Jordan Journal of Agricultural Sciences, Volume **20**, No.**4** **2024**
DOI :https://doi.org/10.35516/jjas.v20i4.1911

Evaluation of Four Control Methods Efficiency and Damage Mitigation of Field Dodder (*Cuscuta campestris* Yunck.) in Eggplant Cultivation

Kamal Almhemed [*1] ***and Tamer Ustuner*** [1]

[1] Department of Plant Protection, Faculty of Agriculture, Kahramanmaras Sutcu Imam University, Kahramanmaras, Turkey

Received on 26/10/2023 and Accepted for Publication on 26/3/2024.

ABSTRACT

Field dodder (Cuscuta campestris Yunck.) is one of the most difficult parasitic weeds to control. This study was conducted in 2020 and 2021 to investigate the efficiency of four selected control methods against field dodder in eggplant. The treatments that were applied in the experiment were hand hoeing, black polyethylene mulch, pendimethalin as a pre-emergence herbicide, and rimsulfuron as a post-emergence herbicide. The hand hoeing treatment achieved the highest efficiency against field dodder among the weed control methods used, reaching 100% weed-free, followed by the mulch treatment, with 91.2% weed-free. When the field dodder was left without control, it caused a decrease in plant height by 31.13%, the number of fruits by 59.00%, and a loss in eggplant yield by 82.16%. Infection with field dodder usually results in failure of the eggplant flowers' pollination and then death, reduced quality of fruits, deformation in leaves, and cases of severe infection lead to the complete death of plants.

Keywords: Field dodder, eggplant, control methods, efficiency, morphological damages.

INTRODUCTION

Eggplant (*Solanum melongena* L.) is considered one of the most important crops of the Solanaceae family. Eggplant is widely consumed globally for its benefits to human health (Docimo *et al.*, 2016).

Weeds negatively affect the quantity and quality of the eggplant yield, as they compete with the crop for essential resources such as water, light, and nutrients (Ture & Kose, 2000). In addition to the direct damage caused by weeds to cultivated crops, certain weeds like the field dodder can transmit viruses, and this may multiply the losses incurred by farmers (Kitis, 2011; Ustuner & Aksoy, 2021). It has been reported that weeds if left uncontrolled, can cause yield losses of up to 96% in eggplant (Marques *et al.*, 2016). In the agriculture realm, *C. campestris* has been classified as one of the most important parasitic weeds that infect cultivated crops due to the multiplicity of plant hosts that it can infect (Lanini & Kogan, 2005). In Turkey, *C. campestris* has a wide distribution range up to 1500 m above sea level (Kaya *et al.*, 2018; Ustuner, 2018; Ustuner & Ozturk, 2018). In Kahramanmaras province in Turkey, *C. campestris* was one of 29 weed species that were identified in eggplant fields, and it was observed to spread at a very high density (Almhemed & Ustuner, 2022). It was reported that the yield loss in the Barcelona hybrid eggplant variety reached 27.01% as a

* Corresponding author. E-mail :almhemed79@gmail.com

result of field dodder infection (Al-Gburi *et al.*, 2019). Moreover, if field dodder is left uncontrolled, this may cause a yield loss in cultivated crops of up to 91% (Nemli & Ongen, 1982). In another experiment, hand hoeing was applied to control field dodder in chickpeas reducing the density of this parasitic weed by 99.7% (Dal & Ustuner, 2020). Furthermore, using black plastic mulch against weeds including field dodder in eggplant achieved a control efficiency ranging between 85.33 and 87.42% (Almhemed & Ustuner, 2022). The application of pendimethalin as a pre-emergence herbicide achieved control efficiency against field dodder in alfalfa ranging between 93% and 94% (Arat, 2015). As well as rimsulfuron achieved control efficiency against field dodder by 50% in tomato (Lanini, 2004).

