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Determination of the control methods of *Ipomoea triloba* L. (three lobe morning glory) in cotton fields

Pamuk ekim alanlarında *Ipomoea triloba* L. (pembe çiçekli akşam sefası)'nın mücadele olanaklarının belirlenmesi

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A B S T R A C T

Cotton (*Gossypium hirsutum* L.) is used as the raw material in more than fifty industries and is also the main source of raw materials used in the textile, the oil, the animal feed, and the paper industries. Additionally, it is a crop of great economic importance for its producer countries with the added value and employment opportunities. Cotton is among the crops sensitive to weed competition and its yield decreases with the weeds. For this reason, weed control treatments should be employed effectively to obtain high yields in cotton fields. In the recent years, *Ipomoea triloba* (IPOTR), which has increased in its importance in the agricultural areas of the Mediterranean Region, prevents the development of the cotton because of its invasive features and causes the harvest difficulties during by hand or machine harvest. The aim of this study is to create an effective control program against IPOTR in cotton. Field experiments were carried out in Ceyhan, Adana, Turkey in 2018 and 2019. For this purpose, impact of the treatments including Pyroxasulfone 85% (PYRS) Trifloxysulfuron sodium 75% (TRFS), Pyrithiobac-sodium 383 g/l (PYBS), Glyphosate isopropylamine salt 480 g/l (GLYI), S-metolachlor 915 g/l + Benoxacor 45 g/l + hand hoe (SMEC), inter-row rotary hoe + intra-row hand hoe (FÇEÇ) were investigated 28 day-after treatment and at the harvest during two years. It has been determined that TRFS and PYBS have an efficacy over 90%, while FÇEÇ, SMEÇ, TRFS and PYBS applications have an efficacy over 60%. Applications against IPOTR have increased the cotton lint and yield. However, crop injury was observed after GLYI application (20%).

GİRİŞ

Cotton (*Gossypium hirsutum* L.) is an industrial plant, and grown in 85 countries which have tropical and subtropical climates (Mert 2007). More than 26 million tonnes lint is obtained from 34.7 million hectares in the world (Anonymous 2020a). Leading countries of cotton production are India, China, USA, and Brazil, and Turkey ranks 7th among them (Anonymous 2020b). Although cotton production is maintained with non-GMO varieties in

Turkey, average lint yield per hectare is equal more or less to the GMO cotton varieties (Anonymous 2020c). Turkey uses traditional varieties and profitable production techniques have a significant share in the world's cotton production system. Cotton production directly or indirectly provides added value to the country's economy.

The main purpose of cotton production is to obtain 35-40% the average fibre yield and 60% of the un-ginned cotton obtained from the unit area is seed called cotton seed. There is 17-24% oil in the seeds from which the fibres are taken after ginning. A healthy cotton plant contains high quality fibre and high efficiency seed oil (Kolsarıcı et al. 2006), it should have ginned performance. One half of cotton production of Turkey was provided by the South-eastern Anatolia region, the other half are produced in the Aegean and Mediterranean Regions (Anonymous 2020c).

Increasing productivity and quality in agricultural production mainly depends on effective control of the weeds, which is one of the main causes of crop losses, except for environmental conditions (Güncan 2016, Tepe 2014). Cotton is one of the sensitive crops to weed competition, especially in the first 6 weeks, and the crop yield decreases with the presence of the weeds. The weeds in cotton resulted in severe yield losses, and even reach to 90% (Ahmad et al. 2003, Gönen 1999, Uludag and Uremiş 2000, Vargas et al. 1996, Zimdahl 1980).

It is reported that an effective weed control application is required in the critical period of 2-3 weeks to 7-10 weeks followed by crop emergence (Gunes et al. 2008, Kaya and Nemli 2003, Tursun et al. 2016, Uludag et al. 2004, Uludag et al. 2012, Vargas et al. 1996). Moreover, some invasive plants such as *Ipomoea triloba* L. and *Amaranthus palmeri* L., appear as weeds that cause problems in agricultural and non-agricultural fields (Üremiş et al. 2020).

