Central Asian Journal of Plant Science Innovation **1**(1): 10–22 (2021)

RESEARCH PAPER

Study flora and distribution of weed (Case Study: fruit orchards of Darreh Shahr city, Ilam province, Iran)

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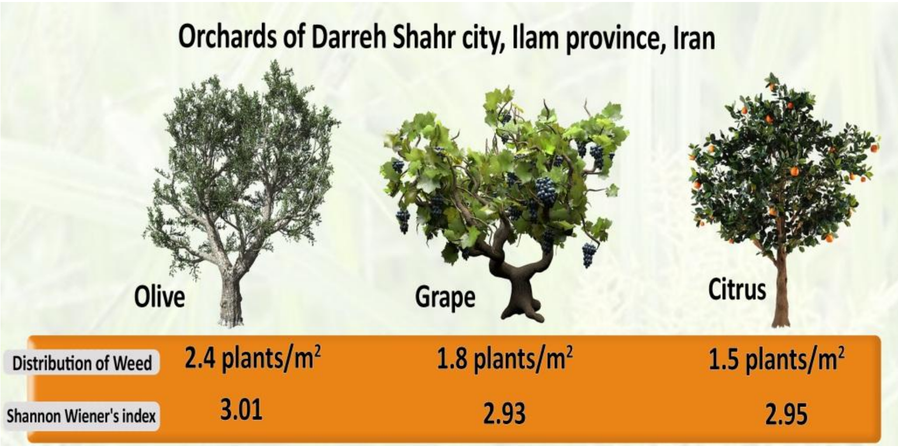
Highlights

• Identifying and Distribution of Weed Species Important information can be obtained for designing weed management programs.
• One of the most important factors affecting the success of crops and orchards is the distribution of weeds and their propagation power.
• Areas with higher diversity indices had higher uniformity and species richness indices.
• Weed management is one of the most important challenges for farmers.

Graphical Abstract



Article Info

Receive Date: 07 November 2020
Revise Date: 19 January 2021
Accept Date: 13 February 2021
Available online: 22 March 2021

Keywords:
Garden
Weed distribution
Dominance index
Flora

Abstract

Weed management is one of the most critical challenges facing farmers. By identifying the weed flora and determining the status, abundance, and distribution of weed species, important information can be obtained for designing weed management programs. Based on this and also due to the lack of enough information about the weed status of orchards in Darreh Shahr city, this study was designed to compare the flora and determine the distribution of weeds in olive, grape, and citrus orchards in 2018. Sampling in each garden was based on the W pattern with a 50x50 cm square. The result showed that among the 37 species of herbaceous plants observed in vineyards, the average density for wild weeds was about 1.8 plants/m^2. Among the 42 species of herbaceous plants observed in the olive orchards, the average density of wild lettuce was about 2.4 plants/m^2. Among the 40 common herbaceous species in citrus orchards, the highest level of uniformity of distribution (30%) was assigned to perennial grasshoppers. Shannon Wiener's index in olive, Citrus, and grape orchards were 3.01, 2.93, and 2.95, respectively. The area under cultivation and management are the most critical factors in determining the diversity and dominance of species in orchards. In general, research results show that weed density is high in Darreh Shahr gardens, so weed management methods should be improved to control weeds. Also, the structure of weeds in city gardens is different, and this can be useful in management planning to control weeds.

10.22034/CAJPSI.2021.01.02

E-ISSN: 2783-1310

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1. Introduction

Iran is one of the most important Asian countries for horticultural products. The area of gardens in the Ilam province in 2015 is more than 6 thousand hectares. The area of gardens in Darreh Shahr city in 2017 is equal to 531 hectares, of which grapes 100 hectares, olives 180 hectares, citrus fruits 100 hectares, and daffodils occupy 350 hectares. Citrus fruits and their products are rich sources of vitamins, minerals, and fiber essential for the growth and development of individuals (Nunes et al., 2020). Citrus production is one of the most important sources of wealth creation, trade, and employment of residents of about 125 citrus-rich countries in the world (Martinelli et al., 2017). Weeds have long been a competitor to crops and trees, so farmers are always trying to eradicate weeds (Smith et al., 2000). Weeds are one of the most critical limiting factors in the optimal production of crops and horticulture, which plays an essential role in reducing crop production (Mahmood et al., 2019). This effect may be induced by weed colonies' formation in plowed areas and reduced yield (Song et al., 2017). One of the most important factors influencing the success of crops and orchards is the distribution and their propagation power of weeds. However, weed communities' composition is affected by agronomic, managerial, and environmental factors (Atajan et al., 2019). The flora of weeds changes with the emergence of new species, field operations, and intraspecific adaptations, so knowledge of flora is one of the basic principles of weed management (Lass and Callihan, 1993). Weed management is of particular importance because the determination of weed flora and their geographical distribution is necessary information (Mousavi et al., 2011). In general, weeds are constantly competing with garden and crop plants for nutrients, water, and space (MacLaren et al., 2020). Also act as hosts for pathogens and pests (Mousavi et al., 2011). The distribution of weed species and their abundance in orchards varies due to the garden plant's nature, agricultural operations, and cultivation system and pattern, soil type, moisture content, region, and season (Mousavi et al., 2011).

In principle, weed control should be at the lowest cost of using agricultural management principles to reduce the use of herbicides to protect the environment. Crop management, such as variety in crop rotation, use of narrower rows, increase in density, use of green manure, application of strip fertilizer, and cover crops, can increase crops and orchards' ability to overcome weeds (Lemerle et al., 2001). Researchers report that weed populations are always changing (Mousavi et al., 2011). But because agricultural systems' ecosystem is subject to sudden and frequent changes such as grazing, plowing, or cutting, the sequence is short. As a result, weed flora is highly dynamic (Campiglia et al., 2018). A citrus weed distribution map report showed that *cyperus rotundus*, *Portulaca oleracea*, and *Amaranthus retroflexus* were present in most studied orchards (Nunes et al., 2020). In most orchards, high diversity and high prevalence of weeds were observed, which could be due to management measures similar to gardeners in the study area (Nunes et al., 2020). A study of weed communities of 19 crops in Denmark has clearly shown a correlation between plant type and associated weed flora (Andreasen et al., 1991). Appropriate strategies and planning for weed management require knowledge of the status and type of weeds in the region. In other words, by identifying, determining the abundance and distribution of weed species, important information can be obtained for proper weed management in that area (Derksen et al., 2002; Sarabi and Zeidali, 2017). The use of relative uniformity indicators, relative abundance, and relative density for weed species show different aspects of weeds' presence in crops (Sarabi and Zeidali, 2017). Weed distribution, power of their development, lack of accurate identification of weeds, poor management and lack of knowledge of farmers about new findings of proper weed management strategies and improper use of control methods are the most critical factors in reducing crop yield (Nunes et al., 2020). Weed distribution is used to implement various weed control operations properly, reduce consumption, increase the effectiveness of herbicides, evaluate management strategies in the past and present, and design future weed management strategies (Nunes et al., 2020).

