

The Effect of Dichlobenil (Casoron 6,7 G) on Weed Infestation, Vegetative and Productive Performance of Young Sweet Cherry Trees

Zarya Rankova, Kolyo Kolev

Fruit-Growing Institute – Plovdiv, Bulgaria

Abstract: In 2005-2006 at the Fruit-Growing Institute – Plovdiv a study was carried out on the efficiency and selectivity of the soil herbicide dichlobenil – Casoron 6.7 G in young sweet cherry plantations. A field experiment was conducted in a young orchard of Lapins cultivar grafted on the vegetative rootstock Gisela 5. The plantation was established in 2001 on alluvial-meadow soil (Fluvisol) at a planting distance of 5x3 m. The soil herbicide dichlobenil was applied during the fourth and the fifth growing seasons of the orchard, early in spring (10-15 March), before the beginning of weed plant development. The following treatments were employed: 1. Control (non-weeded, untreated); 2. Casoron 6.7 G – 80.0 kg/ha; 3. Casoron 6.7 G – 90.0 kg/ha; 4. Casoron 6.7 G – 100.0 kg/ha. The experiment was set up following the long-plot design, 8 trees per treatment, in three replicates.

The soil herbicide dichlobenil applied at rates 80.0 – 100.0 kg/ha (trademark Casoron 6.7 G) had a very good herbicidal effect on a large number of annual and perennial grass and broad-leaved weed species. The efficient herbicide post-effect continued for about 7 months, controlling weed infestation during the whole vegetation period.

Visible symptoms of phytotoxicity and suppression of tree growth and fruiting were not observed after treatment with Casoron 6.7 G applied at all the three studied rates.

Dichlobenil – Casoron 6.7 G could be successfully applied for weed control at the rates 80.0-100.0 kg/ha in sweet cherry plantations grafted on the vegetative rootstock Gisela 5, older than 3 years.

Key words: weeds, weed control, dichlobenil, cherry, vegetative habits, yield.

Introduction

Weed vegetation is one of the major competing factors suppressing growth and development of fruit plants. That is why weed control in fruit orchards is an important cultural operation determining the success of fruit production and its economic efficiency. Sweet cherry as a fruit species is susceptible to herbicide treatment (Mitchell, 1987; Mitchell and Abernethy, 1989; Ben-Arie, 1992; Rankova and Kolev, 2008). At present it is recommended to apply integrated weed control system in sweet cherry plantations, which includes treatment with soil and leaf herbicides – pendimethalin, napropamid, oxyfluorfen, glufosinate ammonium, glyphosate, etc. (Rankova, 2006). An element of the ecological approach in weed control is the application of herbicide products with good efficiency and proven selectivity for the cultural species. At the same time it is not recommended to apply mechanized soil tillage for weed control in sweet cherry plantations of an intensive type on Gisela 5 rootstock, due to the shallow located root system of that rootstock. Therefore, in such plantations it is worth applying soil herbicides such as oxyfluorfen, Trevissimo (diuron + glyphosate), dichlobenil (Rankova and Kolev 2008; Rankova and Kolev 2009), as no preliminary mechanized soil preparation is necessary for achieving herbicide efficacy.

The aim of the present investigation was to study the herbicide efficiency and selectivity of the soil systemic selective herbicide dichlobenil (Casoron 6.7 G) with a view to applying it in the system of integrated control of weed infestation in intensive sweet cherry plantations.

Material and Methods

In 2005-2006 at the Fruit-Growing Institute – Plovdiv a study was carried out on the efficiency and selectivity of the soil herbicide dichlobenil – Casoron 6.7 G in young sweet cherry plantations. A field experiment was conducted in a young orchard of Lapins cultivar grafted on the vegetative rootstock Gisela 5. The plantation was established in 2001 on alluvial-meadow soil (Fluvisol) at a planting distance 5×3 m. The soil herbicide dichlobenil was applied during the fourth vegetation of the orchard, early in spring (10-15 March), before the beginning of weed plant development. The following treatments were employed: 1. Control (non-weeded, untreated); 2. Casoron 6.7 G – 80.0 kg/ha; 3. Casoron 6.7 G – 90.0 kg/ha; 4. Casoron 6.7 G – 100.0 kg/ha. The experiment was set up following the long-plot design, 8 trees per treatment, in three replicates.

The efficiency against annual and perennial weed species forming the weed association in the row strip of the orchard was monitored (in dynamics, every 30 days after the date of treatment).

The average yield in kg per tree and the mean fruit weight (g) were reported for assessment of the effect of the applied rates of dichlobenil on tree growth and development. The following biometric characteristics: the average annual shoot length increment (cm) and the stem cross-section area ($S - \text{cm}^2$) were measured at the end of the vegetation.

