

# Mirex 誘餌防治鳳梨園螞蟻試驗<sup>1</sup>

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## 緒言

粉介殼蟲 *Dysmicoccus brevipes* Ckll. 爲害所引起之鳳梨萎凋病，爲鳳梨最嚴重之病害。而粉介殼蟲之生存，係藉螞蟻之維護，故欲使鳳梨粉介殼蟲萎凋病防治獲得確切之效果，對鳳梨園螞蟻之防治應同時進行。

二十年來在臺灣推行於鳳梨園之螞蟻防治，多用氯化烴劑（Chlorinated hydrocarbons），如 DDT, Aldrin 等，尤以後者用得最多，效果非常良好。由於氯化烴劑有較長之殘效，其藥效在田間可維持數月之久。Gannon (1958) 發現 Aldrin 在土壤中部份氧化而爲 Dieldrin，使其藥效既長且毒，爲最佳之土壤害蟲殺蟲劑。

最近十年來，由於生態學家認爲殺蟲劑應用之後，不但破壞了生態環境，且產生環境污染問題，因此對該類殺蟲劑之應用價值必需加以重估。許多先進國家，對以往被認爲殘效長之氯化烴殺蟲劑，均紛紛宣佈停止應用。因此，在本省應用於鳳梨園螞蟻防治多年之 Aldrin 亦擬停用，同時並加緊探求可替代之其他殺蟲劑，以免影響鳳梨事業之發展。

Lofgren *et al.* (1961), Stringer *et al.* (1964), Banks *et al.* (1973), 曾先後用 Mirex 在美國防治 Imported fire ants, *Solenopsis invicta* Buren, 均獲優異效果。夏威夷鳳梨研究所亦於1966年開始用 Mirex 作鳳梨園螞蟻防治試驗，至1970年作較大面積防治試驗，以空中撒施，每英畝用 0.3% Mirex 2.5 磅，一次施用之後，幾可維持將近一年之久。現夏威夷已大面積採用 Mirex 替代氯化烴劑，防治鳳梨園螞蟻。

1972年8月，本分所接受惠豐股份有限公司委託，以 0.3% Mirex 作鳳梨園螞蟻防治試驗。茲將試驗結果報告如後。

## 材料與方法

臺灣鳳梨園之螞蟻，據記載有 *Pheidologeton diversus* Jerdon, *Anoplolepis longipes* Jerdon, *Camponotus friedae* var. *amia* Ferel 等種。供試殺蟲劑用 0.3% Mirex 誘餌，每公頃施用 3 公斤，及 40% Aldrin WP 每公頃施用 5 公斤，並以不施藥爲對照。試驗區設於本分所鳳梨園，供試鳳梨係在61年9月中旬種植，小區面積爲15×15公尺=225平方公尺，行距50公分，畦距100公分，株距30公分，每小區種鳳梨20行，兩列式，每行種50株，合計 1,000株，三處理，重複4次，計12小區，爲逢機完全區集設計。

施藥時間，原定在61年10月中旬舉行，但因新植鳳梨園螞蟻密度太低，且冬、春二季因氣溫較低，故螞蟻活動較少。至62年5月螞蟻密度增多時乃開始施藥。施藥量按已定之面積施用，每小區施用 Mirex 67.5 公克，手戴橡皮手套，均勻撒施。每小區施用 40% Aldrin WP 112.5 公克，加水 1,500cc 均勻噴於鳳梨園土面。

施藥前先調查每小區螞蟻之密度，調查方法，用粗鉛絲作成每邊各50公分之正方形框一個，放在鳳梨園地面，計算鉛絲框內活動之螞蟻數，在畦間之兩端各調查一處，隔畦調查，即每小區調查10處

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。施藥後10, 30, 60, 100, 和140天各調查一次, 以測定該殺蟲劑之藥效可維持若干時日。

### 研究結果

據歷次調查結果列示如表1。就 Mirex 與 Aldrin 對螞蟻之防治結果比較之, 前者之效果顯較後者為差, 收效亦遲, 但二者藥效在臺灣南部夏季約可維持100天左右。據 Stringer (1964) 之解釋, Mirex 之殺蟻雖較遲緩, 此亦係其優點, 因其藥效若呈現得太快, 則其他未死之螞蟻必不敢再接觸該誘餌, 而致影響其誘殺之意義。

本試驗區因受場地之限制, 致試驗區之面積太過狹小, 由小區之中央至其邊緣平均僅有 7.5公尺, 距離太短, 隣區之螞蟻容易互為侵入, 因而影響調查時該區實際之螞蟻密度。

表 1. Mirex 誘餌防治鳳梨園螞蟻結果  
Table 1. Results of ant control in pineapple field by mirex bait

調 查 時 間 Counted at indicated dates	螞蟻平均數/0.25平方公尺 Avg. No. of ant/0.25m <sup>2</sup>		
	Mirex	Aldrin	Check
5/V/1973 處理前 Pretreatment	46.25	42.00	45.50
18/V 處理後10天 10 days after treatment	11.25	7.25	29.95
7/VI 處理後30天 30 days after treatment	2.25	0.50	2.50
7/VII 處理後60天 60 days after treatment	9.75	8.50	17.25
16/VIII 處理後100天 100 days after treatment	2.75	0.75	4.00
25/IX 處理後140天 140 days after treatment	15.25	11.00	13.00

