4	11.43
<i>Sonchus oleraceus</i> L.	4	0	0	1	0	5	14.29
<i>Trifolium resupinatum</i> L.	2	2	1	0	1	6	17.14
<b>RARE SPECIES</b>							
<i>Anagallis arvensis</i> L.	1	0	2	0	0	3	8.57
<i>Avena sativa</i> L.	0	0	0	0	3	3	8.57
<i>Cuscuta campestris</i> Yunck.	2	0	0	0	0	2	5.71
<i>Cyclospermum leptophyllum</i> (Pers.) Sprague	1	0	0	1	1	3	8.57
<i>Cynanchum acutum</i> L.	0	1	0	0	1	2	5.71
<i>Orobancha ramosa</i> L.	0	3	0	0	0	3	8.57
<i>Phoenix dactylifera</i> L.	0	0	1	1	0	2	5.71
<i>Ricinus communis</i> L.	0	1	0	1	0	2	5.71
<i>Sesbania sesban</i> (L.) Merr.	0	1	1	1	0	3	8.57
<i>Solanum americanum</i> Mill.	0	1	0	1	0	2	5.71
<i>Urtica urens</i> L.	0	0	0	1	1	2	5.71
<b>N. of weeds recorded per crop</b>	<b>23</b>	<b>24</b>	<b>20</b>	<b>28</b>	<b>27</b>		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (35). \***Abundance ratios** = (D = dominant  $\geq 30\%$  frequency), (C = common  $> 10-30\%$  frequency), (R = rare  $\leq 10\%$  frequency). **T** = Total weed species recorded per quadrates

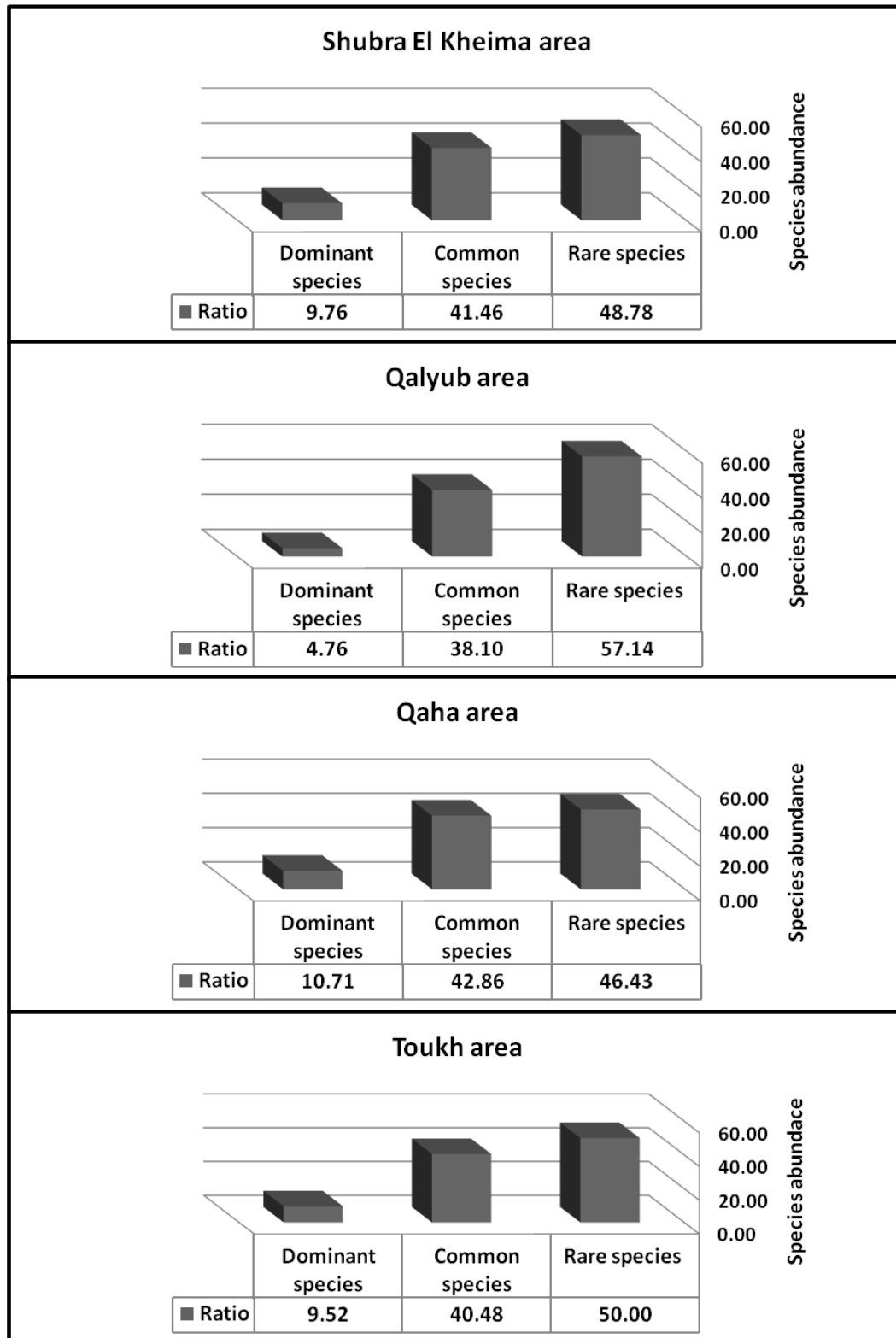
**Table 8. List of recorded species with their frequency ratios at Al Gabal Al Asfar area, Qalyubia governorate**

