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ORGANIC WEED CONTROL MEASURES APPLIED IN ORGANIC TOMATOES CULTURE

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Abstract

In vegetable cultures appears weeds which are perceived to be harmful to the culture. Weed infestation lowers its production through competition for soil resources and light, which can lead to underdevelopment of plant and / or inability to best use. Traditionally, removing weeds from crops is done by digging and hoeing. Usually, the crops still found some weed, with a low density which does not affect the production. In order to increase vegetable productivity different methods were used to eliminate weeds in crops. Among these biodynamic methods with sand or dry soil ash 1:9, the most effective methods are associations with chicken and tomatoes and heat weeding.

Key words: *chicken tomato associations, weeds, biological control, thermal weeding, signed false.*

INTRODUCTION

In the opinion of many scientists weeds are considered undesirable plant species encountered worked and cultivated soils crops, which causes some damage expressed by reduction in production and its quality (Bucur, 2011). Most weeds have medicinal value: plantain (*Plantago* sp.), *Capsella bursa-pastoris*. Beneficial weeds are dandelion (*Taraxacum officinale*), clover (*Trifolium* sp.) and other legumes (Balascuta, 1993). The use of herbicides is one of the most effective measures for weed control, but does not replace, nor exclude other maintenance of soil (Catana *et al.*, 2009). Control of weeds, pests and diseases must be achieved through preventive means, biological and mechanical. If it increases the proportion of cultivation crop rotation will succeed in reducing the degree of weeding, as a result of the large numbers of maintenance. In the same area, in addition to crop rotation is necessary rotation of herbicides with a different spectrum of combat (Catana *et al.*, 2009). Weed species diversity positively contributes to more complete use of vital space. The weeds trash are much more diverse and is embedded in the soil, are subject to successful humification processes compared to stubble cereals. Root systems of many weed species have a high capacity to extract from the arable layer and subarable layer inaccessible compounds for plant culture. Weeds contemporary influences soil formation process, providing the soil with certain quantities of items biofile (Bucur, 2011). The most important tillage to help unweed are: plowing, seedbed preparation, hoeing and weeding. Through a deep plowing will kill perennial weeds by cutting and burying them. Annual weed species and the perennial part will be destroyed by the most energetic mechanical work to destroy weeds-hoeing. To combat the perennial species are required 3-4 mechanical hoeing (Bucur, 2011). Based on the number and weight green weed was considered a weed pest threshold degree of weed number and gravity. Weeding was determined in dynamic, critical period of crop to weed, called the herbocritic stage (Bucur, 2011). In orchards are planted nettles (*Urtica dioica*), which several times a year mowing and leave the ground as mulch. They also planted grass and other plant species that many consider weeds (wild carrot (*Daucus carota*), wild spinach (*Chenopodium album*), yarrow (*Achillea millefolium*), dandelion (*Taraxacum officinale*)). Couch grass (*Triticum repens*) is a plant to be removed even

grasping a biological garden. It is also grown in rows in the orchard clover (*Trifolium* sp.) or clumps of alder (*Alnus incana*) for fixing atmospheric nitrogen in the soil (Catana et al, 2009). Weed density Shepherd's Purse (*Capsella bursa-pastoris*) and nettle (*Urtica dioica*) was lower in the treatments with compost. In vegetable crops can intentionally leave other plants than those of culture that will be health role. Among these against nematodes can successfully call marigold (*Calendula officinalis*) or marigold (*Tagetes* sp.) and snails are chased by the smell hyssop (*Hyssopus officinalis*) or thyme (*Thymus serpyllum*). To protect plants growing between the lines is planted garlic (*Allium sativum*), marigold (*Calendula officinalis*), *Tagetes* sp.. The cultivation of valuable medical plants as vetricea (*Tanacetum vulgare*), wormwood (*Artemisia absinthium*), comfrey (*Symphytum officinale*), nettle (*Urtica dioica*), garlic (*Allium sativum*), and horseradish (*Armoracia rusticana*) will consider most preparations composites good or as extracts, infusions and concoctions. The aim of this work was to analyze and test various ecological ways of preventing and combating weeds that can infest tomato crops in solar.