另一現象為處理前調查時, 各試區螞蟻密度均甚相近。處理後, 在施藥區之螞蟻密度固因受藥劑之影響而下降, 但對照區之螞蟻亦有相對下降之趨向。此種原因, 可能亦如前述受試區狹小之影響, 因對照區雖無施藥, 但 Mirex 乃係誘餌, 所以在對照不施藥區之螞蟻, 可能被誘而至 Mirex 區, 將誘餌搬回對照區蟻窩, 而被殺死, 故對照區螞蟻之密度乃有相對下降之現象。反之, Mirex 試區之誘餌, 亦因受對照區螞蟻之分食, 致藥量減少, 亦影響其防治效果。

### 討 論

由上述情形觀之, 用 Mirex 防治鳳梨園螞蟻, 須大面積施用方可保持較長之時間, 不再受螞蟻侵入, 否則收效不大。復據作者 (1962) 用氯化烴劑在鳳梨園防蟻結果, 發現鳳梨園粉介殼蟲密度需在螞蟻絕跡 5 個月之後, 方急劇降低。如在鳳梨園陸續保有少數之螞蟻, 則對粉介殼蟲之防治效果甚微。故在本省若欲用 Mirex 防治鳳梨園螞蟻, 除鳳梨公司所屬之農場可大面積施用外, 一般果農最好採用共同防治方式, 且在鳳梨園邊緣之空地亦應撒施, 以免空地上之螞蟻侵入鳳梨園中。

## 參考文獻

- Banks, W. A. , B. M. Glancey, C. E. Stringer, D. P. Jouvenaz, C. S. Lofgren, and D. E. Weidhaas. 1973. Imported fire ants : Eradication trials with mirex bait. *Jour. Econ. Entomol.* 66(3) : 785-9.
- Gannon, Norman, and Bigger, J. H. 1958. The conversion of aldrin and heptachlor to their epoxides in soil. *Jour. Econ. Entomol.* 51(1):1-2.
- Illingworth, J. F. 1930. Preliminary report on evidence that mealybugs are an important factor in pineapple wilt. *Jour. Econ. Entomol.* 24(4):877-89.
- Stringer, C. E. , Jr. , C. S. Lofgren, and F. J. Bartlett. 1964. Imported fire ant toxic bait studies : Evaluation of toxicants. *Jour. Econ. Entomol.* 57(6):941-5.
- 李錫山, 1962. 鳳梨園螞蟻防治試驗, 植物保護學會報 4 ( 1 ) : 13—14。
- 李錫山, 簡和順, 1966. 鳳梨粉介殼蟲防治試驗, 植物保護學會會刊 8 ( 4 ) : 277—390。
- 孫守恭, 1958. 螞蟻與鳳梨粉介殼蟲萎凋病關係之研究, 農業研究 7 ( 4 ) : 31—42。

# CONTROL OF ANTS IN PINEAPPLE FIELD BY MIREX BAIT<sup>(1)</sup>

by

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## Summary

The major ant species present in the pineapple field in Taiwan are *Pheidologeton diversus* Jerdon, *Anoplolepis longipes* Jerdon, and *Camponotus friedae* var. *amia* Ferel. A number of ant species associated with mealybugs which induce in turn a serious wilting of pineapple plants, known as mealybug wilt. Direct control of mealybugs with insecticides is important but the work is still uncompleted in the absence of ant control.

For the past two decades, 40% aldrin wp has been used in the pineapple fields in Taiwan for control the ants very successfully, taking advantage of the residual activity of this material following soil application. The problem, now, has been brought under review in the recent years for the excessive used of chlorinated hydrocarbons. Some of this group of insecticides have been gradually eliminated their use because of many ecological questions raised.

Mirex bait was then tested to control the ants in pineapple field instead of aldrin. 3 kgs. of 0.3% mirex per hectare was used in comparison with 5 kgs. of 40% aldrin wp. The plot size was 15×15 m. The space of pineapple planting was 50×30 cm. by 2 rows with 100 cm. apart. It was about 1,000 plants of pineapple in each plot. There were three treatments with four replications in a randomized complete block designed.

Mirex bait was broadcasted by hands worn rubber gloves while aldrin was sprayed by knapsack sprayer. Ant population was counted in each plot prior to treatment. Several

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number of post-treatment evaluations were taken at 10, 30, 60, 100 and 140 days respectively. Ants were counted by means of a wire square, whose size is  $50 \times 50$  cm. The wire square was put on the ground of pineapple field between the wider rows within which the wandering ants were counted. Ten counts were taken in each plot.

The results, as showed in Table 1, revealed that aldrin killed the ants more rapidly than that of the mirex. This might be the advantage of the mirex that treated as a bait. If the bait toxicant killed the ants very quickly, as described by Stringer (1964), it would cause the ants to be aware of taking the poisoned bait, the ants would usually cease feeding on it and move the colony. One application of aldrin and mirex bait both maintained as long as 100 days under the summer condition in south part of Taiwan.

The plot size, which made in this experiment, was found to be inadequate to completely shut off border effect of treatments applied in adjacent plot. It was limited by the size of the field which could be extended no more. As a result, the ants which came from the untreated area were very easily wandering into the treated plots. It would therefore influence the population density of the ants in the plots as they were exactly to be.

The population density of the ants in check plots also decreased significantly in the posttreatment evaluations. It might also be due mainly to the fact that some of the check plots were contiguous to the mirex plots, to which the ants, from the check plots, were very easily attracted and then killed by carrying the bait back. On the other hand, it would also reduce the dosage of the bait as well as the effectiveness of control in the mirex plots.

The results revealed that the mirex bait could be used to kill the ants in large scale of pineapple plantations. Under the condition as now in Taiwan, there is no doubt, the mirex could be used properly in the plantations of Taiwan Pineapple Cooperation. But there are still a large number of pineapples grown by farmers, they own mostly very small scale of farms. The only way that could be done is cooperated control.