Results and Discussion

Seventeen annual and four perennial weed species were found in the row strip during the period of the study: blackgrass (*Alopecurus myosuroides* L.), ivy leaf speedwell (*Veronica hederifolia* L.), common groundsel (*Senecio vulgaris* L.), common chickweed (*Stellaria media* L.), shepherd's-purse (*Capsella bursa-pastoris* L.), henbit deadnettle (*Lamium amplexicaule* L.), common sow thistle (*Sonchus oleraceus* L.), spiny sow thistle (*Sonchus asper* L.), bitter fleabane (*Erigeron canadensis* L.), white goosefoot (*Chenopodium album* L.), redroot pigweed (*Amaranthus retroflexus* L.), purslane (pigweed) – (*Portulaca oleracea* L.), common knotgrass (*Polygonum aviculare* L.), scarlet pimpernel (*Anagalis arvensis* L.), green foxtail (*Setaria viridis* L.), black nightshade (*Solanum nigrum* L.), prickly lettuce (*Lactuca serriola* L.), dandelion (*Taraxacum officinale* L.), field bindweed (*Convolvulus arvensis* L.), cursed thistle (*Cirsium arvense* L.), Johnsongrass (*Sorghum halepensis* L.). The active substance dichlobenil showed very good herbicide efficiency at the applied three rates of Casoron 6.7 G against the weed species in the row strip of the plantation – both against annual and perennial weed species. Data about the herbicide effectiveness demonstrated the same tendency throughout the years of the study and they were presented in average values (Figure 1).

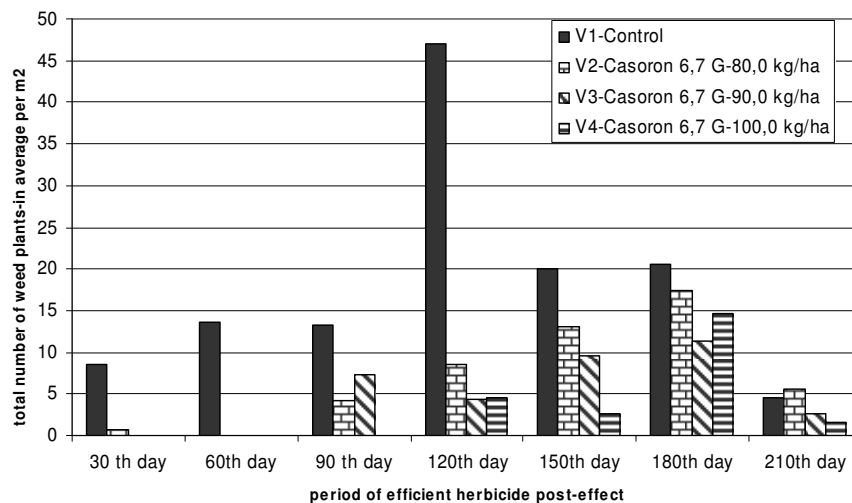


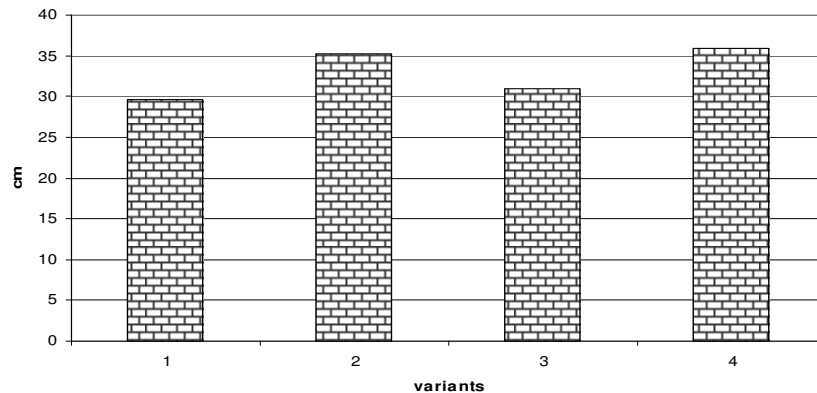
Fig. 1. Herbicide efficiency of Casoron 6.7 G

On days 30 and 60 weed plants were not found in the treated variants and on day 90 only single plants of purslane and field bindweed were reported in Treatments 2, 3 and 4. On days 120 and 150 again very good herbicide efficiency of the applied rates of dichlobenil was established in comparison with the control. At the 6th and 7th reporting dates (180 and 210 days after treatment), although the

herbicide effect of Casoron decreased, some herbicide efficiency was reported in the treated variants. The herbicide post-effect of the active substance dichlobenil lasted for 7 months, i.e. the weeds were controlled during the whole vegetation period.

