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Determination of Densities and Frequencies of Problematic Weed Species in Onion Planting Areas of Ankara and Çorum Provinces

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ABSTRACT

This study was conducted in 2019 in order to determine the weed species, their densities and frequency of occurrences in the onion production areas of Ankara and Çorum Provinces. The surveys were carried out in 78 fields, 55 in Ankara and 23 in Çorum. As a result of the surveys, 75 weed species, two of which are parasite, belonging to 28 families and 64 genera, were determined in the onion fields of Ankara Province. The families with the most species were listed as Asteraceae (11), Poaceae (9), Fabaceae (6), Chenopodiaceae (5) and Apiaceae (5). Other families were determined between 1-3 species. Of these weeds, *Convolvulus arvensis* L. (1.2 plants/m^2), *Xantium strumarium* L. (0.50 plants/m^2), *Amaranthus retroflexus* L. (0.40 plants/m^2), *Cuscuta* sp. (0.37 parazited onion/m^2), *A. blitoides* S. Watson (0.36 plants/m^2) were the 5 most intense species. According to the frequency of occurrence, the first five species are determined as; *C. arvensis* L. (90.90%), *X. strumarium* L. (65.45%), *A. retroflexus* L. (54.54), *Chenopodium album* L. (52.72%), *A. albus* L. (47.27%). In the onion cultivation areas of Çorum Province, 61 weed species one of which is parasite, belonging to 24 families and 51 genera were determined. The families with the most species were listed as Asteraceae (9), Poaceae,(8) Apiacea (5), Polygonaceae (4), Fabaceae (4); as for other families, between 1-3 species were determined. Considering the densities per m^2 of these weeds, the 5 most common weed species are determined as *C. arvensis* L. (0.80 plants/m^2), *Anethum graveolen* L. (0.56 plants/m^2), *A. retroflexus* L. (0.41 plants/m^2), *Chrozophora tinctoria* (L.) Raf. (0.32 plants/m^2), *X. spinosum* L. (0.31 plants/m^2), the first five species in terms of frequency of incidence are; *C. arvensis* L. (86.95), *A. refroflexus* L. (56.52%), *X. strumarium* L. (56.52%), *Cirsium arvense* (L.) Scop. (52.17%), *C. album* L. (52.17%).

1. Introduction

Onion is a vegetable that can be grown in different parts of the world and consumed in many different ways, and it has been farmed for over 4000 years. The homeland of the onion starts from the Mediterranean basin and extends to Iran and Afghanistan. The most widely known and farmed type of onion, which belongs to the Alliaceae family, is *Allium cepa* L. (Albayrak and Elmacı, 2017).

Although onion is not a type used directly in cooking, it ranks third in the world vegetable production after legumes and tomatoes (Bayram, 2021). Onion, which has an important place in human nutrition, is consumed in two ways as dry and fresh. In addition to containing many important vitamins and minerals, it is a medicinal plant known to be used since the beginning of human history (Yılmaz et al., 2006).

Temperature and day length are two important factors in onion cultivation. Although onion is a heat tolerant vegetable, it is more productive in cooler climates. During this period, the average temperature demand is 12-13 ^{0}C. The onion needs higher temperature after it starts to tie the head. The optimum temperature demanded by the onion, which is 18-20 ^{0}C during this period, rises to 23-27 ^{0}C during the ripening phase of the heads (Anonymous, 2022a). Onions are grouped into short day, medium day and long days depending on day length requirements. During the head formation stage, short-day varieties require 8-10 hours, medium-day varieties require 10-12 hours, and long-day varieties require 13-15 hours of day length (Beşirli et al.2021).

