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Improving integrated management of weed control by determination of weed seed bank in sandy and clay soil

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A R T I C L E   I N F O

A B S T R A C T

Knowledge of soil weed seed bank is important for population dynamics studied, establishment of appropriate weed management programs, a little effort in understanding weed seed bank can give valuable information about what weeds to expect in growing season, weed density, and when most weed germination will take place. In this study, a two - year's, two sites were carried out with the aim of assessing weed seed bank status of the soil throughout 2018 and 2019. A site was worked out in Sakha Agriculture Research farm act as a clay soil, Kafr El-Sheikh Governorate, Agriculture Research Center (ARC). Another site was worked out in El-Ismailia Agr; Res; farm act as sandy soil, El-Ismailia Governorate, ARC. At each site, soil samples were selected from nine different places as like three Zigzag shapes divided into three, six and nine sites, "W" to act the whole soil area (30 faddan in Sakha farm, and 15 faddan in El-Ismailia farm). The soil samples were taken from topsoil 0–10 cm depth with an auger (core) 10 cm diameter the soils without tillage and before sowing the summer crop. The result of present the study in two different stations and soils, revealed that the number of soil samples to estimate weed seed banks should be either six or nine sites; each sample weighted 0.50 Kg soil with zigzag shape act a direct seed extraction technique to able recognize the abundance of weed species into the soil and their seed density. The aim is to improve integrated weed control.

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1. Introduction

Weeds are a major biological constraint, because adverse impacts on crop yields by interfering with crop growth and development through allelopathy and competition for water, nutrients, light and space. Weed seeds are an important component of the weed life cycle as they are the origin of future populations (Hossain and Begum, 2015). This review focuses on soil seed banks which are the most common and important in agricultural systems. The weed seed bank is the reserve of viable weed seeds present on the soil surface and scattered throughout the soil profile at consists of both new weed seeds recently shed and other seeds that have persisted in the soil from previous years (BEGUM et al., 2006). The seed bank is often crucial for the survival of plant species, especially short-lived ones (Meulebrouck et al., 2009). The weed seed bank serves as a physical history of the past successes and failures of cropping systems and knowledge of its content (size and species composition) can help producers anticipate and ameliorate potential impacts of crop – weed competition on crop yield and quality (Menalled, 2008). Davis said that using a soil probe or garden shovel, 20 samples 2 in. deep in a "W" pattern should be collected from the field, a little effort in understanding weed seed bank can give valuable information about what weeds to expect in growing season, weed density, and when most weed germination will take place (Davis et al., 2008). Knowledge of soil weed seed bank is important for population dynamics studied, establishment of appropriate weed management programs (Ambrosio et al., 2004). Two main techniques that are used to find out the number of seeds from the soil samples (1) weed seed extraction method and (2) weed seedling emergence method. In direct

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seed extraction method, weed seeds are extracted by washing and floatation methods while in the second technique, weed seedling emergence, the soil sample is placed in the green house on controlled environment, watered on regular basis in order to emerge the weed seedling and these emerged seedlings are then identified and counted (Mahé et al., 2021; Shar et al., 2016). The difficulty of monitoring a process that accursed mostly underground has deterrent weed scientists from gaining a full understanding of the weed seed bank. Nevertheless, current knowledge about weed seed banks has shown some potential management options. Reducing inputs to that seed bank is an important component of seed bank management, while other strategies like using a no – till cropping system can be used to directly affect germination, persistence and mortality of weed seeds. Managing weed seed banks would be an important component of integrated weed management (Hossain and Begum, 2015; Shar et al., 2016). Weed seed banks are an ever-present component of agriculture land, and resource directed to understanding interpreting and predicting seed germination potential can improve agricultural production (LeBaron and Müller, 2008). Soil acts as storage house for different macro and microorganisms including insects, microorganisms, fungi, algae, spores, nematodes and seeds of different weeds. Weed plants after maturation shed thin seeds and these weed seeds ultimately accumulated in the soil profile which form weed seed bank in the soil profile (Forcella et al., 2003). The soil seed bank is the natural storage of seeds, after dormant within the soil of most ecosystems (Dekker, 1999). Soil weed seed bank is natural source for weed infestation. Determination of soil weed seed bank has primary importance to get complete picture of weed seed reservoir in the soil profile (Hussain et al., 2017). The production of a large number of small seeds is an important survival strategy developed by weeds to survive control methods. After their dispersal, the seeds might remain on the soil surface or burial depth by various biotic and a biotic agent, thus farming a soil seed bank that becomes the primary source of weeds in agro ecosystems (Shiferaw et al., 2018; Zhang et al., 2019). Weed seeds disperse both horizontally and vertically in the soil profile. While the horizontal distribution of weed seeds in the seed bank generally follows the direction of crop rows; type of tillage is the main factor determining the vertical distribution of weed seeds within the soil profile, knowing something about seed bank content before the season start can help the farmer prevent severe weed problems before they develop. Seed banks typically are confined to the surface and upper 30 cm of soil. Sampling soil usually is a necessary component of seed bank studies. The most obvious questions that arise are: How many and what size soil samples should be taken? The amount of soil sampled is a product of the number of cores and the size of the cores. Core size involves core area or diameter (most soil sampling tools are tubes with circular orifices) and also core depth (Forcella et al., 2003). Soil seed banks are comprised of both dormant and no dormant seeds persisting at varying depth within the surface soil profile (Davis et al., 2008). The reason the weed seed bank is so difficult to manage is because it contains not only many seeds, but many different kinds of seeds, with typically 20–50 different weed species in a single field (Hossain and Begum, 2015; Rind et al., 2021). Studying weed seed bank possible to assess the potential size of the weed seed bank because many species are capable of extended fluxes of emergence over several weeks under favorable environmental conditions (Mayor and Dessaint, 1998; Shar et al., 2019). There is a need to understand soil weed seed bank dynamics, this might contribute to the prediction of infestations and could lead to improved management strategies for minimizing the effects of the interference of invasive plants with crop growth and yields. Weed seeds can have numerous fates after they are dispersed into a field resulted of the many seeds in the bank, very few will actually emerge and reduce a plant with most seeds will die., decompose or be eaten before ever germinating. Seeds from many species can remain viable for long periods but do not germinate because they possess some degree of physical or physiological dormancy, while others can germinate but do not emerge due to unfavorable environmental conditions. Phytosociological structure was assessed using parameters such as the absolute and relation value of frequency, density, abundance and the importance and value index for each species (Hossain and Begum, 2015). The aim is to improve integrated weed control.