Due to the diversity of the presence of weed species and their dominance in orchards in different regions, this study aimed to study the flora and distribution of weed. Farmers and researchers can use this study's results to identify and control garden weeds in a timely and appropriate manner (Sit et al., 2007).

2. Materials and Methods

This research was conducted in olive, Grape, and citrus orchards in Darreh Shahr city of Ilam province in March 2018. Darreh Shahr city is located 135 km southeast of Ilam province and 160 km southwest of Lorestan province. Darreh Shahr is located at a longitude of 47° 22' and latitude of 33° 8' and is 650 meters above sea level. Weeds sampling were done from about 80 hectares of gardens in Darreh Shahr. Sampling in each garden was based on the W pattern (Mahmood et al., 2019). A corner of the garden was selected and then moved from that point about 15 steps parallel to one of the sides; then, by forming a 90-degree angle of 15 steps into the garden, the starting point was sampled from this place. According to the shape of the letter W, 8 points were selected on it, so that the distance between two consecutive points was 15 steps, and a box of 0.25 m^2 (dimensions 0.5 by 0.5 m^2) was thrown at each point. Therefore, after throwing each box, 0.25 m^2 of weeds of each box were identified exactly by species and species. In addition, the number of weeds of each species in each box was specified.

2.1. Identification of species

Weed samples were collected from the orchards of the region then placing them in unique bags for identification using books and related keys of botanical knowledge according to genus and species.

2.2. Use of collected data

In orchards to study and determine the importance of weeds, indices of uniformity of distribution, species abundance, the relative density of species, the relative importance of species, and indices of dominance and diversity were used, which were calculated based on the following equations.

2.3. Weed species abundance

In this equation F: the frequency of species k was based on whether or not it was present in the area of the orchards visited, regardless of the level of density; Indicating the percentage of gardens in which the species in question has been observed, Yi: presence (1) or absence (0) of species k in garden number i and n: number of gardens visited (Thomas, 1985).

$$F_K = \frac{\sum Y_i}{n} \times 100 \quad (1)$$

2.4. Relative frequency

The relative abundance of species k; the percentage of the species in question indicates all species' total frequency, F_K: the frequency of species k, and the total frequency of all species (Thomas, 1985).

$$RF_K = \frac{F_K}{\sum F} \times 100 \quad (2)$$

2.5. Farm uniformity

In this equationU_K: uniformity of the gardens for the species was based on whether or not it was present in the boxes cast on the surface of the gardens, regardless of the level of density; Indicates the percentage of boxes in which the target species is observed, Xi: presence (1) or absence (0) of species k in quadrats i and m: number of quadrats thrown (Thomas, 1985).

$$U_K = \frac{\sum X_i}{m} \times 100 \quad (3)$$

2.6. Species density

In this equation Dk: density (number of plants/m^2) of species k on the field surface, Zi: number of plants of species k in 50 by 50 cm frames, and m: number of quadrates thrown (Mahmood et al., 2019).

$$D_K = \frac{\sum Z_i}{m} \times 4 \quad (4)$$

2.7. Equation of relative importance of species

The relative importance of the species depends on the indices of species abundance and species uniformity in the orchards and is obtained by summing these two indices divided by 2 (Mahmood et al., 2019).

$$Ris = \frac{U_K + RF_K}{2} \tag{5}$$

Shannon-Wiener Diversity Index: in this equation, S number of species, i the species abundance, and the relative abundance of the species are known:

$$H' = -\sum_{i=1}^{S}(p_i ln p_i) \tag{6}$$

$$P_i = \frac{n_i}{N} \tag{7}$$

Where n_i is the number of individuals or the frequency of each specific species, and N is the total number of individuals or all species' total frequency. This index's value varies from 1.5 for richness (number of species) and species uniformity (uniform distribution of individuals among different species) low to 3.5 for richness and high species uniformity.

2.8. Simpson dominance index

The value of this index is between 1 and zero. The higher the value of this index, the greater the species' diversity, and uniformity and the less the dominant species.

$$D=\sum \{[n_i (n_i-1)]/ [N (n-1)]\} \tag{8}$$

3. Results and Discussion

3.1. Properties of weed flora of olive groves

3.1.1. The abundance of weed species in olive groves

A comparison of the frequency of common weed species in Darreh Shahr city's olive groves is shown in Tables 1 and 2. Among the 42 weed species observed in the olive groves visited, the highest frequency (81.81%) belonged to the perennial weed of Wild Safflower (*Carthamus oxyacantha*). *Sorghum halepense* species with a frequency of 72.7% were ranked second in terms of frequency. In addition to the two mentioned species, nine other species had a frequency of more than 50%. The abundance of *Polygonum aviculare*, *Cuscuta campestris*, and *Lolium rigidum* was 64%. Thus out of 42 weed species observed in the olive groves visited, only 11 species, or 26.19% of weed species, had a frequency of more than 50%. Out of 11 species with an abundance of more than 50%, only four species, including *Carthamus oxyacanthus*, *Sorghum halepense*, *Physocaulis nodosus*, and *Lactuca sp.* were perennials. Thirty-one species of weeds with a frequency of less than 50% were in four distinct groups. The first group includes 9 species (*Melilotus officinalis*), (*Cardaria draba*), (*Chenopodium album*), (*Hibiscus trionum*), (*Myagrum perfoliatum*), (*Picnomun acarna*), (*Secale cereale*), (*Rubus sp*), (*Alhagi camelorum*) with Frequency 45.45%; the second group includes 15 species (*Trifolium repens*), (*Xanthium strumarium*), (*Mentha sp*), (*Altheae sp*), (*Cichorium intybus*), (*Hordeum sp*), (*Neslia apiculata*), (*Paspalum distichum*) (*Veronica persica*), (*Achillea sp*), (*Acroptilon repens*), (*Poa annua*), (*Portulaca oleracea*), (*Vicia sp*) and (*Sonchus arvensis*) with a frequency of 36.3%, the third group includes five species (*Heliotropium europeum*) (*Physalis divaricata*), (*Sisymbrium Irio*), (*Anchousa Italica*) and (*Sideritis monthana*) with a frequency of 27.2%, the fourth group consisted of two species (*Bromus sp.*) and (*Cirsium arvense*) with a frequency of 18.1%. In terms of the life cycle, out of 42 common species in the olive groves of Darreh Shahr, only 15 species, or 35.7% perennial, and the rest, 64.3% of the population, were annual.

