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RESIDUAL BEHAVIOUR OF PACLOBUTRAZOL ON AND IN FRUITS AND LEAVES OF VINE CROP.

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Abstract

Vine trees were treated with Paclobutrazol 25% W/V at the rate of 240 ml per feddan in the vine orchard of the Horticulture Research Institute, ARC, Giza on May8,1988. Residues of Paclobutrazol were determined using a simple modified technique in the fruits and leaves of vine. Persistence, penetration, pre - harvest intervals , half life value and effect of washing and boling after the washing process were also evaluated.

The data obtained indicated that Paclobutrazol is highly penetrative in the leaves immediately after application. Fast degradation of the compound during the first day was folloowed by a slow decomposition during the consequent intervals on and in the leaves.

Paclobutrazol was of short persistence having a half life value of 14.4 hours. No residues wer detected in vine fruits and the pre - harvest intervals reached one day as determined for washed and boiled leaves.

INTRODUCTION

Paclobutrazol is effective on a wide range of plant species where its principal mode of action is to inhibit gibberellin biosynthesis, thus inducing retardation of vegetative growth.

Studying the residual behaviour of Paclobutrazol residues is important to determine whether the compound exists on and in edible portions of vine crop ar not .

Pre - harvest intervals and half life values as well as the effect of washing and boiling processes on reducing Paclobutrazol residues on and in vine leaves were investigated.

MATERIALS AND METHODS

Paclobutrazol 25% a.i. (2RS. 3RS)- 1 - (4 - chlorophenyl) - 4, 4-dimethyl - 2- (1 H - 1,2, 4. triazol - 1 - yl) pentan - 3- 0l (Cultar) W/V was applied by the rate of 240 ml / f (600 litre of water) to vine trees (Romme Red) located in the orachard of the Horticulture Research Institute. The date of appliccation started on May 8 , 1988 by means of high pressure reciprocating pump and manually operated spray gun. Leaf samples were taken one hour following application and then occasionally until 120 days. Each sample was sub - Sampled to three equal portions , unwashed, washed with water, washed then boiled for 3 minutes. Control samples were picked from the untreated plot and were exposed to the same process. Fruit samples were also picked 120 days following application when the crop was ready for marketing. Three replicates wete taken from each leaf and fruit samples.

Extraction procedure

The leaves were cut into small pieces then transferred into a Waring blender using methanol as a suitable solvent for stripping the Paclobutrazol residues (Anonymous 1984). It was added at the rate of 2 ml per one gram sample and then blended for 3 minutes. The extracts wetre filtered through a bed of cotton into 250 ml graduated cylinder. A known volume was taken from the filterate, transferred to 250 ml separatory funnel then extracted with 50 ml of chloroform. Extraction was repeated three more times using 30 ml portion of chloroform in each. Extracts were collected together then evaporated to dryness.

Clean-up procedure

The residues were cleaned up according to Johnson (1963) and Hegazy(1971) using coagulatin solution (0.5 ammonium chloride and 1ml phosphoric acid 85% in 400 ml water) . The residues were redissloved in 5ml methanol and 10 ml of freshly prepared coagulating soution then thoroughly mixed. The contents were quantitatively transferred and filtered through 2.5 cm layer of Hyflo - super - cel packed in a chromatographic column 25 mm in diameter. Filtration was then transferred to 250

ml separatory funnel and extracted with 30 ml chloroform. Extraction was then concentrated to 2 ml and transferred to glass stoppered test tube, then evaporated to dryness and a known volume of n - hexane was added for quantitative determination.

Gas liquid chromatography determination

Pye Unicam 104 gas chromatograph equipped with electron capture detector was used for determination of Paclobutrazol residues, under the conditions : 2.1m 4mm i.d. glass column packed with 1.5% OV - 17 + 1.95% OV - 210 on gas chromosorb Q 80 - 100 mesh, carrier gas (N2) flow rate 65 ml / min, injection port temperature 245°C, column teperature 240° C and detector temperature 250°C.

The average rates of recovery were 100 and 88% in leaves and fruits, respectively and the limit of determination reached 0.005 mg/kg.

RESULTS AND DISCUSSION

Persistence of residues on and in vine leaves and fruits

Amounts of Paclobutrazol residues detected on and in unwashed, washed, washed then boiled vine leaves samples at different periods following application as well as residues on and in vine fruits are demonstrated in Table 1. The initial deposit on and in unwashed leaves (48.12ppm) decreased to 8.88, 9.09, 5.87, 3.21, 1.5 and 0.22 ppm after 1,3,10,15,30 and 60 days from application, respectively.

At the same intervals, washed leaves contained residual amounts of 23.31 , 2.93,1.57, 2.29 , 0.24 and 0.071 ppm, respectively. However, on the 90th day following application no residues were detected in the leaves. Paclobutrazol solubility in water is 35 ppm (Anonymous, 1987). The data obtained for unwashed and washed leaves showed a pronounced penetration in the leaves (23.31 ppm out of 48.12 ppm) during the first hour after application. Considering the persistence of the chemical under field cnditions, a fast degradation occurred within the first 24 hours (48.12ppm decreased to 8.88 ppm) followed by a slow decomposition through the succeeding expermintal periods until it disappeared completely after three months from application.

