Online Version ISSN: 1314-412X
Volume 3, Number 3
September 2011

AGRICULTURAL SCIENCE AND TECHNOLOGY

2011

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria

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Online Version ISSN: 1314-412X

Volume 3, Number 3
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AGRICULTURAL SCIENCE AND TECHNOLOGY

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AGRICULTURAL SCIENCE AND TECHNOLOGY, VOL. 3, No 3, pp 254 - 256, 2011

Productive performance and quality of essential oil from oil bearing rose (*Rosa damasscena* Mill) for use of oxadiargyl

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Abstract. *The survey was conducted during the period 2009 - 2010 at IREMC - Kazanlak. The experiment is set in four iterations at a plantation of roses /R. damascena Mill./. We examined herbicide efficacy and selectivity of oxadiargyl /Raft 400 SC/ applied as soil herbicide before vegetation at a dose of 1,2 l/ha and 1,5 l/ha. It was found that a higher level of performance against annual and perennial weeds is Raft 400 SC applied at a dose of 1,5 l/ha. The herbicide has excellent selectivity for the oil-bearing rose. When using the two concentrations positive and statistically proven differences in production traits were found at P= 5% and P = 1.*

Keywords: oil-bearing rose, weeds, herbicide, efficiency, selectivity

Introduction

Rosa damascena Mill. is emblematic for Bulgaria, the area of which in recent years reached 35,000 da (Kovacheva et al., 2010). At present, the population of Kazanlak rose which is grown occupies almost 100% of the areas in the country. Institute of Roses, Essential and Medical Cultures (IREMC), Kazanlak maintain shortlisted Bulgarian varieties, characterized by good economic indicators and events characterized in terms of adaptability and stability of yield (Kovacheva et al., 2010). It was found that some varieties have a good productive capacity under less favorable conditions of production while others have lower adaptive capacity. Despite the good performance of our species and populations, the main problem that rose-oil producers face is the minimum number of approved plant protection products, including herbicides. Against the background of the other crops, the areas with oil-bearing roses are relatively small and companies importing pesticides have no interest to pay the charge on their biological testing. This puts rose production in disadvantage, which reports a significant yields decrease in recent years. Not always the removal of chemical control is successful but in most cases it is associated with increased cost.

The purpose of this study is to determine the impact of herbicide Raft 400 SC at different concentrations on oil-bearing rose productive quality.

Material and methods

The survey was conducted during the period 2009 - 2010 at IREMC - Kazanlak. The experiment is embedded in a block method of Fischer in four repeats with size of the test area 25 m^2, in flowering plantation of Kazanlak rose (*R. damascena* Mill.). Tested were the following options: Control - no herbicide, Raft 400 SC (400 g/l oxadiargyl) - 1,2 l/ha and 400 Raft SC - 1,5 l/ha. Introduction of herbicides is done in early spring season before rose and weed growing. The efficacy of the herbicide was recorded on the 20th and 40th day after treatment. The species composition of weeds was recorded by the eye-measure method and the extent of weeding - by quantitative method. The selectivity of herbicide was report on 10-ballroom scale EWRS (in ball 1 no damage to the crop, and in ball 9 – the crop is completely destroyed). Reported is the number of flowers from a bush and the daily yield of flowers by variations and repeats, equivalent to 1 ha.

The content of essential oil was determined by water-steam distillation-type calipers Klevendzhar in options and repetitions, each of which is presented in three samples of 200 g fresh flower.

Determination of the main constituents of essential oils is performed on a gas chromatograph PYE UNICAM on the following operating conditions: Capillary column – EKONO – CAP ™ EC ™ – 1,30 m length, inner diameter 0,32 mm. ™. Oven temperature: temperature programming from 70 ºC to 230 ºC at a rate of increase in 8 ºC / min. Injector temperature: 300 ºC, detector temperature: 300 ºC, carrier gas: hydrogen injection, volume: 0,1 µl, velocity - winner: 1,3 ml/min. In chromatograms obtained to identify representative and distinctive ingredients given in BS ISO 9842 – 2004. The precision of the results to determine the peaks using pure substances.

The results were statistically processed, and the differences between the variants included in the study were identified through Single - analysis of variance (ANOVA) (Zapryanov and al., 1978).