2. Materials and methods

In this study, a two - year's, two sites were carried out with the aim of assessing weed seed bank status of the soil throughout 2018 and 2019. A site was worked out in Sakha Agriculture Research farm act as a clay soil, Kafr El-Sheikh Governorate, Agriculture Research Center (ARC). Another site was worked out in El-Ismailia Agr; Res; farm act as sandy soil; El-Ismailia Governorate; ARC. At each site, soil samples were selected from nine different places as like three Zigzag shapes divided into three, six and nine sites, "W" to act the whole soil area (30faddan in Sakha farm, and 15 faddan in El-Ismailia farm). The soil samples were taken from top soil 0–10 cm depth with an auger (core) 10 cm diameter the soils without tillage and before sowing the summer crop.

These soil samples are consisted of both new weed seeds recently shed and older seeds that have persisted in the soil for several years. In each place, seeds removal from the soil samples by washed in tap water to remove soil particles, dried, then screened to separate by different sizes and identify the weed species under a binocular microscope.

Each side was included nine soil samples. Each sample was consisted of 0.5 kg soil. The zigzag shape of the nine soil samples was divided into three size categories; to recognize the differences of the weed's density and species between them as follows:

Number of soil samples treatments:

1. 3, 7 and 9 soil samples
2. 2, 3, 4, 5, 6 and 9 soil samples
3. 1, 2, 3, 4, 5, 6, 7, 8 and 9 soil samples

At each site, soil samples were selected from nine different places as like three Zigzag shapes divided into three, six and nine sites, "W" to act the whole soil area (30faddan in Sakha farm, and 15 faddan in El-Ismailia farm), as shown in the following figure:
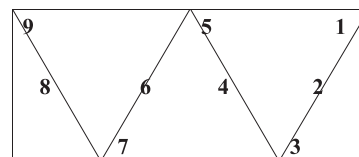
The optioned data as Follows:

1. Recorded the major weeds species in Sakha and Ismailia stations
2. Estimated the weeds density with determined the dominant weed species by calculate the seed index % of each weed species by equation of:

$$Seed\ index = \frac{No.\ of\ individual\ seeds\ species}{Total\ No.\ of\ all\ weed\ seed\ species}$$

3. showed the ideal shape and size for weed seed bank studies

3. Results

Weed species of the soil samples in Sakha Research Station as clay soil are summarized in Table 1, twenty annual species belong to ten family's and fifteen genera are recorded. They classified into two categories fifteen broadleaf weeds: *Amaranthus ascendens* (Amaranthaceae)*, Anagalis arvensis* (Priulaceae), *Beta vulgaris* (Chenopodiaceae)*, Brassica kaber* (Brassicaceae)*, Capsella bursa-postoris*(Brassicaceae)*, Chenopodium album* (Chenopodiaceae), *Cichorium endivia* (Asteraceae), *Corchorus olitorius* (Tiliaceae), *Ipomea cairica* (Morningglory), *Lathyrus hirisutus* (Fabaceae), *Melilotus indica* (Fabaceae), *Portulaca oleraceae* (Portulacaceae), *Rumex dentatus* (Polygonaceae), *Silybum marinum* (Asteraceae), *Sonchus oleraceus* (Asteraceae) and five narrowleaf weeds: *Echinochloa colonum, Phalaris minor, Phalaris paradoxa, Polypogon monspeliensis, Setaria viridis* were belongedto Poaceae family (Soumia, 2021); explained that the dynamics Weed Seed Bank; Seed banks are generally composed of numerous species belonging to three groups. The first group includes dominant species accounting for 70–90% of the total seed bank. These species represent most of the weed problems in a cropping system. Second group of species comprise of 10–20% of the seed bank, including those adapted to the geographic area but not to current production practices. The final group accounts for a small percentage of the total seed and includes recalcitrant seeds from previous seed banks of the previous crop (Rao, 2000); explained that the soil weed seed bank is natural source for weed infestation.

1. Sakha Res. Station farm

1.1. In first season, as shown from Table 2, the dominant annual broadleaf weeds were i.e. *Portulaca oleraceae* was presented in nine soil samples with sum 154.8, and seed index 35.43%; *Anagallis arvensis* was presented in six soil samples with sum 50.5, and seed index 11.56%; meanwhile the dominant grassy weeds were i.e. *Phalaris minor* was presented in seven soil samples with sum 41.2, and seed index 9.43%, *Echinochloa colonum* was presented in five soil samples with sum 26.8, and seed index 6.13%. Whist

Table 1
Number of seed weeds species/0.5 kg each soil samples in the Sakha research farm, 2017 and 2018 seasons.