The researchers said that the share of annual and perennial species in the total number of dominant species was equal (MacLaren et al., 2019). *Lolium rigidum* with 468.3 plants/m^2 had the highest population density. The relative share of this species in the total plant density was 91.4%. *Sisymbrium Irio* and *Bromus* species had the lowest density among the dominant species (MacLaren et al., 2019).

Table 1. Functional groups of weed orchards of Darreh Shahr city by species and family.

Scientific name	Family	Vegetative form	PPFG	Vegetative cycle	Stubborn and non-stubborn
Amaranthus retroflexus	Amaranthaceae	Dicotyledonous	C3	one year	non-stubborn
Falcaria vulgaris	Apiaceae	Dicotyledonous	C3	one year	non-stubborn
Achillea sp	Asteraceae	Dicotyledonous	C3	Perennial	non-stubborn
Acroptilon repens	Asteraceae	Dicotyledonous	C3	Perennial	non-stubborn
Carthamus oxyacanthus	Asteraceae	Dicotyledonous	C3	Perennial	non-stubborn
Cirsium arvense	Asteraceae	Dicotyledonous	C3	Perennial	Stubborn
Lactuca sp.	Asteraceae	Dicotyledonous	C3	Perennial	non-stubborn
Sonchus arvensis	Asteraceae	Dicotyledonous	C3	Perennial	Stubborn
Cichorium intybus	Asteraceae	Dicotyledonous	C3	one year	Stubborn
Picnomun sp	Asteraceae	Dicotyledonous	C3	one year	non-stubborn
Xanthium strumarium	Asteraeae	Dicotyledonous	C3	one year	non-stubborn
Anchousa italica	Boraginaceae	Dicotyledonous	C3	one year	non-stubborn
Cardaria draba	Brassicaceae	Dicotyledonous	C3	Perennial	non-stubborn
Myagrum perfoliatum	Brassicaceae	Dicotyledonous	C3	one year	non-stubborn
Neslia apiculata	Brassicaceae	Dicotyledonous	C3	one year	non-stubborn
Sisymbrium irio	Brassicaceae	Dicotyledonous	C3	one year	non-stubborn
Chenopodium album	Chenopodiaceae	Dicotyledonous	C3	one year	Stubborn
Cuscuta campestris	Cuscutaceae	Monocotyledonous	C3	one year	Stubborn
Alhagi camelorum	Fabaceae	Dicotyledonous	C3	Perennial	non-stubborn
Melilotus officinalis	Fabaceae	Dicotyledonous	C3	one year	non-stubborn
Vicia sp	Fabaceae	Dicotyledonous	C3	one year	non-stubborn
Digitaria sanguinalis	Gramineae	Monocotyledonous	C3	one year	Stubborn
Heliotropium europeum	Heliotropioideae	Dicotyledonous	C3	one year	non-stubborn
Mentha sp	labiatae	Dicotyledonous	C3	Perennial	non-stubborn
Sideritis monthana	Labiatae	Dicotyledonous	C3	Perennial	non-stubborn
Trifolium repens	Leguminosae	Dicotyledonous	C3	Perennial	non-stubborn
Altheae sp	Malvaceae	Dicotyledonous	C3	Perennial	non-stubborn
Hibiscus trionum	Malvaceae	Dicotyledonous	C3	one year	non-stubborn
Paspalum distichum	Poaceae	Monocotyledonous	C3	Perennial	non-stubborn
Sorghum halepense	Poaceae	Monocotyledonous	C4	Perennial	non-stubborn
Bromus sp	Poaceae	Monocotyledonous	C3	one year	Stubborn
Echinochloa crus-galli	Poaceae	Monocotyledonous	C3	one year	Stubborn
Hordeum sp	Poaceae	Monocotyledonous	C3	one year	Stubborn
Lolium rigidum	Poaceae	Monocotyledonous	C3	one year	Stubborn
Poa annua	Poaceae	Monocotyledonous	C3	one year	non-stubborn
Secale Cereale	Poaceae	Monocotyledonous	C3	one year	Stubborn
Polygonum sp	Polygonaceae	Dicotyledonous	C3	one year	non-stubborn
Portulaca oleracea	Portulacaceae	Dicotyledonous	C3	one year	non-stubborn
Rubus sp	Rosaceae	Dicotyledonous	C3	Perennial	non-stubborn
Veronica persica	Scrophulariaceae	Dicotyledonous	C3	one year	non-stubborn
Physalis divaricata	Solanaceae	Dicotyledonous	C3	one year	non-stubborn
Physocaulis nodosus	Umbelliferae	Dicotyledonous	C3	Perennial	non-stubborn

PPFG: Photosynthetic Pathway Functional Group

Table 2. Average plant density, relative uniformity, relative density, relative importance and species abundance of olive groves.