Results and discussion

The results obtained that render an account of weed infestation after the introduction of herbicides are given in Table 1. The experimental area is a natural weeding background of mixed type, dominant weeds are annual broadleaf species - *Amaranthus retroflexus L., Chenopodium album L., Galinsoga parviflora Cav., Polygonum aviculare L., Datura stramonium L.*. Their number average for the period is 88 pcs./m^2. Annual grains are represented by *Setaria glauca L.*, perennial species - *Convolvulus arvensis L.,*

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Cirsium arvense L., Cardaria draba L. and Cynodon dactylon L. also have high density - 48 pcs./m^2.

Consideration of weeds shows that options with Raft 400 SC (400 g/l oxadiargyl) in both tested doses reported 93% efficacy against annual broadleaf weeds such as *Amaranthus retroflexus L., Chenopodium album L., Galinsoga parviflora Cav*. and others. In perennial weeds the rate of destruction varies from 83-86 in different variants. From perennial broadleaf species much more strongly affected and suppressed in their development bindweed. Total destroyed weeds to control in adjacent options, Raft 400 SC administered dose of 1,2 l/ha was 88% with the higher dose - 1,5 l/ha remained roughly the same over the years - 92%. Raft 400 SC applied in doses 1,2 and 1,5 l/ha exhibits excellent selectivity to oil-bearing rose (score 1 on scale EWRS).

Single – Anova analysis showed differences in the productive characteristics of different variants. For the year 2009 (Table 2) no statistically significant differences in the variants were found. Between repetitions significantly larger variations have been obtained and the differences are from 700 kg/ha (var.1) to 1420 kg/ha (var.2). This is due to climatic conditions during the harvesting period – low relative humidity and high average temperature which had a negative impact on the development of the bushes and caused shedding of many flower buds. For a variant with a lower dose of herbicide more flowers are formed on a bush, but with lower average weight of 1 flower - 2 gr, against 2,3 gr with Raft 400 SC.

The results for the year 2010 show certain differences between the average yield of flower and essential oil, for both version of the herbicide (Table 3). In relative terms, however, excess production of flower is only 9% in variants with herbicides compared to the control variant. This indicates that under certain conditions, incl. climatic factors, the plant adaptive capacity of the untreated control is increased overcoming the negative impact of weeds. Indicators of essential oil content and number of flowers on a bush confirm the finding.

As regards the composition of essential oil, all variants showed minor deviations from the standard BDS ISO 9842-2004, which are beyond all bounds, due to the influence of different factors that are not object of this study. Variants involving herbicide showed a higher alcohol content compared to control variant. They also reported a higher content of microelements cis and trans-rose oxide, which are

Table 1. Efficiency and selectivity of herbicides in rose oil

Variants	Weeds number per m^2					Selectivity by EWRS
	Annual monocotyledouns	Annual dycotyledouns	Total annual	Perennual	Total	
Untreated control	17	88	105	43	148	1
Raft 400 SC – 1.2 l/ha	3.5	6.5	10	7.5	17.5	1
Raft 400 SC – 1.5 l/ha	2.5	6	8.5	6	14.5	1

EWRS scale - 10 grades (grade 1 - no damage on the crop)

Table 2. Statistics analysis of differences in productive parameters of the variants – year 2009

Variants	Yield flower		Content of essential oil %	Essential oil yield g/ha	Number of flower on one shrub
	kg/ha	%			
Untreated control	4113.3	100	0.04	2056.6	36.33
Raft 400 SC – 1.2 l/ha	5286.6	129	0.05	2803.3	53+
Raft 400 SC – 1.5 l/ha	5856.6	142	0.055	3220+	51.33+
Gd 5%	1464.9			781.7	9.82
Gd 1%	2429.6			1296.6	16.28
Gd 0,1%	4543.7			2424.7	30.46

Table 3. Statistics analysis of differences in productive parameters of the variants – year 2010