This study aimed to investigate the efficiency of four control methods against field dodder and to understand the effect of infection severity with field dodder on some morphological and productive characteristics of eggplant.

MATERIALS AND METHODS

Experiment Location and Soil Properties

This experiment was carried out in the field at the trial area of the East Mediterranean Transitional Zone Agricultural Research Institute in Kahramanmaras, Turkey (37.53564°N, 36.91800°E) during the years 2020 and 2021. Table 1 shows the soil properties in the experiment land.

Table 1: Soil properties of the experiment land

Parameters	Analysis results	Analysis method
Saturation (%)	52.8	TS 8333
pH	7.36	TS 8332
Total salt (%)	0.15	TS 8334
Lime (%)	15.22	TS 8335 ISO 10693
Organic substances (%)	3.49	TS 8336
K (mg/kg)	231.7	Olsen method
P (mg/kg)	54.19	Olsen method

The Eggplant Variety and Treatments Used in the Experiment

In this experiment, 5-week-old seedlings of the Adana eggplant variety (*Solanum melongena* var. *esculentum*) were used. The eggplant seedlings were cultivated on 11 May 2020, and on 12 May 2021, with dimensions of 70 cm between the rows and 40 cm between the plants on the same row. Different control treatments were conducted in the field: (1) hand hoeing which was carried out four times at two-week intervals 20 days after cultivating seedlings in the field, (2) black polyethylene mulch with a thickness of 100 microns, (3) pre-emergence herbicide (pendimethalin 330 EC) at a rate of 500 ml /dunam which was applied one day before cultivating eggplant seedlings, and (3) post-emergence herbicide (rimsulfuron 25 SG) at a rate of 5g /dunam along with Vivolt at a rate of 25 ml /dunam which was applied after the field dodder was coiled to the eggplant stem and shoots and the haustorium was formed, in addition to control treatment in which field dodder was left to grow without any control treatments. Herbicides were sprayed using a 16-liter knapsack sprayer at a 90° angle and a pressure range of 0.4-0.6 MPa. Although the experiment land was infested with field dodder seeds, 2 g / m^2 of seeds were added. The dormancy of field dodder seeds was broken by exposing them to 98% concentrated sulfuric acid for 5 minutes, after that the seeds were washed with running water for 10 minutes, and then those seeds were seeded in the experimental land (Almhemed *et al.*, 2020).

Experiment Design and Methodology

The experiment was implemented based on a randomized complete block design (RCBD) with three replications. Each block consisted of 5 treatments and each experimental plot's area was 10 m^2 (2×5 m). A distance of 1 m was left between plots, 2 m between blocks, and 3 m as a boundary area around the experiment land. All weeds that appeared in the experiment land were removed manually and field dodder plants were allowed to grow in all plots. The results obtained from the analysis of samples collected from the experimental land indicate specific soil characteristics, including a soil saturation level of 52.8%, a soil pH of 7.36, a total salt content of 0.15%, a lime concentration of 15.22%, organic matter content of 3.49%, potassium (K) presence at a concentration of 231.7 mg/kg, and phosphorus (P) content measuring 54.19 mg/kg. Meteorological data from the Kahramanmaras Province Meteorological Station for the two years encompassing the experiment duration revealed that July and August were the warmest months, whereas January and February were identified as the coldest periods. Additionally, January exhibited the highest precipitation levels, while June, July, August, and September experienced significantly reduced precipitation levels.

The field underwent two rounds of orthogonal tillage to prepare for the cultivation of eggplant seedlings. Following this, super phosphate and urea fertilizers, each with a 46% concentration (25 kg/dunam for each), were incorporated into the soil using a disc plow before cultivating eggplant seedlings. Additionally, NPK (15-15-15) fertilizer was applied four times throughout the eggplants' lifespan at a rate of 100 kg/dunam. Irrigation of the eggplant seedlings occurred at intervals of 7-10 days, adjusted based on prevailing weather conditions and seedling age. Each experimental plot consisted of 38 eggplant seedlings. The harvest season began in mid-July and harvesting was conducted weekly, resulting in a total of 12 harvests per season for both years of the experiment.

