Journal of International Scientific Publications: Agriculture and Food

Volume 2, ISSN 1314-8591 (Online), Published at: http://www.scientific-publications.net

EFFECT OF PROHEXADIONE-CALCIUM (REGALIS) ON DIFFERENTIATION OF FLOWER BUDS AND FRUIT SET IN PEAR VAR. PASSE CRASSANE

Maxhun Shehaj[1], Bari Hodaj, [2]Petrit Rama[2], Natasha Hodaj[2]

[1]NOA, Kosova, [2]Agricultural University of Tirana, Albania

Abstract

Summer pruning and Prohexadione-Ca were the strategies that produced the next shortest shoot length; however, summer pruning registered the lowest return bloom and accumulated yield. Prohexadione-Ca did not have any significant negative effect on either return bloom or yield. Prohexadione-calcium (Regalis) as a shoot growth retardant that inhibits gibberellins biosynthesis has been used to improve the differentiation of flower buds and fruit set in Pear var. Passe Crassane. The aim of this study was to evaluate the efficacy of applying Regalis by foliar applications in Passé Crassane pear orchards to reduce tree vigor or shoot growth and to control the alternate fruit production. Three different dosages were tested: 50ppm, 100ppm 150ppm. Regalis treatments ranging from 50 to 150 ppm were compared with control, without treatments. The first treatment was applied 7days after petal fall and the others every 10 days after the first treatment. Three different dosages were tested: 50ppm, 100ppm 150ppm. Regalis treatments ranging from 50 to 150 ppm were compared with control, without treatments. The first treatment was applied 7days after petal fall and the others every 10 days after the first treatment. The data was collected at the full bloom time and two weeks, at the time of fruit set. The flower number and the fruit number was significantly difference after the treatment of 150 ppm and 100ppm than the application of 50ppm and without treatment. The average fruit weight was greater than other treatments and than non treated-trees. Variability in soluble solids concentration (SSC,^{0}Brix) was not significantly different between different treatment (50ppm, 100ppm and 150ppm)

Key words: *Prohexadione-Ca, Regalis, Brix, Growth retardant. Passe Crassane, bloom.*

INTRODUCTION

In order to inhibit excessive vegetative growth in fruit trees are usually used the growth retardants. By other side, the inhibition of vegetative growth (exclusion of apical dominance) may be stimulating differentiation of flower buds. Early workers (6, 7) reported that Prohexadione-Calcium is a plant bio-regulator that is primarily used to inhibit excessive vegetative growth in fruit trees and reduces abortion of fruitlets, thereby increasing fruit set. The production of the next shorter shoot length can be done with summer pruning or the use of Prohexadione-Ca .But the summer pruning registered the lowest return bloom and accumulated yield.(3). While, Prohexadione-Ca did not have any significant negative effect on either return bloom or yield (3). Is evidence that endogenous GA can inhibit floral initiation and that GA can also inhibit floral initiation through effects on shoot growth (2). Also, the Prohexadione-calcium (Regalis) as a shoot growth retardant that inhibits gibberellins biosynthesis, may be used to improve the differentiation of flower buds and fruit set in fruit tree plants. Is evidence that endogenous GA can inhibit floral initiation and that GA can also inhibit floral initiation through effects on shoot growth (1). Other growth retardant as maleic hydrazide increased both endogenous cytokines levels and floral initiation to 'Japanese pear, Pyrus pyrifolia Nakai Has also observed that Pro-Ca did reduce fruit weight in commercial orchards (1), although it appeared that there was no difference in fruit set. Pro -Ca does not leave residue in plants because it is rapidly inactivated within the tree (7)

The objective of this research was to quantify the efficacy Prohexadione-calcium (Regalis) on differentiation of flower buds and fruit set in Pear var. Passe Crassane.

MATERIALS AND METHODS

Investigations of Prohexadione-calcium (Regalis) effect on pear tree cv. Passe Crassane were carried out at the region of Peja, municipality of Kline, Republic of Kosova. The orchard was planted in the spring of 2009. Planting distance were 3 x 1.5 m. Trees were trained as slender spindle. A randomized complete block with four replications, four treatments and two trees per experimental unit was used as the experimental design.

Regalis ranging of treatments were as follow:

1. Control without treatment
2. Treatment with 50 ppm (a.i.) Regalis
3. Treatment with 100 ppm (a.i.) Regalis
4. Treatment with 150 ppm (a.i.) Regalis

The first treatment was applied 7 days after the petal fall, the second 10 days after the first treatment, and the third 10 days after the second treatment

The flower numbers per tree, the number of fruits per tree, the mean weight of the fruits and the SSC (0BRIX) of the fruit in the harvest moment were measured. Differences between means of each treatment were analyzed by the Duncan multiple range test ($P < 0.05$).