Weeds prevent the development of cotton by sharing essential components such as water, nutrients, etc., which are necessary for growth of crop, and also, they reduce the amount of light that can be taken as a result of shading the plant. In addition to these damages, some weeds such as bindweed (*Convolvulus arvensis*), three lobe morning glory (*Ipomoea triloba*), rough cocklebur (*Xanthium strumarium*), black nightshade (*Solanum nigrum*), jimsonweed (*Datura stramonium*) and hooked bristlegrass (*Setaria verticillata*), especially emerge after watering, may make cotton harvest difficult and/or cause quality losses in cotton fibres (Bükün and Uygur 1997, Kadıoğlu et al. 1993, Özer et al. 1998, Özkil et al. 2019, Uludağ and Üremiş 2000, Uygur et al. 1984).

The Ipomoea genus, which includes more than five hundred species, is widely found in agriculture and non-agricultural areas in the tropical and subtropical regions of the world and continues to spread rapidly other regions of the world (Willis 1966). *Ipomoea triloba* (IPOTR) was firstly detected in cotton production areas in 1986 (Joel and Liston 1986). In Turkey, it was determined in cotton of Antalya (Özkil et al. 2019, Yazlık et al. 2014, Yazlık et al. 2018), and, in following years, it has been found in other cities of the Mediterranean region and suppress other weeds (Özkil and Üremiş 2020). It was reported that in a survey carried out in 46 different products to determine the prevalence and density of IPOTR showed that IPOTR infested cotton, soybean, corn, peanut, orange, tangerine, pomegranate gardens and eggplant fields (Özkil and Üremiş 2020). In a study conducted on glyphosate-resistant soybeans in Brazil, IPOTR was reported to cause yield loss of 70-83%. It has also been stated that IPOTR can be controlled nearly 70% with glyphosate (Ovejero et al. 2019).

IPOTR completes its vegetative growth in a short time by surrounding the cultivated plant due to its invasive nature; consequently it prevents the development of the crop. In cotton, especially in Antalya province, cotton harvest is difficult or sometimes impossible by hand or by machine (Özkil et al. 2019). The aim of this study is to create an effective weed control program in cotton against IPOTR. In cotton, there is no registered herbicide in Turkey that can be used against IPOTR. For this reason, determination of the herbicide which may control IPOTR in cotton is important for cotton producers and country's economy.

MATERIALS AND METHODS

This study was conducted to determine control strategies against IPOTR at the field conditions. The trials were carried out between 2018 and 2019 in a cotton field located in Ceyhan, Adana (37°6´8.226 E, 35°46´49.428 N). At the beginning of the trial, soil samples (0-20 cm) were taken to determine important physical and chemical features of soil (Table 1). The soil structure in the field trials has a clay structure (Table 1).

Table 1. Soil characteristics of the experimental field (0–20 cm soil depth)

Analyses	2018-2019	
	Result	Specifications
Texture (%)	84.70	Clay
pH	7.97	Mild Alkaline
Total Salt (%)	0.040	Without Salt
Organic Matter (%)	2.33	Middle
Available Potassium (K_2O) (kg/da)	186.71	High
Available Phosphorus (P_2O_5) (kg/da)	6.86	Middle
Total Lime (%)	20.60	Too Chalky

Table 2. The monthly average climate data for the period of herbicide application in IPOTR control