	Number of quadrates recorded by weeds per crop						
Taxa	Broad bean	Cabbage	Egyptian Clover	Lettuce	Onion	T	F ratio
<b>DOMINANT SPECIES</b>							
<i>Convolvulus arvensis</i> L.	4	3	1	3	2	13	32.50
<i>Cynodon dactylon</i> (L.) Pers.	4	5	2	3	5	19	47.50
<i>Cyperus rotundus</i> L.	3	6	4	4	5	22	55.00
<i>Euphorbia peplus</i> L.	3	4	2	3	2	14	35.00
<i>Polypogon monspeliensis</i> (L.) Desf.	4	2	2	2	2	12	30.00
<i>Sonchus oleraceus</i> L.	2	3	3	3	2	13	32.50
<b>COMMON SPECIES</b>							
<i>Amaranthus lividus</i> L.	1	1	1	1	1	5	12.50
<i>Anagallis arvensis</i> L.	0	1	2	1	1	5	12.50
<i>Beta vulgaris</i> L.	1	0	2	1	1	5	12.50
<i>Chenopodium album</i> L.	0	3	0	2	2	7	17.50

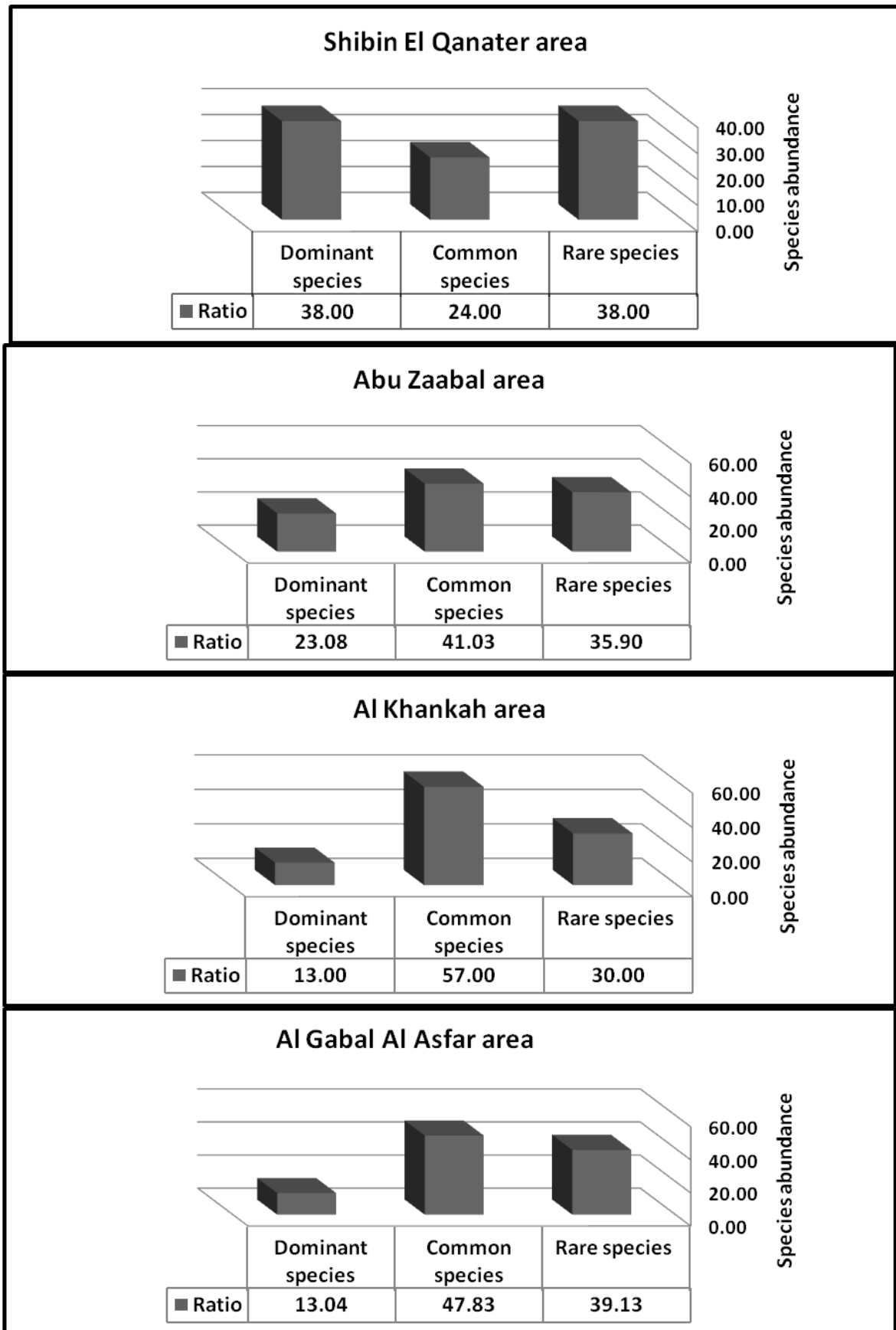
<i>Chenopodium murale</i> L.	1	3	1	2	1	8	20.00
<i>Cichorium endivia</i> L. subsp. <i>divaricatum</i> (Schousb.) P.D. Sell	1	0	5	1	1	8	20.00
<i>Coriandrum sativum</i> L.	1	1	1	0	3	6	15.00
<i>Cyclospermum leptophyllum</i> (Pers.) Sprague	1	1	2	1	1	6	15.00
<i>Emex spinosa</i> (L.) Campd.	1	1	1	1	2	6	15.00
<i>Eruca vesicaria</i> (L.) Cav.	2	1	2	1	1	7	17.50
<i>Lepidium didymum</i> L.	2	1	0	1	1	5	12.50
<i>Lolium perenne</i> L.	0	1	0	2	2	5	12.50
<i>Malva parviflora</i> L.	1	3	2	2	1	9	22.50
<i>Medicago sativa</i> L.	1	1	2	1	1	6	15.00
<i>Melilotus indicus</i> (L.) All.	0	2	2	1	1	6	15.00