Serial	Location	Sakha season 2017												
	Number of soil Sample Scientific name	1	2	3	4	5	6	7	8	9	Sum.	Av.	seed index%	LSD at 5%
1	*Silybum marinum*	0d	3b	1.6c	2.27					5.3a	9.9	1.1	2.27	1.09
2	*Cichorium endivia*			5b	6.68	0 d	7.3 a	7 a	1.6c	2.3c	29.2	3.24	6.68	1.89
3	*Phalaris paradoxa*	10a			2.29						10	3.3	2.29	0.57
4	*Melilotus indica*				0.76						3.3	0.36	0.76	0.87
5	*Polypogon monspeliensis*	5.6a			1.28						5.6	0.65	1.28	0.66
6	*Setaria viridis*	5.6a			1.14						5	0.55	1.14	0.66
7	*Brassica kaber*			3.3a	0.76						3.3	0.36	0.76	0.87
8	*Chenopodium album*			4b	2.66				5a	2.6c	11.6	1.28	2.66	0.66
9	*Portulaca oleraceae*	23c	14.3d	43a	35.43	5.6ef	23c	8e	2f	13.6d	154.8	17.2	35.43	5.13
10	*Anagallis arvensis*	11b	6.6c		11.56	22.3a	3.3 d	7.3c			50.5	5.61	11.56	2.82
11	*Phalaris minor*	9 a	7bc	12.3a	9.43			4 d	5.3 cd	3.6 d	41.2	4.57	9.43	2.62
12	*Echinochloa colonum*	14.6a	3.3c		6.13	5.3b	3.6c				26.8	2.97	6.13	1.32
13	*Amaranthus ascendens*				3.41	5.6 a		5 ab	4.3b		14.9	1.65	3.41	0.73
14	*Lathyrus hirsutus*				3.64	7.6 a	4.3b			4b	15.9	1.76	3.64	1.95
15	*Capsella bursa- pastoris*				0.92		4 a				4	0.44	0.92	0.57
16	*Corchorus olitorius*				0.37	1.6 a					1.6	0.17	0.37	0.33
17	*Sonchus oleraceus*				0.98		4.3 a				4.3	0.47	0.98	0.66
18	*Rumex dentatus*	9 a	7.3b		3.73						16.3	1.81	3.73	1.54
19	*Beta vulgaris*				1.83				3b	5 a	8	0.88	1.83	0.57
20	*Ipomea cairica.*			3.3 a	0.76						3.3	0.36	0.76	0.33
21	Total grassy weeds	45 a	10.3b	12.3b	20.46	5.3c	3.6c	4c	5.3c	3.6c	89.4	9.93	20.46	3.52
22	Total broad-leaves weeds	57.6 a	31.3 cd	58.3 a	79.51	43. b	46.3b	27.3 d	16 e	33 cd	347.4	38.6	79.51	5.96
23	Total weeds	102.6a	41.6de	70.6b	10	48.3 cd	50c	31.3f	21.3 g	36.6 ef	436.9	48.54	10	7.06
Sakha season 2018														
1	*Silybum marinum*		2.6ab	1.6b						3a	3.6	0.4	0.83	1.23
2	*Cichorium endivia*			5b	6.6a		6ab	5.3b	1c	5.3b	29.2	3.24	6.76	1.14
3	*Phalaris paradoxa*	10a									10	1.1	2.31	0.57
4	*Melilotus indica*				3 a						3	0.33	0.69	1.14
5	*Polypogon monspeliensis*			3.6a							3.6	0.40	0.83	0.33
6	*Setaria viridis*	7 a									7	0.77	1.62	1.14
7	*Brassica kaber*			4 a							4	0.44	0.93	0.57
8	*Chenopodium album*			4 a					1.3b	1.3b	6.6	0.73	1.53	0.73
9	*Portulaca oleraceae*	36.3b	13.6e	43a	23.6c	3.6 g	23.3c	11.3f	13.6e	16d	183.7	20.4	42.52	2.16
10	*Anagallis arvensis*	10.3b	5c			22.3a	2.3d	5.3c			45.2	5.02	10.46	0.66
11	*Phalaris minor*	7.3b	7.3b	11.6a				6.6b	4c	8b	44.8	4.97	10.37	1.92
12	*Echinochloa colonum*	13a	4c			6b	2.6d	1 e			26.6	2.95	6.16	1.32
13	*Amaranthus ascendens*					5.3a		5 a	4.3a		14.6	1.62	3.38	1.23
14	*Lathyrus hirsutus*					6 a				6 a	12	1.3	2.78	0.57
15	*Capsella bursa- pastoris*				1.6b		4.6a				6.2	0.68	1.44	0.93
16	*Corchorus olitorius*					1.6a					1.6	0.17	0.37	0.33
17	*Sonchus oleraceus*						5.3a				5.3	0.58	1.23	0.33
18	*Rumex dentatus*	7.3a	5.3b								12.6	14	2.92	0.46
19	*Beta vulgaris*									5 a	5	0.55	1.16	3.40
20	*Ipomea cairica.*			2.3a							2.3	0.255	0.53	0.33
21	Total grassy weeds	37.3a	11.3c	15.3b	0 g	6 de	2.6f	7.6d	4 ef	8c	92.1	10.23	21.32	2.11
22	Total broad-leaves weeds	54b	26.6f	60 a	35e	39 cd	41.6c	27f	20.3 g	36.6de	340.1	37.78	78.73	2.87
23	Total weeds	91.3a	38d	75.3b	34.6e	45c	44.3c	34.6e	24.3f	44.6c	432	48	10	2.74

Means followed by the same letters within each column do not differ significantly according to Duncan's Multiple Range test at the 5%.

Table 2
The presented weed species and number of seeds into 0.5 kg soil of three zigzag shapes at Sakha station, 2017 and 2018 seasons.

	Sakha station, 2017									Sakha station, 2018									
N. of samples	Silybum marinum	Cichorium endivia	Brassica kaber	Chenopodium album	Portulaca oleraceae	Anagallis arvensis	Phalris minor	Lithyrus hirsutus	Ipomea cairica.	Silybum marinum	Cichorium endivia	Polypogon monspeliensis	Brassica kaber	Chenopodium album	Portulaca oleraceae	Anagallis arvensis	Phalaris minor	Echinochloa colonum	Ipomea cairica
3	1.66	5.00	3.33	4.00	43.00		12.30		3.33	1.60	5.00	3.60	4.00	4.00	43.00		11.60		2.30
7		7.00			8.00	7.30	4.00				5.30				11.30	5.30	6.60	1.00	
9	5.33	2.30		2.66	13.60		3.66	4.00		3.00	5.30			1.30	16.00		8.00		
Total	6.99	14.3	3.33	6.66	64.6	7.3	19.96	4	3.33	4.6	15.6	3.6	4	5.3	70.3	5.3	26.2	1	2.3

the remainder weed species were presented in low density and located between 1, 2, 3 soil samples.

Table 2, in 3, 7 and 9 zigzag shape, there were the presented nine weed species i.e. *Silybum marinum, Cichorium endivia, Brassica kaber, Chenopodium album, Portulaca oleraceae, Anagallis arvensis, Lathyrus hirsutus, Ipomea cairica* as broad-leave weeds and *Phalris minor* as grassy weeds. The pree dominant weed species were *Portulaca oleraceae* (65 seeds), *Phalris minor* (20 seeds), *Cichorium endivia* (14 seeds), *Silybum marinum* (7 seeds).

Table 3, in 2, 3, 4, 5, 6 and 9 zigzag shape, there were the presented sixteen weed species i.e. *Silybum marinum, Cichorium endivia, Brassica kaber, Chenopodium album, Portulaca oleraceae, Anagallis arvensis, Lathyrus hirsutus, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Sonchus oleraceus, Rumex dentatus* as broad-leave weeds and *Phalris minor* and *Echinochloa colonum* as grassy weeds. The pree dominant weed species were *Portulaca oleraceae* (122 seeds), *Anagallis arvensis* (32 seeds), *Phalris minor* (23 seeds), *Cichorium endivia* (21 seeds), *Lathyrus hirsutus* (16 seeds) and *Silybum marinum* (10 seeds).