Scientific name	Average density	Relative uniformity	Relative density	Species abundance	Relative importance
Achillea sp.	0.8	10.0	2.01	36.4	23.0
Acroptilon repens	1.1	17.5	2.76	36.4	27.0
Alhagi Camelorum	0.6	10.0	1.50	45.5	27.5
Altheae sp.	1.2	17.5	3.01	36.4	27.0
Amaranthus retroflexus	1.0	10.0	2.51	54.5	32.5
Anchousa Italica	0.7	7.5	1.75	27.3	17.5
Bromus sp.	0.2	2.5	0.50	18.2	10.5
Cardaria draba	0.3	7.5	0.75	45.5	26.5
Carthamus oxyacanthus	1.5	15.0	3.76	81.8	48.5
Chenopodium album	1.1	15.0	2.76	45.5	30.0
Cichorium intybus	0.7	12.5	1.75	36.4	24.5
Cirsium arvense	0.8	7.5	2.01	18.2	13.0
Cuscuta campestris	1.0	17.5	2.51	63.6	41.0
Digitaria sanguinalis	1.2	15.0	3.01	54.5	35.0
Echinochloa crus-galli	1.3	17.5	3.26	54.5	36.5
Falcaria vulgaris	1.4	22.5	3.51	54.5	39.0
Heliotropium europeum	1.6	20.5	4.01	27.3	23.5
Hibiscus trionum	0.8	12.5	2.01	45.5	29.0
Hordeum sp.	1.3	20.0	3.26	36.4	28.0
Lactuca sp.	2.4	30.0	6.02	54.5	42.5
Lolium rigidum	1.0	15.0	2.51	63.6	39.5
Melilotus officinalis	1.2	20.0	3.01	45.5	32.5
Mentha sp.	1.4	20.0	3.51	36.4	28.0
Myagrum perfoliatum	0.9	15.0	2.26	45.5	30.0
Neslia apiculata	1.0	12.5	2.51	36.4	24.5
Paspalum distichum	1.0	12.5	2.51	36.4	24.5
Physalis divaricata	0.5	5.0	1.25	27.3	16.0
Physocaulis nodosus	0.3	7.5	2.76	54.6	36.5
Picnomun sp.	0.7	10.0	1.75	45.5	27.5
Poa annua	1.0	17.5	2.51	36.4	27.0
Polygonum sp.	1.5	17.5	3.76	63.6	41.0
Portulaca oleracea	1.1	12.5	2.76	36.4	24.5
Rubus sp.	0.7	7.5	1.75	45.5	26.5
Secale Cereale	0.5	7.5	1.25	45.5	26.5
Sideritis monthana	0.8	12.5	2.01	27.3	20.0
Sisymbrium Irio	0.2	2.5	0.50	27.3	15.0
Sonchus arvensis	0.8	12.5	2.01	36.4	24.5
Sorghum halepense	1.1	7.5	0.75	72.7	40.5
Trifolium repens	1.2	15.0	3.01	36.4	25.5
Veronica persica	0.5	7.5	1.25	36.4	22.0
Vicia sp.	0.3	5.0	0.75	36.4	20.5
Xanthium strumarium	1.2	17.5	3.01	36.4	27.0

3.1.2. Uniformity of distribution of weed species in olive groves

The uniformity of the distribution of common weed species in Darreh Shahr city's olive groves is shown in Table 2. Among 42 common weed species in Darreh Shahr city's olive groves, the highest level of uniformity of distribution (30%) was allocated perennial weed *Lactuca sp.* The second-ranking of distribution uniformity was related to *Falcaria vulgaris*. The third-ranking of uniformity was allocated to *Heliotropium europeum*, *Hordeum sp*, *Melilotus officinalis*, and *Mentha sp*., respectively. The uniformity of distribution for the six mentioned species was significantly higher than the other species. *Acroptilon repent*, *Altheae sp*, *Cuscuta campestris*, *Echinochloa crus-galli*, *Physocaulis nodosus*, *Poa annua*, *Polygonum sp*., and *Xanthium strumarium* have uniformity of 17.8%, *Carthamus oxyacanthus*, *Chenopodium rigid*, *Lhen*, and *Chenopodium rigid* It has a uniformity of 15.1%, *Cichorium intybus, Hibiscus trionum, Neslia apiculata, Paspalum distichum, Portulaca oleracea, Sideritis monthana* and *Sonchus arvensis* with uniformity of 12.5%, *Achillea sp., Alhagi camelorum* and *Amaranthus retroflexus*. The other 11 species had a uniformity of less than 10%. Species with uniform distribution of less than 10% were in three groups. *Anchousa italica, Cirsium arvense, Cardaria draba, Rubus sp., Secale Cereale, Sorghum halepense* and *Veronica persica* with 7.5% uniformity in the first group, species of *Vicia sp.,* and *Physalis divaricata* with 5% uniformity in the second group, *Bromus sp*., and *Sisymbrium irio* species were in the third group with uniformity of 2.5%.The use of animal manures, non-use of herbicides and use of chemical fertilizers by gardeners can be the main reasons for species diversity.

3.1.3. The average density of weed species in olive groves

The comparison of the mean density of common weed species in the olive groves of Darreh Shahr city is shown in Table 2. Among the 42 weed species observed in the olive groves visited, the average density for *Lactuca sp.*, weeds was very different from other species. The average density for *Lactuca sp*., were 4.2 plants/m^2. Thus, the first ranking of density was allocated to the weed *Lactuca sp*., *Heliotropium europaeum* was the second species with 1.6 plants/m^2 average density. Weed species *Carthamus oxyacanthus* and *Polygonum sp.,* with an average of 1.5 plants/m^2 were ranked third. In terms of the life cycle, two species are annual among the four species, and the other two species are perennial. Two *Mentha sp*., and *Falcaria Vulgaris* species with an average density of 1.4 plants/m^2 were ranked fourth. Mean density for *Echinochloa crus-galli* and *Hordeum sp*., 1.3 plants/m^2, Mean density for *Altheae sp*., *Digitaria sanguinalis*, *Melilotus officinalis*, *Trifolium repens*, and *Xanthium strumarium* 1.2 plants/m^2 and mean density for weeds of *Chenopodium album*, *Acroptilon repens*, *Sorghum halepense*, and *Portulaca oleracea* was 1.1 plants/m^2. Weed species *Amaranthus retroflexus*, *Lolium rigidum*, *Poa annua, Paspalum distichum*, and *Neslia apiculata* had an average density of 1.0 plants/m^2. Thus, out of 42 species observed in the olive groves visited, 23 species had 54.76% of the population, with an average density of more than one plant/m^2. More than half of these species have an average density of more than one plant/m^2 of perennials. Out of 42 weed species observed in olive groves, 19 species (45.2%) of the population had an average density of less than one plant/m^2.