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While India, China and Nigeria are the countries with the largest onion cultivation areas in the world, China, India and the USA are the first three ones in production (Bayram, 2021). In 2020, 105 million tons of onion production was realized in approximately 5.5 million hectares of land in 138 countries in the world. According to the Food and Agriculture Organization (FAO) 2020 data, Turkey ranks 12th in the world onion cultivation area and 5th in production. While the world onion yield is 1.908 kg/da, Turkey's yield is 3.244 kg/da, which is higher than the world average. It has been reported that the amount of dry onion in world foreign trade was 16.6 million tons in 2020, with a monetary value of $ 7.1 billion, and the average ton price in 2020 was $233. World onion exports amounted to 8.5 million tons, with a value of 3.6 billion dollars in 2020, and imports amounted to 8.1 million tons and 3.5 billion dollars. Considering the amount of production, Türkiye is a self-sufficient and exporting country in dry onions, and ranks 10th with an export of 221 thousand tons (Anonymous, 2022b). In our country, dry onion proficiency level was determined as 114.2% and per capita consumption was determined as 21.4 kg. Although onion cultivation is carried out in every region of our country with different climatic conditions, it is seen that the production is concentrated in the Central Northern part of Central Anatolia, the Central Black Sea and the Mediterranean Region for early types (Anonymous, 2022c). On the basis of provinces; It is produced intensively in Ankara, Amasya, Hatay, Çorum, Tokat, Adana, Eskişehir, Bursa, Konya, Balıkesir, Tekirdağ, Karaman, Aksaray, Gaziantep, Antalya, Yozgat, Afyon, Kahramanmaraş provinces. The province with the largest onion cultivation area is Ankara with 165 thousand decares. Ankara is followed by Çorum with 105 thousand decares, Amasya with 70 thousand decares, and Hatay, Tokat, Eskişehir and Adana, respectively.

Ankara is in the first place with 835 thousand tons of dry onion production, as it is in the cultivation area. Ankara is followed by Çorum with a production of 295 thousand tons, Amasya with a production of 286 thousand tons, and Hatay, Eskişehir and Adana, respectively (TÜİK, 2022).

Turkey had an onion planting area of 722.319 decares in 2012, and 1.735.857 tons of onions were produced. In the years two thousand and twenty-one, onion production areas in Turkey decreased by approximately 3.9% compared to 2012 and were realized on a total area of 698.972 decares. While the cultivation areas decreased, the amount of product obtained increased by 44% and reached 2.5 million tons of dry onion production (TUIK, 2022).

In the provinces of Ankara and Çorum, where the study was conducted, the cultivation area was 88.507 and 46.463 decares, respectively, in 2012; production amount was stated as 268.224 and 123.886 tons. In the years two thousand and twenty-one, the total planting and production amounts are 165.767 decares and 835.269 tons for Ankara; for Çorum, it was determined as 105.739 decares and 295.503 tons.

In the provinces of Ankara and Çorum, where the study was conducted, the increase in planting and product amounts from 2012 to 2021 was 87% and 211% for Ankara, respectively; for Çorum, it was 127% and 138%. The reason for this is thought to have successful results in the selection of the right variety in production, the use of healthy seeds, the improvement of cultivation techniques, the intensive use of agricultural technology, and the methods for combating harmful organisms that cause problems for onions.

Commercial onion production is made in three ways; 1. Production by direct seed sowing, 2. Shallot production, 3. Seedling production, (Beşirli et al., 2021). Many factors affect the yield in onion production areas. Of these factors; disease agents (fungal, bacterial, viral), harmful insects and weeds take the lead. These harmful organisms not only reduce the yield, but also reduce the market value of the product. As it is known, weeds are compete with cultivated plants in terms of growth factors that are water, nutrients, light and place, live as semi-or full parasites in cultivated plants, negatively inhibit the development of cultivated plants by showing allelopathic effects, harm human and animal health with some toxic chemicals they contain, cause significant yield and quality losses. This causes more cost, especially in the early period (Özer et al., 1997; Işık et al., 2015). In addition to causing direct damage to cultivated plants, weeds cause many disease factors and host or intermediately host pests, which are problematic in cultivated plants, causing them to survive in the environment and to pass on to cultivated plants (Özer et al., 1997; Kitiş, 2011).

Onion is a plant that has little competition with weeds because it is a slow-growing, short, shallow rooted plant with a weak canopy. Additionally, it has been reported that the cylindrical shaped, upright growing leaves cannot suppress weed growth because they cannot shade in the soil (Ghosheh, 2004).

In the studies conducted abroad, it has been revealed that the onion is affected by weeds during the whole development period depending on the weed species and density, but the most competition is in the first 1.5-2 months when annual weeds are dominant (Anonymous, 2008; Güncan and Karaca, 2018). It is stated that especially in onion production from seeds, product losses due to competition are very high, and the highest competition is at the beginning of germination. It is estimated that losses from weeds are much higher than losses from pests and diseases (Tripathy et al., 2013). Additionally, a 15% weed density in the first 6 weeks reduces the yield by 86%, and a 50% weed density reduces the yield by 91% (Klingman and Ashton 1982; Torun, 2017), In another study, it was reported that weed competition reduced the average onion yield by 62% compared to the weed-free control (Qasem, 2006), and season-long crop-weed competition reduced the onion yield by 81.2% compared to the weed-free condition (Prakash et al., 2000). In another study conducted in Pakistan, it was stated that weed competition caused a 71% and 76%

decrease in onion yield in the first and second years, respectively (Khokhar et al., 2006).