Table 4, in 1, 2, 3, 4, 5, 6, 7, 8 and 9 zigzag shape, there were the presented twenty weed species i.e. *Silybum marinum, Cichorium endivia, Brassica kaber, Chenopodium album, Portulaca oleraceae, Anagallis arvensis, Lathyrus hirsutus, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Sonchus oleraceus, Rumex dentatus* and *Beta vulgaris* as broad-leave weeds and *Phalris minor, Echinochloa colonum, Phalaris paradoxa, Polypogon monspeliensis* and *Setaria viridis* as grassy weeds. The pree dominant weed species were *Portulaca oleraceae* (155 seeds), *Anagallis arvensis* (51 seeds), *Phalris minor* (41 seeds), *Cichorium endivia* (29 seeds), *Echinochloa colonum* (27 seeds), *Rumex dentatus* (16 seeds), *Lathyrus hirsutus* (16 seeds), *Amaranthus ascendens* (15 seeds), *Chenopodium album* (12 seeds) and *Silybum marinum* (10 seeds).

1.2. In second season, as shown from Table 2 the dominant annual broadleaf weeds were i.e *Portulaca oleraceae* was presented in nine soil samples with sum 183.7, and seed index 42.52%; *Anagallis arvensis* was presented in five soil samples with sum 45.2, and seed index 10.46%; meanwhile the dominant grassy weeds were i.e *Phalaris minor* was presented in six soil samples with sum 44.8, and seed index 10.37%. Whist the remainder weed species were presented in low density and located between 1, 2, 3 soil samples.

Table 2, in 3, 7 and 9 zigzag shape, there were the presented ten weed species i.e. *Silybum marinum, Cichorium endivia, Brassica kaber, Chenopodium album, Portulaca oleraceae, Anagallis arvensis* and *Ipomea cairica* as broad-leave weeds and *Polypogon monspeliensis, Phalris minor* and *Echinochloa colonum* as grassy weeds. The pree dominant weed species were *Portulaca oleraceae* (70 seeds), *Phalris minor* (26 seeds), *Cichorium endivia* (17 seeds).

Table 3, in 2, 3, 4, 5, 6 and 9 zigzag shape, there were the presented fifteen weed species i.e. *Silybum marinum, Cichorium endivia, Brassica kaber, Chenopodium album, Portulaca oleraceae, Anagallis arvensis, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Sonchus oleraceus,* as broad-leave weeds and *Polypogon monspeliensis, Phalris minor* and *Echinochloa colonum* as grassy weeds. The pree dominant weed species were *Portulaca oleraceae* (123 seeds), *Anagallis arvensis* (30 seeds), *Phalris minor* (27 seeds), *Cichorium endivia* (23 seeds), *Echinochloa colonum* (13 seeds) and *Silybum marinum* (7 seeds).

Table 4, in 1, 2, 3, 4, 5, 6, 7, 8 and 9 zigzag shape, there were the presented nineteen weed species i.e. *Silybum marinum, Cichorium endivia, Brassica kaber, Chenopodium album, Portulaca oleraceae, Anagallis arvensis, Lathyrus hirsutus, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius,*

Table 3
The presented weed species and number of seeds into 0.5 kg soil of six zigzag shapes at Sakha station, 2017 and 2018 seasons.

N. of samples	Silybum marinum	Cichorium endivia	Brassica kaber	Chenopodium album	Portulaca oleraceae	Anagallis arvensis	Phalris minor	Lathyrus hirsutus	Ipomea cairica.	Melilotus indica	Echinochloa colonum	Amaranthus ascendens	Capsella bursa-pastoris	Corchorus olitorius	Sonchus oleraceus	Rumex dentatus
Sakha station, 2017																
2	3.00				14.30	6.60	7.00				3.30					7.30
3	1.60	5.00	3.30	4.00	43.00		12.30		3.30							
4		6.00			22.30					3.30			1.00			
5					5.60	22.30		7.60			5.30	5.60		1.60		
6		7.30			23.00	3.30		4.30			3.60		4.00		4.30	
9	5.30	2.30		2.60	13.60		3.60	4.00								
Total	9.9	20.6	3.3	6.6	121.8	32.2	22.9	15.9	3.3	3.3	12.2	5.6	5	1.6	4.3	7.3
Sakha station, 2018																
2	2.60				13.60	5.00	7.30									5.30
3	1.60	5.00	4.00	4.00	43.00		11.60		2.30							
4		6.60			23.60					3.00						
5					3.6g	22.30							5.30	1.60		
6		6.00			23.30	2.30									5.30	
9	3.00	5.30		1.30	16.00		8.00									
Total	7.2	22.9	4	5.3	123.1	29.6	26.9		2.3	3			5.3	1.6	5.3	5.3

Table 4
The presented weed species and number of seeds into 0.5 kg soil of nine zigzag shapes at Sakha station, 2017 and 2018 seasons.

N. of samples	Silybum marinum	Cichorium endivia	Brassica kaber	Chenopodium album	Portulaca oleraceae	Anagallis arvensis	Phalris minor	Lathyrus hirsutus	Ipomea cairica.	Melilotus indica	Echinochloa colonum	Amaranthus ascendens	Capsella bursa-pastoris	Corchorus olitorius	Sonchus oleraceus	Rumex dentatus	Phalaris paradoxa	Polypogon monspeliensis	Setaria viridis	Beta vulgaris
Sakha station, 2017																				
1					23.00	11.00	9.00				14.60					9.00	1	5.60	5.60	
2	3.00				14.30	6.60	7.00				3.30					7.30				
3	1.60	5.00	3.30	4.00	43.00		12.30		3.30											
4		6.00			22.30					3.30			1.00							
5					5.60	22.30		7.60			5.30	5.60		1.60						
6		7.30			23.00	3.30		4.30			3.60		4.00		4.30					
7		7.00			8.00	7.30	4.00					5.00								
8		1.60		5.00	2.00		5.30					4.30								3.00
9	5.30	2.30		2.60	13.60		3.60	4.00												5.00
Total	9.9	29.2	3.3	11.6	154.8	50.5	41.2	15.9	3.3	3.3	26.8	14.9	5	1.6	4.3	16.3	1	5.6	5.6	8
Sakha station, 2018																				
1					36.30	10.30	7.30				13.00					7.30		*Polypogon monspeliensis*		
2	2.60				13.60	5.00	7.30				4.00					5.30				
3	1.60	5.00	4.00	4.00	43.00		11.60		2.30											
4		6.60			23.60					3.00			1.60					3.60		
5					3.6g	22.30					6.00	5.30		1.60						
6		6.00			23.30	2.30					2.60		4.60		5.30					
7		5.30			11.30	5.30	6.60				1.00	5.00								
8		1.00		1.30	13.60		4.00					4.30								
9	3.00	5.30		1.30	16.00		8.00	6.00											5.00	6.00
Total	7.2	29.2	4	6.6	184.3	45.2	44.8	6	2.3	3	26.6	14.6	6.2	1.6	5.3	12.6			5	6