Applications	2018			2019		
	Avg. Temperature (°C)	Avg. Relative Humidity (%)	Avg. Wind Speed (m/s)	Avg. Temperature (°C)	Avg. Relative Humidity (%)	Avg. Wind Speed (m/s)
TRFS (One passes)	24.20	75.60	2.50	25.00	65.90	2.20
TRFS (Two passes)	24.20/29.80	75.60/49.50	2.50/3.40	25.00/29.30	65.90/75.70	2.20/2.90
PYBS(One passes)	24.20	75.60	2.50	25.00	65.90	2.20
PYBS (Two passes)	24.20/29.80	75.60/49.50	2.50/3.40	25.00/29.30	65.90/75.70	2.20/2.90
GLYI	28.60	67.60	3.50	27.70	69.10	3.00
GLYI	28.60	67.60	3.50	27.70	69.10	3.00
PYRS	17.80	64.80	3.30	23.90	38.80	2.50
PYRS	17.80	64.80	3.30	23.90	38.80	2.50
PYRS + GLYI	17.80/28.60	64.80/67.60	3.30/3.50	23.90/29.30	38.80/69.10	2.50/3.00
SMEÇ	17.80	64.80	3.30	23.90	38.80	2.50

*TRFS: 75% Trifloxysulfuron sodium, PYBS: 383 g/l Pyrithiobac-sodium, GLYI: 480 g/l Glyphosate isopropylamine salt, PYRS: 85% Pyroxasulfone, SMEÇ: 915 g/l S-metolachlor + 45 g/l Benoxacor) + hand hoe, FÇEÇ: inter-row rotary hoe + intra-row hand hoe, YOZK: weed-free control, YOKS: Full season weedy control (Ç.S.), YOKS: Full season weedy control (Ç.Ö.)

Climatic data, monthly average temperature (°C), relative humidity (%) and average wind speed (m/s) of the year during the cotton growing season were obtained using imetos 3.3 climate station in field trials (Table 2). The climatic parameters during TRFS, PYBS, and GLYI treatments were very close to each other at both years. However, these parameters at PYRS and SMEÇ in 2018 were different than in 2019.

The agronomic treatments were employed in harmony with the cotton farmer practices. Soil fertilizer (20:20-N:P) and foliar fertilizer (8 kg N, 8 kg K) were applied to support the normal development of crops. Additionally, in 2018 and 2019, the soil was surface irrigated 3 times during trials followed by application of plant growth regulator. The soil was cultivated using a rotary hoe 3 times during the cotton growing season in accordance with the cotton

Table 3. Applications carried out to control IPOTR

Applications	Active Ing.	Application Method	Application Dose	Application Frequency
Trifloxysulfuron sodium (TRFS)	75%	Foliar app.*	1.5 g/ da	1 pass
Trifloxysulfuron sodium (TRFS)	75%	Foliar app.*	1.5 g/ da	2 passes with an interval of 2 weeks
Pyrithiobac-sodium (PYBS)	383 g l^{-1}	Foliar app.*	20 ml/ da	1 pass
Pyrithiobac-sodium (PYBS)	383 g l^{-1}	Foliar app.*	20 ml/ da	2 passes with an interval of 2 weeks
Glyphosate isopropylamine salt (GLYI)	480 g l^{-1}	Foliar app.*	60 ml/ da	1 pass
Glyphosate isopropylamine salt (GLYI)	480 g l^{-1}	Foliar app.*	100 ml/ da	1 pass
Pyroxasulfone (PYRS)	85%	Soil App **	10 g/ da	1 pass
Pyroxasulfone (PYRS)	85%	Soil App **	15 g/ da	1 pass
Pyroxasulfone + Glyphosate isopropylamine salt (PYRS+ GLYI)	85% + 480 g l^{-1}	Soil. App. + Foliar App.	10 g/ da + 60 ml/ da	
(S-metolachlor + Benoxacor) + over row hoeing (SMBE)	915 g l^{-1}+ 45 g l^{-1}	Soil App * + 2 hoeing	150 ml /da	1 pass + 2 passes with an interval of 2 weeks
Inter-row rotary hoe + intra-row hand hoe (FÇEÇ)	-	-	-	3 passes with an interval of 2 weeks
Control (weed-free) (YOZK)		-	-	Throughout the season
Control (Full season weedy) (Ç.S.) (YOKS)		-	-	-
Control (Full season weedy) (Ç.Ö.) (YOKÖ)		-	-	-