MATERIALS AND METHODS

Experimental field is located in southern Muntenia, Teleorman county and has been used for each variant 100m^2 in solar. The land was already converse in organic agriculture. Vegetables grown on land are tomato (*Lycopersicum esculentum*). Other materials: Cropmax, Champion 0.3% (copper hydroxide with 50% copper metal), decoction of Horsetail (*Equisetum arvense*), infusion of nettle (*Urtica dioica*), cylinder stove, burning appliances, ash resulting from home heating, put the minimum age of 7 days, black and white film for mulch.

Methods

Tomato crop in solar technology used in the experiments: the terrain was prepared by green manure fertilization founded in autumn, digging, leveling, remove weeds (10 days after seedbed preparation), planted seedling age was 60 days, planting culture was performed on 5 April 2009 after planting scheme 70 x 40 cm with a density 36-40000 culture plants / ha, flowering began April 20, 2009.Care works were drip irrigation and 2 hand- hoeing and for fertilization was used Cropmax at two weeks after planting.Preventive phytosanitary treatments were:-25 April 2009 product preventive treatment for hand Champion 0.3%-on May 5 was used horsetail decoction dilution of 1/10 against Septoria,infusion of nettle dilution of 1/10, from 10 to 10 days from 20 April 2009 until the abolition of culture to prevent diseases and pests throughout the growing season, nettle with role of fungicides and insecticides.

Trellising was made from planting and continued throughout the period until meat. Mulching was done in the first 10 days after planting for weed control sheet and maintains soil moisture. Child cut was performed at 10 days after planting, to reduce foliar apparatus. Defoliation was performed at 10 days after planting, the plant ventilation, preventing passage of soil manna plants. The cut of shoots has been made to 7 inflorescences, in order to speed up fructification and ripening existing fruit. Exploit stimulation was performed by placing near a beehive solarium, complete with artificial pollination induced by shaking the main wire to support plant every 15 days throughout the flowering. First harvest first collection was recorded June 10, 2009. Last harvest and dissolution culture were made on 15 September 2009, followed by dissolution culture and plant remains were transported to a composting platform.

False semantics was made after the preparation phase for sowing train, waiting 12 days, during which weeds have sprouted and grown destroyed then very rigid, as described by Fitiu, for the creation culture tomato in solar. Working variants were V1: tomato crop planting, V2: 14 days after planting, V3: 30 days after planting for field experience and witness field, where weeds were counted in sq. Thermal weeding was performed in cultured tomato in solar, after being established culture, the technology presented. Instead weeding thermal manual weeding was made. Working variants were V1: tomato crop planting, V2: 14 days after planting, V3: 30 days after planting for field experience and witness field, where weeds were counted in sq. Burning Flame was carried out to prepare the land for crop establishment. Experimental variants field work and the witness are as follows: V1 burning day, V2: 10 days to remove weeds by burning V3 at 20

days after removal of weeds by burning, Control, and will include weeds. Gas consumption for soil preparation flame burning weeds tomato crop establishment are: V1 in consumption of 15 liters of gas/1000 sqm, V2 at a rate of 20 liters of gas/1000 sqm, Control without gas consumption, and will include weeds raise counting. Type of existing weeds on land that was unprepared with thermal weeds. Working versions are V1: number monocotyledonous plants, V2: number dicotyledonous plants, monocotyledonous and dicotyledonous plants Control number. Weed control with ash: soil 1:9, it was made after he was setting the stage for crop cultivation without something on the land for at least 15 days. Were counted in a number of plant species 15 days after soil preparation and management of gray, with the following types of work: V1 couch grass crawler (*Agnopyrom repens*), V2 bindweed (*Convolvus arvensis*), V3 veronica (*Veronica* sp.) to control.

Association between tomato-chicken was done in a tomato crop as presented technology with the changes that not have been made hand weeding and was eliminated Cropmax fertilization and in solar were introduced in the 10 days after planting (15 April) 150 chickens aged 7 days, which were removed from culture at the beginning of ripening fruit (June 5). Weeds were counted at 20 days and at 40 days after placing puppies in culture. It has also been determined average amount of fruits per plant.

