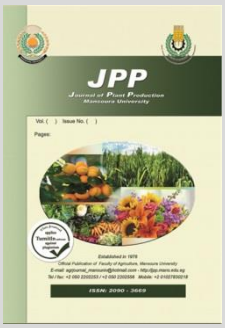
Journal of Plant Production

Journal homepage: www.jpp.mans.edu.eg
Available online at: www.jpp.journals.ekb.eg

Impact of some Herbicide, Mulches and Their Combinations on Tomato Productivity and Associated Weeds

Mohamed, A. G.[1] and A. M. A. Hassanein[2*]

[1]Veg. Breed. Res. Dept., Hort. Res. Inst., Agric. Res. Cent., Giza, Egypt
[2]Weed Research at Central Laboratory, Agricultural Research Center, Giza, Egypt



ABSTRACT

A field experiment was carried out on 2018/2019 and 2019/2020 at Sids Horticultural Research Farm, Egypt. To study the effect of some herbicide, mulches and their combinations on tomato productivity and associated weeds. A field trial included: a) mulches (rice and wheat straw), b) herbicides (Stomp extra at 1.7 L./fed. and Sencor at 300 g./fed.) either both at full rate alone or at reduced rate 50% of full rate with their integrated by mulches (rice or wheat straw), beside, hand hoeing ,three times and weedy check. A experiment was laid out in a Randomized Complete Blocks Design with three replicates. The results revealed that the all combinations between the two herbicides (Stomp extra at 0.850 L. and Sencor at 150 g./fed.) followed by mulches rice or wheat straw were superior on weed control efficacy than either the herbicides at full rate alone, or mulches alone without any significant differences between all these combinations. But Sencor 150 g./fed. combined with mulching rice straw gave higher weed efficacy than stomp extra combinations with rice or wheat straw in both seasons. It's noticed a positive correlated between weed control efficiency, improving vegetative growth traits and higher tomato fruit yield and its components. Therefore, the combination of Sencor at 150 g./fed. with rice straw can be used as alternative safety methods replaced by either herbicides Sencor and Stomp extra at full rate alone or mulches alone to achieve weed control efficacy without loosing tomato fruit yield, quality and its components.

Keywords: Tomato *(Solanum lycopersicon)*, mulching, weed control, reduced rate.

INTRODUCTION

Tomato (*Solanum lycopersicon* L.) a member of the family *Solanaceae*, is the most popular vegetable in the world and one of the most economically important vegetables grown in Egypt is mainly cultivate in all seasons.

Weeds adversely affect tomato production. At the beginning of growing season, tomato is strongly influenced by the competition from weeds causing yield reduction (Wilson *et al*., 2001). Since tomato seedlings are usually transplanted to the field, they do not have strong rooting system to compete with weeds for light, water and nutrients before being fully established, therefore are seriously affected by weeds (Law *et al*., 2006 and Radics *et al*., 2006). It is widely known that losses caused by weeds have exceeded the losses from any category of agricultural pests, in this respect (Oerke, 2006) found that the potential crop yield loss without weed control was estimated by 43%, on a global scale. Also, (Rao, 2000) has reported that of the total annual loss of agricultural produce from various pests, weeds account for 45%, insects 30%, diseases 20% and other pests 5%.

Weed control is considering the major obstacle for the growers in the field. Lower productivity of crop yields mainly related to the poor weed control. In conventional fields growers controlling weeds by hand weeding or hand hoeing is safe and very effective against annual weeds. However, hand hoeing for a long time would inadvertently damage or remove some of the vegetable plants, while missing some of the weeds. In addition, growers were unwilling to accept hoeing damage to their crops and to increase plants spacing because of yields losses. Also, the manual weed control is highly expensive and often the major limiting factor for yield production. Furthermore, some closely planted (seeded) or broadcast crops are difficult for hand weeded without damage to crops (Rao, 2000).