Variants	Yield flower		Content of essential oil %	Essential oil yield g/ha	Number of flower on one shrub
	kg/ha	%			
Untreated control	6033.3	100	0.05	2413.3	53.33
Raft 400 SC – 1.2 l/ha	6603.3++	109	0.053	3230+++	54.66
Raft 400 SC – 1.5 l/ha	6576.6++	109	0.055	3620+++	55.33
Gd 5%	236.7			99.9	4.5
Gd 1%	392.5			165.7	7.46
Gd 0,1%	734.1			309.9	13.96

Table 4. Composition of essential oil for the year 2009 - 2010

Variants	Main components			Other components							
	Citronelool+ nerol	Geraniol	Phenylethyl-alcohol	Ethanol	Paraffins			Linalool	Cis rose oxide	Trans rose oxide	Methyl eugenol
					C_{17}	C_{19}	C_{21}				
BDS 150 9842 - 2004	24 - 46	15 - 22		max 2	1.0 - 2.5	8.0 - 15	3.0 - 5.5				
Untreated control	21.136	22.326	0.131	0.026	5.378	15.859	6.992	1.595	0.089	0.039	0.355
Raft 400 SC - 1.2 l./ha	23.863	24.321	0.143	0.025	4.545	14.363	7.882	2.742	0.158	0.048	0.326
Raft 400 SC – 1.5 l./ha	26.52	26.064	0.293	0.02	3.987	10.725	6.789	1.788	0.117	0.058	0.351

an important part of the smell qualities of essential oil (Table 4).

Conclusion

Oxadiargyl (Raft 400 SC) at tested doses shows good efficacy against sensitive annual and some perennial weeds. The studied herbicides preparation exhibits excellent selectivity for oil-bearing rose. The application of the herbicide in both variants proved to have a positive influence on the overall yield of flower and essential oil, compared to untreated controls. For the two reporting years, better results displayed the variants with a dose of annex 1.5 l/ha. Application of herbicide Raft 400 SC at concentrations 1.2 and 1.5 l/ha does not affect the qualitative composition of essential oil.

References

Chaushev G, 1980. Influence of some herbicides on weeds in a rose plantation and mining them, Plant Sciense, 17, 144-147 (Bg).

Margina A, 1994. Conservation of oil rose from weeds. Plant Protection, 10, 15-17 (Bg).

Margina A, Lecheva I and Seykova K, 1999. Diseases, pests and weeds in rose oil, peppermint, valerian and yellow poppies, Forum, Plovdiv, Bulgaria.

Zapryanov H and Marinkov F, 1978. Experimental work with biometrics, Hristo G. Danov, Plovdiv, 242.

Kovacheva N, Rusanov K and Atanasov I, 2010. Industrial cultivation of oil bearing rose and rose oil production in Bulgaria during 21st century, directions and challenges. Biotechnology& Biotechnological Equipment, 24, 2, 1793-1798.

Kovacheva N, Rusanov K and **Atanassov I**, 2010. Adaptive possibility and yield stability of varieties of oil-bearing roses. Agricultural Science and Technology, 2, 2, 61-63.

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Todorov N and Mitev J, 1995. Effect of level of feeding during dry period, and body condition score on reproductive performance in dairy cows, IX[th] International Conference on Production Diseases in Farm Animals, Sept.11 – 14, Berlin, Germany, p. 302 (Abstr.).

Thesis:

Penkov D, 2008. Estimation of metabolic energy and true digestibility of amino acids of some feeds in experiments with muscus duck (Carina moshata, L). Thesis for DSc. Agrarian University, Plovdiv, 314 pp.

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Volume 3, Number 3
September 2011

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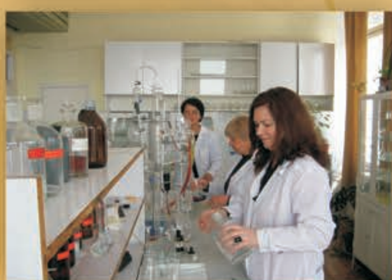

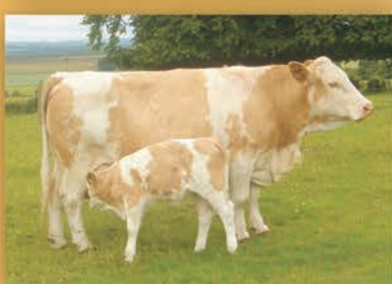

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