Mulching foil was made in tomato culture under given technology, in the first 10 days after planting. There were taken in consideration the following variants: V1 mulching with black foil, white foil mulching V2, V3 control without mulching. Were counted sprung weeds around plants that have been grown to 10 days after mulching were removed by weeding, and mulching at 20 days (actually 10 days from weeding). All experiments were performed in triplicate, and results presentation is average. Each variant of the experiment was conducted over an area of 100 sqm.

RESULTS AND DISCUSSIONS

Weed control in tomato crops by false semantics, on 1000 sqm, with predominant weeds Veronica (*Veronica* sp.), *Amaranthus retroflexus*, *Portulaca Oleraceea*.

Table 1. Weed control by false seeding at tomato culture

Variant		Weeds density / sqm	
		Experiment	**Control**
V1	At tomato transplanting	18±2	26±3
V2	At 14 days from transplanting	29±4	48±6
V3	At 14 days from transplanting	34±3	69±12

At 14 days after planting weeds in the field were 29 at experiment and 48 at control in the area. At 30 days after planting were observed 34 and 69 weeds experience in control field. After 30 days of culture planting control, in the experimental field consisted of 16 weed emergence, while control cultures were counted 43 weeds. Thermal weed is used as a means of weed control such *Atriplex*, on an area of 100 sqm. Weed control by thermal weed in tomato culture.

Table 2. Weed control by thermal weed in tomato culture

Variant		**Weeds density** / sqm	
		Experiment	**Control**
V1	At tomato transplanting	2±1	32±4
V2	At 14 days from transplanting	6±2	51±5
V3	At 30 days from transplanting	18±4	74±8

At the control planting culture in the experimental field there were 2 weeds, while zone of weed control were 32. At 14 days after planting is noted that the experimental culture have 6 weeds and the weed control were 51. At 30 days after planting, weeds were 18 in the experimental and the control 74. During the 30 days of experiment, the cultures appeared 16 weeds in the experimental field and the control 42 weeds have emerged. Results flame burning weeds, depending on when counting weeds following table:

Table 3. Removing weeds by burning with flame

Variant		**Weeds density / sqm**	
		Experiment	**Control**
V1	At removing the weed by thermal process	0	64±8
V2	At 14 days from transplanting	16±3	83±13
V3	At 30 days from transplanting	32±7	105±16

In V1, immediately after burning in field experience was not any weed, while in the control group were 64 weeds.

The variant V2 there were a few weeds because it's been a short period of cleaning by burning, the weed seeds germinate to light, so 16 plants were found in lot of experience, while the

control was 83 weeds. Increased to a period more weeds pop up on sqm. In variant V3 were found 32 plants in the experimental group, while the number of weed control increased to 105 plants.

Note that 20 days of treatment increased the number of weeds experience with 32 plants and the weed control number increased by 41 plants, the total number of weeds in group sqm were 3.28 times higher than experience. Gas consumption flame burning weeds in tomato crop, calculated at an area of 1000 square meters, according to Table. 4:

Table 4. Gas consumption flame burning weeds in tomato culture.

Variant	V1	V2	Control
	Gas consumption 15 liter	Gas consumption 20 liter	Gas consumption 0 liter
The quantity of weeds burn on sqm, % compare with control	91,7±3,1	83,2±2,4	100

After flame burning of weeds was observed that maximum efficiency was achieved at 15 liters gas consumption at 1000 mp.

The control was untreated weeds are in culture. Flame burning weeds in tomato crops, area 0.01 square meters at a density of 70 x 40 cm, depending on the type of weeds, weed correlated with the type existing in culture.

After thermal weeding there are determined the type of existing weeds on land unprepared. Such weeds were counted on a square before treatment, and at 30 days after treatment plants were counted according to the type found in them.

