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夏油及數種殺蟲劑對桑介殼蟲及梨圓介殼蟲之防治效果[1]

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摘　要

桑介殼蟲(*Pseudaulacaspis pentagona* Targ.-Tozz.)及梨圓介殼蟲(*Quadraspidiotus perniciosus* Comstock) (Homoptera : Diaspidae)皆是爲害果樹及觀賞樹木的重要害蟲。本試驗目的在比較夏油與數種慣用的殺蟲劑，對上述兩種盾介殼蟲的防治效果。針對桃樹的桑介殼蟲及梨樹的梨圓介殼蟲分別進行試驗。結果顯示，夏油乳劑能有效控制桑介殼蟲及梨圓介殼蟲的族群，且防治效果明顯優於其他數種殺蟲劑。然而，夏油施用後會對於桃樹花苞、葉片及幼嫩枝條產生藥害，宜推薦作爲落葉果樹萌芽期前的防治藥劑，至於滅大松乳劑則適用於植株生長期。

關鍵字：夏油、桑介殼蟲、梨圓介殼蟲、防治。

前　言

桑介殼蟲(*Pseudaulacaspis pentagona* Targ.-Tozz.)及梨圓介殼蟲(*Quadraspidiotus perniciosus* Comstock)同屬同翅目(Homoptera)，盾介殼蟲科(Diaspidae)，皆爲廣佈世界爲害果樹及觀賞植物之重要盾介殼蟲類(armored insect)害蟲之一[(1,2)]。桑介殼蟲多棲息在果樹之樹幹、分枝及小枝上，當嚴重感染時，甚至全株死亡。梨圓介殼蟲雌蟲寄生於枝幹或枝條分叉處、果實的萼凹及果柄附近，雄蟲則常寄生於葉片主脈兩側。梨果被害後發生黑褐色斑點，斑點隨時間逐漸擴大，嚴重時果面呈龜裂狀。

礦物油類是最早用於介殼蟲類防治的藥劑，由於礦物油僅對幼齡期介殼蟲有效，且對植物造成藥害，遂逐漸由有機磷類或氨基甲酸鹽類等接觸性殺蟲劑所取代。然而，由於此類殺蟲劑的專一性不強，且對於溫血動物具有神經毒性。因此，較安全的昆蟲生長調節劑被篩選爲防治藥劑[(9)]。由於盾介殼蟲類會分泌腊質，在身體外表形成介殼，爬行期的若蟲可藏匿在成蟲的介殼之下，避免直接接觸殺蟲劑及天敵[(5,8)]，造成防治效果不佳。夏油(summer oil)雖爲礦物油類的一種，但施用高劑量的夏油對於盾介殼蟲類防治有極佳的效果(劉，未發表資料)。因此，本試驗目的即在比較夏油及數種殺蟲劑，對於桑介殼蟲及梨圓介殼蟲的防治效果。

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材料與方法

夏油及數種殺蟲劑對桃樹桑介殼蟲防治試驗

試驗地點分別於台中縣東勢鎮一處及新社鄉兩處，以熱帶水蜜桃爲供試作物品種。藥劑種類及濃度分別爲95% 夏油乳劑20倍、40%滅大松乳劑1,000倍、44%大滅松乳劑1,000倍、40%丁基加保扶可濕性粉劑1,200倍及25%芬諾克可濕性粉劑1,500倍，對照組則不施藥處理。採逢機完全區集設計(RCBD)，每小區2株，每株皆標定5個枝條，4重覆。當發生桑介殼蟲蟲體時施藥一次。於施藥前當日及施藥後7、14、21天各調查一次，調查標定枝條上桑介殼蟲之活蟲數目，換算防治率。

夏油及數種殺蟲劑對梨樹梨圓介殼蟲防治試驗

試驗地點分別位於台中縣東勢鎮及新社鄉，以橫山梨爲供試作物品種。藥劑種類及濃度分別爲95% 夏油乳劑20倍、95%夏油乳劑30倍、40%滅大松乳劑800倍及40.8%陶斯松乳劑2,000倍，並以不施藥處理爲對照。採逢機完全區集設計，每小區2株，每株皆標定5個枝條，4重覆。於冬季落葉後，春季萌芽前發生梨圓介殼蟲蟲體時施藥一次。於施藥前當日及施藥後7、14、21天各調查一次，調查標定枝條上梨圓介殼蟲之活蟲數目，換算防治率。