<i>Phalaris minor</i> Retz.	1	1	1	1	1	5	12.50
<i>Poa annua</i> L.	1	2	1	1	2	7	17.50
<i>Portulaca oleracea</i> L.	1	1	2	1	1	6	15.00
<i>Rumex dentatus</i> L.	2	1	2	1	1	7	17.50
<i>Setaria verticillata</i> (L.) P. Beauv.	1	2	0	1	2	6	15.00
<i>Trifolium resupinatum</i> L.	0	0	2	1	3	6	15.00
<i>Urtica urens</i> L.	1	1	0	1	2	5	12.50
<b>RARE SPECIES</b>							
<i>Ammi majus</i> L.	0	1	2	0	0	3	7.50
<i>Brassica nigra</i> (L.) K. Kotch	2	0	0	0	0	2	5.00
<i>Cuscuta campestris</i> Yunck.	0	0	3	0	0	3	7.50
<i>Dactyloctenium aegyptium</i> (L.) Willd.	1	0	0	0	1	2	5.00
<i>Digitaria sanguinalis</i> (L.) Scop.	0	0	0	0	2	2	5.00
<i>Laphangium luteoalbum</i> (L.) Tzvelev	0	0	0	0	2	2	5.00
<i>Leptochloa fusca</i> (L.) Kunth	1	0	0	1	1	3	7.50
<i>Leucaena leucocephala</i> (Lam.) de wit	0	0	1	0	0	1	2.50
<i>Lycopersicon esculentum</i> Mill.	0	0	1	1	2	4	10.00
<i>Medicago polymorpha</i> L.	0	0	0	1	2	3	7.50
<i>Orobancha ramosa</i> L.	4	0	0	0	0	4	10.00
<i>Phoenix dactylifera</i> L.	0	1	1	0	0	2	5.00
<i>Raphanus raphanistrum</i> L.	0	1	2	0	1	4	10.00
<i>Ricinus communis</i> L.	1	0	1	0	0	2	5.00
<i>Salix tetrasperma</i> Roxb.	0	1	1	0	0	2	5.00
<i>Sesbania sesban</i> (L.) Merr.	1	0	0	0	0	1	2.50
<i>Solanum americanum</i> Mill.	1	0	1	0	1	3	7.50
<i>Solanum tuberosum</i> L.	0	0	0	0	1	1	2.50
N. of weeds recorded per crop	30	29	32	30	37		

