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【Scientific note】

番茄素對小菜蛾產卵之影響【科學短訊】

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Abstract

摘要

以0.1%、0.2%及0.4於番茄素(tomatine)液處理甘藍葉，其對小菜蛾(*Plutella xylostella* L.) 成蟲卵之影響，本試驗由無選擇(no choice test)及選擇試驗(choice test)來比較。小菜蛾成蟲在番茄素液處理組與對照組間均會趨前產卵，其間產卵數並無顯著差異，亦即此濃度範圍之番茄素液對小菜蛾成蟲產卵並不具忌避之效果。

Key words:

關鍵詞: 小菜蛾、番茄素、產卵。

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番茄素對小菜蛾產卵之影響

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摘 要

以 0.1%、0.2% 及 0.4% 番茄素 (tomatine) 液處理甘藍葉，其對小菜蛾 (*Plutella xylostella* L.) 成蟲產卵之影響，本試驗由無選擇 (no choice test) 及選擇試驗 (choice test) 來比較。小菜蛾成蟲在番茄素液處理組與對照組間均會趨前產卵，其間產卵數並無顯著差異，亦即此濃度範圍之番茄素液對小菜蛾成蟲產卵並不具忌避之效果。

關鍵字：小菜蛾、番茄素、產卵。

Influence of Tomatine on Oviposition Preference of Diamondback Moth *Plutella xylostella* L.

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ABSTRACT

The effect of 0.1%、0.2% and 0.4% tomatine solution on the ovipositional preference of female diamondback moths by no choice test and choice test was

investigated. No appreciable influence of tomatine on the ovipositional preference was observed. It showed that tomatine has no significant ovipositional deterrent effect to adult moth.

Key words: *Plutella xylostella* L., tomatine, oviposition.

前 言

小菜蛾(*Plutella xylostella* L.)爲十字花科蔬菜之首要害蟲，因本省現階段在保護農作物之方法上除生物防治(包括微生物防治)外，仍多以農藥之利用爲主要之防治對策。但爲期減少農藥對環境之污染及對人體安全性之威脅，故需探討非農藥防治方面之研究。而非農藥防治法包括範圍亦廣，其中例如利用拒食劑(antifeedants)或取食抑制劑(feeding inhibitors)等，雖不直接殺死害蟲，但可使害蟲因拒食或食慾不振而得不到適當與適量之營養以致影響其生長發育或產卵，甚至因飢餓而死等現象(Munakata, 1970)，故可減少害蟲對農作物之爲害。

Buranday and Raros (1975)曾以黏蟲板調查甘藍單作區和甘藍與番茄間作區之間小菜蛾之發生情形，結果發現在間作區小菜蛾成蟲及卵數均較少，所以推測番茄中可能含某種忌避產卵效果之物質，以致減少小菜蛾之發生量。由Gottlieb (1943)及Irving *et al.* (1945)之研究得知，番茄中含有番茄素(tomatine)是一種天然植物鹼類。繼而由Dahlman and Hibbs (1967)報告得知番茄素濃度之增加，可降低馬鈴薯浮塵子 *Empoasca fabae* (Harris)若蟲之取食量及存活數；及Harley and Thorsteinson (1967)報告番茄素可影響雙點飛蝗 *Melanoplus bivittatus* (Say)若蟲之生長及發育等，此外亦有多篇有關番茄素抑制害蟲取食之報告(Hsiao and

Fraenkel, 1968; Sinden *et al.*, 1978; Isman and Duffey, 1982; Juvik *et al.*, 1982; Chan and Tam, 1985; Dimock *et al.*, 1986; Weissenberg *et al.*, 1986; Gelder and Ponti, 1987; Bloem, 1989 etc.)，故番茄素是值得開發的一種新資源。由Lu and Chu (1992)及Chu and Lu (1992)之報告，發現0.1%、0.2%及0.4%番茄素液對小菜蛾幼蟲之取食及卵之孵化率具強度抑制之效果，然其對小菜蛾成蟲之產卵是否具忌避效果，則需待觀察。