統計分析

田間藥劑防治試驗計算公式如下：

防治率(%)=【1-(處理區施藥後蟲數x對照區處理前蟲數)/(處理區施藥前蟲數x對照區處理後蟲數)】x100%。蟲數經(x+0.5)1/2轉換後，以鄧肯氏多變域分析法比較各處理間是否達到1%或5%顯著性差異。

結果與討論

夏油及數種殺蟲劑對桃樹桑介殼蟲防治試驗

東勢鎮及新社乙區的試驗結果顯示，95%夏油乳劑20倍，施藥後7天防治率即高達90%以上。夏油在桑介殼蟲的防治效果上顯著地優於其他處理，有機磷類的滅大松及大滅松處理間未達到顯著性差異，氨基甲酸鹽類的丁基加保扶及昆蟲生長調節劑的芬諾克防治效果最差(表一、三)。夏油作用模式爲阻礙呼吸作用以達到防治介殼蟲類的目的[3]，由新社乙區施藥後21天的防治率仍高達97.7%(表三)，可見夏油可有效地控制桃樹桑介殼蟲的族群。然而，試驗期間發現，若於桃樹休眠期連續施藥兩次，花苞及幼嫩枝條會因藥害而枯死；若於植株生長期施用，則會造成葉片黃化落葉。因此，高劑量夏油的施用時間應限制在桃樹休眠期使用，開花萌芽後避免使用。至於其他藥劑則無藥害情形發生。在本試驗中效果僅次於夏油的滅大松，對於桑介蟲族群的控制也有不錯的效果[3,5]。芬諾克爲青春激素(juvenile hormone)的類似物，可扮演昆蟲生長調節劑的角色，具有廣效性的昆蟲毒性[7]，一般用於防治初齡及生長中之介殼蟲，對成蟲無明顯藥效。在Bakircioglu Erkilis和Uygun[3]發表的桃樹的試驗中，所施用的芬諾克對中度族群的桑介殼蟲有較佳的防治效果，在本試驗中其防治效果則相當有限。

表一、夏油及數種殺蟲劑對桃樹桑介殼蟲之防治效果(地點：東勢)

Table 1. Effect of summer oil and various insecticides for control the white peach scale on peach (location : Tungshih)

Insecticides and diluted rate		No. scale before test	Days after treatment					
			7		14		21	
			No. scale	Control	No. scale	Control	No. scale	Control
				%		%		%
95% summer oil	20×	173.8	16.4a*	90.7	9.2a	94.2	5.7a	96.0
40% methidathion	1000×	159.6	134.7e	16.8	82.9b	42.8	50.9b	60.9
44% dimethoate	1000×	114.2	103.1b	11.0	83.4b	19.5	49.6b	46.7
40% carbosulfan	1200×	149.2	122.5c	19.0	110.3c	18.5	67.2c	44.7
25% fenoxycarb	1500×	137.7	135.9e	0	112.5cd	10.0	85.4d	23.9
Control		129.6	127.4d	-	117.6d	-	105.6e	-

* Means followed by the same letter within each column are not significantly different at P=0.05 by Duncan's multiple range test.

表二、夏油及數種殺蟲劑對桑介殼蟲之防治效果(地點：新社甲區)

Table 2. Effect of summer oil and various insecticides for control the white peach scale on peach (location : Hsinshe No. 1)

Insecticides and diluted rate		No. scale before test	Days after treatment					
			7		14		21	
			No. scale	Control	No. scale	Control	No. scale	Control
				%		%		%
95% summer oil	20×	125.9	11.4a*	91.3	7.5a	93.2	4.2a	96.6
40% methidathion	1000×	138.4	112.4cd	22.2	82.1c	32.0	53.1b	60.4
44% dimethoate	1000×	102.1	87.3b	18.1	69.9b	21.6	53.5b	45.9
40% carbosulfan	1200×	140.2	104.9c	28.3	95.3d	22.1	81.3c	40.1
25% fenoxycarb	1500×	131.9	142.2e	0	116.9f	0	109.6d	14.2
Control		124.7	124.7d	-	104.3e	-	115.7d	-

* Means followed by the same letter within each column are not significantly different at P=0.05 by Duncan's multiple range test.