Table 1. Residues of paclubtrazol on and in vine leaves and fruits and the effect of washing and boiling processes on residues in the leaves.

Time of treatment (days)	Residues (ppm) on and in the leaves		
	Unwashed	Washed	Washed then boiled
0**	48.12	23.31	2.96
1	8.88	2.39	0.27
3	9.09	1.47	1.06
10	5.87	1.52	1.43
15	3.21	2.29	0.187
30	1.50	0.24	0.115
60	0.22	0.017	0.01
90	not detected	not detected	not detected
120	not detected	not detected	not detected
	Residues (ppm) in the fruits		
120	not detected.		

* 0 day = One hour after application.

The half life value (RL_{50}) of paclobutrazol as estimated from the persistence curve was less than one day (14.4 hours). This short persistence in the leaves could be due to climatic factors leading to extensive metablolism.

Paclobutrrazol residues were not detected in riped vine fruit samples collected 120 days following application (Table 1). This perfectly coincided with a similar published work (Anonymous, 1987)

Determination of pre-harvest intervals

As vine leaves are used in human consumption, it is important to determine the pre - harvest interval (PHI) that should pass after the last applicatiion with the chemical and before marketting . The determination of PHI of Paclobutrazol on vine leaves was based on unwashed samples . The maximum residue limit (MRL) of Paclobutrazol in vine fruits is 0.15 ppm (Anonymous, 1987), while is 1.5 ppm in the leaves (personal communication). According to the data obtained, PHI could be determined after 30 days from application at which residues in the unwashed leaves reached 1.50 ppm.

Effect of washing and boiling processes

Table 2 demonstrates reduction percentages of pacloburtazol reiduses on vine leaves subjected to washing and to boiling following washing. While washing reduced high amounts of Pacloburazol residues from the vine leaves, washing followed by boiling resulted in higher percentage reduction rates. One hour after application, the residues reached 51.56% and 93.84% following washing and boiling, respectively. After one day the percentages of reduction reached 73.09 and 96.96%, respectively.

Table 2. precentage reduction of paclobutrazol residues in leaves through washing and boiling processes.

Days after treatment	% Reduction	
	Washing	Washing and boiling
0	51.56	93.84
1	73.09	96.96
3	82.77	88.34
10	73.97	75.51
15	82.66	94.17
30	84.00	92.33
60	67.73	95.46
90	---	---
120	---	---

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متبقيات الباكلوبيوترازول(كلتار) علي ثمار وأوراق العنب

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المعمل المركزي للمبيدات – مركز البحوث الزراعية – الدقي – مصر

عومل العنب صنف رومي أحمر بمركب الباكلوبيوترازول (كلتار) ٢٥٪ وزن حجم بمعدل ٢٤٠ سم ٣ للفدان وذلك في مزرعة معهد بحوث البساتين (مركز البحوث الزراعية) بالجيزة في تاريخ ١٩٨٨/٥/٨، وبتحليل عينات ثمار العنب التي جمعت بعد ١٢٠ يوما من المعاملة وبواسطة طرق التحليل الكروماتوحجرافي الغازي لم يتبين بها آثار من المركب. أما بالنسبة لعينات الأوراق فقد قدرت متبقيات المركب علي فترات من المعاملة وأخذ منها عينات غير مغسولة وعينات مغسولة وعينات مغسولة ثم تم سلقها في ماء يغلي لمدة ٣ دقائق وهي الطريقة المتبعة في استعمال ورق العنب للتغذية الأدمية في مصر . ووجد أن كمية المتبقي علي اوراق العنب بعد الرش مباشرة كانت ٤٨,١٢ جزءً في المليون انخفضت الي ٨,٨٨ ، ٩,٠٩ ، ٥,٨٦ ، ٣,٢١ ، ١,٥ ، ٢٢, جزء في المليون بعد ١، ٣، ١٠، ١٥، ٣٠، ٦٠ يوماً علي التوالي. وبعد ثلاثة أشهر لم توجد أي اثار متبقية من المركب.

أما في حالة الأوراق المغسولة فكانت الكمية المقدرة هي ٢٣,٣١ جزء في المليون ثم انخفضت الي ٢,٣٩ ، ١,٥٧ ، ١,٥٢ ، ٢,٢٩ ، ٠,٢٤ ، ٠,٠٧١ جزء في المليون في نفس الفترات السابقة علي التوالي.

وفي حالة الأوراق المغسولة والتي تم سلقها لمدة ٣ دقائق فكانت الكمية المقدرة بعد المعاملة مباشرة هي ٢,٩٦ جزء في الميلون إنخفضت إلي ٠,٢٧ ، ١,٠٦ ، ١,٤٣ ، ٠,٠١٨٧ ، ٠,٠١١٥ ، ٠,٠١ جزء في الميلون علي مدي نفس الفترات السابقة علي التوالي.

وحيث أن الكمية المسموح بها علي ثمار العنب والأوراق علي التوالي هي ٠,١٥ ، ١,٥ جزء في المليون فانه يمكن استعمال اوراق العنب كغذاء بعد اليوم الأول من الرش.