Currently, weeds in tomato field are controlled using herbicides that are not actually stable and have detrimental effects on the environment (Mohammadi, 2013). Now a day's different types of pre-planting, post-planting and post emergence herbicides are being widely used (Soltani *et al*., 2005). The heavy use of herbicides has given rise to serious environmental and public health problems (Sopena *et al*., 2009) and herbicides residues in food, soil and ground water-atmosphere. Thus, weed scientists are now facing new challenges, particularly in the light of the emergence of weeds resistant to herbicides (Li *et al*., 2003; Meksawat & Pornprom, 2010; Pot *et al*., 2011).

In the light of the toxicological problems created by herbicides, it has become necessary to develop the safety methods for controlling weeds. Mulching Biodegradable has been successfully adopted in many countries as safe methods for controlling weeds.

Recently, with the development of sustainable production systems, researchers are looking for ways to not

* **Corresponding author.**
E-mail address: ahmed_mostafa5782@yahoo.com
DOI: 10.21608/jpp.2020.114570

only increase crop production, but also reduced use of the chemicals, in this respect (Riley *et al*., 2004; Khanh *et al*., 2005; Candidoa *et al*., 2011; Farooq *et al*., 2011; Abouziena *et al*., 2015) have been successfully tried mulching and were found to be effective and safe methods to control weeds.

Successful and sustainable weed management systems are those that employ combinations of techniques rather than relying on one method. Thus, the objectives of this investigation were to study the impact of mulches (straw rice and wheat) as a cheap; by product of plant production; some herbicides alone and their combinations on the efficiency of weed control and yield productivity of tomato.

MATERIALS AND METHODS

A field experiment was carried out during two successive winter seasons 2018/2019 and 2019/2020 at Sids Horticultural Research Station, Beni-Suef Governorate, Horticultural Research Institute, Agricultural Research Center, Egypt. The aim was to study the effect of ten weed control treatments on weeds, fruit yield and its components of tomato.

Each field trial including the following treatments:

1- Rice straw (*Oryza sativa* L.) mulch; at 10 ton/fed., by 25 kg/plot covering in the furrow between plants and ridges.

2- Wheat straw (*Triticum spp*) mulch; at 10 ton/fed., by 25 kg/plot covering in the furrow between plants and ridges.

3- Pendimethalin (N - (1- ethylpropyl) – 3, 4 dimethyl - 2, 6 dinitro -benzenamin) commercially known as "Stomp extra 45.5 % CS" used at full rate 1.7 l./fed., applied as pre-transplanting.

4- Pendimethalin at reduced rate 50% (0.850 l./fed.) followed by Rice straw.

5- Pendimethalin at reduced rate 50% (0.850 l./fed.) followed by wheat straw.

6- Metribuzin (4 – amino – 6 - (1,1-dimethylethyl) -3-(methylthio)1,2,4-triazip-5 (4H) one) commercially known as "Sencor 70 % WP" used at full rate 300 g/fed., applied as post-emergence at 14 days from transplanting.

7- Metribuzin at reduced rate 50% (150 g/fad.) followed by Rice straw.

8- Metribuzin at reduced rate 50% (150 g/fad.) followed by wheat straw.

9- Hand hoeing at three times with 15 days intervals; begin at 15 days from sowing of transplanting.

10- Unweeded check (control).

The following table explains trade, common and chemical names, family group and site of action of the herbicides according to the pesticide manual (2012) and number of group according to (WSSA) classification:

Trade name	Common name	Chemical name	Family group	Site of Action	WSSA Group
Stomp extra 45.5% CS	Pendimethalin	(N-(1-ethylpropyl)–3,4 dimethyl-2,6 dinitrobenzenamin)	dinitroaniline	Cell division inhibition	3
Sencor 70% WP	Metribuzin	(4-amino-6-(1,1-dimethylethyl) -3-(methylthio) 1,2,4-triazin-5 (4H)-one)	triazinone	inhibitor the photosystem II	5

A Randomized Complete Block Design (RCBD) with three replicates. The experimental unit area was 10.8 m^2. Each row was (5m long and 1.2m wide) with 30 cm distance between holes. Six week-old tomato seedlings (*Solanum lycopersicon* L.) "Hybrid 184" was transplanted were 25th August in 2018 and 2019 seasons. Seedlings were transplanted in three ridges. The other agricultural practices were done as recommends.