\* **Frequency ratio (F ratio)** = Total number of quadrates where the species was recorded divided by the total number of quadrates (40). \***Abundance ratios** = (D = dominant  $\geq$  30%)

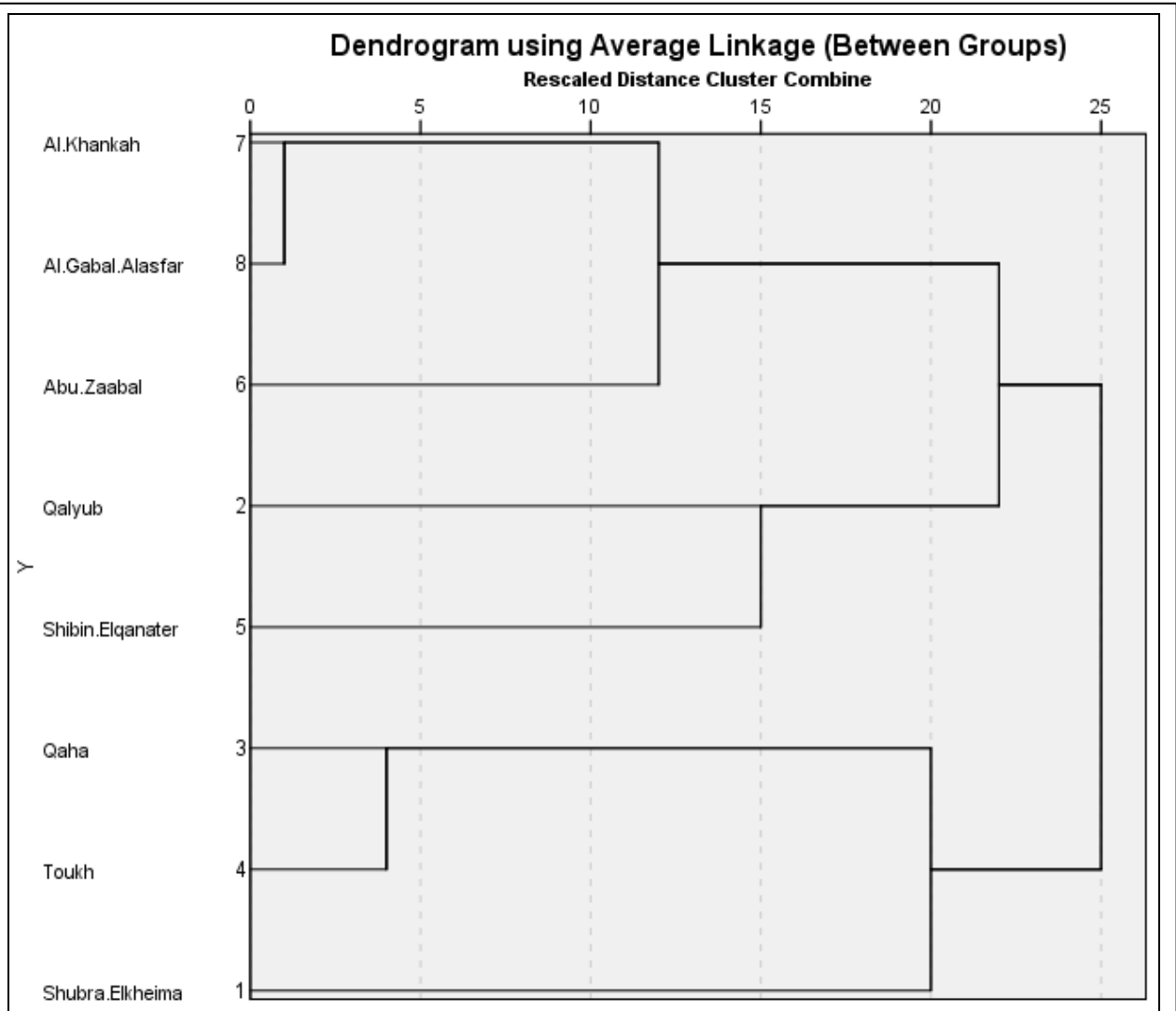
frequency), (C= common > 10- 30% frequency), (R = rare  $\leq$ 10% frequency). **T** = Total weed species recorded per quadrates



