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WEED CONTROL IN TOMATO CROPS IN THE FIELD

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Abstract
The experiment was established at R.D.I.V.F.G. Vidra in 2023 and aimed the weeds control in tomato crops in the field. The tomato variety Pontica 102 was used. The herbicides Buzzin, in doses of 0.5 kg/ha, Stomp Aqua, 1.0-3.0 l/ha, Wish Top, 0.83-1.25 l/ha and Titus 25 DF, 40-60 g/ha were tested. The experiment included 5 variants, in 2 replicates. The surface of the repetition plot was 36 square meters. The presence of the following weed species was identified in the culture: Setaria spp. (bristle grasses), Portulaca oleracea (fat grass), Amaranthus spp. (amaranth), Convolvulus arvensis (field bindweed), Abutilon theophrasti (velvetleaf) and Cerastium arvense (field chickweed). The herbicide Titus 25 DF effectively combated the weed species Setaria spp. (E=99.4%), Portulaca oleracea (E=66.7%; average E=83.1%) and Buzzin, the weed species Portulaca oleracea (E =89%) and Setaria spp. (E=68.4%; average E=78.7%). Regarding the yields obtained, variants 2 (Stomp Aqua) with 5.740 kg/m^2 and 1 (Buzzin) with 5.650 kg/m^2 were in the first 2 places, compared to 4.050 kg/m^2 for variant 5 (untreated control).

Keywords: competitive ability, herbicides, Solanum lycopersicum, weed management, weeds.

1. INTRODUCTION

Weeds have the ability to reproduce sexually through seeds and/or asexually through vegetative structures which has allowed them to reproduce easily, increasing their ability to contaminate agricultural crops (de Aguiar et al., 2022).

In growing areas, limited resources (water, fertilizers) amplify competition between crops and weeds. The intensity of competition and the capacity of the weeds to interfere depend on the species present in the area and their density (da Silva et al., 2022).

Using herbicides yield of tomato fruit was consistently high (Ackley et al., 2017).

The use of herbicides in the agriculture is one of the most important tools for weed management (de Prado et al., 2022).

Tomatoes have high nutritional value due to the fruit's content of vitamins, sugars, minerals, amino acids and organic acids. The origin of tomatoes is in Central and South America, in Peru and Ecuador (Ciofu et al., 2023).

In our country, tomatoes occupy an area of 17.170 ha (FAO, 2022).

The use of herbicides must be done as rationally as possible, with minimum but effective doses, so that the active substances of the herbicides do not become a polluting agent for crops, water and soil (Dumitrescu et al., 1998).

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The paper presents the efficacy of some herbicides in the control of some weed species in tomato crops.

2. MATERIALS AND METHODS

The experiment was established at R.D.I.V.F.G. Vidra, on June14 2023, aiming the control of weeds in tomato crops in the field. The experiment included 5 variants, with 2 replicates.
The experimental variants were:
V1. Buzzin, 0.5 kg/ha, 200 l solution/ha (when planting)
V2. Stomp Aqua, 1.0 l/ha, 200 l solution/ha (on June 14, before planting; on June 15, planting)
V3. Wish Top, 0.83 l/ha, 300 l solution/ha (after planting)
V4. Titus 25 DF, 40 g/ha + Trend 90 0,1%, 200 l solution /ha (after planting)
V5. Untreated control.
The replicate plot had an area of 36 square meters.
To the tomato crop in the field, one treatment was applied to each experimental variant. During the vegetation period, observations were made on the appearance and evolution of the weed attack, on the basis of which the efficacy of the products was calculated. The yields on variants and replicates were recorded in dynamics, which, finally, were processed by the variance analysis method.

3. RESULTS AND DISCUSSIONS

The tomatoes crop in the field was attacked by the monocotyledonous weeds *Setaria* spp. (bristle grasses) and by the dicotyledonous weeds *Portulaca oleracea* (fat grass), *Amaranthus* spp. (amaranth), *Convolvulus arvensis* (field bindweed), *Abutilon theophrasti* (velvetleaf) and *Cerastium arvense* (field chickweed).
Among the tested herbicides, the following stood out in terms of efficacy:
- the herbicide Buzzin effectively combated the weed species *Portulaca oleracea* (E=89%) and *Setaria* spp. (E=68.4%; average E=78.7%).
- the herbicide Titus 25 DF effectively combated the weed species *Setaria* spp. (E=99.4%), *Portulaca oleracea* (E=66.7%; average E=83.1%; table 1).
The main economically important weed species that appeared on the experimental surface were: *Setaria* spp. (69.7/m^2) and *Portulaca oleracea* (144.4/m^2).
The species that were present with a low frequency were: *Amaranthus* spp. (3.0/m^2), *Convolvulus arvensis* (0.3/m^2), *Abutilon theophrasti* (0.1/m^2) and *Cerastium arvense* (0.03/m^2).