All herbicidal treatments were sprayed with "knapsack sprayer CP3" equipped with one nozzle even flat fan calibrated to deliver spray volume of 200 l./fed., the Stomp extra was sprayed before just transplanting irrigation, while the Sencor herbicide was sprayed after two weeks post transplanting, organic mulches (rice or wheat straw) covered soil surface after sprayed herbicides. Soil texture was the clay loam. Chemical analysis of the soil was carried out at the laboratories of soil Research Institute, Agriculture Research Center at Sids by the official methods of Jackson (1960). Physical and chemical properties of the surface soil of basin 15 when the here experiments were conducted, according to Wilde *et al*., (1985) and data are shown in Table (1).

Table 1. Mechanical and chemical analysis of the experimental soil.

Mechanical analysis			Chemical analysis					Available nutrients				
Sand %	Silt %	Clay %	Texture	OM	PH	E.C mmhos/cm	N%	P (ppm)	K (ppm)	Fe (ppm)	Mn (ppm)	Zn (ppm)
19.8	30.8	49.4	Clay loam	1.55	7.72	1.1	0.1	29.2	370.1	33.0	19.0	5.7

Recorded data:

On weeds:

Weed assessment was carried at 45 days from tomatoes transplanting. Weeds were hand pulled from one square meter were chosen at random from each plot and fresh weight (g/m^2).Were identified according to Tackholm (1974) and classified into their species and divided into the following groups:

1- Annual broad-leaved weeds.

2- Annual grassy weeds.

3- Total of annual weeds.

Weed control efficiency (WCE) was calculated as follow:

$$WCE\ \% = \frac{FWC - FWT}{FWC} \times 100$$

Where, FWC = Fresh weight of weeds from control plot and FWT = Fresh weight of weeds from treated plot.

Vegetative growth traits: a sample of 6 plants was taken at random from each plot, 65 days after transplanting and the following measurements were recorded, plant height (cm), number of branches/plant, leaf area (cm^2) according to Manivel and Weaver (1974).

Tomato fruit yield, its components and fruit quality: the following data were recorded, ten mature fruits were taken at random from each experimental plot in the second gathering (5 pickings) to determine the average fruit length (cm),fruit diameter(cm), fruit weight(g), total fruit yield (ton/fed.) and total soluble solids (T.S.S. %) using Zeiss laboratory refractometer.

All obtained data were estimated by statistical analysis of variance according to the procedure outlined by Snedecor and Cochran (1980). The treatment means were compared using Duncan's multiple range tests as published by Duncan (1955).

RESULTS AND DISCUSSION

Results

Effect of weed control treatments:

1. On weeds:

During both growing seasons of tomato in the experimental fields the major weeds flora identification and classification included *Portulaca oleracea* L., *Euphorbia geniculata* L., *Amaranthus ascendens* L., *Malva parviflora* L., *Rumex dentatus* L., *Hibiscus trionum* L., *Sonchus oleraceus* L., as annual broad-leaved weeds, while *Brachiaria eruciformis* L., *Echinochloa colonum* L. and *Phalaris minor* L. as annual grassy weeds.

Results showed in (table 2) that both of organic mulches (rice and wheat straw) were superiority significant compared to unweeded treatments, while rice straw gave higher weed control efficiency than wheat straw; whereas controlling efficacy reached to (63.9, 54.7% and 65.4, 50.7%, respectively) in first and second seasons.

As for both of herbicides used at full rates alone (Stomp extra 45.5% CS at 1.7 L. and Sencor 70% WP at 300 g/fed) gave decreased significantly on the fresh weight of total weeds as compared with unweeded check, also, both herbicides were no significant differences between them, while Sencor gave better controlling efficiency than the Stomp extra, whereas it reached to (73.8, 70.1% and 75.2, 71.2%, respectively) in both seasons.