* One day after the application, flood irrigation was carried out up to the field capacity.
** Soil application (pre em)
*** Soil application and foliar application (pre em and post em)
**** 1st application after planting 85% Pyroxasulfone 10 g/da;
2nd application 480 g/l Glyphosate isopropylamine salt 60 ml / da

Table 4. Application information of herbicides used

Active Substance	Application Time	Form.	Dose (g-ml/da)
75% Trifloxysulfuron sodium	Post emergence	WG	1g - 2g da^{-1}
383 g/l Pyrithiobac-sodium	Post emergence	SL	20 ml da^{-1}
480 g/l Glyphosate isopropylamine salt	Cotton 7-9. Node period	SL	60-100 ml da^{-1}
85% Pyroxasulfone	Pre-Emergence	WG	10-15 g da^{-1}
915 g/l S-metolachlor + 45 g/l Benoxacor	Pre-Emergence	EC	150 ml da^{-1}

Form. Formulation

growing technique. The pests control applications in cotton were applied with insecticides, if necessary according to the integrated control technical instructions

Field trials started on 08.04.2018 and 08.05.2019 by planting (var. Ceyhan 520). The cotton was harvested on 28.09.2018 and 03.10.2019 by hand. The trials were arranged in a randomized complete block design with 4 replicates. There was a 1.50 m allay between the blocks and 75 cm between the parcels to prevent herbicide drift. Each parcel had 4 cotton rows (75x20), and was $24m^2$. In addition, two constant quadrats, each of was $1m^2$, were left completely untreated as control to weed count. In the field trials, a knapsack sprayer with a boom mounted multiple flat fan nozzles was used to treat herbicides. The herbicides were applied at a pressure of 3 bar.

Some information about the applications, application dosage and application methods in the field trials are presented in Table 3. The information of herbicides is given in Table 4.

To compare efficacy of the pre or post emergence herbicides applied, the status of the weeds was visually evaluated at 7, 14, 21 and 28 days after treatment (DAT) compared to the weeds in untreated control plots. The 0-100 scale is used to assess the herbicide efficacy, where 0 equals no control and 100 equals complete died. The rates were converted according to Arc-Sin transformation before the statistical analysis, but real values were presented to clarify the interpretations.

The weeds in the quadrats in the trial plots were harvested from the soil levels on the 28 DAT and were dried at 105 ºC for 24 h. (Eymirli 2011). Cotton was harvested from two rows in the middle from each plot, and the ginning efficiency (WR: %) and fibre yield (LV: kg da^{-1}) were calculated.

As some important yield component, ginning efficiency and fibre yield were calculated following formula (1 and 2).

$$GE=FWC\ (g)/((FWC\ (g)+SWC\ (g))X100 \quad (1)$$

$$LY=(LY\ (kg)xGE)/100 \quad (2)$$

Where GE means ginning efficiency, FWC means fibre weight of cotton, SWC means seed weight of cotton, LY means lint yield. The data obtained from the experiments were subjected to analysis of variance using SPSS (version 23), and the mean were compared by Duncan's multiple comparison test at 5% significance level.

RESULTS AND DISCUSSION

Crop injury symptoms caused by herbicide treatments varied heavily depending on the herbicide. TRFS resulted in temporarily growth reduction in cotton, but the symptoms disappeared in time. In parallel with our results, previous studies have also reported that TRFS in cotton may temporarily retard crop growth (O'Berry et al. 2008, Salimi et al. 2006). In the preliminary studies conducted in 2017, it was determined that some producers applied GLYI to control weed species such as IPOTR, which affect the quality of the product and make the harvest difficult, before harvest. But, it was determined that GLYI caused chlorotic and necrotic spots on the cotton leaves, and decreased the number of boll and yield of cotton.