**Fig. 2. Histogram shows weed species abundance ratios among the studied areas at Qalyubia governorate**



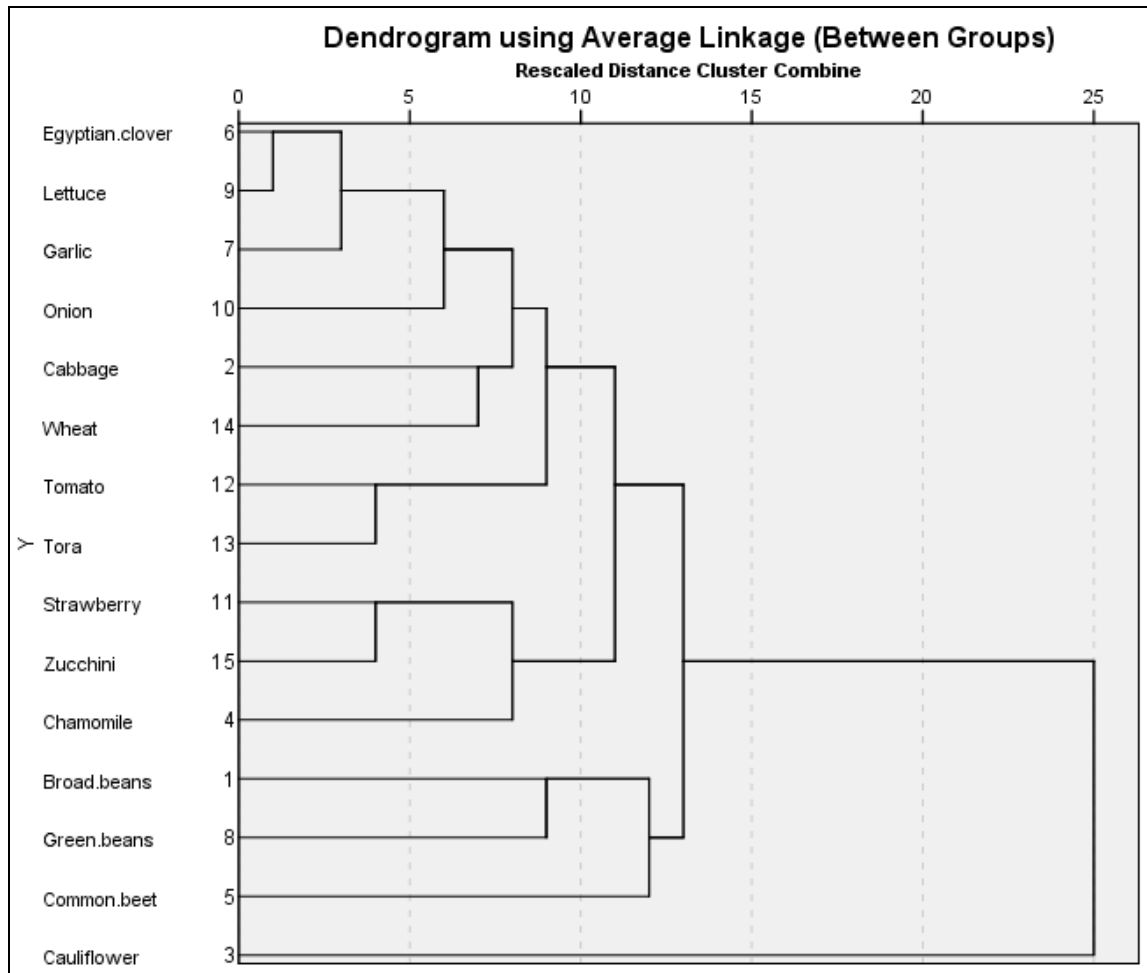
**Fig. 3. Histogram shows weed species abundance ratios among the studied areas at Qalyubia governorate**