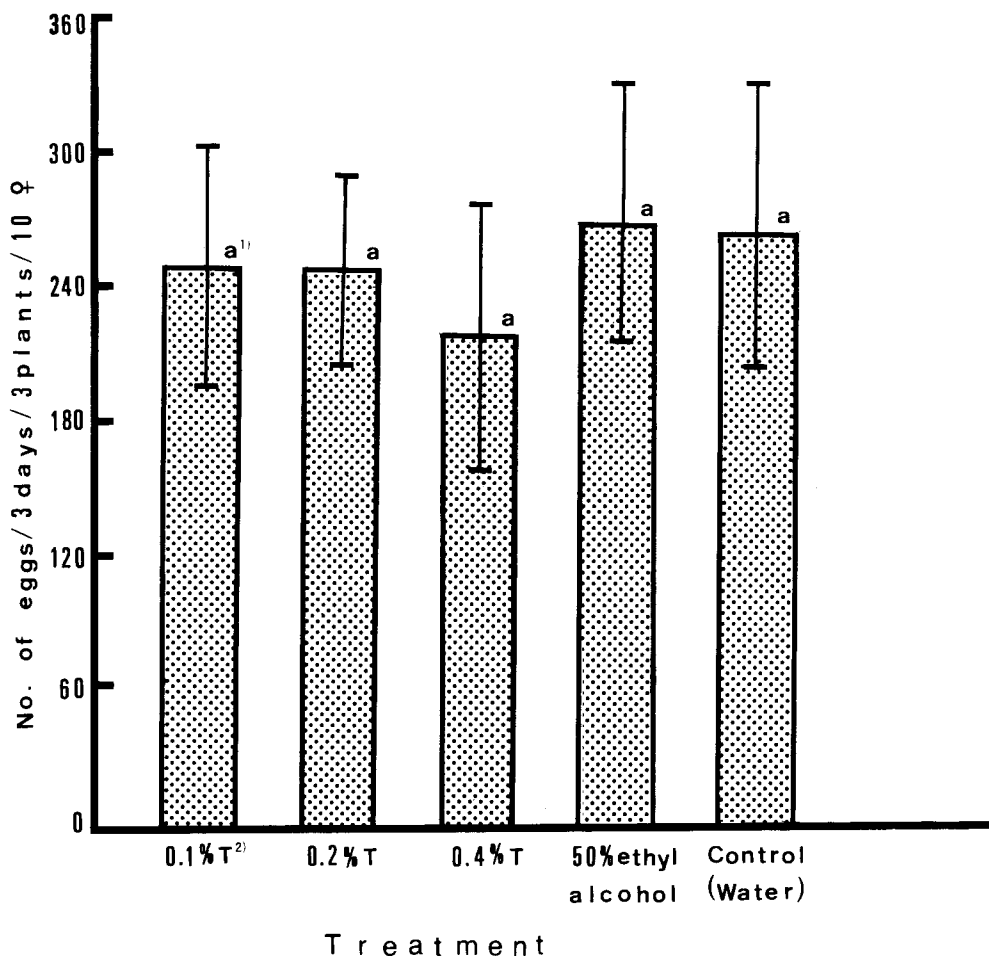
(A)無選擇試驗(No choice test)

將番茄素溶於50%酒精中，配製成0.1%、0.2%及0.4%三種濃度，且將這三種濃度之番茄素液分別均勻噴施於株高10~12 cm的5~8葉片期的甘藍苗上，並以50%酒精及噴水的甘藍苗做爲對照組，每一處理各三盆菜苗，分別置於小網箱(50×45×60 cm)內，每一箱內放入初羽化之小菜蛾成蟲10對，以10%蜂蜜水餵食。三天後記錄各菜苗上之卵數，各處理共六重複。

結果爲在0.1%~0.4%番茄素液處理組之甘藍苗上每箱內小菜蛾平均產卵數約爲218~248粒，與兩對照組之平均產卵數在263~267粒比較，其間差異性並不顯著(圖1)。

(B)選擇試驗(Choice test)

將0.1%、0.2%及0.4%番茄素液分別均勻噴施於株高10~12 cm的5~8葉片期的甘藍苗上，並將各處理之菜苗分別列置於大型養蟲箱(75×60×45 cm)內，每箱每處理各5



圖一 無選擇試驗中番茄素對小菜蛾成蟲產卵之影響

Fig. 1. No choice test for ovipositional action of tomatine solution to adult of DBM.