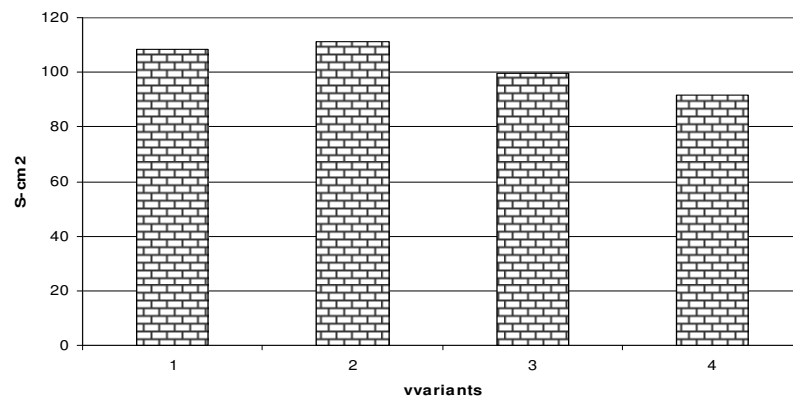
Visible symptoms of phytotoxicity and growth suppression were not observed in the trees treated with different rates of Casoron 6.7 G.

The results on the effect of dichlobenil on biometric characteristics were presented in Figures 2 and 3.



Gd 5%-2.45; 1%-3.71; 0.1 %-15.40

Fig. 2. Effect of dichlobenil – Casoron 6.7 G on the average annual shoot length increment (cm)



Gd 5%-23.02; 1%-34.87; 0.1 %-56.02

Fig. 3. Effect of dichlobenil – Casoron 6.7 G on stem cross-section area (cm²)

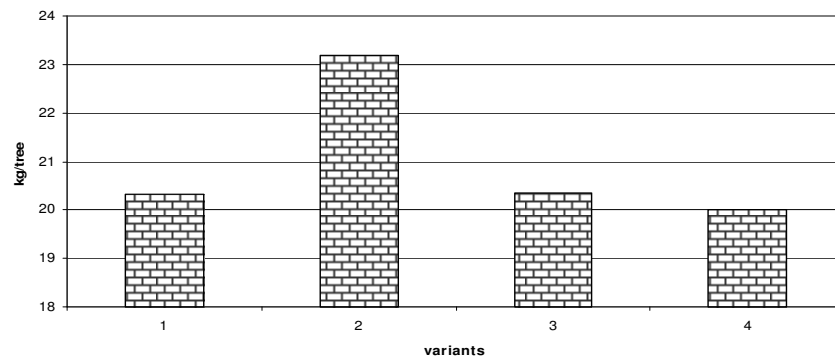
No depressing effect of the applied dichlobenil rates on the average annual shoot length increment of the trees was established. An increasing

tendency in the average annual shoot length increment was observed when treating the trees with increasing rates of dichlobenil.

The values of the cross-section area of the tree stem in Treatments 2 and 3 were similar to those in the control treatment. The differences to the control were statistically insignificant. A tendency towards a decrease of the stem cross-section area values was established in Treatment 4, however the differences were statistically insignificant.

These results gave reason to conclude that the application of Casoron at the rates of 80.0 to 100.0 kg/ha did not cause any disturbance in tree growth.

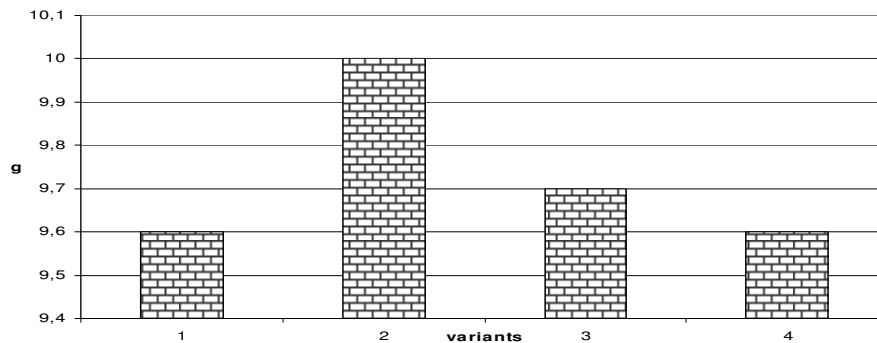
No negative effect of the increased rates of Casoron 6.7 G on yield was established. When applying Casoron 6.7 G at the rates of 80.0 and 90.0 kg/ha the yield per tree was higher than that of the control trees. The differences to the control treatment were not statistically significant.



n.s.

Fig. 4. Effect of dichlobenil – Casoron 6.7 G on fruit yield – kg per tree

At the highest rate applied (Treatment 4), a yield decreasing tendency was reported, without exerting an effect on mean fruit weight.



n.s.