The Effect of Treatments on the Total Number of Eggplant Branches and Density of Field Dodder

At the end of the season, 10 eggplants were randomly selected in each experimental plot. The number of branches per plant was counted, then the average number of branches per plant was calculated. The density of the field dodder was determined based on the number of infected plants per square meter and based on the number of infected branches for each plant. To calculate the percentage of infected plants per square meter, the following formula was used:

The percentage of infected plants (%) = $\left(\frac{x-y}{x}\right)\times 100$

Where, x: the number of plants per square meter, y: the number of infected plants per square meter.

The Effect of Treatments on the Fresh Biomass Weight of Field Dodder and Efficiency of Control Methods

At the end of the experiment, all field dodder plants within one square meter of each plot were meticulously harvested and individually enclosed in nylon bags. These bags were appropriately labeled with the respective treatment name and replication number. The bags were transferred to the laboratory, where the fresh biomass weight of the field dodder in each treatment was quantified.

The effectiveness of control methods against field dodder was calculated based on the rate of reduction in fresh biomass of field dodder using the formula proposed by Topps & Wain (1957).

The efficiency of control methods (%) = $\left(\frac{A-B}{A}\right) \times 100$

Where A: is the fresh biomass weight of the field dodder in the control plot, B: is the fresh biomass weight of the field dodder in the treatment x.

The Effect of Treatments on the Eggplant Height

After the end of the eggplant harvest season in late September, 10 eggplants were randomly collected in each experimental plot. The plant height was measured using a 2-meter ruler, then the average eggplant height was calculated for the 10 plants that were selected. To determine the percentage of reduction in the eggplant height due to field dodder infection, the following formula was used:

The percentage of reduction in the eggplant height = $[1 - (Lx/L0)] \times 100$

Where Lx: is the eggplant height in the treatment x, L0: is the eggplant height in the hand hoeing treatment (as no infection with field dodder was recorded in this treatment).

The Effect of Treatments on the Number of Eggplant Fruits

Since the start of the eggplant harvest season, 10 eggplants were randomly determined in each experimental plot as the number of fruits was counted per plant. Counting eggplant fruits was repeated during each harvest. At the last harvest, the cumulative number of fruits per plant was recorded. In order to calculate the percentage decrease in the number of eggplant fruits due to field dodder, the following formula was used:

The percentage decrease in eggplant fruits number = $[1 - (Nx/N0)] \times 100$

Where Nx: is the number of eggplant fruits in the treatment x, and N0: is the number of eggplant fruits in the hand hoeing treatment.

The Effect of Treatments on Eggplant Harvest Times and Yield

The number of eggplant harvests was recorded from the beginning of the harvest season until the end of the season, where the harvest was conducted weekly. The eggplant yield was calculated cumulatively in tons/dunam. The loss in eggplant yield was determined by comparing the yield for each treatment with the yield obtained from the hand-hoeing treatment using the following formula:

Eggplant yield loss rate = $[1 - (Yx/Y0)] \times 100$

Where, Yx: Yield in x treatment, Y0: Yield in hand hoeing treatment.

Non-Quantitative Morphological Damages Caused by Field Dodder on Eggplant

The eggplant field was closely monitored during the two experiment years, and the non-quantitative morphological damages caused by field dodder on eggplant were recorded and documented with photographs.

Statistical Analysis of the Data

The experiment was conducted at one location ((37.53564°N, 36.91800°E) in 2020 and 2021. Levene test was used to determine the standard deviation of each mean from the general mean for each year of the experiment. Based on Levene test results, a T-test assuming equal variances was used to compare the means between the two years. According to the T-test results, the hypothesis that indicated no significant differences in means between the two years was accepted. Accordingly, the average results for the two years of the experiment were adopted in discussing the results. The data collected from the field experiment were analyzed by ANOVA through MSTAT-C software (Version 2.10). The Least Significant Difference (LSD) test was used to compare the means at a significance level of 0.05.