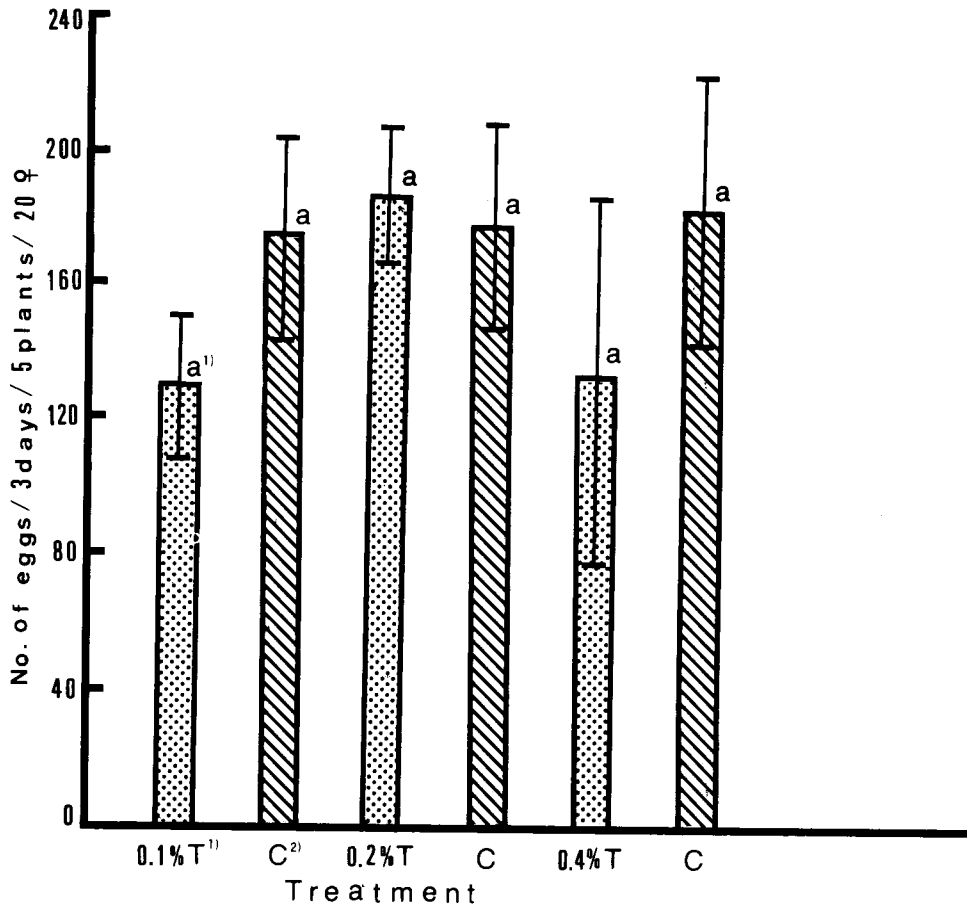
1) T: Tomatine solution.

2) Letter "a" on each column indicates no significant difference.

株，各處理行株中各加列一行噴水之對照處理組，每行亦各 5 株。其苗盆間距離約為 6 cm。每箱內釋放初羽化成蟲 20 對，供以 10% 蜜水為食，任其在箱內自然產卵。三天後將各菜苗取出，記錄各苗上小菜蛾之卵數，共四重複。

結果為 0.1%、0.2% 及 0.4% 番茄素液處理之每行甘藍苗葉上平均產卵數分別為 129 粒、186 粒、131 粒，與間列對照組之平均產卵數各為 174 粒、178 粒、183 粒，其間差異性亦不顯著(圖 2)。

故由無選擇試驗及間列式選擇試驗之結



圖二 選擇試驗中番茄素對小菜蛾成蟲產卵之影響。

Fig. 2. Choice test for the ovipositional action of tomatine solution to adult of DBM.

1) a,T: refer to footnote of Fig.1.

2) C: control.

果得知 0.1%、0.2% 及 0.4% 等濃度範圍之番茄素液對小菜蛾成蟲之產卵並不具顯著之忌避效果，致使小菜蛾成蟲仍可在番茄素液處理組之甘藍葉上產卵，而不致將小菜蛾驅趕到未處理之鄰區而造成防治上之困擾，然可由其強度抑制卵之孵化及幼蟲取食之效果，而降低小菜蛾對作物之為害 (Chu and Lu,

1992; Lu and Chu, 1992)。但現用之番茄素因係精製之結晶體，其價格甚為昂貴，故田間利用時在成本上需加考量；如選用較低之濃度以降低成本，或發展其它有效之拒食劑、忌避劑等，才能發揮實際應用之價值。

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