夏油及數種殺蟲劑對梨樹梨圓介殼蟲防治試驗

夏油及數種殺蟲劑對梨樹梨圓介殼蟲之田間防治效果，與桃樹桑介殼蟲實驗結果一樣，95%夏油乳劑對梨圓介殼蟲的防治效果亦優於其他處理，並達到顯著性差異。滅大松其次，陶斯松效果最差(表四、表五)。且試驗期間，各處理皆未對梨樹葉片或花苞造成藥害。

除了有翅型的雄成蟲外，爬行期及新落居(settled)的若蟲爲盾介殼蟲類最脆弱的階段，常成爲化學藥劑施用的目標。本試驗雖未針對各齡期蟲體進行室內試驗，然而由試驗期間觀察得知，桑介殼蟲以雌成蟲狀態越冬，雌成蟲藏匿在自體分泌的圓盤狀的腊質覆蓋物中，並平貼於桃樹枝條背面，此點與Davidson等[6]報告中所述相同。梨圓介殼蟲在寒冷的中歐是以初齡若蟲越冬，在較溫暖的南歐則所有齡期皆可越冬[4]。同樣地，在台灣冬季，亦可發現各齡期的梨圓介殼蟲。梨圓介殼蟲在較溫和的冬季，雖然發育稍顯遲緩，但並未真

表三、夏油及數種殺蟲劑對桑介殼蟲之防治效果(地點：新社乙區)

Table 3. Effect of summer oil and various insecticides for control the white peach scale on peach (location : Hsinshe No.2)

Insecticides and diluted rate		No. scale before test	Days after treatment					
			7		14		21	
			No. scale	Control	No. scale	Control	No. scale	Control
				%		%		%
95% summer oil	20×	62.1	9.7a*	86.3	5.0a	93.4	2.0a	97.7
40% methidathion	1000×	105.2	91.2d	23.7	71.2c	44.7	47.2b	68.0
44% dimethoate	1000×	89.6	75.4b	25.9	65.4b	40.3	64.9c	48.3
40% carbosulfan	1200×	80.5	76.1b	16.8	63.8b	35.2	62.8c	44.3
25% fenoxycarb	1500×	91.2	104.2e	0	97.2d	12.9	90.1d	29.5
Control		85.9	97.6d	-	105.1e	-	120.4e	-

* Means followed by the same letter within each column are not significantly different at P=0.05 by Duncan's multiple range test.

正進入冬眠現象，往往各個齡期的蟲體皆可越冬[4]。一般認爲，夏油僅對初齡爬行期若蟲有效果，所使用的濃度爲1,000倍稀釋[3]，然而，本試驗結果顯示，高劑量的夏油對於以雌成蟲越冬的桑介殼蟲，及不同齡期越冬季的梨圓介殼蟲，皆有優異的防治效果(表一至表五)。且夏油對於桑介殼蟲的天敵 *Chilocorus bipustulatus* (L.) (Col. : Coccinellidae) 及 *Cybocephalus fodori minor* (Col. : Cybocephalidae) 僅造成輕度的爲害。然而，滅大松則造成中度程度以上的爲害[3]。

表四、夏油及數種殺蟲劑對梨圓介殼蟲之防治效果(地點：東勢)

Table 4. Effect of summer oil and various insecticides for control the San Jose scale on pear (location : Tungshih)

Insecticides and diluted rate		No. scale before test	Days after treatment					
			7		14		21	
			No. scale	Control	No. scale	Control	No. scale	Control
				%		%		%
95% summer oil	20×	103	24.8a	81.7	7.0a	95.9	5.3a	96.8
95% summer oil	30×	127	60.0ab	64.1	51.3ab	75.8	56.0b	72.6
40% methidathion	800×	175	81.3b	64.7	87.8b	69.9	99.8c	64.6
40.8% chlorpyrifos	2000×	239	182.0c	42.1	185.5c	53.4	204.8d	46.8
Control		144	189.5c	-	240.0c	-	231.8d	-

* Means followed by the same letter within each column are not significantly different at P=0.01 by Duncan's multiple range test.