Data revealed that the all combinations between the two herbicides at reduced rate 50% (Stomp extra 45.5% CS at 0.850 L. and Sencor 70% WP at 150 g/fed) followed by mulches rice or wheat straw were superior on weed control than either the herbicides at full rate alone, or mulches alone without any significant differences between all these combinations. However, The combination of Sencor 70% WP at reduced rate 50% (150 g/fed.) followed by mulching rice straw gave higher controlling effect than other combination treatments, whereas weed control efficiency reached to (90.2 and 91.1 %, respectively) In the 1st and 2nd seasons.

Table 2. Effect of mulching, herbicides and their combinations on fresh weight of total weeds (g / m^2) in 2018/2019and 2019/2020 seasons.

Treatments	Fresh weight of total weeds (g / m^2)			
	2018/2019 season		2019/2020 season	
	Mean	%	Mean	%
Rice straw at 10 ton/fed.	839.3 bc	63.9	856.3 c	65.4
Wheat straw at 10 ton/fed.	1052.3 b	54.7	1218.7 b	50.7
Trade N. *(rate/fed.)				
Stomp extra 1.7 L.	694.0 cd	70.1	711.7 cd	71.2
Sencor 300 g.	609.7 d	73.8	612.7 cde	75.2
Stomp extra 0.850 L. *foll.*** by rice straw 10 ton.	403.3 ef	82.6	411.7 ef	83.4
Stomp extra 0.850 L. *foll.* by wheat straw 10 ton.	440.3 ef	81.1	473.7 def	80.8
Sencor at 150 g *foll.* by rice straw 10 ton	228.3 f	90.2	220.3 f	91.1
Sencor 150 g *foll.* by wheat straw 10 ton.	334.0 ef	85.6	383.3 ef	84.5
Hand hoeing(three times)	469.7 def	79.8	528.0 de	78.6
Unweeded check)	2324.3 a	0.0	2472.7 a	0.0

*** N. = Name, ** *foll.*.= followed.**

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

2- Tomato vegetative growth:

The results in table (3) revealed that there were a positive correlation between herbicide efficiency on weed control and vegetative growth (plant height, number of branches/plant and leaf area) in the two seasons; whereas a better combination was Sencor 70% WP at reduced rate 50% (150 g/fed.) followed by rice straw (at 10 ton/fed.) gave the highest increasing plant height, number of branches/plant, leaf area, whereas the values were (97 cm, 3.75 and 311 cm^2, respectively) in the first season. The same trend was in the second season, whereas reached to (96.1 cm, 3.92 and 330.9 cm^2, respectively).

Table 3. Effect of mulching, herbicides and their combinations on tomato traits in 2018/2019 and 2019/2020 seasons.

Treatments	2018/2019 season			2019/2020 season		
	plant height (cm)	No. of branch/plant	Leaf area (cm)	plant height (cm)	No. of branch/plant	Leaf area (cm)
Rice straw at 10 ton/fed.	76 d	2.61 de	228.7 e	75.0 e	2.77 ef	231.1 e
Wheat straw at 10 ton/fed.	75 d	2.47 e	224.3 e	70.4 e	2.65 f	230.5 e
Trade N. (rate/fed.)						
Stomp extra 1.7 L.	78 cd	2.84 cde	250.0 de	77.6 de	2.91 def	257.2 de
Sencor 300 g.	81 bcd	3.08 bcd	266.3 bcd	79.3 bcde	3.15 cde	289.4 bcd
Stomp extra 0.850 L. *foll.*** by rice straw 10 ton.	92 ab	3.28 abc	288.7 abc	92.5 abc	3.36 bc	301.1 ab
Stomp extra 0.850 L. *foll.* by wheat straw 10 ton.	89 abc	3.22 bc	278.7 abcd	88.1 abcd	3.25 bcd	293.7 bc
Sencor at 150 g *foll.* by rice straw 10 ton	97 a	3.75 a	311.0 a	96.1 a	3.92 a	330.9 a
Sencor at 150 g *foll.* by wheat straw 10 ton.	92 ab	3.38 ab	300.0 ab	93.4 ab	3.62 ab	311.3 ab
Hand hoeing(three times)	82 bcd	2.79 cde	257.7 cde	80.3 cde	2.84 def	262.3 cde
Unweeded check)	54 e	1.77 f	184.0 f	55.4 f	1.93 g	156.0 f