**Fig. 4. Dendrogram shows weeds similarity among the studied areas at Qalyubia governorate**

**Table 9. Proximity matrix shows weeds similarity value among the studied areas at Qalyubia governorate**

Proximity Matrix								
Areas	Matrix File Input							
	Shubra Elkheima	Qalyub	Qaha	Toukh	Shibin Elqanater	Abu Zaabal	Al Khankah	Al Gabal Alasfar
<b>Shubra Elkheima</b>	1.000							
<b>Qalyub</b>	0.566	1.000						
<b>Qaha</b>	0.563	0.609	1.000					
<b>Toukh</b>	0.491	0.500	0.667	1.000				
<b>Shibin Elqanater</b>	0.421	0.569	0.469	0.462	1.000			
<b>Abu Zaabal</b>	0.421	0.509	0.469	0.434	0.592	1.000		
<b>Al Khankah</b>	0.519	0.472	0.458	0.480	0.520	0.583	1.000	
<b>Al Gabal.Alasfar</b>	0.452	0.435	<b>(0.373)</b>	0.466	0.526	0.611	<b>(0.700)</b>	1.000



**Fig. 5. Dendrogram shows weeds similarity among the studied crops at Qalyubia governorate**

**Table 10. Proximity matrix shows weed similarity value among the studied crops at Qalyubia governorate**

Proximity Matrix															
Crop	Matrix File Input														
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
C1	1.000														
C2	0.512	1.000													
C3	0.182	0.220	1.000												
C4	0.256	0.383	0.182	1.000											
C5	0.459	0.477	0.258	0.350	1.000										
C6	0.467	0.510	0.275	0.404	0.375	1.000									
C7	0.455	0.563	0.195	0.455	0.455	0.583	1.000								
C8	0.500	0.476	0.385	0.308	0.457	0.537	0.452	1.000							
C9	0.523	0.560	0.209	0.457	0.457	<b>(0.646)</b>	0.638	0.455	1.000						
C10	0.450	0.468	0.265	0.450	0.415	0.556	0.478	0.447	0.614	1.000					
C11	0.357	0.447	<b>(0.167)</b>	0.541	0.425	0.500	0.558	0.350	0.489	0.525	1.000				
C12	0.432	0.542	0.200	0.537	0.465	0.531	0.587	0.463	0.551	0.396	0.435	1.000			
C13	0.452	0.469	0.179	0.488	0.452	0.490	0.479	0.381	0.609	0.444	0.422	0.591	1.000		
C14	0.367	0.529	0.209	0.426	0.426	0.519	0.540	0.455	0.509	0.449	0.400	0.490	0.423	1.000	
C15	0.421	0.477	0.219	0.500	0.421	0.535	0.524	0.378	0.457	0.450	0.583	0.465	0.488	0.457	1.000