The effects of the applications on IPOTR (%) were given in Table 5. The treatments reduced more or less dry weight of IPOTR. In both years, mechanical control treatments provided the most effective weed control compared to the herbicides. The dry matter reduction was the highest point 7 DAT with 96.5-97%, but the efficacy of treatments steadily declined due to new emergent weeds. At harvest, the impact of the treatments was higher than at 28 DAT. This case may be caused by the suppressive effect of crop on the IPOTR and other agronomic practices such as hand hoe and machine hoe. The lowest weed control provided by the GLYI and PYRD+GLYI treatments 7 DAT. Even though the impact of these treatments reached to nearly 60% 28 DAT, IPOTR recovered themselves from the adverse effects of GLYI at harvest. It was determined that the pre-emergent PYRS resulted in a moderate dry biomass reduction at 10 and 15 g da^{-1} rates.

The post-emergence herbicides, SMEÇ, FÇEÇ, PYBS and TRFS were the most effective treatments for both years. TRFS treatments reduced dry biomass accumulation at 44-46% 7 DAT, and their efficacy increased continuously until harvest. But, there were no significant differences between the treatments TRFS (1 pass) and TRFS (2 passes). Similar to TRFS, PYBS caused significant dry biomass reduction at

Table 5. The effect of the applications on IPOTR (%) at 7, 14, 21, 28 DAT and at harvest

Application	7 DAT	14 DAT		21 DAT	28 DAT	Harvest
		2018	2019			
			Pre-emergence[1]			
PYRS (10 g da^{-2})	29.03±6.88 a*	36.54±3.52 a	37.64±3.75 a	39.49±2.19 a	40.92±3.59 a	59.20±7.59 a
PYRS (15 g da^{-2})	41.32±6.90 a	48.08±3.81 a	39.21±2.92 a	44.46±2.09 a	46.84±1.30 a	49.70±5.88 a
			Post-emergence[1]			
FÇEÇ	97.10±2.64 a	93.10±4.51 b	86.33±3.79 a	86.52±1.87 a	80.68±1.79 b	94.69±1.16 a
PYRS+GLYI	10.62±4.28 c	37.93±3.95 d	46.04±1.55 c	59.57±2.52 c	66.10±1.48 c	22.66±6.41 c
SMEÇ	96.46±2.94 a	100.00±0.00 a	88.49±1.78 a	86.05±1.52 a	81.61±1.85 b	94.03±1.29 a
TRFS (1 pass)	46.31±3.28 b	62.07±4.39 c	73.38±1.59 b	80.88±1.73 ab	87.49±1.11 a	89.68±1.38 a
TRFS (2 pass)	44.29±3.33 b	68.97±2.19 c	69.78±2.82 b	82.74±1.59 ab	91.11±1.22 a	93.76±2.53 a
PYBS (1 pass)	50.30±4.64 b	67.24±2.66 c	74.82±2.45 b	80.49±1.87 ab	87.81±1.07 a	64.10±7.13 b
PYBS (2 pass)	40.75±5.81 b	62.07±2.65 c	64.03±2.52b	79.14±0.95 b	90.21±0.77 a	74.04±6.44 b
GLYI (60 ml da^{-2})	10.18±5.41 c	34.48±2.76 d	41.01±2.67 c	53.05±1.88 c	62.25±1.49 c	34.68±6.43 c
GLYI (100 ml da^{-2})	11.95±5.69 c	36.21±4.81 d	43.17±1.62 c	56.27±1.99 c	63.15±1.13 c	12.86±6.08 c

1 Pre-emergence and post-emergence applications have been evaluated within themselves.
* Data with the same letter in the columns are not statistically different (P≤0.05)
TRFS: 75% Trifloxysulfuron sodium, PYBS: 383 g l^{-1} Pyrithiobac-sodium, GLYI: 480 g l-1 Glyphosate isopropylamine salt, PYRS: 85% Pyroxasulfone, SMEÇ: 915 g l^{-1} S-metolachlor + 45 g l^{-1} Benoxacor) + hand hoe, FÇEÇ: inter-row rotary hoe + intra-row hand hoe

28 DAT; however, its suppressive impact on IPOTR declined at harvest. In another application, PYBS treatments, one or two pass, did not create any significant weed control efficacy on IPOTR.