*** N. = Name, ** *foll.*.= followed.**

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

3- Tomato fruit yield, its components and quality:

Data revealed that in table (5) both of rice and wheat straw gave satisfactory tomato fruit yield was reached to (16.4 and 15.5 ton/fed.) than unwedded treatment which reached to (5.3 ton/fed.) in the first season, while in the second season (18.8, 17.7 and 6.4 ton/fed.), respectively. It's clear from table (5) the tomato fruit yield was significantly affected by all combination treatments. Whereas, the best combination was Sencor 70% WP at reduced rate 50% (150 g/fed.) with mulches both rice and

wheat straw gave increased tomato fruit yield whereas reached to (26.4 and 25.3 ton/fed) over either Sencor at full rate alone or mulches (rice or wheat straw) alone by (19.60, 16.4 and 15. 5 ton/fed., respectively) in first season. Same altitude was obtained by Stomp extra combinations with mulches (both rice and wheat straw) in both seasons.

Similar trend was observed in tomato fruit yield components (fruit weight (g), fruit length (cm) and fruit diameter (cm) in both seasons.

Data presented in (Table 5) showed that the combinations between the herbicides (Stomp extra and Sencor) at reduced rate 50% followed by both rice and wheat straw, were exceeded the rest of other treatments. whereas, The highest TSS was recorded in combinations of Sencor at reduced rate 50% (150 g/fed.) followed by both mulches rice or wheat straw (both of them at 10 ton/fed.) whereas, TSS reached to (7.60, 7.43and 7.83, 7.50 %), respectively, in the first and second seasons.

Table 4. Effect of mulching, herbicides and their combinations on tomato traits in 2018/2019and 2019/2020 seasons.

Treatments	2018/2019 season			2019/2020 season		
	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)
Rice straw at 10 ton/fed.	118.7 cd	4.17 bcd	5.4 cd	122.8 de	4.26 cd	5.70 d
Wheat straw at 10 ton/fed.	116.6 d	4.01 cd	5.1 d	115.3 e	4.19 cd	5.40 d
Trade N.* (rate/fed.)						
Stomp extra 1.7 L.	120.4 cd	4.32 bc	5.7 cd	124.8 de	4.37 bc	6.10 cd
Sencor 300 g.	122.9 bcd	4.48 bc	5.90 c	131.7 cd	4.65 abc	6.80 bcd
Stomp extra 0.850 L. *foll.*** by rice straw 10 ton.	138.3 ab	4.78 abc	6.90 ab	147.4 ab	5.58 abc	7.40 abc
Stomp extra 0.850 L. *foll.* by wheat straw 10 ton.	136.4 abc	4.54 abc	6.64 b	140.0 bc	5.12 abc	7.25 abc
Sencor at 150 g *foll.* by rice straw 10 ton	148.1 a	5.82 a	7.50 a	153.5 a	6.05 a	8.40 a
Sencor 150 g *foll.* by wheat straw 10 ton.	143.1 a	5.60 ab	7.40 a	150.3 ab	5.72 ab	7.80 ab
Hand hoeing(three times)	119.4 cd	4.29 bc	5.80 cd	120.7 de	4.48 bc	6.31 cd
Unweeded check)	64.4 e	2.89 d	3.23 e	71.9 f	3.03 d	3.60 e

N.* = Name, ** *foll.*= followed.
Means followed by the same letters within each column do not differ significantly according to Duncan's Multiple Range test at the 5% level.

Table 5. Effect of mulching, herbicides and their combinations on TSS% and fruit yield (ton/fed.) of tomato in 2018/2019 and 2019/2020 seasons.