Sonchus oleraceus, Rumex dentatus and *Beta vulgaris* as broad-leave weeds and *Polypogon monspeliensis, Phalris minor, Echinochloa colonum,* and *Setaria viridis* as grassy weeds. The pree dominant weed species were *Portulaca oleraceae* (184 seeds), *Anagallis arvensis* (45 seeds), *Phalris minor* (45 seeds), *Cichorium endivia* (29 seeds), *Echinochloa colonum* (27 seeds), *Amaranthus ascendens* (15 seeds), *Rumex dentatus* (13 seeds).

Given the figure opposite number of total seed weeds species /0.5 kg soil in the Sakha research farm station first year, find that *the* total number of weeds output of three samples (3, 7 and 9) by 138.5 resulted from 9 species of weeds; The six samples (2, 3, 4, 5, 6 and 9) by 347.1 from 16 species and nine samples (1,2,3,4,5,6,7,8,9) by 502.3 from 20 species; while number of total seed weeds species /0.5 kg soil in the Ismailia research farm station first year, three samples (3, 7 and 9) by 185.5 resulted from 18 species; The six samples (2, 3, 4, 5, 6 and 9) by 310.4 from 16 species and nine samples (1,2,3,4,5,6,7,8,9) by 442.2 from 20 species. Weed species of the soil sample in Ismailia Research Station as sandy soil are summarized in Table 4, twenty-four annual species belong to eleven family's and thirteen genera are recorded. They classified into two categories thirteen broadleaf weeds *Amaranthus ascendens* (Amaranthaceae), *Anagalis arvensis* (Priulaceae), *Brassica kaber* (Brassicaceae), *Capsella bursa-postoris*(Brassicaceae), *Cichorium endivia* (Asteraceae), *Convolvulus arvensis* (Convolvulaceae), *Corchorus olitorius* (Tiliaceae), *Emex spinosus* (Polygonaceae), *Ipomea cairica* (Convolvulaceae), *Lathyrus hirisutus* (Fabaceae), *Melilotus indica* (Fabaceae), *Portulaca oleraceae* (Portulacaceae), *Rumex dentatus* (Polygonaceae) and eleven narrow leave weeds *Avena fatua, Brachiaria repans, Cenchrus biflorus roxb, Dactyloctenium egyptium, Digitaria sangunalis, Echinochloa colonum, Lolium temulentum, Phalaris minor, Poa annua Polypogon monspeli.e.ns, Setaria viridis* belonged to Poaceae family.

2. Ismailia Res. Station farm

2.1. In first season, as shown from Table 5 the dominant annual broadleaf weeds were i.e. *Emex spinosus* was presented in nine soil samples with sum 78.5, and seed index 17.7%; *Portulaca oleraceae* was presented in seven soil samples with sum 49.3, and seed index 11.1%; meanwhile the *dominant* grassy weeds were i.e. *Phalris minor* was presented in seven soil samples with sum 50.8, and seed index 11.4%; Whilst the remainder weed species were presented in low density and located between 1, 2, 3 soil samples.

Table 6, in 3, 7 and 9 zigzag shape, there were the presented eighteen weed species i.e. *Brassica kaber, Portulaca oleraceae, Anagallis arvensis, Amaranthus ascendens, Lathyrus hirsutus, Capsella bursa- pastoris, Corchorus olitorius, Emex spinosus* and *Ipomea cairica, Cenchrus biflorus roxb* and *Convolvulus arvnsis* as broad-leave weeds and *Polypogon monspeliensis, Setria viridis, Echinochloa colonum, Brachiaria repans, Poa annua, Avena fatua* and *Lolium temulentum* as grassy weeds. The pree dominant weed species were *Emex spinosus* (33 seeds), *Phalris minor* (24 seeds), *Cenchrus biflorus roxb* (21 seeds), *Lolium temulentum* (20 seeds) and *Portulaca oleraceae* (18 seeds).

Table 7, in 2, 3, 4, 5, 6 and 9 zigzag shape, there were the presented twenty tow weed species i.e. *Brassica kaber, Portulaca oleraceae, Anagallis arvensis, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Emex spinosus, Cenchrus biflorus roxb, Lathyrus hirsutus, Rumex dentatus* and *convolvulus arvnsis* as broad-leave weeds and *Polypogon monspeliensis, Setria viridis, Phalris minor, Echinochloa colonum, Brachiaria repans, Poa annua, Avena fatua, Lolium temulentum, Digitaria sangunalis* and *Dactyloctenium aegyptius* as grassy weeds. The pree dominant weed species were *Emex spinosus* (64 seeds), *Portulaca oleraceae* (43 seeds), *Phalris minor* (43 seeds), *Digitaria sangunalis* (23 seeds), *Cenchrus biflorus roxb* (20 seeds) and *Poa annua* (15 seeds).

Table 8, in 1, 2, 3, 4, 5, 6, 7, 8 and 9 zigzag shape, there were the presented twenty fife weed species i.e. *Brassica kaber, Portulaca oleraceae, Anagallis arvensis, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Emex spinosus, Cenchrus biflorus roxb, Lathyrus hirsutus, Rumex dentatus, Cichorium endivia* and *convolvulus arvnsis* as broad-leave weeds and *Polypogon monspeliensis, Setria viridis, Phalris minor, Echinochloa colonum, Brachiaria repans, Poa annua, Avena fatua, Lolium temulentum, Digitaria sangunalis, Phalaris paradoxa* and *Dactyloctenium aegyptius* as grassy weeds. The pree dominant weed species were *Emex spinosus* (88 seeds), *Phalris minor* (51 seeds), *Portulaca oleraceae* (49 seeds), *Cenchrus biflorus roxb* (40 seeds), *Digitaria sangunalis* (23 seeds), *Lolium temulentum* (20 seeds) and *Poa annua* (16 seeds).