Ginning efficiency as a yield component was unaffected not only by herbicides but also by hoeing and/or herbicide treatments. The results show that the impact of IPOTR on the cotton yields and LV were very similar. It was determined that TRFS (one pass) application increased yield 70% while TRFS (two passes) application increased cotton yield 11% more than TRFS (one pass) application. This increase caused by one more pass TRFS create a significant difference between these treatments. Another herbicide, PYBS (one pass) and (two passes) applications resulted in 25% and 27%

Table 6. Effects of the applications to control IPOTR in terms of the cotton yield (kg da^{-1}), the ginning efficiency (%) and the fibre yield (kg da^{-1})

Application	Yield (kg da^{-1})	ÇR (%)	LV (kg da^{-1})
		Pre-emergence	
PYRS (10 g da^{-1})	208.34±34.76 b	40.03±0.76 a	83.63±14.78 a
PYRS (15 g da^{-1})	158.06±22.14 b	40.79±0.55 a	64.73±9.57 a
YOZK	537.00±32.64 a	40.56±0.46 a	218.22±14.17 b
YOKÖ	131.23±14.00 b	39.74±0.29 a	52.29±5.82 a
		Post-emergence	
FÇEÇ	533.34±28.70 a	40.49±0.42 a	216.30±12.68 a
PYRS+GLYI	156.95±27.85 e	40.28±0.51 a	63.44±11.65 e
SMEÇ	523.03±31.56 a	40.61±0.44 a	212.24±12.56 a
TRFS (1 times)	374.47±31.50 c	40.36±0.41 a	151.75±13.80 c
TRFS (2 times)	479.84±34.17 ab	40.34±0.40 a	194.18±14.91 ab
PYBS (1 times)	404.44±36.86 bc	39.86±0.40 a	161.60±15.72 bc
PYBS (2 times)	392.75±23.88 bc	40.83±0.41 a	160.53±10.19 bc
GLYI (60 ml da^{-1})	246.95±35.47 d	40.66±0.57 a	100.47±14.80 d
GLYI (100 ml da^{-1})	156.94±19.08 e	40.83±0.54 a	64.17±7.99 e
YOZK	537.00±32.64 a	40.56±0.46 a	218.22±14.17 a
YOKS	129.17±19.72 e	40.63±0.62 a	52.86±8.44 e

* Data with the same letter in the columns are not statistically different. (P≤0,05)
* Each column has been evaluated in itself.
* Ginning efficiency: ÇR%, Fibre yield: LV: kg/da
* Pre-emergence and post-emergence applications have been evaluated within themselves.
*TRFS: 75% Trifloxysulfuron sodium, PYBS: 383 g/l Pyrithiobac-sodium, GLYI: 480 g/l Glyphosate isopropylamine salt, PYRS: 85% Pyroxasulfone, SMEÇ: 915 g/l S-metolachlor + 45 g/l Benoxacor) + hand hoe, FÇEÇ: inter-row rotary hoe + intra-row hand hoe, YOZK: weed-free control, YOKS: Full season weedy control (Ç.S.), YOKS: Full season weedy control (Ç.Ö.).

yield reduction, respectively. The difference between PYBS (one pass) and (two passes) applications was not significant statistically. Therefore, PYBS (one pass) application is enough if this herbicide would be preferred by the farmer. Glyphosate application at 60 g ai ha^{-1} increased cotton yield at 46% while at 100 g ai ha^{-1} increased cotton yield at 29% compared to the weedy control. PYRS+GLYI treatment increased cotton yield as same as glyphosate application at 60 g ai ha^{-1}. Mechanical control treatments, FCEC and SMEC, provided the highest cotton yield, and they were included in the same statistical group with the un-weedy control. Pre-emergent PYRS resulted in a slight increase on cotton yield, but this difference was not significant statistically.