In the studies conducted in our country, it has been revealed that the product losses in the fields where weed control is not done or done at late stages are between 20-100%, and it also affects the quality negatively creating small-headed onions (Özer et al., 1997; Anonymous, 2008).

In another study, it was determined that the competition between onion and weed started with the emergence of the onion, and there was a 55% decrease in yield and a 32% decrease in onion diameter with the prolongation of the competition between onions and weeds. It was determined that weeds, which were determined to cause great decreases in onion yield and quality, should be controlled, especially in the first 4-5 weeks (Kızılkaya et al., 2001).

For this reason, in order to benefit more from the existing agricultural areas, as the world population is increasing rapidly, it is necessary to minimize the weed problems in the onion production areas and to increase the amount and quality of the product taken from the unit area.

For this, besides breeding methods, it becomes necessary to fight against weeds; chemical, mechanical and cultural methods are applied in the control. However, hoeing and manual plucking is not economical in places where worker wages are high (Özer et al., 1997). For an effective and correct control method, it is of great importance to know the weed species, their density and biology, which are the problem.

This study was carried out in order to determine the weed species, densities and incidence frequencies in the onion cultivation areas of Ankara and Çorum provinces, where both the cultivation area and production are high in our country.

2. Materials and Methods

The main material of the study consists of weeds in Ankara and Çorum provinces and districts where onions are produced. The survey studies required to determine the weed species that are problematic in terms of frequency and density in onion planting areas were carried out in a total of 78 fields, 55 for Ankara and 23 for Çorum, in areas where onion production is intense in May-August 2019 (Tablo 1).

Survey studies have been carried out in at least 1% of the onion planting areas. The distribution of onion production areas in Ankara and Çorum provinces is unequal and concentrated in a certain regions (Figure 1).

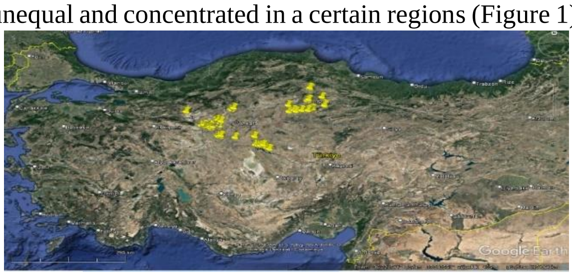

Figure 1
Sampling areas

Table 1
Onion planting areas (da) in the provinces where the survey was conducted and the number of sampling fields

Names of the provinces	Onion production areas (da)	Number of fields to be sampled
Çorum	41.054	23
Ankara	97.085	55
Total	138.139	78

(TUİK, 2019)

Care was taken to ensure that the fields to be surveyed were at least 3 km away from each other. Additionally, attention was paid to the fact that it was in different directions. The counts to be made in the field in the cultivation areas to be sampled were started from within 10 m inside in the direction of the diagonals, avoiding the field edge effect. 1 m^2 frame is used at each sampling point, 4 for 1-5 decares, 6 for 5-10 decares, 8 for 10-20 decares, 12 for 20-60 decares, and 16 points for larger fields are taken with a 1 m^2 frame. Plants were counted according to species, and the number of weeds detected in the counts were recorded together with the estimated cultivation areas (Kadıoğlu et al., 1993). Each of the narrow-leaved weeds of the wheatgrass group was counted as a sister plant. As for the parasitic plant *Cuscuta* sp., the number of parasitized onions per m^2 was taken into account. The herbariums of the species that could not be identified under field conditions were tried to be diagnosed under laboratory conditions, and the diagnoses were performed by utilising Davis PH (1965-1985), Uluğ et al. (1993), Özer et al. (1999), Özgür (2013).

The formulas given below were used to determine the weed species, their densities (number/m2) and the frequency of occurrence (%) (Odum, 1971).

Y=b/m

Y: densities (number of plant /m^2)

m: number of surveys

b: Number of plants in total m^2 in surveys made at the counting point

Incidence Frequency: It is the value that shows the % of a weed species encountered in the surveyed regions.