RESULTS

The Effect of Treatments on the Total Number of Eggplant Branches and Density of Field Dodder

The number of eggplant branches ranged between a maximum of 37.77 branches per plant in the hand hoeing treatment and a minimum of 13.93 branches per plant in the control plots. There were significant differences between the treatments, as the hand-hoeing treatment significantly outperformed other treatments. No infection with field dodder was recorded on eggplant in the hand hoeing treatment. At the same time, the percentage of infection with field dodder in the mulch treatment was the lowest at a rate of 8.53%. As well as no significant differences were observed between the pendimethalin and rimsulfuron treatments, as the infection rate was 72.53% and 71.10% for these two treatments, respectively. The highest infection rate was recorded in the control plots, which reached 93.80% (Table 2).

Table 2: The number of infected branches, infected plants, and percentage of infected plants

Treatments	The number of eggplant branches per plant	The number of infected eggplant branches per plant	The number of infected plants/m^2	Percentage of infected plants (%)
Hand hoeing	37.77 ^{a}	0.00 ^{a}	0.00 ^{a}	0.00 ^{a}
Mulch	32.73 ^{b}	2.77 ^{b}	0.33 ^{b}	8.53 ^{b}
Pendimethalin	20.67 ^{c}	15.00 ^{e}	2.87 ^{c}	72.53 ^{c}
Rimsulfuron	19.50 ^{d}	13.87 ^{d}	2.87 ^{c}	71.10 ^{c}
Control	13.93 ^{e}	13.10 ^{c}	3.73 ^{d}	93.80 ^{d}
LSD 0.05	0.5742	0.5258	0.1191	2.809

Values followed by the same letter(s) in the same column are not significantly different from each other at a 0.05 level of probability

The Effect of Treatments on the Fresh Biomass Weight of Field Dodder and Efficiency of Control Methods

While no infection with the field dodder was recorded in the hand hoeing treatment, the fresh biomass of the field dodder was at the lowest level in the mulch treatment at 151.0 g/m^2. No statistically significant differences were observed between the pendimethalin and rimsulfuron treatments in terms of the fresh biomass of field dodder, which recorded 947.3 and 967.0 g/m^2 in these two treatments, respectively.

The hand hoeing treatment outperformed the mulch, pendimethalin, and rimsulfuron treatments in terms of the efficiency of control methods against field dodder, and the differences between all treatments were significant, as the efficiency was recorded at 100.0%, 91.2%, 47.2%, and 45.8% for these four treatments, respectively (Table 3).

Table 3: Fresh biomass of field dodder and efficiency of control methods

Treatments	Field dodder fresh bio-mass g/m^2	Efficiency of control methods (%)
Hand hoeing	0.0^a	100.0^a
Mulch	151.0^b	91.2^b
Pendimethalin	947.3^c	47.2^c
Rimsulfuron	967.0^c	45.8^d
Control	1774.0^d	0.0^e
LSD 0.05	43.80	1.176

Values followed by the same letter(s) in the same column are not significantly different from each other at a 0.05 level of probability

The Effect of Treatments on the Eggplant Height

The hand hoeing treatment significantly outperformed other treatments, as it recorded the highest plant height of 113.2 cm. The lowest plant height was recorded in control plots, which reached 78.00 cm. No significant differences were observed between pendimethalin and rimsulfuron treatments, where the plant height for these two treatments was 85.27 and 84.10 cm, respectively. Field dodder caused a significant decrease in eggplant height by 31.13% compared to hand hoeing treatment. As noted above, all treatments reduced the effect of field dodder on eggplant height (Table 4).