Treatments	2018/2019 season		2019/2020 season	
	TSS %*	Fruit yield (ton/fad.)	TSS %*	Fruit yield (ton/fad.)
Rice straw at 10 ton/fed.	5.70 c	16.37 de	5.87 bc	18.77 ef
wheat straw at 10 ton/fed.	5.27 cd	15.53 e	5.33 cd	17.67 f
Trade N.** (rate/fed.)				
Stomp extra 1.7 L.	6.07 bc	18.5 cd	6.03 bc	20.7 de
Sencor 300 g.	6.13 bc	19.60 c	6.40 abc	22.37 cd
Stomp extra 0.850 L. *foll.**** by rice straw 10 ton.	6.23 abc	24.50 ab	7.40 ab	24.40 abc
Stomp extra 0.850 L. *foll.* by wheat straw 10 ton.	6.37 abc	23.60 b	7.30 ab	23.00 bcd
Sencor at 150 g *foll.* by rice straw 10 ton	7.60 a	26.40 a	7.83 a	26.50 a
Sencor 150 g *foll.* by wheat straw 10 ton.	7.43 ab	25.30 ab	7.50 ab	25.40 ab
Hand hoeing(three times)	6.03 bc	18.30 cd	5.97 bc	19.40 ef
Unweeded check)	4.03 d	5.30 f	4.13 d	6.37 g

N. = Name, * TSS %=Total soluble solids. *** *foll.*= followed.**
Means followed by the same letters within each column do not differ significantly according to Duncan's Multiple Range test at the 5% level.

Discussion

From the previous results mentioned in this study, it can be concluded that there was a positive correlated between weed control efficacy; improved vegetative growth traits and higher tomato fruit yield and its components. This correlated might be attributed to the significant effect of weed control treatments on weed elimination consequently, decreased weed competitive ability, which lead to stimulated tomato growth vegetative (plant high, number of branches/plant and leaf area), it could due to capture more light (Tagour and Mosaad, 2017), and therefore, had higher photosynthetic activity and accumulation of dry matter, which positively reflected on improve growth character (Ozdemir *et al*., 2004) and higher productivity of tomato fruit yield.

In this respect other researchers confirming the results were obtained from this study, whereas (Jabran *et al*., 2010b) found that integrating mulches with reduced does of herbicide mixture may provide effective weed control. Furthermore, it will reduce the cost and phytotoxic effect of herbicide mixtures which are the two major constrains using herbicide mixture at recommended rates.

Also, integration of mulches and chemicals weed control helped reduce herbicide doses without reducing weed control efficiency (Jabran *et al*., 2010b; Iqbal *et al*., 2009; Shah *et al.,* 2013). It can be concluded from this study that the integration Sencor (Metribuzin) at reduced rate 50% (150 g/fed.) with rice straw provide efficiency weed control; higher fruit yield and its components than that obtained by combination Stomp extra (pendimethalin) at reduced rate 50% (0.850 cm^3/fed.) with rice straw; that attributed to the degradation of Metribuzin is slow; so, the herbicide residues in soil is available (Moorman and Harper, 1989) and can be effective controlled weeds that emergence later. While, the breakdown of Pendimethalin by volatilization and photo-degradation is fast, also, it's strongly adsorbed by soil. So, the herbicide residue not available for efficacy weeds control. (Zimdahl *et al*., 1984) and (Sikkema and Robinson, 2005).

REFERENCES

Abouzina H.F., Radwan S.M. and El-Dabaa M.A.T. (2015). Comparison of potato yield, quality and weed control obtained with different plastic mulch colors. Middle East J. Appl. Sci., v. 5, n. 2, p. 374-382.

Candidoa V., D'Addabbo T., Miccolis V. and Castronuovo D. (2011). Weed control and yield respon se of soil solarization with different plastic films in lettuce. Sci. Hortic., v. 130, n. 3, p. 491-497.

Duncan D.B. (1955). Multiple range and multiple F. Tests biometrics, 11: 1- 24.

Farooq M., Jabran K., Cheema A. Z., Wahid A. and Siddique K.H.M.. (2011). The role of allelopathy in agricultural pest management. Pestic Manage Sci., v. 67, n. 5, p. 493-506.

Iqbal J., Cheema Z.A. and Mushtaq M.N. (2009). Allelopathic crop water extracts reduce the herbicide dose for weed control in cotton (Gossypium hirsutum). Int. J. Agric. Biol. 11, 360-366.