3.2. Properties of weed flora of citrus orchards

3.2.1. The abundance of citrus orchard weed species

A comparison of the frequency of common weed species in the citrus orchards of Darreh Shahr is shown in Table 3. Among 40 weed species observed in the visited citrus orchards, the highest frequency (77.7%) was related to perennial weeds of *Lactuca sp.* and *Cirsium arvense* and annual weeds *Sideritis monthana* and *Xanthium strumarium*. *Falcaria Vulgaris*, *Hordeum sp*, and *Anchousa Italica* species with a frequency of 66.7% had the second rank in terms of frequency. In addition to the seven species mentioned, nine other species had a frequency of more than 50%. Frequency of grass species *Lepidium draba*, *Trifolium repens*, *Echinochloa crus-galli*, *Hibiscus trionum*, *Rubus daeus*, *Veronica persica*, *Sonchus asper*, *Umbrella grass*, and *Lolium temulentum* was equal to 55.6%. Thus, out of 40 weed species observed in the citrus orchards visited, only 16 species 40% of weed species had a frequency of more than 50%. Out of 16 species, only seven species had a frequency of more than 50%. In other words, 44% of weed species had a frequency of more than 50% of perennials. Twenty-four weed species with a frequency of less than 50% were in four distinct groups. The first group includes five species of *Melilotus officinalis*, *Acroptilon repens*, *Alhagi Camelorum*, *Altheae sp*, *Chenopodium album*, and *Physocaulis nodosus* with a frequency of 45.45%; the second group includes 12 species of *Achillea sp*, *Amaranthus retroflexus*, *Carthamus* *oxyacanthus*, *Heliotropium europeum*, *Melilotus officinalis*, *Myagrum perfoliatum*, *Neslia apiculata*, *Physalis divaricata*, *Picnomun sp.*, *Poa annua*, *Sisymbrium Irio* and *Sorghum halepense* with a frequency of 33%, The third group includes five species of *Bromus sp*, *Cichorium intybus*, *Cuscuta campestris*, *Portulaca oleracea* and *Vicia sp.*, with a frequency of 22.2%, The fourth group involves a species of *Secale Cereale* with a frequency of 11.1%. In terms of the life cycle, out of 40 common species in the citrus orchards of Darreh Shahr city, only 13 species, or other words, 32.5% were perennials, and the rest were 67.5% of the annual population. High values of uniformity and uniformity for some species indicate their greater adaptation to climatic and soil conditions, while high values of average field density for some species indicate the ability to compete and reproduce more than other species.

Table 3. Average plant density, relative uniformity, relative density, relative importance, and species abundance of Citrus.

scientific name	Average density	Relative uniformity	Relative density	Species abundance	Relative importance
Achillea sp.	0.7	32	6.18	33.0	32.5
Acroptilon repens	0.4	25	4.57	44.0	34.5
Alhagi Camelorum	1.0	25	4.57	44.0	34.5
Altheae sp.	0.7	25	3.76	44.0	34.5
Amaranthus retroflexus	0.7	25	3.76	33.0	29.0
Anchousa Italica	1.1	25	3.76	67.0	46.0
Bromus sp.	0.1	25	3.49	22.0	23.5
Carthamus oxyacanthus	1.0	21	3.49	33.0	27.0
Chenopodium album	1.0	21	3.49	44.0	32.5
Cichorium intybus	0.4	18	3.49	22.0	20.0
Cirsium arvense	1.4	18	2.96	78.0	48.0
Cuscuta campestris	0.9	18	2.96	22.0	20.0
Digitaria sanguinalis	1.1	18	2.96	56.0	37.0
Echinochloa crus-galli	1.3	18	2.69	56.0	37.0
Falcaria vulgaris	1.3	18	2.69	67.0	42.5
Heliotropium europium	1	18	2.69	33.0	25.5
Hibiscus trionum	1	14	2.69	56.0	35.0
Hordeum sp.	0.9	14	2.69	67.0	40.5
Lactuca sp.	1.4	14	2.69	78.0	46.0
Lolium rigidum	1.7	14	2.69	56.0	35.0
Melilotus officinalis	0.9	14	2.69	33.0	23.5
Myagrum perfoliatum	1.0	14	2.42	33.0	23.5
Neslia apiculata	1.0	14	2.42	33.0	23.5
Paspalum distichum	0.1	14	2.42	33.0	23.5
Physalis divaricata	0.1	14	2.42	33.0	23.5
Physocaulis nodosus	1.7	11	2.42	44.0	27.5
Picnomun sp.	1.4	11	1.88	33.0	22.0
Poa annua	0.6	11	1.88	33.0	22.0
Polygonum sp.	1.1	11	1.88	56.0	33.5
Portulaca oleracea	0.4	11	1.88	22.0	16.5
Rubus sp.	0.9	11	1.88	56.0	33.5
Secale Cereale	0.4	11	1.61	11.0	11.0
Sideritis monthana	1.3	7	1.08	78.0	42.5
Sisymbrium Irio	1.0	7	1.08	33.0	20.0
Sonchus arvensis	2.3	7	1.08	56.0	31.5
Sorghum halepense	1.3	4	1.08	33.0	18.5
Trifolium repens	0.7	4	0.81	56.0	30.0
Veronica persica	1.1	4	0.27	56.0	30.0
Vicia sp.	0.3	4	0.27	22.0	13.0
Xanthium strumarium	0.9	4	0.27	78.0	41.0

3.2.2. Uniformity of distribution of weed species in citrus orchards

The uniformity of the distribution of common weed species in citrus orchards of Darreh Shahr city is shown in Table 3. Among 40 species of common weeds in citrus orchards of Darreh Shahr city, the highest level of uniformity of distribution (30%) belonged to the perennial weed *Cirsium arvense*. The second order of distribution uniformity was related to *Falcaria Vulgaris*, *Carthamus oxyacanthus*, *Lactuca sp*., *Physocaulis nodosus*, *Sideritis monthana*, and *Sonchus arvensis*. The third order of uniformity belonged to *Echinochloa crus-galli* and *Lolium rigidum*, respectively. Species of *Anchousa Italica*, *Polygonum sp*., *Chenopodium album*, *Heliotropium europeum*, *Hibiscus trionum*, *Melilotus officinalis*, *Picnomun sp*., and *Rubus sp*., have uniformity of 17.8%. *Alhagi Camelorum*, *Altheae sp*., *Amaranthus retroflexus*, *Digitaria sanguinalis*, *Hordeum sp*., *Neslia apiculata*, Sisymbrium Irio, Sorghum halepense, and Trifolium repens have uniformity of 14.3%. *Achillea sp*., *Cuscuta campestris*, *Myagrum perfoliatum*, *Poa annua*, *Portulaca oleracea*, *Veronica persica*, and *Xanthium strumarium* had 10.7% uniformity. The other eight species had a uniformity of less than 10%. Species with uniformity of distribution less than 10% were in two groups. *Acroptilon repens* and *Cichorium intybus* with 7.1% uniformity in the first group, *Bromus sp*., *Paspalum distichum*, *Physalis divaricata*, *Secale Cereale*, and *Vicia sp*., with 3.5% uniformity were in the second group. The most abundant weeds have the highest uniformity and the highest average field density and it has been shown that these species are difficult to control.