Table 4: The eggplant height, the percentage of decrease in plant height, the number of eggplant fruits, and the percentage of decrease in the number of fruits

Treatments	The eggplant Height (cm)	The decrease in the eggplant height (%)	Number of eggplants fruits/plant	The decrease in the number of fruits/plant (%)
Hand hoeing	113.2 [a]	0.00 [a]	32.03 [a]	0.00 [a]
Mulch	104.1 [b]	8.03 [b]	24.33 [b]	24.00 [b]
Pendimethalin	85.27 [c]	24.67 [c]	15.23 [c]	52.40 [c]
Rimsulfuron	84.10 [c]	25.77 [c]	14.77 [c]	53.90 [c]
Control	78.00 [d]	31.13 [d]	13.13 [d]	59.00 [d]
LSD 0.05	1.362	1.226	0.7531	1.742

Values followed by the same letter(s) in the same column are not significantly different from each other at a 0.05 level of probability

The Effect of Treatments on the Number of Eggplant Fruits

The highest number of eggplant fruits was recorded in the hand hoeing treatment, as it reached 32.03 fruits/plant, as well this treatment significantly outperformed other treatments. The mulch treatment ranked second, with 24.33 fruits/plant. No significant differences were observed between pendimethalin and rimsulfuron, as the number of fruits was 15.23 and 14.77 per plant in these two treatments, respectively. All treatments reduced the effect of field dodder on the number of eggplant fruits at varying levels. The rate of decrease in the number of eggplant fruits due to field dodder was 59.00% based on the data collected from the control plots (Table 4).

The Effect of Treatments on Eggplant Harvest Times and Yield

The hand hoeing treatment achieved the highest yield of 10.540 tons/dunam and significantly outperformed other treatments. The mulch treatment ranked second, with a yield of 8.036 tons/dunam. According to the results, the yield of eggplant was the lowest in the two treatments with pendimethalin and rimsulfuron and in the control plots, as it recorded 2.270, 2.156, and 1.881 tons/dunam, respectively. The infection with field dodder caused a loss in eggplant yield of up to 82.16% based on control plots. It was also observed that all treatments reduced the yield loss caused by the field dodder of eggplant, as the loss in eggplant yield was reduced to 23.75% in the mulch treatment. The number of harvests was 12 times in the treatments of hand hoeing, mulch, and pendimethalin, while it was 10 times in rimsulfuron treatment and 8 times in control plots (Table 5).

Table 5: Eggplant yield, Loss of eggplant yield, and the number of harvest times

Treatments	Eggplant yield (ton/dunam)	Loss of eggplant yield (%)	The number of harvest times
Hand hoeing	10.540 [a]	0.00 [a]	12 [a]
Mulch	8.036 [b]	23.75 [b]	12 [a]
Pendimethalin	2.270 [c]	78.46 [c]	12 [a]
Rimsulfuron	2.156 [d]	79.54 [d]	10 [b]
Control	1.881 [e]	82.16 [e]	8 [c]
LSD 0.05	0.05954	0.4375	0.01883

Values followed by the same letter(s) in the same column are not significantly different from each other at a 0.05 level of probability

Non-Quantitative Morphological Damages Caused by Field Dodder on Eggplant

When flowers were infected with field dodder in the early stages, it was observed that there was a failure to pollinate, followed by the death of unpollinated flowers. It was observed that the fruits of eggplant infected with field dodder in its early stages remain undersized and not suitable for harvesting and human consumption, as the fruit cover becomes hard. Infection with field dodder often causes deformation of leaves, which reduces their photosynthesis efficiency. Yellowing is often observed in the leaves of plants infected with the field dodder compared to healthy plants. Severe infestation with field dodder may lead to plant death completely (Figure 1).