2.2. In second season, as shown from Table 5 the dominant annual broadleaf weeds were i.e. *Emex spinosus* was presented in nine soil samples with sum 80.5, and seed index 19.93%; *Portulaca oleraceae* was presented in seven soil samples with sum 47.2, and seed index 11.69%; meanwhile the dominant grassy weeds were i.e. *Phalaris minor* was presented in seven soil samples with sum 40.7, and seed index 18%); Whilst the remainder weed species were presented in low density and located between 1, 2, 3 soil samples.

Table 6, in 3, 7 and 9 zigzag shape, there were the presented nineteen weed species i.e. *Brassica kaber, Portulaca oleraceae, Anagallis arvensis, Amaranthus ascendens, Lathyrus hirsutus, Capsella bursa- pastoris, Corchorus olitorius, Emex spinosus* and *Ipomea cairica, Sonchus oleraceus* and *Convolvulus arvnsis* as broad-leave weeds and *Polypogon monspeliensis, Setria viridis, Echinochloa colonum, Brachiaria repans, Poa annua, Avena fatua, Phalaris minor* and *Lolium temulentum* as grassy weeds. The pree dominant weed species were *Emex spinosus* (32 seeds), *Phalris minor* (19 seeds), *Sonchus oleraceus* (19 seeds), *Phalaris minor* (19 seeds), *Lolium temulentum* (18 seeds) and *Portulaca oleraceae* (17 seeds).

Table 7, in 2, 3, 4, 5, 6 and 9 zigzag shape, there were the presented twenty three weed species i.e. *Brassica kaber, Portulaca oleraceae, Anagallis arvensis, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Emex spinosus, Cenchrus biflorus roxb, Lathyrus hirsutus, Rumex dentatus, Sonchus oleraceus* and *convolvulus arvnsis* as broad-leave weeds and *Polypogon monspeliensis, Setria viridis, Phalris minor, Echinochloa colonum, Poa annua, Avena fatua, Lolium temulentum, Digitaria sangunalis* and *Dactyloctenium aegyptius* as grassy weeds. The pree dominant weed species were *Emex spinosus* (64 seeds), *Portulaca oleraceae* (44 seeds), *Phalris minor* (43 seeds), *Digitaria sangunalis* (23 seeds), *Cenchrus biflorus roxb* (21 seeds), *Echinochloa colonum* (15 seeds), *Anagallis arvensis* (15 seeds) and *Poa annua* (15 seeds).

Table 8, in 1, 2, 3, 4, 5, 6, 7, 8 and 9 zigzag shape, there were the presented twenty six weed species i.e. *Brassica kaber, Portulaca oleraceae, Anagallis arvensis, Ipomea cairica, Melilotus indica, Amaranthus ascendens, Capsella bursa- pastoris, Corchorus olitorius, Emex spinosus, Cenchrus biflorus roxb, Lathyrus hirsutus, Rumex dentatus, Cichorium endivia, Medicago polymorpha* and *convolvulus arvnsis* as broad-leave weeds and *Polypogon monspeliensis, Setria viridis, Phalris minor, Echinochloa colonum, Brachiaria repans, Poa annua, Avena fatua, Lolium temulentum, Digitaria sangunalis, Phalaris paradoxa, Polypogon monsplins, Setaria viridis, Digitaria sangunalis* and *Dactyloctenium aegyptius* as grassy weeds. The pree dominant weed species were *Emex spinosus* (72 seeds), *Portulaca oleraceae* (47 seeds), *Phalris minor* (41 seeds), *Cenchrus biflorus roxb* (39 seeds), *Digitaria sangunalis* (24 seeds), *Lolium temulentum* (18 seeds), *Echinochloa colonum* (14 seeds), *Melilotus indica* (14 seeds) and *Poa annua* (11 seeds).

Table 5
Number of seed weeds species/0.5 kg soil in the Ismailia research farm station soil samples 2017 season and 2018 seasons.