Buchanan and Burns (1971) reported that *I. purpurea* species caused a 21-83% yield reduction in cotton, and Crowley and Buchanan (1978) reported that *Ipomoea* genus caused a cotton yield decrease up to 88%, but their competition did not affect the ginning efficiency. In the experiment, IPOTR caused a 76% cotton yield reduction similar to Crowley and Buchanan (1978).

In brief, cultural weed control practices have an important role in cotton production fields of Turkey. Some treatments, in this context, such as preparing a good seed-bed, crop rotation, and hoeing can control the weeds effectively (Tepe 1997). However, they are not always sufficient in weed control as they are not available during weed control time. In addition, the soil tillage treatments may spread some of the weed seeds in the cotton fields or infest other cotton fields if the soil tillage machineries are not cleaned after the infested fields. Therefore, chemical weed control options are one of the most significant components of weed control management. In cotton production, agronomic practices including irrigation should be employed at the proper time when the rainfall is below than average because water deficit may create a significant crop stress and reduce the competitive ability of the crop against to the weeds. Hand hoeing, which is made to inter-row and intra-row, is an important agronomic tool to control the weeds and tillage the soil. However, high labour costs and difficulties in finding workers prevent using this tool effectively. Although IPOTR has a potency to create a strong soil bank, there is no comprehensive study to control IPOTR with soil residual herbicides in the conventional cotton (Serim et al. 2017). Further studies should conduct to create a new and cost-effective weed control program, which consist of all components related to the weed control.

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ÖZET

Pamuk (*Gossypium hirsutum* L.) elliden fazla sanayi kolunun girdisini oluşturmakta olup, özellikle tekstil, yağ, yem ve kâğıt sanayisinde kullanılan hammaddenin de ana kaynağı durumundadır. Ayrıca, yarattığı katma değer ve istihdam olanaklarıyla da üretici ülkeler açısından büyük ekonomik öneme sahip bir üründür. Pamuk özellikle çıkış sonrası ilk dönemde yabancı ot rekabetine duyarlı bitkilerden olup, verim miktarı, yabancı otların etkisiyle azalmaktadır. Bu nedenle, pamuk ekim alanlarında yüksek ve kaliteli ürün elde etmek için yabancı ot kontrol uygulamaları uygun şekilde yapılmalıdır. Son yıllarda Akdeniz Bölgesi tarım alanlarında yaygınlığı artan *Ipomoea triloba* (IPOTR) istilacı özelliğe sahip olup, pamuk bitkisinin gelişimini engellemekte, hasat döneminde ise elle veya makine ile yapılan hasadı güçleştirmektedir. Bu çalışmanın amacı, IPOTR'ye karşı pamukta etkin bir mücadele programının oluşturulmasıdır. Tarla denemeleri 2018-2019 yılları arasında Ceyhan (Adana)'da yürütülmüştür. Bu amaçla %85 Pyroxasulfone (PYRS) %75 Trifloxysulfuron sodium (TRFS), 383 g/l Pyrithiobac-sodium (PYBS), 480 g/l Glyphosate isopropylamine tuzu (GLYI) 915 g/l S-metolachlor+ 45 g/l Benoxacor) + el çapası (SMEÇ), Frezeli ara çapa makinesi + sıra üzeri el çapası (FÇEÇ) uygulamalarının etkisi 2 yıl süresince araştırılmıştır. IPOTR'ye karşı yapılan uygulamaların etkinliği kuru madde miktarı üzerinden değerlendirildiğinde; TRFS ve PYBS'nin %90'nın üzerinde, FÇEÇ, SMEÇ, TRFS ve PYBS uygulamalarının ise %60'ın üzerinde etki gösterdiği belirlenmiştir. IPOTR'ye karşı yapılan bütün uygulamalarda lif ve ürün veriminde artış sağlandığı tespit edilmiştir. Ancak, GLYI uygulamasında pamukta fitotoksisite (%20) gözlenmiştir.

Anahtar kelimeler: pamuk, *Ipomoea triloba*, mücadele, biyolojik etkinlik

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