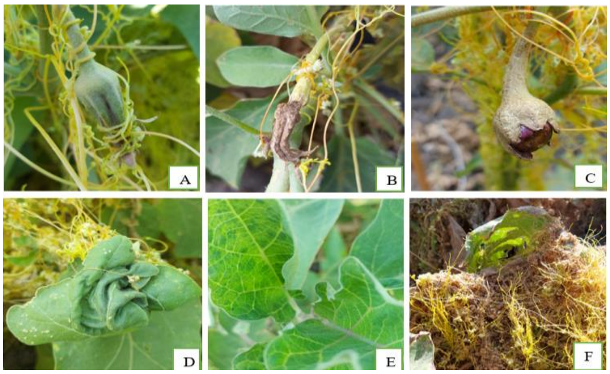

Figure 1. Some non-quantitative morphological damages caused by field dodder on eggplant; A: obstruction of flower pollination, B: failure of pollination and death of flowers, C: undersized and hard eggplant fruits, D: deformation of the leaves, E: yellowing of leaves, F: plant death

DISCUSSION

The results of this experiment showed that the percentage of infection with field dodder was 93.80% based on the control plots. All control methods tested reduced the percentage of field dodder infection on eggplant. In this experiment, the hand hoeing treatment achieved 100% efficiency in preventing field dodder infection, and this result is consistent with Dal & Ustuner (2020) indicated, as they reported an efficiency of 99.7% in controlling field dodder in chickpea fields using hand hoeing. Mulch treatment was among the effective control methods that were investigated in this experiment, as it reduced the percentage of field dodder infection by 91.2%. These results are aligned with the results of many previous studies, where the black plastic mulch achieved 99.86% efficiency in controlling weeds including field dodder in apple orchards (Ustuner & Ustuner, 2011), 93% in chickpea fields (Shamse et al., 2013), 87.42% in eggplant fields (Almhemed & Ustuner, 2022), and 98% in tomato fields (Johnson *et al.*, 2007). In this experiment, result showed that the use of pendimethalin and rimsulfuron against field dodder achieved moderate control efficiency, and this aligns with some previous studies, as it was reported that pendimethalin achieved an efficiency of 60% against field dodder in alfalfa fields (Chinnusamy *et al.*, 2008), and rimsulfuron achieved a control efficiency against field dodder of 50% in tomato fields (Lanini 2004). Furthermore, infection with field dodder caused a decrease in eggplant height by 31.13% compared to healthy plants. These results agree with the results of Al-Gburi *et al*. (2019) who reported a 25.78% decrease in eggplant height due to infection with field dodder. The results of this experiment showed that field dodder caused a loss of eggplant yield by 82.16% in control plots. This result is not consistent with the result reported by Al-Gburi *et al.* (2019) showed that the field dodder caused a loss in eggplant yield by 53.43%. The results of this experiment showed that field dodder caused a reduction in the number of eggplant fruits by 59.00% and a loss of eggplant yield by 82.16% in untreated control plots. These results are not consistent with the results reported by Al-Gburi et al. (2019) in that the field dodder caused a reduction in the number of eggplant fruits by 38.92% and a loss in eggplant yield by 53.43%. The difference in these results may be due to the difference between eggplant varieties in terms of sensitivity to field dodder infection and environmental conditions or crop varieties used.

CONCLUSION

Field dodder is a major challenge facing eggplant farmers. In case the field dodder is not controlled, yield loss may reach more than 80%, in addition to other damages that field dodder may cause significant loss in yield quantity and quality of eggplant. Hand hoeing and black plastic mulch are recommended as effective control methods against field dodder in eggplant fields. In addition, the use of herbicides such as pendimethalin and rimsulfuron alone is not sufficient, and other control methods must be applied in addition to the use of these herbicides.

ACKNOWLEDGEMENTS

The authors are thankful to the KSU Scientific Research Unit (BAP) for their financial support to conduct this study (Project No: 2019/6-15 D).

CONFLICT OF INTERESTS

The authors have no conflict of interest to declare.