Incidence Frequency (%) = (n/m) x 100

n = Total number of fields with a species (units)

m = Total number of fields observed (units)

3. Results and Discussion

As a result of the surveys carried out at 55 sampling points in 2019 in order to determine the weed types, densities and frequency of occurrence in the onion cultivation areas of Ankara Province, 75 weed species, two of which are parasites (*Cuscuta* sp. and *Orobanche* sp.), belonging to 28 families and 64 genera, were determined. Follow-up studies are continuing to determine whether onion or weed is the host plant of *Orobanche* sp. or not (Figure 2). As a result of the study, when it is determined that it is the host of the onion, it will be the first record in our country. When the determined weed species are considered on the basis of family, Asteraceae

(11), Poaceae (9), Fabaceae (6), Chenopodiaceae (5) and Apiaceae (5) families are in the first place. Other families were found between 1-3 species. Considering the densities per m^2 of these weeds, the 5 most common weed species are *C. arvensis* L. (1.2 plants/m^2), *X. strumarium* L. (0.50 plants/m^2), *A. retroflexus* L. (0.40 plants/m^2). *Cuscuta* sp. (0.37 parasitic onions/m^2), *A. blitoides* S.Watson (0.36 plants/m^2). When evaluated according to the frequency of occurrence, the first five species are; *C. arvensis* L. (90.90%), *X. strumarium* L. (65.45%), *A. retroflexus* L.(54.54%), *C. album* L. (52.72%) and *A. albus* L. (47.27%) determined (Table 2).

In the surveys carried out at 23 sampling points in the onion cultivation areas of Çorum, 61 weed species belonging to 24 families and 51 genera were determined. The families with the most species were listed as Asteraceae (9), Poaceae (8) Apiaceae (5), Polygonaceae (4), Fabaceae (4), while other families were determined between 1-3 species. Considering the densities per m2 of these weeds, the 5 most common weed species are *C. arvensis* L. (0.80 plants/m^2), *A. graveolen* L. (0.56 plants/m^2), *A. retroflexus* L. (0.41 plants/m^2), *C. tinctoria* (L.) Raf. (0.32 plants/m^2), *X. spinosum* L. (0.31 plants/m^2), the first five species according to the frequency of occurrence; *C. arvensis* L. (86.95%), *A. refroflexus* L. (56.52%), *X. strumarium* L. (56.52%), *C. arvense* (L.) Scop (52.17%), *C. album* L. (52.17%) (Table 2).

Figure 2
Orobanche sp.

Table 2
Weed Species, Densities and Incidence Frequency in Onion Production Areas in Ankara and Çorum Province

		Ankara		Çorum	
Family	Weeds	Density (plant/m^2)	Frequency of incidence (%)	Density (plant/m^2)	Frequency of incidence (%)
Amaranthaceae	*Amaranthus albus* L.	0.17	47.27	0.16	34.78
	Amaranthus blitoides S.Watson	0.36	43.63	0.05	8.69
	Amaranthus retroflexus L.	0.40	54.54	0.41	56.52
Apiaceae	*Anethum graveolens* L.	0.11	20.00	0.56	52.00
	Bifora radians Bieb.	0.005	1.81	0.02	4.34
	Daucus carota L.	0.004	3.63	0.01	4.34
	Echinophora tenuifolia L.	0.07	18.18	0.10	17.39
	Turgenia latifolia L.Hoffm.	0.008	5.45	0.01	4.34
Aristolochiaceae	*Aristolochia maurorum* L.	0.03	7.27	0.05	13.04
Asclepiadaceae	*Cynanchum acutum* L.	0.01	7.27	0	0
Asteraceae	*Acroptilon repens* (L.) DC	0.10	23.63	0.22	17.00
	Centaure solstitialis L	0	0	0.01	4.34
	Chondrilla juncea L.	0.002	1.81	0	0
	Cichorium intybus L.	0.005	1.81	0	0
	Cirsium arvense (L.) Scop	0.11	21.81	0.24	52.17
	Helianthus annus L.	0.002	1.81	0.01	4.34
	Lactuca serriola L.	0.002	1.81	0	0
	Matricaria chamomilla L.	0	0	0.02	8.69
	Senecio vulgaris L.	0.01	3.63	0.005	4.34
	Silybum marianum L. Gaertn.	0.002	3.63	0	0
	Sonchus oleraceus L.	0.01	10.90	0.02	8.69
	Xanthium spinosum L.	0.27	52.72	0.31	47.82
	Xanthium strumarium L.	0.50	65.45	0.30	56.52
Boraginaceae	*Echium vulgare* L.	0.001	1.81	0.01	8.69
	Heliotropium europaeum L.	0.12	21.81	0.20	21.73
Brassicaceae	*Boreava orientalis* Jaub and Spach	0	0	0.05	13.04
	Sinapis arvensis L.	0.09	34.54	0.17	47.82
	Siymsbrium officinale (L.) Scop.	0.01	12.72	0.05	17.39
Caryophyllaceae	*Agrostemma githago* L.	0.002	1.81	0	0
Chenopodiaceae	*Chenopodium album* L.	0.30	52.72	0.18	52.17
	Chenopodium opulifolium Schrad.	0.06	14.54	0.10	17.39
	Chenopodium urbicum L.	0.02	7.27	0	0
	Chenopodium vulvaria L.	0.14	30.90	0.24	43.47
	Salsola kali L.	0.16	40.00	0	0