RESULTS AND DISCUSSIONS

Table.1 summarizes the results of several experiments with 'Passe Crassane', in which the effects of different dosages of application had been evaluated. The number of flowers per tree was generally reduced by treatments (6-11%) as compared to untreated trees. The number of the flowers was significantly different between untreated trees and the treatment trees with 150 ppm Regalis. Also shoot length was generally reduced by treatments (14.5% to 22 %) as compared to untreated trees.(3). This indicates that the reduction of the shoot length affects in the reduction of the flower number.

Table. 1 - The mean number of flowers per tree

Treatments	R1	R2	R3	R4	Total	Means
'V0 (control)	34.0155	34.9561	41.3443	38.4395	148.7553	37.1888
V1	44.0352	34.6011	39.3578	27.3404	145.3345	36.3336
V2	36.8920	41.7448	29.9914	33.7493	142.3775	35.5944
V3	40.4403	32.1750	28.8607	34.4353	135.9112	33.9778
Total	155.3829	143.4769	139.5542	133.9645	572.3786	
Means	38.8457	35.8692	34.8886	33.4911		143.0946

ANOVA of table 1

Source	DF	SS	MS	F		
				F.statistic	F .distribution	
					95%	99%
Treatments	3	4.653092	1.551031	46.05992**	3.86254	6.9919
Replications	3	0.311115	0.103705	3.079662ns	3.86254	6.9919
Error	9	0.303068	0.033674			
Total	15	5.267276				

Tab 2 shows that the number of fruits was not significantly differ between non-treated trees and treated trees, while decrease of the numbers of the flowers in absolute terms was different between treatments. This means that the treatment with Regalis inhibits number of the flower buds, but improves the fruit set. For this reason the average number of the fruits is equal in treated trees and untreated ones.

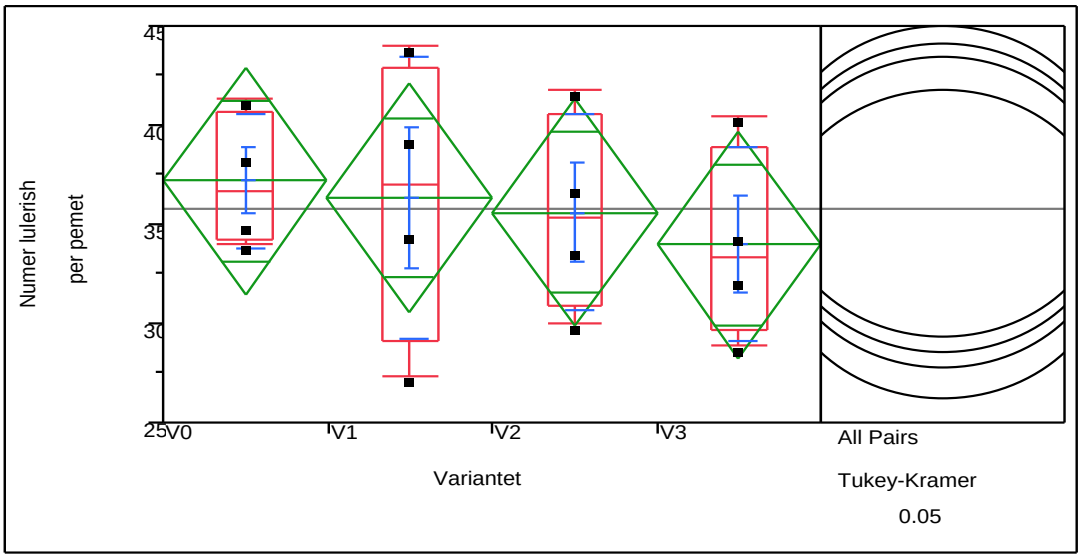


Figura 1. The boxplot Diagram (as per variants, standard deviations and the mean)

Table 2 - The mean of the number of fruits per tree

Treatments	P1	P2	P3	P4	Total	Means
V0(control)	29.9336	34.5212	43.2338	46.1320	153.8206	38.4551
V1	58.1264	41.3293	36.0124	33.0309	168.4990	42.1248
V2	48.4498	47.7262	34.1339	45.3877	175.6976	43.9244
V3	54.8694	42.5195	40.5961	46.1378	184.1228	46.0307
Total	191.3792	166.0962	153.9761	170.6884	682.1400	
Means	47.8448	41.5241	38.4940	42.6721		170.5350

Anova of table 2

Source	DF	SS	MS	F		
				F.statistic	F distribution	
					95%	99%
Treatments	3	123.6991	41.23305	0.601035ns	3.86254	6.9919
Replications	3	182.1009	60.70029	0.8848ns	3.86254	6.9919
Error	9	617.4307	68.60342			
Total	15	923.2307				

Evaluation of the data from Table 3 and Table 4 shows that the decrease of the flowers number does not affects to the weight of the fruits and the SSC. This means that the buds formed on the trees treated with Regalis may be have less competition from the apical dominance. This is not affects in the number of the flowers and the fruits but the possibility of the differentiation the flowering buds tmay be greater for the next year. This has been

confirmed by other authors. Excessive vigor could be considered to competitively inhibit flowering through hormonal control.