REFERENCES

Al-Gburi, B. K., Al-Sahaf, F. H., Al-Fadhal, F. A., Mohammed, A. E., & Monte Diaz de Guerenu, J. P. D. (2019). Effect of different control methods on *Cuscuta campestris*, and growth and productivity of eggplant (*Solanum melongena*). *Plant Archives, 19*(1), 461-469.

Almhemed, K., & Ustuner, T. (2022). Assessment of some weed control methods efficiency and yield losses caused by weed in eggplant. *Fresenius Environmental Bulletin, 31*(8), 7514-7520.

Almhemed, K., Al Sakran, M., & Ustuner, T. (2020). Effect of seed's age on some treatments' efficiency for breaking of dodder (*Cuscuta campestris* Yunc.) seed's dormancy. *International Journal of Scientific and Research Publications, 10*(04), 326-329. https://doi.org/10.29322/IJSRP.10.04.2020.p10038

Arat, B. B. (2015). Importance of dodder species (*Cuscuta spp.*) in alfalfa-growing areas in Aydin province and determination of the effect of herbicides and plant extracts for their control (Master's thesis). Adnan Menderes University, Aydın, Turkey. (In Turkish)

Chinnusamy, C., Prabhakaran, N., Janaki, P., Govindarajan, K., Rathika, S., & Mynavathi, V. (2008). *Compendium weed science research in Tamil Nadu*. All India Coordinated Research Programme on Weed Control, Department of Agronomy, Centre for Soil and Crop Management Studies, Tamil Nadu Agricultural University.

Dal, S., & Ustuner, T. (2020). The effect of dodder (*Cuscuta spp.*) and weed density in Kahramanmaras province chickpea (*Cicer arietinum* L.) fields on the morphological and agronomic features of chickpea plant (Master's thesis). Kahramanmaras Sutcu Imam University, Kahramanmaras, Turkey. (In Turkish)

Docimo, T., Francese, G., Ruggiero, A., Batelli, G., De Palma, M., Bassolino, L., Toppino, L., Rotino, G. L., Mennella, G., & Tucci, M. (2016). Phenylpropanoids accumulation in eggplant fruit: Characterization of biosynthetic genes and regulation by a MYB transcription factor. *Frontiers in Plant Science, 6*, 1233. https://doi.org/10.3389/fpls.2015.01233

Johnson, W. C., Davis, R. F., & Mullinix, B. G. (2007). An integrated system of summer solarization and fallow tillage for *Cyperus esculentus* and nematode management in the Southeastern Coastal Plain. *Crop Protection, 26*(11), 1660-1666. https://doi.org/10.1016/j.cropro.2007.02.005

Kaya, I., Nemli, Y., & Demir, I. (2018). Taxonomic characteristics, distributions, and hosts of dodder species (*Cuscuta spp.*) seen in agricultural and non-agricultural areas in Turkey. *Turkish Journal of Weed Science*, *21*(1), 1-7.

Kitis, Y. E. (2011). Mulch and solarization applications in weed control. *GAP VI. Agriculture Congress*, 09–12 May, Şanlıurfa, Turkey.

Lanini, W. T., & Kogan, M. (2005). Biology and management of *Cuscuta* in crops. *Ciencia e Investigacion Agraria*, *32*(3), 127-141.

Lanini, W. T. (2004). Economical methods of controlling dodder in tomatoes. *Proceedings of the California Weed Science Society*, *56*, 57-59.

Marques, L. J. P., Bianco, S. C., Filho, A. B., & Bianco, M. S. (2016). Phytosociological survey and weed interference in eggplant cultivation. *Planta Daninha*, *34*(2), 309-318. https://doi.org/10.1590/S0100-83582016340200012

Nemli, Y., & Ongen, N. (1982). Taxonomic studies on dodder species (*Cuscuta spp.*) in the Thrace region of Turkey. *Turkish Journal of Agriculture and Forestry*, *6*(3), 147-154.