Table 2 (Continuation)
Weed Species, Densities and Incidence Frequency in Onion Production Areas in Ankara and Çorum Province

Convolvulaceae	*Convolvulus arvensis* L.	1.20	90.90	0.80	86.95
	Convolvulus galacticus Roston. ex Choisy.	0.01	1.81	0.13	13.04
Cuscutaceae	*Cuscuta* sp.	0.37 parasited onion nummer/m^2	23.63	0.09 parasited onion number/m^2	4.16
Euphorbiaceae	*Chrozophora tinctoria (*L.) Rafin	0.08	29.09	0.32	30.43
	Euphorbia prostrata Aiton	0.17	43.63	0.28	47.82
	Euphorbia sp.	0.008	7.2	0.08	43.47
Equi*setaceae*	*Equisetum arvense L.*	0.007	5.45	0.06	13.04
Fabaceae	*Alhagi pseudalhagi (Bieb)* Resv	0.20	27.27	0.05	8.69
	Cicer arietinum L.	0.001	1.81	0	0
	Glycyrrhiza sp.	0.001	1.81	0	0
	Medicago sativa L.	0.05	7.27	0.01	4.34
	Melilotus officinalis (L.) Desr.	0.01	9.09	0.08	30.43
	Vicia sativa L.	0.002	1.81	0.005	4.34
Juglandaceae	*Juglans regia*	0.001	1.81	0	0
Lamiaceae	*Molucella leavis* L.	0.03	1.81	0	0
Malvaceae	*Abutilon theophrasti* Medik.	0.005	3.63	0	0
	Hibiscus trionum L.	0.25	12.72	0.14	34.78
	Malva neglecta Wallr.	0.03	16.36	0.04	13.04
Orobanchaceae	*Orobanche* sp.	0.002	3.63	0	0
*P*lantaginaceae	*Plantago majör* L.	0.01	5.45	0.02	8.69
Poaceae	*Avena fatua* L.	0.14	25.45	0.29	34.78
	Avena sterilis L.	0	0	0.08	13.04
	Cynodon dactylon (L.) Pers.	0.33	29.09	0.28	30.43
	Echinochloa crus-galli (L.) P. B	0.14	21.81	0.15	17.39
	Hordeum vulgare L.	0.004	1.81	0	0
	Lolium perenne L.	0.02	3.63	0.03	4.34
	Phragmites australis (Cav) Trin. ex. Steudel	0.07	12.72	0.13	17.39
	Setaria verticillata (L.)P.B.	0.15	14.54	0.12	13.04
	Sorghum halepense (L.) Pers	0.10	18.18	0.22	21.73
	Triticum aestivum L.	0.005	1.81	0	0
Polygonaceae	*Polygonum aviculare* L.	0.10	29.09	0.21	30.43
	Polygonum convolvulus L.	0.004	3.63	0.02	8.69
	Polygonum cognatum Meissn.	0.045	1.81	0.02	8.69
	Rumex crispus L.	0.007	1.81	0	0
	Rumex sp.	0	0	0.01	13.04
Portulacaceae	*Portulaca oleracea* L.	0.12	27.27	0.05	21.73
Primulaceae	*Anagallis arvensis* L.	0.002	1.81	0.03	8.69
Ranunculaceae	*Consolida orientalis* (Gay)Schröd.	0.005	3.63	0.005	4.34
Resedaceae	*Reseda lutea* L.	0.03	14.5	0.12	8.69
Rubiaceae	*Galium aparine* L.	0.04	3.63	0.02	4.34
	Galium tricornutum Dandy.	0.005	1.81	0	0
	Rubia tinctorum L.	0.01	1.81	0	0
Scrophulariaceae	*Kickxia spuria* L. Dumort	0	0	0.03	13.04
Solanaceae	*Datura stramonium* L.	0.16	34.54	0.28	21.73
	Solanum nigrum L.	0.12	30.90	0.11	39.13
Zygophyllaceae	*Peganum harmala* L.	0.005	1.81	0	0
	Tribulus terrestris L.	0.29	36.36	0.10	13.04