Jabran K., Cheema Z.A., Farooq M. and Hussain M. (2010b). Lower doses of pendimethalin mixed with allelopathic crop water extracts for weed management in canola (*Brassica napus*). Int. J. Agric. Biol. 12: 335-340.

Jackson M.L. (1960). Soil Chemical Analysis. Printice Hall, Englewood Cliffs, N.J.; U.S.A.

Khanh T.D., Hong N.H., Xuan T.D. and Chung I.M. (2005). Paddy weed control by medicinal and leguminous plants from Southeast Asia. Crop Protec., v.24, n. 5, p.421-431.

Law D.M., Rowell A. B., Snyder J. C., and Williams, M. A. (2006). Weed control efficacy of organic mulches in two organically managed bell pepper production systems. Hort. Technology, 16(2), 225-232.

Li Y., Sun Z., Zhuang X., Xu L., Chen S. and Li M. (2003). Research progress on microbial herbicides. Crop Protec., v. 22, n. 2, p. 247-252.

Manivel L. and Weaver R.J. (1974). Biometric correlations between leaf area and length measurements of 'Grenache' grape leaves. Hort Sci., 9.1:27-28.

Meksawat S.and Pornprom T., (2010). Allelopathic effect of itchgrass (*Rottboellia cochinchinensis*) on seed germination and plant growth. Weed Biol. Manage., v. 10, n. 1, p. 16-24.

Mohammadi G.R. (2013). Alternative weed control methods: A Review. In Soloneski, S., and Larramendy, M. (Eds.), Larramendy Weed and Pest Control - Conventional and New Challenges (pp. 117-159). Croatia, In Tech Press.

Moorman T.B. and Harper S.S. (1989). Transformation and mineralization of metribuzin in surface and subsurface horizons of a Mississippi delta soil. J. Environ. Qual. 18:302-306.

Oerke E. C. (2006). Crop losses to pests. J. Agric. Sci., v. 144, n. 1, p. 31-43.

Ozdemir O., Melike B., Tijen D. and Ismail, T. (2004). Effects of, 24-epibrassinolide on seed germination, seedling growth, lipid peroxidation, praline cotent and antioxidative system of rice (Oryza sativa L.) under salinity stress. Plant Growth Regul. 42, 203–211.

Sikkema P.H. and Robinson D.E. (2005). Soil Residual herbicides: An integral component of weed management systems in Eastern Canada Science and Management. Canadian Weed Science Society. Volume 3:p. 89-99.

Pot V., Benoit P., Le Menn M., Ole-Martin E., Sveistrupc T. and Kværnerc J. (2011). Metribuzin transport in undisturbed soil cores under controlled water potential conditions: experiments and modeling to evaluate the risk of leaching in a sandy loam soil profile. Pest Manage Sci., v. 67, n. 4, p. 397-407.

Radics L., Szekelyne E. B., Pusztai P., and Horvath, K. (2006). Role of mulching in weed control of organic tomato. Plant Diseases and Protection, 18, 643- 650.

Rao S. (2000). Principles of weed science. 2nd Ed. New York: Science Publishers. 526 p

Riley H., Brandsaeter L.O. and Danielsberg G. (2004). Mulching compared to physical weed control measures in organically grown vegetables. In: EWRS Workshop on Physical and Cultural Weed Control, 6. Lillehammer. Proceeding.. Lillehammer.

Shah M.H., Khan S.N., Bashir U. and Bajwa R. (2013). Allelopathy of rice: effect of rice mulching on the growth of (*Avena sativa*). Sci. Tech. Dev. 32, 197-204.

Snedecor, G.W. and W.G. Cochran (1980). "Statistical method", 7th edition. The Iowa State University Press Ames, USA.

Sopena F.M.C., Maqueda C. and Morill E. (2009). Controlled release formulations of herbicides based on micro-encapsulation, Literature Review. Cien. Invas. Agr., v. 35, n. 1, p. 27-42.

Soltani N., Robinson D.E., Hamil A.S., Bowley S., and Sikkema P. H. (2005). Tolerance of processing tomato (*Lycopersicon escolentum*) to thifensulfuron methyl. Weed Technology, 19, 669-673.

