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Different weed control systems in tomato

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Introduction

In the last years physical methods have been developed for weed control. These methods can be interesting in organic farming and for integrated production. In this context, thermal weeding (selective heat employment for the elimination of weeds), mechanical weed control with horizontal brush weeder between the crop lines, and mulching with black plastic or crop residues are accepted weed control methods by the regulations of organic farming. Nevertheless, there is little empirical evidence about advantages of these weed control systems (Leroux *et al.*, 2000; Bàrberi, 2002). Suso *et al.* (2003) compared the above mentioned weeding systems for tomato crop with two trials located at Logroño and Zaragoza, Spain. Results of one year showed that the plastic mulching was a better weeding system, which in addition gave higher yield. However, to confirm these results, it is necessary to repeat the trial several years. In this work, different weed control systems were compared in three trials to analyze the efficiency in weed control and the effects on yield.

Materials and methods

Three trials were performed in Montañana (Zaragoza, Spain) in 2002, 2003 and 2004. The experimental design was a randomized block with five treatments and four replications. Table 1 shows the description of the five treatments tested every year.

Table 1. Treatments description in trials for every year. HW: hand-weeded. DAT: days after transplanting.

Treatment	2002	2003	2004
1) Check with herbicide	Glyphosate (36%) (impregnation)	Metribuzin (70%) 0.5 l ha^{-1} + glyphosate (36%) (impregnation)	Metribuzin (70%) 0.5 l ha^{-1} + rimsulfuron (25%) 30 g ha^{-1}
2) Horizontal brush weeder	2 times (22 and 34 DAT)	1 time (13 DAT) + 1 HW (16 DAT)	1 time (19 DAT) + 1 HW (21 DAT)
3) Flame weeder	5 times (13, 21, 27, 36, 44 DAT)	2 times (10 and 24 DAT) + 1 HW (16 DAT)	3 times (21, 28 and 41 DAT) + 1 HW (51 DAT)
4) Black plastic mulch	Polyethylene 15µ + glyphosate (36%) (impregnation)	Polyethylene 15µ + glyphosate (36%) (impregnation)	Polyethylene 15µ + glyphosate (36%) (impregnation)
5) *Artemisia absinthium* straw mulching	2 HW +2 applications (1.6 + 1.6 kg m^{-2}, 10 an 26 DAT)	2 HW + 2 applications (6.6 + 5.4 kg m^{-2}, 2 and 3 DAT)	2 HW + 2 applications (3.4 + 1 kg m^{-2}, 8 and 2 DAT)

The treatment 2 was performed with a horizontal rotary brush (trade mark Bärtschi-Fabro, mod. Brush Hoe type 500, of Hüswil, Switzerland) which operated between the crop lines. The thermal weed control was applied between the crop lines with a manual flame weeder (propane burner of 37x13 cm, trade mark: Agrironco de Tecnasa, Madrid, Spain). The glyphosate for doses impregnation in 1) and 4) were in average 9,9 ml.a.i/experimental plot (12 linear meters). The transplant was done in single rows 1.5 m apart. Tomato cv. 'Perfectpeel' was used and planted at 20 cm between plants. The dates of transplanting were 21/5, 10/6 and 26/5 in 2002, 2003 and 2004 respectively. Fertilization was done preplant and with foliar fertilizer. Every year several assessments of weed density were done in 3 m^2 of each

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