3.2.3. The average density of weed species in citrus orchards

The comparison of the mean density of common weed species in the citrus orchards of Darreh Shahr city is shown in Table 3. Among the 40 weed species observed in the citrus orchards visited, the mean density for *Sonchus arvensis* weeds was very different from other species. The average density for *Sonchus arvensis* was 2.3 plants/m^2. Thus, the first ranking of density was allocated to the weed *Sonchus arvensis*. *Lolium rigidum* and *Physocaulis nodosus* species with a mean density of 1.7 plants/m^2 were second-ranking. Weed species *Cirsium arvense*, *Lactuca sp*., and *Picnomun sp* was in third place with an average of 1.4 plants/m^2. In terms of the life cycle, out of six species, three species are annual, and the other three species are perennial. Four species of *Echinochloa crus-galli*, *Falcaria Vulgaris*, *Sideritis monthana*, and *Sorghum halepense* with an average density of 1.3 plants/m^2 were ranked fourth. Mean density for *Cardaria draba*, *Anchousa Italica*, *Digitaria sanguinalis* and *Veronica persica*, 1.1 plants/m^2, the average density for *Alhagi Camelorum*, *Carthamus oxyacanthus*, *Chenopodium album*, *Heliotropium europeum*, *Hibiscus trionum*, *Myagrum perfoliatum*, *Neslia apiculata*, and *Sisymbrium Irio* were 1.0 plants/m^2. Thus, out of a total of 40 species observed in the citrus orchards visited, 22 species, 55% of the populations, had an average density of more than one plant/m^2. One-third of these species have an average density of more than one plant/m^2 of perennials. Out of 40 species of weeds observed in citrus orchards, 18 species or 45% of the population had an average density of less than one plant/m^2. The presence of high-density weeds in orchards can be effective in the spread of plant pests and diseases because weeds can provide a suitable environment for the presence of plant pathogens and various pests (Buhler et al., 1992). It should be noted that weeds have high reproductive capacity and high seed production capacity. It is necessary to pay attention to even low-frequency weeds from a managerial perspective because even one weed can produce several thousand seeds (Nunes et al., 2020).

3.3. Properties of weed flora of vineyards

3.3.2. The abundance of weed species in vineyards

The comparison of the frequency of common weed species in the vineyards of Darreh Shahr city is shown in Table 4. Among 37 species of weeds observed in the vineyards visited, the highest frequency (87.5%) was attributed to the annual weed *Sideritis monthana*. *Anchousa Italica* species with a frequency of 75.0 % were ranked second in terms of frequency. In addition to the two mentioned species, 13 other species had a frequency of more than 50%. The abundance of *Cirsium arvense*, *Digitaria sanguinalis*, *Lactuca sp*., *Lolium rigidum*, *Mentha sp*., *Cardaria draba*, and *Rubus sp*. is 62.5%, and the abundance of *Echinochloa crus-galli*, *Falcaria Vulgaris*, *Polygonum sp*., *Portulaca oleraceens*, and *Trifolium repens* was 50%. Thus, out of a total of 37 weed species observed in the vineyards visited, only 15 species (40.5% of weed species) had a frequency of more than 50%. Out of 16 species with a frequency of more than 50%, only seven species were perennial, 43.7% of weed species had a frequency of more than 50% perennial. Twenty-two species of weeds with a frequency of less than 50% were in three distinct groups. The first group includes 12 species of *Achillea sp.*, *Acroptilon repens*, *Alhagi Camelorum*, *Chenopodium album*, *Cichorium intybus*, *Hordeum sp.*, *Melilotus officinalis*, *Neslia apiculata*, *Sisymbrium Irio*, *Sorghum halepense*, *Veronica persica*, and *Xanthium strumarium* with 37.5 % abundance; the second group includes five species of *Amaranthus retroflexus*, *Physocaulis nodosus*, *Cuscuta campestris*, *Physalis divaricata* and *Sonchus arvensis* with a frequency of 25.0 %, the third group involves five species of *Bromus sp.*, *Picnomun sp.*, *Poa annua*, *Secale Cereale* and *Vicia sp.*, with a frequency of 12.5%. In terms of the life cycle, out of a total of 37 common species in the vineyards of Darreh Shahr city, only 13 species, or in other words, 35.1% were perennials, and the rest were 64.8% of the annual population. High values of uniformity and uniformity for some species indicate their greater adaptation to climatic and soil conditions (Andreasen et al., 1991).

3.3.3. Uniformity of distribution of weed species in vineyards

The uniformity of the distribution of common weed species in the vineyards of Darreh Shahr city is shown in Table 4. Among 37 common weed species in the vineyards of Darreh Shahr city, the highest level of uniformity of distribution (32%) belonged to the annual weed *Bromus sp*. The second order of distribution uniformity was related to *Echinochloa crus-galli*, *Carthamus oxyacanthus*, and *Portulaca oleracea*. The third order of uniformity is *Cirsium arvense*, *Hordeum sp.*, *Lactuca sp.*, *Mentha sp.*, *Physocaulis nodosus*, *Picnomun sp.*, and *Poa annua* with 22.7%, respectively. Species of Anchousa Italica, Digitaria sanguinalis, Physalis divaricata, *Cardaria draba*, *Rubus sp.*, *Secale cereale*, *Sideritis monthana*, and *Trifolium repens* with uniformity of 18.1%, *Amaranthus retroflexus*, *Chenopodium album*, *Cichorium intybus*, *Falcaria Vulgaris*, *Lolium rigidum*, *Melilotus officinalis*, *Sorghum halepense*, *Vicia sp.*, and *Sisymbrium irio* had 13.6% uniformity. The other nine species had a uniformity of less than 10%. Species with uniformity of distribution less than 10% were in two groups. *Achillea sp.*, *Alhagi camelorum*, *Physocaulis nodosus*, *Cuscuta campestris*, *Neslia apiculata*, *Veronica persica*, and *Xanthium strumarium* with uniformity of 7.1% were in the first group, *Acroptilon repens* and *Sonchus arvensis* with uniformity of 4.5% were in the second group**.**

3.3.4. Mean density of weed species in vineyards

The comparison of the mean density of common weed species in the vineyards of Darreh Shahr city is shown in Table 4. Among the 37 weed species observed in the vineyards visited, the mean density for Carthamus oxyacanthus weed was very different from other species. The average density for *Carthamus oxyacanthus* weed was 1.8 plants/m^2. Thus, the first rank of density was allocated to Carthamus oxyacanthus weed. *Bromus sp.*, *Echinochloa crus-galli*, *Physocaulis nodosus*, and *Cardaria draba* were the second species with an average density of 1.5 plants/m^2. Weed species *Digitaria sanguinalis*, *Lactuca sp.*, *Portulaca oleracea*, and *Sideritis monthana* with an average of 1.3 plants/m^2 were ranked third. Five species of *Cichorium intybus*, *Hordeum sp.*, *Mentha sp.*, *Picnomun sp.*, and *Trifolium repens* with an average density of 1.1 plants/m^2, were ranked fourth. Thus, out of the total of 37 species observed in the vineyards visited, 14 species, 37.8% of the population, had an average density of more than one plant/m^2. Approximately one-third of these species have an average density of more than one plant/m2 of perennials. Out of 37 species of weeds observed in vineyards, 23 species or 62.2% of the population had an average density of less than one plant/m^2. In general, the researchers said that the predominance of weed species in different environmental conditions is a function of evolutionary process and strategy as well as climatic conditions, soil, and management methods in horticultural and agricultural products. It is expected that in orchards, due to less soil and environmental degradation which occurs due to reduced tillage operations compared to annual crops, mainly weeds that have evolved according to the competition-stress tolerance strategy are among the dominant species. These plants are mostly perennial or perennial plants (Colbach et al., 2017).