Shamse, S., Nasab, A. D., & Amini, R. (2013). Effect of integrated management of dodder (*Cuscuta campestris*) on yield of chickpea and dodder biomass. *The 6th Iran Weed Science Conference*, Birjand, 10-12 September 2013.

Topps, J. H., & Wain, R. L. (1957). Investigation of fungitoxicity of 3 and 5-alkyl salicylanilide and parachloroaniline. *Annals of Applied Biology*, *45*(3), 506–511. https://doi.org/10.1111/j.1744-7348.1957.tb05888.x

Ture, C., & Kose, Y. B. (2000). An investigation on the weed distribution in some agricultural fields of Eskisehir and environs. *Turkish Journal of Agriculture and Forestry*, *24*(3), 327-331.

Ustuner, T., & Aksoy, E. O. (2021). Current issues in weed science. In *Chapter 6: Parasitic Weeds* (pp. 179-262). ISBN: 978-625-8061-67-3. (In Turkish)

Ustuner, T., & Ozturk, E. (2018). Effect of dodder (*Cuscuta campestris* Yunc.) on yield and quality in sugar beet (*Beta vulgaris* L.) cultivation. *Plant Protection Bulletin*, *58*(1), 32-40. https://doi.org/10.16955/bitkorb.360142

Ustuner, T. (2018). The effect of field dodder (*Cuscuta campestris* Yunck.) on the leaf and tuber yield of sugar beet (*Beta vulgaris* L.). *Turkish Journal of Agriculture and Forestry*, *42*(5), Article 5. https://doi.org/10.3906/tar-1711-108

Ustuner, T., & Ustuner, M. (2011). Investigation on different mulch materials and chemical control for controlling weeds in apple orchards in Turkey. *Scientific Research and Essays*, *6*(19), 3979-3985.

تقييم كفاءة أربعة طرق للتحكم وتخفيف اضرار الحامول الحقلي (.Cuscuta Campestris Yunck) في زراعة الباذنجان

كمال المحيمد[1]* و تامر أوستونير[1]

[1] جامعة كهرمان ماراس سوتشو إمام، كهرمان ماراس، تركيا.

تاريخ استلام البحث: 2023/10/26 وتاريخ قبوله: 2024/3/26.

ملخص

يعتبر حامول الحقل (.Cuscuta campestris Yunck) من الأعشاب المتطفلة التي يصعب مكافحتها. أجريت هذه الدراسة في عامي 2020 و2021 لمعرفة مدى كفاءة بعض طرق المكافحة ضد حامول الحقل في الباذنجان. تم استخدام أربعة طرق للمكافحة في التجربة هي العزق اليدوي، التغطية بالبولي إيثيلين الأسود، البنديميثالين كمبيد أعشاب ما قبل الإنبات، والريمسولفورون كمبيد أعشاب ما بعد الإنبات. حققت معاملة العزق اليدوي أعلى كفاءة ضد حامول الحقل حيث وصلت إلى 100% خلو من الأعشاب تلتها معاملة التغطية بالبولي إيثيلين الأسود بكفاءة وصلت إلى 91.2% خلو من الأعشاب. أدى ترك حامول الحقل دون مكافحة إلى انخفاض في ارتفاع نبات الباذنجان بنسبة 31.13% وانخفاض عدد الثمار بنسبة 59.00% وسبب خسارة اقتصادية في الانتاج وصلت إلى 82.16%. تؤدي الإصابة بحامول الحقل عادة إلى فشل تلقيح أزهار الباذنجان ثم موتها، وانخفاض جودة الثمار، وتشوه الأوراق، وفي حالات الإصابة الشديدة سبب موت النباتات بشكل كامل.

الكلمات الدالة: حامول الحقل، الباذنجان، طرق التحكم، الكفاءة، الأضرار المورفولوجية

* الباحث المعتمد للمراسلة: almhemed79@gmail.com