Table 3 The mean weight of the fruits(gr)

Treatments	R1	R2	R3	R4	Total	Means
V0(control)	197.4570	232.4620	229.1870	230.2320	889.3380	222.3345
V1	200.7343	236.9545	225.1050	233.4483	896.2421	224.0605
V2	202.8844	242.5996	227.5161	237.9808	910.9808	227.7452
V3	217.1295	243.9734	234.8708	227.8837	923.8573	230.9643
Total	818.2052	955.9894	916.6789	929.5447	3620.4183	
Means	204.5513	238.9974	229.1697	232.3862		905.1046

ANOVA of table 3

Source	DF	SS	MS	F		
				F.statistic	F.distribution	
					95%	99%
Treatments	3	178.3311	59.44369	2.217336ns	3.86254	6.9919
Replications	3	2718.015	906.005	33.79531**	3.86254	6.9919
Error	9	241.2774	26.80861			
Total	15	3137.624				

Table 4. SSC (^{O}BRIX) in the harvesting moment

Treatments	R1	R2	R3	R4	Total	Means
V0	13.0786	12.9347	11.1034	11.0872	48.2038	12.0510
V1	11.5342	11.7135	12.2567	12.0080	47.5123	11.8781
V2	12.1568	12.1205	11.0942	11.4145	46.7860	11.6965
V3	11.1340	13.2980	11.2456	12.0450	47.7226	11.9307
Total	47.9036	50.0666	45.6999	46.5547	190.2247	
Means	11.9759	12.5166	11.4250	11.6387		47.5562

ANOVA of table 4

Source	DF	SS	MS	F		
				F. statistic	F distribution	
					95%	99%
Tretments	3	0.260574	0.086858	0.154128ns	3.86254	6.9919
Replications	3	2.717934	0.905978	1.60764ns	3.86254	6.9919
Error	9	5.071907	0.563545			
Total	15	8.050414				

CONCLUSIONS

Final flowers buds were generally reduced by treatments with Regalis as compared to untreated trees. The number of the fruits was not significantly different between treatments and untreated trees. To define the right application doze and the timing more researches and experiments are required.





Picture A (treated shoots in winter period and in flowering stage)

Picture B (Untreated shoots at the flowering stage)



REFERENCES

Duane W. Greene1 The Effect of Prohexadione-calcium on Fruit Set and Chemical Thinning of Apple Trees HortScience October 2007 vol. 42 no. 6 1361-1365

John D. Wilkie, Margaret Sedgley and Trevor Olesen Regulation of floral initiation in horticultural trees Journal of Experimental Botany, Vol. 59, No. 12, pp. 3215–3228, 2008

Luis Asin,Simo alegre,Ramon Monsterrat(2007) Effect of paclobutrazol,prohexidione-ca,deficit irrigation,summer pruning and root pruning on shoot growth, yeld,and return bloom, ina "Blanquilla pear orchard. Scientia Horticulturae 2007 | 113 | 2 | 142-148

Maxhun Shehaj,Petrit Ramaj, Bari Hoda(2013) Effect of prohexadione-calcium(Regalis) on shoot growth in Pear var. Passe Crassane Albanian j. agric. sci. 2013;12 (2): 163-165

Smit J, J. Meintjes, G. Jacobs, P. J. C. Stassen, K. I. Theron(2005) Shoot growth control of pear trees (Pyrus communis L.) with prohexadione-calcium. Scientia Horticulturae.Sci.Hort-Amstredam.01/2005;106 (4):515-529. DOI:10.1016/j.scienta.2005.05.003

Rademacher.w, Spinelli.f,and costa.c(.2006).prohexadione-ca:modes of action of a multifiunctional plant bioregulator for fruit trees.Acta Hort.727:97-106

Tadeusz Jacyna, Tomasz Lipa, 2010; Direct and apparent residual Effects of prohexadione – calcium applied to young cropping sweet cherry trees; acta agrobotanica Vol. 63 (1): 87–92 2010

Vilardell. P, Pages J.M. and Asin, L.(2008). Effect of bioregulator applications on fruit set in „Abate Fetel‟ pear trees. Acta Hort. 800: 169-174;

W. Rademacher1), K. van Saarloos2), J. A. Garuz Porte3), F. Riera Forcades3), Y. Senechal4) C. Andreotti5), F.Spinelli5), E. Sabatini5) and G. Costa5) 2004 Impact of Prohexadione-Ca on the Vegetative and Reproductive Performance of Apple and Pear Trees Europ.J.Hort.Sci., 69 (6). S. 221–228, 2004, ISSN 1611-4426.