Serial	Soil samples 2017 season	1	2	3	4	5	6	7	8	9	Sum.	Av.	Seed index	LSD at 5%
	Number of soil Sample Scientific name													
1	Cichorium endivia								1 a		1	0.11	0.23	0.57
2	Melilotus indica	4 a			3.3 a				2.6 a		9.9	1.1	2.24	1.58
3	Polypogon monspeli.e.ns	2 a						1.3a		2 a	5.3	0.58	1.20	0.87
4	Setaria viridis			2 a	1.6ab		1.3ab	1.3ab	1b		7.2	0.8	1.63	0.99
5	Brassica kaber	3.3 a			1.3b					2b	6.6	0.73	1.49	1.09
6	Portulaca oleraceae		17.3a	4.6bc	5.6bc	3.3c	5.6bc	5.6bc		7.3b	49.3	5.47	11.15	2.64
7	Anagallis arvensis		7.3 a			7.3 a		3.3b			17.9	1.98	4.05	2.06
8	Phalaris minor		13.3a	13.3a	3.3c		5.6bc	3.3c	5 bc	7b	50.8	5.64	11.49	2.83
9	Echinochloa colonum		7.3 a	6.3 a							19.9	2.21	4.50	1.58
10	Amaranthus ascendens			5 a		2.3b		1.6bc		1c	9.9	1.1	2.24	0.93
11	Lathyrus hirsutus				1.3b		2b			3.6a	6.9	0.76	1.56	1.09
12	Capsella bursa- pastoris				1 a				0.6a	1 a	2.6	0.28	0.59	0.66
13	Corchorus olitorius					3.3a				3.3a	6.6	0.73	1.49	1.23
14	Rumex dentatus						3.3b		7.3a		10.6	1.17	2.40	1.68
15	Ipomea cairica.				1.3a						1.3	0.14	0.29	0.33
16	Emex spinosus	4.3d	11abc	12ab	8.6bc	8 cd	11abc	7.3 cd	12ab	13.3a	78.5	8.72	17.75	3.93
17	Brachiaria repans	5 a							5 a	4.3a	14.3	1.58	3.23	1.74
18	Phalaris paradoxa	1.3 a									1.3	0.14	0.29	0.33
19	Cenchrus biflorus roxb	12.3a		7.6b					6.6b	13.3a	39.8	4.42	9.00	2.38
20	Poa annua		8 a	7.3 a				1b			16.3	1.81	3.69	2.16
21	Digitaria sangunalis		7b		15.6a						22.6	2.51	5.11	1.32
22	Dactyloctenium aegyptius					5.3a	4b				9.3	1.03	2.10	1.04
23	Avena fatua						1.3a		1.3a	0.6b	3.2	0.35	0.72	0.57
24	Lolium temulentum							12.3a	0c	7.3b	19.6	2.17	4.43	2.03
25	Medicago polymorpha								3.3a		3.3	0.36	0.75	0.87
26	Convolvulus arvensis									3.3a	3.3	0.36	0.75	0.87
	Total grassy weeds	20.6c	35.6a	36.6a	20.6c		9.3d	24.3bc	18.3d	30.3ab	195.6	21.73	44.23	6.75
	Total broad-leaves weeds	11.6f	35.6ab	21.6e	22.6de	29.6cde 29.6bcd	26cde	30.3bc	27cde	42.3a	246.6	27.4	55.77	7.44
	Total weeds	32.3e	71.3a	58.3b4	43.3d	29.6e	35.3de	54.6bc	45.3 cd	72.6a	442.2	49.13	10	18
	Soil samples 2018 season													
1	Cichorium endivia								0.6 a		0.6	6	0.15	0.33
2	Phalaris paradoxa	1.3 a									1.3	0.14	0.32	0.33
3	Melilotus indica	4 a			3.6 a	0c	2.3b		4 a		13.9	1.54	3.44	1.23
4	Polypogon monspeliensis	2.6 a						1b		0.6b	4.2	0.46	1.04	0.46
5	Setaria viridis			3.3 a			1b	0.6bc	0.6bc	0c	5.5	0.61	1.36	0.99
6	Brassica kaber	3.3a			1.3b					1.3b	5.9	0.62	1.46	0.99
7	Portulaca oleraceae		18.3a	2.3de	5.3bc	3 cd	4 cd	7.3b		7b	47.2	5.24	11.69	2.44
8	Anagallis arvensis		7.3 a			7 a		2.3b			16.6	1.84	4.11	1.58
9	Phalaris minor		13 a	12.3a			5.3b	2.6 cd	3.2 cd	4.3bc	40.7	4.52	18	1.68
10	Echinochloa colonum		7.3 a	5b	1.3c						13.6	1.51	3.37	1.58
11	Amaranthus ascendens			3.3a		2 bc		1.3c		2.3b	8.9	0.98	2.20	0.99
12	Lathyrus hirsutus				2b		2b			3.3a	7.3	0.81	1.81	0.87
13	Capsella bursa- pastoris				0.6b				1 a	1 a	2.6	0.28	0.64	0.33
14	Corchorus olitorius					2.3b				3.3a	5.6	0.62	1.39	0.93
15	Rumex dentatus						3.3b		7.3 a		10.6	1.17	2.62	1.68
16	Ipomea cairica.				1 a					1 a	2	0.22	0.50	2.62
17	Emex spinosus	5.6e	9.3bc	12 a	6 e	6.6de	10b	8 cd	11ab	12 a	80.5	8.94	19.93	1.89
18	Brachiaria repans	2.6ab						2.3b	3.3a		8.2	0.91	2.03	0.99
19	Cenchrus biflorus roxb	11a		7c					9b	11.6a	38.6	4.28	9.56	1.32
20	Poa annua		4b	6.3a				0.6c			10.9	1.21	2.70	0.73
21	Digitaria sangunalis		9.3b		14.3a						23.6	2.62	5.84	1.47
22	Dactyloctenium aegyptius					3.3b	4.3a		1c		8.6	0.95	2.13	0.46
23	Avena fatua						1 a		1 a	0.6b	2.6	0.28	0.64	0.33
24	Lolium temulentum							11 a		7b	18	2	4.46	0.80
25	Medicago polymorpha								3 a		3	0.33	0.74	1.14
26	Convolvulus arvensis									1.6 a	1.6	0.17	0.40	0.33
	Total broad-leaves weeds	13 g	35ab	17.6 fg	20ef	24.3ef	26 cd	30bc	28 cd	40 a	233.9	25.98	57.91	5.23
	Total grassy weeds	17.6c	33.6a	34 a	16.3c	0 e	8.6d	18.3c	17.3c	24.3b	170	18.88	42.09	3.20
	Total weeds	30.6d	68.6a	51.6b	36.3d	24.3e	34.6d	48.3bc	45.3c	64.3a	403.9	44.87	10	5.80

Means followed by the same letters within each column do not differ significantly according to Duncan's Multiple Range test at the 5%.

4. Discussion

The results explained that the dynamics Weed Seed Bank; Seed banks are generally composed of numerous species belonging to three groups. The first group includes dominant species accounting for 70–90% of the total seed bank. These species represent most of the weed problems in a *cropping* system. Second group of species comprise of 10–20% of the seed bank, including those adapted to

Table 6
The presented weed species and number of seeds into 0.5 kg soil of three zigzag shapes at Ismailia station 2017 and 2018 seasons.

N. of samples	Polypogon monsplins	Setria viridis	Brassica kaber	Portulaca oleraceae	Anagallis arvensis	Phalaris minor	Echinochloa colonum	Amaranthus ascendens	Lathyrus hirsutus	Capsella bursa-pastoris	Corchorus olitorius	Emex spinosus	Brachiaria repans	Cenchrus biflorus roxb	Poa annua	Avena fatua	Lolium temulentum	Convolvulus arvnsis	Sonchus oleraceus	Ipomea cairica.
Ismailia station 2017																				
3		2.00		4.66		13.30	6.30	5.00				12		7.6	7.33					
7	1	1.30		5.66	3.33	3.30		1.60				7.33	5		1.00		12.3			
9	2		2.0	7.33		7.00		1.00	3.60	1	3.30	13.3		13.3		0.66	7.30	3.30		
Total	3	3.3	2	17.6	3.33	23.6	6.3	7.6	3.6	1	3.3	32.63	5	20.9	8.33	0.66	19.6	3.3	0	0
Ismailia station 2018																				
3		2.00		4.66		13.30	6.30	5.00				12		7.60	7.33				7.0	
7	1	1.30		5.66	3.33	3.30		1.60				7.33	5.00		1.00		12.30			
9	2		2.00	7.33		7.00		1.00	3.60	1.0	3.30	13.3		13.30		0.66	7.30	3.30	11.6	1.0
Total	3	3.3	2	17.6	3.33	23.6	6.3	7.6	3.6	1	3.3	32.63	5	20.9	8.33	0.66	19.6	3.3	18.6	1

Table 7
The presented weed species and number of seeds into 0.5 kg soil of six zigzag shapes at Ismailia station 2017 and 2018 seasons.