For Ankara and Çorum provinces, the number of species with a frequency of over 10% and above was determined as 36 and 39 species, respectively. The number of species with a density of more than 0.10 plant/m^2 was determined as 25 for Ankara and 26 for Çorum.

Centaure solstitialis L, *Matricaria chamomilla* L., *Avena sterilis* L., *Boreava orientalis* Jaub and Spach, *Kickxia spuria* L. Dumor. weed species were not found in the survey areas carried out in the onion fields in Ankara, while *Cynanchum acutum L.*, *Chondrilla juncea* L., *Cichorium intybus* L, *Lactuca serriola* L., *Silybum marianum* L. Gaertn., *Agrostemma githago* L., *Chenopodium urbicum* L., *Salsola kali* L., *Cicer arietinum* L., *Glycyrrhiza* sp, *Juglans regia*, *Molucella leavis* L., *Abutilon theophrasti* Medik., *Orobanche* sp., *Hordeum vulgare* L., *Triticum aestivum* L., *Galium tricornutum* Dandy., *Rubia tinctorum* L. *Peganum harmala* L. species were not found in onion fields of Çorum provivce.

Studies on the determination of weeds in onion cultivation areas in our country are at a limited level, and it has been observed that there are no studies on weeds in the onion cultivation areas of Ankara and Çorum Provinces in the literature research. In this context, when the study is evaluated, it has the feature of being the first.

In this context, when the study is evaluated, the weed species encountered in the mentioned provinces have been determined, and the frequency and densities of these species have been determined for the first time throughout this study.

When we look at similar studies carried out on weeds in onion production, survey studies were carried out by

Alsan (1986) to determine the weeds in the onion fields of the Eastern Anatolia Region. The surveys were carried out in 14 fields, in onion fields in the provinces of Tunceli (Mazigirt and Pertek districts), Erzincan (Central district) and Sivas (Suşehri district). In the results of working; It was determined that weed species found in onion fields belong to 26 genera in Tunceli, 22 genera in Erzincan and 17 genera in Sivas. In Tunceli Province, *C. arvensis* L. *M. officinalis* Lam. Thuill, *Chenopodium* spp., especially *C. album* L., *P. aviculare* L. *Sorghum halepense* (L.) Pers., *Setaria viridis* (L.) P. Beauv., *Cynodon dactylon* (L.) Pers., *Echinochloa crus-galli* (L.) P. Beauv.), *Cuscuta* sp.; in Erzincan *A. retroflexus* L, *C. albüm* L., *C. arvensis* L, *C. arvense* (L.) Scop., *Solanum nigrum* L., *Hibiscus trionum* L., *Sinapis arvensis* L., *Setaria viridis* (L.) P. Beauv., *E. crus-galli* (L.) P. Beauv., *Cuscuta* sp.; in Sivas *A. retroflexus* L. *C. albüm* L., *C. arvense* (L.) Scop. *C. arvensis* L., *P. convolvulus* L, *Euphorbia glyptosperma* Engilm., *Rapistrum rugosum* (L.) Al., *S. viridis* (L.) P. Beauv., *Cuscuta* sp. were determined to be species found in onion fields.

In a study conducted by Zengin (1997), he determined the weeds, their densities, prevalence rates and community formation status in onion fields in Erzurum region. It was found that 41 weed species belonging to 18 families in the research regions have an average density of 95.87 units/m^2. *A. retroflexus, S. viridis L., C. album L.* and *C. arvensis* are very dense in onion cultivation areas, respectively, *C. album* L., *C. arvensis* L., *A. retroflexus* L. and *S. viridis* (L) were determined as the most common species.