Tackholm V. (1974). Student, flora of Egypt published by Cairo Univ., pp. 888.

Tagour R.M.H., Mosaad I.S.M. (2017). Effect of the foliar enrichment and herbicides on maize and associated weeds irrigated with drainage water. Annals of Agricultural Sciences. 62; 183–192

The pesticide manual, PM- Tomlin C.D.S. (2012). (15th Ed.). British Crop Production Council.

Wilde S.A., R.B. Corey, Yer J.G.L. and Voigt G.K. (1985). Soil and plant analysis for tree culture. Oxford and IBH Publishing Co., New Delhi India.

Wilson H.P., Monks D.W., Hines T. E. and Mills R. J. (2001). Response of potato (*Solanum tuberosum*), tomato (*Lycopersicon esculentum*), and several weeds to ASC67040 herbicide. Weed Technology, 15, 271-276.

Zimdahl R.L., Catizone P. and Butcher A.C. (1984). Degradation of pendimethalin in soil. Weed Sci. 32: 408-412.

تأثير بعض مبيدات الحشائش وانواع تغطية والتكامل بينهما على انتاجية محصول الطماطم ومكافحة الحشائش المصاحبة.

احمد جمعة محمد[1] و احمد مصطفى احمد حسانين[2]

[1] قسم بحوث تربية الخضر - معهد بحوث البساتين - مركز البحوث الزراعية - الجيزة – مصر

[2]المعمل المركزي لبحوث الحشائش- مركز البحوث الزراعية - الجيزة - مصر.

أقيمت تجربة حقلية فى موسمي 2019/2018 و 2020/2019 بمزرعة بحوث البساتين بسدس بمصر لدراسة تأثير بعض أنواع التغطية ومبيدات الحشائش والتكامل بينهما على محصول ثمار الطماطم وجودته, مكوناته والحشائش المصاحبه للمحصول. اشتملت التجربة على المعاملات التالية: أ) التغطية بقش ارز والقمح (كلا منهما 10 طن/فدان). ب) مبيد ستومب اكسترا ومبيد سنكور بالمعدلات الكاملة (منفردة) (1.7 لتر و 300 جم/فدان, على التوالى) وبالمعدل المخفض 50% من المعدل الكامل مع توليفات باستخدام انواع تغطية مختلفة (قش ارز او قمح), بجانب عزيق (3مرات) وبدون معامله (كنترول). التصميم الاحصائى المستخدم فى التجربة القطاعات كاملة العشوائيه فى ثلاث مكررات. أشارت النتائج المتحصل عليها من هذه الدراسه ان كلا من توليفات المبيدين بالمعدلات المخفضة 50% (ستومب اكسترا S بمعدل 850 سم^3 ومبيد سنكور بمعدل 150 جم/فدان) متبوعا بالتغطية سواء بقش (الارز او القمح) تفوقاً معنوياً مقارنة من اى من المبيدين ذات المعدل الكامل (منفردا) او بالتغطية (منفردا). ولكن مبيد سنكور بالمعدل المخفض 50% (150 جم/فدان) متبوعا بـ قش الارز , أعطى فاعلية في مكافحة الحشائش تفوّق توليفات مبيد ستومب اكسترا ذات المعدل المخفض 50% متبوعا بالتغطية (سواء قش الارز او القمح) في كلا الموسمين. كما تبين من هذه الدراسة ان هناك ارتباط موجب بين كفاءة مكافحة الحشائش وتحسين صفات النمو الخضرية و محصول ثمار الطماطم العالى ومكوناته. لذلك يمكن استخدام توليفة مبيد سنكور بالمعدل المخفض 50% (150 جم/فدان) متبوعا بـ قش الارز كمعامله بديلة وآمنه لأى من المبيدين بالمعدلات الكامله (منفردا) او بالتغطية بالقش (منفردا) للحصول على كفاءة ابادية لمكافحة الحشائش ومحصول عالى من ثمار الطماطم ومكوناته.

الكلمات الداله: الطماطم, التغطية, مبيدات, مكافحة الحشائش, بالمعدلات المخفضه.