N. of samples	Polypogon monsplins	Setria viridis	Brassica kaber	Portulaca oleraceae	Anagallis arvensis	Phalaris minor	Echinochloa colonum	Amaranthus ascendens	Lathyrus hirsutus	Capsella bursa-pastoris	Corchorus olitorius	Emex spinosus	Cenchrus biflorus roxb	Poa annua	Avena fatua	Lolium temulentum	convolvulus arvnsis	Rumex dentatus	Ipomea cairica.	Digitaria sangunalis	Dactyloctenium aegyptium	Melilotus indica	Sonchus oleraceus
Ismailia station 2017																							
2				17.30	7.30	13.30	7.30					11.00		8.00						7.00			
3		2.00		4.60		13.30	6.30	5.00				12.00	7.60	7.30									
4		1.60	1.30	5.60	7.30	3.30			1.30	1.00		8.60							1.30	15.60		3.30	
5				3.30				2.30			3.30	8.00									5.30		
6		1.30		5.60		5.60	1.00	2.00				11.00			1.30			3.30			4.00		
9	2		2.00	7.30		7.00		1.00	3.60	1.00	3.30	13.30	13.30		0.60	7.30	3.30						
Total	2	4.9	3.3	43.7	14.6	42.5	14.6	8.3	6.9	2	6.6	63.9	20.9	15.3	1.9	7.3	3.3	3.3	1.3	22.6	9.3	3.3	0
Ismailia station 2018																							
2				17.3	7.3	13.3	7.3					11.0		8.0						7.0			
3		2.0		4.6		13.3	6.3	5.0				12.0	7.6	7.3									
4		1.6	1.3	5.6	7.3	3.3			1.3	1.0		8.6						1.3	1.3	15.6		3.3	
5				3.3				2.3			3.3	8.0									5.3		
6		1.3		5.6		5.6	1.0	2.0				11.0			1.3						4.0		3.3
9	2.0		2.0	7.3		7.0		1.0	3.6	1.0	3.3	13.3	13.3		0.6	7.3	2.0						
Total	2	4.9	3.3	43.7	14.6	42.5	14.6	8.3	6.9	2	6.6	63.9	20.9	15.3	1.9	7.3	2	1.3	1.3	22.6	9.3	3.3	3.3

Table 8
The presented weed species and number of seeds into 0.5 kg soil of nine zigzag shapes at Ismailia station 2017 and 2018 season.

N. of samples	Polypogon monsplins	Setria viridis	Anagallis arvensis	Phalaris minor	Echinochloa colonum	Amaranthus ascendens	Lathyrus hirsutus	Capsella bursa-pastoris	Corchorus olitorius	Emex spinosus	Brachiaria repens	Cenchrus biflorus roxb	Poa annua	Avena fatua	Lolium temulentum	Convolvulus arvensis	Rumex dentatus	Ipomea catrica	Digitaria sangunalis	Dactyloctenium aegyptius	Cichorium endivia	Melilotus indica	Phalaris paradoxa	Medicago polymorpha
Ismailia station 2017																								
1	2									4.30	5	12.30	8.00									4	1.3	
2			7.30	13.30	7.30					11			7.30						7.00					
3		2.00		13.30	6.30	5.00				12		7.60							15.6			3.3		
4		1.60		3.30			1.30	1.00		8.6								1.30		5.3				
5			7.30			2.30			3.30	8										4				
6		1.30		5.60			2.00			11				1.30			3.30							
7	1	1.30	3.30	3.30		1.60				7.3	5		1.00											
8	0	1.00		5.00				0.60		12		6.60		1.30	12.30						1.00	2.6		
9	2			7.00		1.00	3.60	1.00	3.30	13.3	4.3	13.30		0.60	7.30	3.30	7.30							
Total	5	7.2	17.9	50.8	13.6	9.9	6.9	2.6	6.6	87.5	14.3	39.8	16.3	3.2	19.6	3.3	10.6	1.3	22.6	9.3	1	9.9	1.3	
Ismailia station 2018																								
1	2.6									5.6	2.6	11.0										4	1.3	
2			7.3	13.0	7.3					9.3			4.0						9.3					
3		3.3		12.3	5.0	3.3				12		7.0	6.3											
4					1.3		2.0	0.6		6.0									14.3	3.3				
5			7.0			2.0	2.0		2.3	6.6								1.0		4.3		3.6		
6		1.0		5.3						1	2.3			1.0			3.3							
7	1.0	0.6	2.3	2.6		1.3				8	3.3		0.6									2.3		
8		0.6		3.2		2.3			3.3	11		9.0		1.0	11.0		7.3			1.0	0.6	4		
9	0.6			4.3			3.3	1.0		12		11.6		0.6	7.0	1.6		1.0						3
Total	4.2	5.5	16.6	40.7	13.6	8.9	7.3	2.6	5.6	71.5	8.2	38.6	10.9	2.6	18	1.6	10.6	2	23.6	8.6	0.6	13.9	1.3	3

the geographic area but not to current production practices. The final group accounts for a small percentage of the total seed and includes recalcitrant seeds from previous seed banks of the previous crop, These results are in agreement with (Cothern and Smith Jr, 2013). While ((Gulden and Shirtliffe, 2009)); Illustrated that the seed bank forms an important component of the life cycle of weeds. In annual and some perennial weed species that reproduce by seed only, seed banks are the sole source of future weed populations. Because of this, understanding what happens to seeds in the seed bank can be an important component of overall weed control. Also, the method of taking soil samples using the W-shaped zigzag method had a clear effect on the variation of weeds types in all samples taken. (Menalled, 2008) Found that weed seed bank study one of the most important-yet often neglected weed management strategies is to reduce the number of weed seeds present in the field, and thereby limit potential weed populations during crop production. This is accomplished by managing the weed seed bank, as explained that the reason the weed seed bank is so difficult to manage is because it contains not only many seeds, but many different kinds of seeds, with typically 20–50 different weed species in a single field (Mayor and Dessaint, 1998); Said to seed banks are of ecological and evolutionary importance in the dynamics of weed populations and communities. Also (Mesquita et al., 2015) explained that the studying weed seed bank possible to assess the potential size of the weed seed bank because many species are capable of extended fluxes of emergence over several weeks under favorable environmental conditions. Also (Rao, 2000) explained that the soil weed seed bank is natural source for weed infestation.

5. Conclusion

The number of soil samples to estimate weed seed banks should be either six or nine sites; each sample weighted 0.50 Kg soil with zigzag shape act a direct seed extraction technique to able *recognize* the abundance of weed species into the soil and their seed density. The aim is to improve integrated weed control.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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