C1=Broad beans; C2=Cabbage; C3=Cauliflower; C4=Chamomile; C5= Common beet; C6= Egyptian clover; C7=Garlic; C8=Green beans; C9=Lettuce; C10= Onion; C11=Strawberry; C12=Tomato; C13=Tora; C14=Wheat; C15=Zucchini

Table 11. Dominant weed species among the studied winter crops at Qalyubia governorate

No.	Crop types	Dominant weeds species										
		<i>Chenopodium album</i>	<i>Chenopodium murale</i>	<i>Cichorium endivia subsp. divaricatum</i>	<i>Convolvulus arvensis</i>	<i>Cynanchum acutum</i>	<i>Cyperus rotundus</i>	<i>Cynodon dactylon</i>	<i>Melilotus indicus</i>	<i>Euphorbia peplus</i>	<i>Polypogon monspeliensis</i>	<i>Sonchus oleraceus</i>
1	Broad beans	-	-	-	+	-	+	+	-	+	+	+
2	Cabbage	+	+	+	+	-	+	+	+	+	+	+
3	Cauliflower	-	-	-	-	-	+	+	-	-	-	-
4	Chamomile	+	+	-	+	+	+	+	+	-	+	-
5	Common beet	-	-	-	+	-	+	+	-	-	+	-
6	Egyptian clover	+	+	+	+	-	+	+	+	+	+	+
7	Garlic	+	-	-	+	-	+	+	-	-	+	-
8	Green beans	+	+	-	+	-	+	+	-	-	-	-
9	Lettuce	+	-	-	+	+	+	+	-	+	+	+
10	Onion	+	+	+	+	-	+	+	+	+	+	+
11	Strawberry	+	+	+	+	-	+	+	+	+	+	-
12	Tomato	+	+	-	+	+	+	+	+	+	+	-
13	Tora	+	+	-	+	+	+	+	+	+	+	-
14	Wheat	+	+	+	+	-	+	+	+	+	+	-
15	Zucchini	+	+	-	+	+	+	+	+	+	+	-

Table 12. Weed species ratios per crop among the studied areas at Qalyubia governorate

Area	Winter crop	Ratio	Area	Winter crop	Ratio
Shubra El Kheima area	Egyptian Clover	24.56	Qalyub area	Wheat	30.63
	Taro	21.93		Zucchini	19.82
	Cabbage	18.42		Onion	18.92
	Lettuce	18.42		Common beet	16.22
	Garlic	16.67		Cauliflower	14.41
		100			100
Qaha area	Wheat	28.09	Toukh area	Wheat	22.60
	Egyptian Clover	20.22		Garlic	21.23
	Onion	20.22		Lettuce	20.55
	Tomato	16.85		Egyptian Clover	18.49
	Garlic	14.61		Common beet	17.12
		100			100
Shibin El Qanater	Wheat	23.48	Abu Zaabal area	Tomato	23.53
	Onion	21.97		Zucchini	21.32
	Strawberry	19.70		Chamomile	20.59
	Cabbage	17.42		Tora	18.38
	Egyptian Clover	17.42		Strawberry	16.18
		100			100
Al Khankah area	Tomato	22.95	Al Gabal Al Asfar area	Onion	23.42
	Wheat	22.13		Egyptian Clover	20.25
	Green beans	19.67		Broad bean	18.99
	Egyptian Clover	18.85		Lettuce	18.99
	Onion	16.39		Cabbage	18.35
		100			100

## CONCLUSIONS

Frequency ratios of weed species were generally varied among the studied areas. The abundance of weed species may be interpreted as dominant, common or rare species and varied among the studied areas. The cluster analysis of the recorded weed species divided the studied areas and crops into four and seven groups; respectively. Eleven weed species were recorded among 15 studied winter crops. The total ratios of weed species varied from one crop to another. On the whole, dramatic changes in the weed species of Qalyubia governorate during the last decades necessitate sustainable management. Using of pesticides and high techniques in cultivation had adverse effects on total ratio of weed species among the studied crops. The current agricultural practices are neither helping farmers to protect their crops from weeds nor helping the survival of the weed species. It became clear that the more destructive methods farmers use against weeds, the more weed resistance they get back.

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