The results are shown below:

Table 5. Flame burning weeds, weed correlated with the type existing in culture

Variant	V1	V2	Control
Type of weeds	Mono cotyledon	Dicoty ledonous	Monocot yledon and Dicoty ledonous
Initial quantity of weeds, % compare with control	100	100	100
Weed quantity, %, distroyed by the treatament compared with control	78,2±5,8	86,9±3,7	0
The weeds after the treatment,% compare with control	21,8±5,8	13,1±3,7	100

Percentage of destruction was not 100%, due to the existence of perennial weeds in crop. Monocotyledonous weeds were destroyed in the 2-3 leaf stage, because at that time are sensitive to heat.

Note that the efficiency was higher in Dicotyledonous than Monocotyledon destruction. Combustion was achieved at temperature of 70-80^{o}C, so protein coagulates and weeds die.

Results of weed biodynamic methods, the ratio of 1:9 ash to dry soil are presented in the following table.

The results show that the percentage of all existing weed control cultures is reduced by 22% for creeping couch grass, bindweed and 28% to 16% for veronica. Reproduction is inhibited by the introduction of new weeds into the soil ash obtained by burning their seeds. This is repeated for 3-4 consecutive.

Table 6. Weed biodynamic methods, the ratio of 1:9 ash soil dry for at least 15 days

Variant		Results of weeds destroyed after treatment compared with control	Results,% plants find after treatment compare with control	Control
V1	Couch grass crawler	22±2,9	78±2,9	100
V2	Bindweed	28±4,3	72±4,3	100
V3	Veronica	16±6,1	84±6,1	100

Results weed control in tomato crop using chicken tomato combination, are shown in the following table:

Table 7. Chicken with tomato Association

Variant		Weed density/ mp	
		Experiment	Control
V1	At 20 days after chicken puppies introduced in culture	2±1	154±
V2	At 40 days after chicken puppies introduced in culture	3±2	316±
	Medium crop, kg/wire	3,2±0,5	1,9±0,3

At 20 days after placing puppies in culture is noted that the field experience are only 2 weeds while the crop weed control is 154. At 40 days after placing puppies in culture, experimental culture has three weeds, which was 314 compared with control weeds. Experiment 20 days, compared to the previous determination,

it appears that the culture has grown a weed test compared to 1620 weeds in the control group. Output gap was 1.3 kg wire tomato production increase for the experimental group. This can be explained by the fact that chickens ate weeds, then fertilized with a fertilizer culture rapidly mineralized (represented by their manure) and mobilized soil around plants. Land mulching helps remove weeds from the crop, as shown below:

Table 8. Mulching land and the number of weeds sprung

No	Var	Specification	No of weeds at mp	
			After 10 days after transplanting	After 20 days after transplanting
1	V1	Black foil	15±2	7±3
3	V2	White foil	21±5	9±3
4	V3	Control	83±18	129±26

Were counted sprung weeds around plants that have been grown to 10 days after mulching were removed by weeding, and mulching at 20 days (actually 10 days from weeding). Number of weeds at 20 days after planting is less than 10 days from planting because of weed seed near existing plants benefit from light to dawn. Moreover, foil prevent weed emergence, but heats the soil to a depth of 4-5 cm by 5-6^{o}C compared to the control. If it was white film number of weeds was higher, the higher number of weeds around plants as existing in foils rises but suffocate due to temperature. If it was black film, the number of weeds is lower. Since soil is well warmed by mulching with plastic white culture plants grow more quickly, reaching maturity earlier.

CONCLUSIONS

The most efficient mode to combat weeds is the association of tomatoes plants with chichen and with the use of thermal and mulching weeds.

A low effciency was found to ash/soil bio-dynamic methods.

REFERENCES

Bălăscuță N., 1993. "Protecția plantelor de grădină cu deosebire prin mijloace naturale", Ed. Tipocart, Brașov.

Bucur Gh., 2011. "Rolul culturii protectoare în controlul biologic al buruienilor la culturile prășitoare", Știința agricolă, nr. 2/2011. ISSN 1857-0003, p. 10-13.

Catana E., G. Câmpeanu, N. Atanasiu, G. Neață, V. Zaharachescu, «Preparate ecologice obținute din plante folosite la combaterea bolilor și dăunătorilor în legumicultură la Familia Solanaceae"; Simpozionul științific "Tendințe ale horticulturii rurale, periurbane și urbane în mileniul trei", 6 nov. 2009, București.


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