Regarding the yields obtained, they stood out variants 2 (Stomp Aqua) with 5.740 kg/m^2 and 1 (Buzzin) with 5.650 kg/m^2 compared to 4.050 kg/m^2 in variant 5 (untreated control; table 2). The yield differences, obtained in addition to the untreated control variant, between 1.125 kg/m^2 (V4) and 1.690 kg/m^2 (V2) were, in all cases, very significant (table 2).

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Table 1. Weed control in tomatoes crops in the field – Vidra, 2023

No. crt.	The product, the active substance, the dose and the date of treatment	Weed species	No. weeds/m^2 on:		Efficacy (%)		Average efficcy (%) (07.07)
1.	BUZZIN (metribuzin) 0.5 kg/ha 14.06.2023	**Annual monocotyledonous weeds**	**27.06**	**07.07**	**27.06**	**07.07**	78.7
		Setaria spp. (bristle grasses)	14.3	22.0	62.3	68.4	
		Dicotyledonous weeds					
		Portulaca oleracea **(**fat grass**)**	5.8	15.9	96.0	89.0	
2.	STOMP AQUA (pendimetalin) 1.0 l/ha 14.06.2023	**Annual monocotyledonous weeds**	**27.06**	**07.07**	**27.06**	**07.07**	88.1
		Setaria spp. (bristle grasses)	7.9	8.3	79.2	88.1	
3.	WISH TOP (quizalofop-P-etil) 0.83 l/ha 04.07.2023	**Annual monocotyledonous weeds**	**27.06**	**14.07**	**-**	**14.07**	87.5
		Setaria spp. (bristle grasses)	19.2	8.7	-	87.5	
4.	TITUS 25 DF (rimsulfuron metil) 40 g/ha 05.07.2023	**Annual monocotyledonous weeds**	**27.06**	**14.07**	**-**	**14.07**	83.1
		Setaria spp. (bristle grasses)	30.4	0.4	-	99.4	
		Dicotyledonous weeds					
		Portulaca oleracea (fat grass)	72.2	48.1	-	66.7	
5.	Untreated control	**Annual monocotyledonous weeds**	**27.06**	**07.07**	**-**	**-**	-
		Setaria spp. (bristle grasses)	37.9	69.7	-	-	
		Dicotyledonous weeds					
		Portulaca oleracea (fat grass)	142.8	144.4	-	-	

Table 2. Influence of treatments with different herbicides on field tomato yield (2023)

Variant	Yield (kg/m^2)	Relative yield (%)	The difference from the control (kg/m^2)	Significance
1. Buzzin	5.650	139.5	+1.600	***
2. Stomp Aqua	5.740	141.7	+1.690	***
3. Wish Top	5.545	136.9	+1.495	***
4. Titus 25 DF	5.175	127.7	+1.125	***
5. Untreated control	4.050	100.0	Mt	-

LD 5%= 0.30; LD 1%= 0.50; LD 0,1%= 0.94

Integrated management for weed control in field tomato crops has been established. To prevent the appearance and evolution of weed attacks, the following measures were considered:
- seedling production in alveolar pallets with ready-made (disinfected) mixtures, which also contain fertilizers;
- planting in strips of 2 rows each, on ground mulched with special, black foil. Thus, a higher temperature in the soil was ensured which contributed to the increase in the earliness of the production, the contamination of the fruits, from the basal part of the plants, with soil pathogens was avoided and at the same time the development of weeds on the mulched surfaces was inhibited (Figures 1, 2, 3, 4, 5, 6).

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Figure 1. Experimental field (19.06.2023)

Figure 2. Variant 1 (29.06.2023; after treatment)

Figure 3. Variant 2 (29.06.2023; after treatment)

Figure 4. Variant 3 (29.06.2023; before treatment)

Figure 5. Variant 4 (29.06.2023; before treatment)

Figure 6. Variant 5 (29.06.2023; untreated control)

4. CONCLUSIONS

The herbicides that provided good protection of tomatoes plants against weed attack were:

- Buzzin effectively combated the weed species *Portulaca oleracea* (E=89%) and *Setaria* spp. (E=68.4%; average E=78.7%).
- Titus 25 DF effectively combated the weed species *Setaria* spp. (E=99.4%), *Portulaca oleracea* (E=66.7%; average E=83.1%).

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Regarding the yields obtained, the first 2 places were occupied by variants 2 (Stomp Aqua, average efficacy=88.1%) with 5.740 kg/m^2 and 1 (Buzzin, average efficacy=78.4%) with 5.650 kg/ m^2 compared to 4,050 kg/m^2 in variant 5 (untreated control).

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