Table 4. Average plant density, relative uniformity, relative density, relative importance, and species abundance of Grape.

scientific name	Average density	Relative uniformity	Relative density	Species abundance	Relative importance
Achillea sp.	0.7	9.1	2.04	37.5	23.5
Acroptilon repens	0.4	4.5	1.17	37.5	21.5
Alhagi camelorum	0.7	9.1	2.04	37.5	23.5
Amaranthus retroflexus	0.9	13.6	2.62	25.0	19.5
Anchousa italica	0.9	18.2	2.62	75.0	46.5
Bromus sp.	1.5	31.8	4.37	12.5	22.5
Cardaria draba	1.5	18.2	2.04	50.0	17.0
Carthamus oxyacanthus	1.8	27.3	5.25	50.0	38.5
Chenopodium album	0.9	13.6	2.62	37.5	26.0
Cichorium intybus	1.1	13.6	3.21	37.5	26.0
Cirsium arvense	0.9	22.7	2.62	62.5	43.0
Cuscuta campestris	0.5	9.1	1.46	25.0	17.0
Digitaria sanguinalis	1.3	18.2	3.79	62.5	40.5
Echinochloa crus-galli	1.5	27.3	4.37	50.0	38.5
Falcaria vulgaris	0.9	13.6	2.62	50.0	32.0
Hordeum sp.	1.1	22.7	3.21	37.5	30.5
Lactuca sp.	1.3	22.7	3.79	62.5	43.0
Lolium rigidum	0.9	13.6	2.62	62.5	38.5
Melilotus officinalis	0.5	13.6	1.46	37.5	26.0
Mentha sp.	1.1	22.7	3.21	62.5	43.0
Neslia apiculata	0.4	9.1	1.17	37.5	23.5
Physalis divaricata	0.7	18.2	2.04	25.0	21.5
Physocaulis nodosus	1.5	22.7	4.37	62.5	43.0
Picnomun sp.	1.1	22.7	3.21	12.5	18.0
Poa annua	0.9	22.7	2.62	12.5	18.0
Polygonum sp.	1.5	9.1	4.37	25.0	34.0
Portulaca oleracea	1.3	27.3	3.79	50.0	38.5
Rubus sp.	0.7	18.2	2.04	62.5	40.5
secale cereal	0.9	18.2	2.62	12.5	15.5
Sideritis monthana	1.3	18.2	3.79	87.5	53.0
Sisymbrium irio	0.7	13.6	2.04	37.5	26.0
Sonchus arvensis	0.2	4.5	0.58	25.0	15.0
Sorghum halepense	0.5	13.6	1.46	37.5	26.0
Trifolium repens	1.1	18.2	3.21	50.0	34.0
Veronica persica	0.7	9.1	2.04	37.5	23.5
Vicia sp.	0.7	13.6	2.04	12.5	13.5
Xanthium strumarium	0.5	9.1	1.46	37.5	23.5

3.3.5. Indices of diversity and dominance of weeds in Darreh Shahr orchards

Many factors, including soil and climate, affect flora and weed dominance. However, according to the results and the role of each of the factors of perennial or stubborn weeds against chemical control operations and also the role of plowing operations in their spread and distribution through vegetative organs can be effective in their spread and dominance (Ravet et al., 2018). On the other hand, weed diversity, dominance and stability are among the most critical ecological characteristics studied in cropping systems greatly influenced by crop management factors (Mahmoodi et al., 2011). Indices of biodiversity of weeds in olive, Citrus, and grape orchards of Darreh Shahr city are shown in Table 5. Shannon-Wiener index in olive, citrus, and grape orchards were 3.01, 2.93, and 2.59, respectively. Species uniformity in olive orchards was higher than in vineyards and citrus orchards, and the rate of species richness of weeds in citrus was lower than the other two orchards. The Shannon index has a more extraordinary ability to detect species diversity and is affected by species uniformity or richness. Therefore, to determine the ecological potential of ecosystems, their comparison and evaluation are considered in more time and place (Ravanbakhsh et al., 2005). The dominance index in olive, citrus, and grape orchards were 0.772, 0.828, and 0.861, respectively. The results showed that the highest Simpson dominance index was obtained in the vineyard and the lowest was in the citrus and olive orchards. The justification of the lowest species richness and the increase of dominance obtained in vineyards can be considered due to the frequent and excessive use of chemical pesticides. Areas with higher diversity indices had higher uniformity and species richness indices. Climatic conditions area under cultivation and management are the most important factors in determining the diversity and dominance of species at the field level.

Table 5. Indices of biodiversity of weeds in olive, citrus and grape orchards of Darreh Shahr.

Garden	Shannon wiener index	Simpson dominance index
Olive	3.01±0.56	0.772±0.07
Citrus	2.93±0.28	0.828±0.12
Grape	2.59±0.61	0.861±0.09

4. Conclusion

Promotional measures and strategies to prevent the increase of seed banks and vegetative organs in garden weed management for farmers should be explained. In general, research results show that weed density is high in Darreh Shahr gardens, so weed management methods should be improved to control weeds. Also, according to the results of this research, the structure of weeds in city gardens is different, and this can be useful in management planning for weed control.