Fig. 5. Effect of dichlobenil – Casoron 6.7 G on mean fruit weight (g)

The results obtained on the high herbicide efficiency of dichlobenil throughout the whole vegetation period both against annual and stubborn perennial species, as well as the results on the lack of a depressing effect of the applied rates on vegetative habits and fruit yield gave reason to apply the herbicide for an efficient control of weed infestation in intensive sweet cherry plantations after the third year of tree planting. The lower rate of 80.0 kg/ha should be applied in orchards on lighter soils and at lower levels of weed infestation, while the higher rates of 90.0 – 100.0 kg/ha should be applied on heavier soils at high levels of weed infestation, mainly when stubborn perennial species have to be eradicated.

Conclusion

The soil herbicide dichlobenil applied at the rates of 80.0-100.0 kg/ha of the trademark Casoron 6.7 G showed a very good herbicide effect against a large number of annual and perennial grassy and broad-leaved weed species. The efficient herbicide effect lasted for about 7 months, providing the control of weed infestation throughout the whole vegetation period.

Visible symptoms of phytotoxicity and suppression of tree growth and fruiting after treatment with Casoron 6.7 G applied at the three studied rates were not observed.

Dichlobenil – Casoron 6.7 G can be successfully applied at rates 80.0-100.0 kg/ha for weed control in sweet cherry plantations grafted on the vegetative rootstock Gisela 5, when over 3 years old.

References

- Ben-Arie Z. (1992): Weed control in orchards, *Phytoparasitica*, **20** (4): 350 (abst).
Mitchell R. B. (1987): Evaluation of herbicides in establishing stone fruit. Proc. 40th New Zealand Weed and Pest Control Conf., Nelson, Aug. 11-13, Palmerston North, 144 – 148.
Mitchell R. B., R. J. Abernethy (1989): The effect of weed removal on the growth of young apricot trees. Proc. 40th New Zealand Weed and Pest Control Conf., Nelson, Aug. 11-13, Palmerston North, 209 – 212.
Rankova Z. (2006): Ecological approaches for weed control in orchards. *Proceedings of the First International Symposium on "Ecological Approaches in Safety Food Production"*, October 2006, Academic Publishing House of the Agricultural University, 211-216.
Rankova Z., K. Kolev (2008): Weed control in young sweet cherry plantations of an intensive type. *Journal of mountain agriculture on the Balkans*, **2**: 321-331.
Rankova Z., K. Kolev (2009): Weed control in sweet cherry plantations of an intensive type. *Journal of mountain agriculture on the Balkans*, **1**:168-178.

**UTICAJ DIKLOBENILA (CASORON 6,7 G) NA
ZAKOROVljenOST, VEGETATIVNI RAST I PROIZVODNE
OSOBINE MLADIH SADNICA TREŠNJE**

- originalni naučni rad -

Zarya Rankova, Kolyo Koley

Institut za voćarstvo – Plovdiv, Bugarska

Rezime

U periodu od 2005-2006. u Institutu za voćarstvo u Plovdivu ispitivana je efikasnost i selektivnost zemljišnog herbicida diklobenila – Casoron 6,7 G primenjenog u mladim zasadima trešnje. Poljski ogled izvršen je u mladom zasadu sorte Lapins kalemljene na vegetativnoj podlozi Gisela 5. Zasad je zasnovan 2001. godine na aluvijalnom livadskom zemljištu pri gustini sadnje od 5x3 m. Zemljišni herbicid diklobenil primenjen je tokom četvrte i pete vegetacije zasada u rano proleće (10-17. marta) pre početka razvoja korova. Primenjene su sledeće varijante: 1. kontrolna varijanta (nezarasla u korov, netretirana); 2. Casoron 6,7 G – 80,0 kg/ha; 3. Casoron 6,7 G – 90,0 kg/ha; 4. Casoron 6,7 G – 100,0 kg/ha. Ogled je postavljen po blok sistemu, sa 8 voćki po varijanti, u tri ponavljanja.

Zemljišni herbicid diklobenil primenjen u dozi od 80,0 – 100,0 kg/ha (Casoron 6,7 G) ispoljio je veoma dobar herbicidni efekat na veliki broj jednogodišnjih i višegodišnjih travnih i širokolisnih korovskih vrsta. Produženo dejstvo herbicida trajalo je oko 7 meseci, pri čemu je zakorovljenost držana pod kontrolom tokom celog vegetacionog perioda.

Vidljivi simptomi fitotoksičnosti i suzbijanja rasta i plodonošenja nisu primećeni nakon primene Casoron 6,7 G u sve tri ispitivane doze.

Diklobenil – Casoron 6,7 G može se uspešno primeniti u suzbijanju korova pri dozama od 80,0-100,0 kg/ha u zasadima trešnje kalemljene na vegetativnoj podlozi Gisela 5 starosti preko 3 godine.