In the survey studies conducted in Kazova and Kelkit valleys of Tokat province, 73 weed species belonging to 27 families in Kazova and a total of 83 weed species belonging to 31 families in Kelkit Valley were determined. The species with the highest density in Kazova was determined as *C. arvensis* L. with 13.81%, and *A. retroflexus* L. with 17.48% in Kelkit Valley (Kızılkaya, 2003)

Mennan and Işık (2003) investigated the change in weed flora of onion production areas by comparing the results of the survey conducted in Amasya Province in 1976 and the years 1999-2000. While 23 weed species were recorded in the first survey, it was reported that 87 weed species were detected in the second survey. According to the density, the most common species in the first survey were *C. album, A. retroflexus, C. arvensis, Heliotropium europaeum* and *S. nigrum*; In the study conducted between 1999-2000, the first 5 species with the highest incidence are respectively; *C. arvensis* L., *X. strumarium* L., *A. retroflexus* L., *Galium aparine*, *S. arvensis*. In the second survey, it was determined that X. *strumarium, C. arvense, S. arvensis, G. aparine* and *Bifora radians* gained more importance in the 25-year period.

In the study conducted by Gürbüz (2007), 105 weed species belonging to 30 plant families were determined. According to the number of weed species, the largest 3 families were reported to be Asteraceae (17), Poaceae (14) and Fabaceae (9). While the incidence of 57 of the weed species determined in the studies was over 10%, *Medicago polymorpha* L., *C. arvensis* L., *Avena sterilis* L., *C. album* L. and *S. arvensis* L. were found to be in the first 5 places.

In a study carried out in the onion cultivation areas of Tekirdağ province, 39 weed species belonging to 21 families were determined. *Convolvulus* spp., *S. arvensis* L., *Avena spp*., *C. album* L., *Euphorbia* spp., *Adonis flammea* Jacq., *S. nigrum* L., *Cirsium* sp., *X. strumarium* L., *P. aviculare* L. species reported to be the most dense species on the basis of (Yaşar, 2012).

In a study conducted in Hatay, 82 genera and 93 weed species belonging to 29 families, 2 of which are monocotyledonous, 26 of which are dicotyledonous and 1 of which are parasitic, were determined. *A. sterilis* L., *S. arvensis* L., *C. arvensis* L were found to be the most common weed species, *A. sterilis* L., *S. arvensis* L. and *A. retroflexus* L. were determined to be the most intense weeds. (Kaya and Üremiş, 2019).

When the previous survey studies in onion fields were compared with the study we conducted in Ankara, it was found that it was similar to the weed species detected in the survey studies conducted in Amasya by Mennan and Işık (2003).

When compared on the basis of families, in the study conducted by Gürbüz (2007) in the onion production areas covering Adana, Hatay and Mersin provinces, it was seen that the largest family according to the number of weed species overlapped as Asteraceae, Poaceae and Fabaceae. When the survey studies carried out in onion cultivation areas grown both in summer and winter are examined, it is seen that *C. arvensis* L, and *A. retroflexus* are common weed species.

The differences in the weed types and densities detected in the survey results are thought to vary depending on the different climate and soil characteristics of the regions, production technique, topographic factors, height, crop pattern, weed control methods and time, and cultivation techniques.

As a result, weeds, which are one of the most important plant protection problems in onions, as in other crop plants, compete with the onion in terms of nutrients, water, light and place, affect its development, cause a large amount of yield and quality losses.by hosting diseases and pests.

For this reason, the determination of weed species, density and incidence is important in order to be able to fight economically, effectively and correctly in onions that have weak competition.

In the interviews with the producers encountered in the field during the survey, it was stated that they mainly used chemical control and then hoeing at least once in weed control, and it was reported that this increased production costs. It is accepted that the competitive power of *C. arvensis* L, *A retroflexus* L. and *X. strumarium* L. weed species that are common in surveys in Ankara and Çorum are high. Since weed seeds are carried to long distances by wind, birds, animals, irrigation water, tools, equipment or people, and spread over large areas thanks to their seed forming abilities and high adaptability, the producers are provided with the Integrated Chemical and Mechanical Control, which includes cultural measures to prevent contamination, especially by rotation. Training activities should be increased on the need to implement Integrated Weed Management (IWM)

Finally, it is thought that this study will contribure to ensure healthy, adequate and balanced nutrition of the increasing population in our country and in the world, increasing the yield and quality in onion production, ensuring the necessary agricultural food production, and to the researches to be carried out within the framework of "Integrated Weed Management" against these weeds detected in order to increase the useful life of existing herbicides.

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