由以上結果顯示，95%夏油乳劑20倍稀釋液，對於桑介殼蟲及梨圓介殼蟲有優異的防治效果。而且僅須施藥一次，即可有效抑制盾介殼蟲類的族群。相較於一般農民反應，使用有機磷類的滅大松、大滅松及陶斯松或氨基甲酸鹽類的丁基加保扶，連續施藥兩次後效果依然不佳，故夏油可作爲盾介殼蟲類防治上的替代選擇。然而，由於高劑量的夏油施用

於休眠期的桃樹，會造成花苞及初生嫩葉有藥害的情形，因此推薦於冬季落葉後，春季萌芽期前，發現蟲體時施藥一次。休眠期外，則以滅大松作爲防治藥劑。此外，冬季修剪果樹時，將有介殼蟲附著的枝條剪除並燒毀，藉以有效防除盾介殼蟲類的爲害。

表五、夏油及數種殺蟲劑對梨圓介殼蟲之防治效果(地點：新社)

Table 5. Effect of summer oil and various insecticides for control the San Jose scale on pear (location : Hsinshe)

Insecticides and diluted rate		No. scale before test	Days after treatment					
			7		14		21	
			No. scale	Control	No. scale	Control	No. scale	Control
				%		%		%
95% summer oil	20×	401	59.5a*	86.3	12.3a	97.4	7.5a	98.6
95% summer oil	30×	392	91.3a	78.5	92.3b	80.0	109.0b	79.3
40% methidathion	800×	359	180.3b	53.7	141.0c	66.6	151.8bc	68.5
40.8% chlorpyrifos	2000×	266	209.8c	27.3	140.3c	55.1	184.0c	48.5
Control		317	344.0c	-	372.3d	-	426.0d	-

* Means followed by the same letter within each column are not significantly different at P=0.01 by Duncan's multiple range test.

參考文獻

1.周堯 1985 中國盾蚧誌 (第二卷)陝西科學技術出版社。

2.陶家駒 1999 中國介殼蟲總科(同翅目)名錄 p.176 台灣省農業試驗所(編)。

3.Bakircioglu Erkilis L. and N. Uygun. 1997. Studies on the effects of some pesticides on white peach scale, *Pseudaulacaspis pentagona* (Targ.-Tozz.) (Homoptera: Diaspidae) and its side-effects on two common scale insect predators. Crop Prot. 16 (1) : 69-72.

4.Beardley, Jr. J. W. and R. H. Gonalez. 1975. The biology and ecology of armored scales. Ann. Rev. Entomol. 20 : 47-73.

5.Bobb, M. L., J. A. Jr. Weidhaas and L. P. Ponton. 1973. White peach scale: Life history and control studies. J. Econ. Entomol. 66 : 1290-1292.

6.Davidson, J. A., D. R. Miller and S. Nakahara. 1983. The white peach scale, *Pseudaulacaspis pentagona* (Targioni-Tozzetti) (Homoptera: Diaspidae): evidence that current concepts include two species. Proc. Entomol. Soc. Wash. 85 : 753-761.

7.Dhadialla, T. S., G. R. Carlson and D. P. Le. 1998. New insecticides with ecdysteroidal and juvenile hormone activity. Ann. Rev. Entomol. 43 : 545-569.

8.Hanks, L. M. and R. F. Denno. 1993. The white peach scale, *Pseudaulacaspis pentagona* (Targioni-Tozzetti) (Hom. : Diaspidae) life history in Maryland, host plants and natural enemies. Proc. Entomol. Soc. Wash. 95 : 79-98.

9.Staal, G. B. 1975. Insect growth regulators with juvenile hormone activity. Ann. Rev. Entomol. 20 : 417-460.

Effects of Summer Oil and Various Insecticides on *Pseudaulacaspis pentagona* (Targ.-Tozz.) and *Quadraspidiotus perniciosus* (Comstock) (Homoptera : Diaspidae)[1]

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ABSTRACT

White peach scale (*Pseudaulacaspis pentagona* Targ.-Tozz.) and San Jose scale (*Quadraspidiotus perniciosus* Comstock) (Homoptera : Diaspidae) are two important insect pests of fruit and ornamental trees. The effectiveness of summer oil and various practical insecticides were evaluated under field conditions. White peach scale was examined on peach trees and San Jose scale was examined on pear trees. The populations of white peach scale and San Jose scale were successfully control by summer oil, which revealed a significantly difference with other insecticides, respectively. However, summer oil may be harmful the flower bud, leaves and young branch of plants. Therefore, summer oil should be applied at dormancy of deciduous hosts, before the sprout period. As regards methidathion was used at growth stage.

Key words: summer oil, *Pseudaulacaspis pentagona*, *Quadraspidiotus perniciosus*, control.

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