References

Andreasen, C., Streibig, J.C., Haas, H., 1991. Soil properties affecting the distribution of 37 weed species in Danish fields. *Weed Res.*, **31**(4), 181-187. https://doi.org/10.1111/j.1365-3180.1991.tb01757.x

Atajan, F.A., Mozafari, V., Abbaszadeh-Dahaji, P., Hamidpour, M., 2019. Fractionation and speciation of manganese in rhizosphere soils of Pseudomonas sp. rhizobacteria inoculated Pistachio (*Pistacia vera* L.) seedlings under salinity stress. *Commun. Soil Sci. Plant Anal.*, **50**(7), 894-908. https://doi.org/10.1080/00103624.2019.1594876

Buhler, D.D., Gunsolus, J.L., Ralston, D.F., 1992. Integrated weed management techniques to reduce herbicide inputs in soybean. *Agron. J.*, **84**(6), 973-978. https://doi.org/10.2134/agronj1992.00021962008400060013x

Campiglia, E., Radicetti, E., Mancinelli, R., 2018. Floristic composition and species diversity of weed community after 10 years of different cropping systems and soil tillage in a Mediterranean environment. *Weed Res.*, **58**(4), 273-283. https://doi.org/10.1111/wre.12301

Colbach, N., Colas, F., Pointurier, O., Queyrel, W., Villerd, J., 2017. A methodology for multi-objective cropping system design based on simulations. Application to weed management. *Eur. J. Agron.*, **87**, 59-73. https://doi.org/10.1016/j.eja.2017.04.005

Derksen, D.A., Anderson, R.L., Blackshaw, R.E., Maxwell, B., 2002. Weed dynamics and management strategies for cropping systems in the northern Great Plains. *Agron. J.*, **94**(2), 174-185. https://doi.org/10.2134/agronj2002.1740

Lass, L.W., Callihan, R.H., 1993. GPS and GIS for weed surveys and management. *Weed Technol.*, **7**(1), 249-254. https://doi.org/10.1017/s0890037x00037222

Lemerle, D., Gill, G.S., Murphy, C.E., Walker, S.R., Cousens, R.D., Mokhtari, S., Peltzer, S., Coleman, R., Luckett, D.J., 2001. Genetic improvement and agronomy for enhanced wheat competitiveness with weeds. *Aust. J. Agric. Res.*, **52**(5), 527-548. https://doi.org/10.1071/AR00056

MacLaren, C., Bennett, J., Dehnen-Schmutz, K., 2019. Management practices influence the competitive potential of weed communities and their value to biodiversity in South African vineyards. *Weed Res.*, **59**(2), 93-106. https://doi.org/10.1111/wre.12347

MacLaren, C., Storkey, J., Menegat, A., Metcalfe, H., Dehnen-Schmutz, K., 2020. An ecological future for weed science to sustain crop production and the environment. A review. *Agron. Sustain. Dev.*, **40**(4), 1-29. https://doi.org/10.1007/s13593-020-00631-6

Mahmood, N., Arshad, M., Kächele, H., Ma, H., Ullah, A., Müller, K., 2019. Wheat yield response to input and socioeconomic factors under changing climate: Evidence from rainfed environments of Pakistan. *Sci. Total Environ.*, **688**, 1275-1285. https://doi.org/10.1016/j.scitotenv.2019.06.266

Mahmoodi, G., Ghanbari, A., Mohammadabadi, A.A., 2011. Assessment of Corn Densities on Ecological Indices of Weed Species. *Iran. J. Field Crops Res.*, **9**(4), 685-693 (In Persian). https://doi.org/10.22067/gsc.v9i4.13276

Martinelli, R., Monquero, P.A., Fontanetti, A., Conceição, P.M., Azevedo, F.A., 2017. Ecological mowing: An option for sustainable weed management in young citrus orchards. *Weed Technol.*, **31**(2), 260-268. https://doi.org/10.1017/wet.2017.3

Mousavi, S., Soori, N., Zaidali, E., Azadbakht, N., Ghiasvand, M., 2011. Comparison of Weed Floristic Composition in Fruit Gardens in Khorramabad. *Iran. J. Field Crops Res.*, **8**(2), 252-268 (In Persian). https://doi.org/10.22067/gsc.v8i2.7523

Nunes, M.A., Novelli, V.M., da Cunha, B.A., Soares, A.J., de Mineiro, J.L., Freitas-Astúa, J., Bastianel, M., 2020. Survey of the citrus leprosis vector (Brevipalpus yothersi) and phytoseiids in spontaneous plants of an organic citrus orchard. *Exp. Appl. Acarol.*, **82**(2), 199-209. https://doi.org/10.1007/s10493-020-00543-w

Ravanbakhsh, M., Ejtehadi, H., Pourbabaei, H. Ghoreshi-al-Hoseini, J., 2005. Investigation on plants species diversity of Gisoum Talesh Reserve forest, Gilan province, Iran. *Iran. J. Biol.*, **20**(3), 218–229 (In Persian).

Ravet, K., Patterson, E.L., Krähmer, H., Hamouzová, K., Fan, L., Jasieniuk, M., Lawton-Rauh, A., Malone, J.M., McElroy, J.S., Merotto Jr, A., Westra, P., 2018. The power and potential of genomics in weed biology and management. *Pest Manage. Sci.*, **74**(10), 2216-2225. https://doi.org/10.1002/ps.5048

Sarabi, V., Zeidali, E., 2017. Flora and Distribution of Weeds in Wheat, Tomato, Sugar Beet, Onion, and Chickpea Fields in Mashhad Region. *Plant Product. Technol.*, **9**(2), 167-180 (In Persian). https://doi.org/10.22084/ppt.2017.8223.1473

Sit, A.K., Bhattacharya, M., Sarkar, B., Arunachalam, V., 2007. Weed floristic composition in palm gardens in Plains of Eastern Himalayan region of West Bengal. *Curr. Sci.*, **92**(10), 1434-1439.

Smith, M.W., Carroll, B.L., Cheary, B.S., 2000. Mulch improves pecan tree growth during orchard establishment. *Hort Sci.*, **35**(2), 192-195. https://doi.org/10.21273/HORTSCI.35.2.192

Song, J.S., Kim, J.W., Im, J.H., Lee, K.J., Lee, B.W., Kim, D.S., 2017. The effects of single-and multiple-weed interference on soybean yield in the far-eastern region of Russia. *Weed Sci.*, **65**(3), 371-380. https://doi.org/10.1017/wsc.2016.25

Thomas, A.G., 1985. Weed survey system used in Saskatchewan for cereal and oilseed crops. *Weed Sci.*, **33**(1), 34-43. https://doi.org/10.1017/s0043174500083892

How to cite this paper:
Zeidali, E., Roein, Z., Fathi, A., 2020. Study flora and distribution of weed (Case Study: fruit orchards of Darreh Shahr city, Ilam province, Iran). *Cent. Asian J. Plant Sci. Innov.*, **1**(1), 10-22.