

Abstract

Synergistic Potential of Dillapiole Oil for Synthetic Pyrethroid Insecticides against the Fall Armyworm.**Murilo Fazolin,^{a,*} Joelma L. V. Estrela,^a André Fábio M. Medeiros,^a Maria Samylla de F. Silva,^b Iriana Maria da Silva,^b Luiara P. Gomes^b**^aEmbrapa Acre, Rodovia BR 364 Km 14 s/n, CEP 69900-056, Rio Branco-AC, Brazil.^bUnião Educacional do Norte (UNINORTE)* murilo.fazolin@embrapa.br**Keywords:** *Piper aduncum*; essential oil; methylenedioxyphenyl compounds; brazilian Amazonia.

Spodoptera frugiperda (J.E. Smith) is a serious lepidopterous pest of several economically important crops. Control of the fall armyworm depends exclusively on insecticides, developed resistance to the major classes of insecticides. There has been mounting interest in the use of synergism to reduce this resistance by combined application of insecticide. It was shown that piperonylbutoxide (PBO) and others methylenedioxyphenyl compounds inhibited the microsomal oxidation of many insecticides and other xenobiotics in a number of insect species. *Piper aduncum* L. is a widespread tropical shrub, known as an invading plant in Amazon areas deforested after timber exploitation. The leaves and stems of *P. aduncum* contain an essential oil composed mainly of dillapiole (5-allyl-6,7-dimethoxy-1,3-benzodioxole),¹ which has demonstrated to have synergistic effects with several pesticides. The objective of this study was to evaluate the synergy and response homogeneity of the *S. frugiperda* larvae population to the essential oil of *P. aduncum* in combination with pyrethroid insecticides: α -cypermethrin, β -cypermethrin, fenpropathrin and γ -cyhalothrin, compared with piperonylbutoxide (PBO positive controls). By the ratio of the LC₅₀ and LD₅₀ of the insecticides taken singly and their respective synergistic combinations with essential oil and (PBO), the synergism (FS) factors for comparison with each other were obtained. The slope of the dose/concentration-mortality curves was used to establish the relative toxicity increase promoted by synergism and to determine the response homogeneity. Residual contact revealed a significant potentiation for commercial insecticides formulated with β -cypermethrin (FS= 9.05-0.5), fenpropathrin (FS= 34.05-49.77), when combined with the essential oil of *P. aduncum*. In the topical contact, there occurred significant potentiation only for the α -cypermethrin (FS= 7.55-3.68), fenpropathrin (FS= 3.37-1.21) and γ -cyhalothrin (FS= 5.79-10.48) insecticides when combined with the essential oil. Except fenpropathrin and γ -cyhalothrin, other synergistic combinations presented homogeneous response by topical contact as well as residual, for at least a synergistic combination with the essential oil of *P. aduncum*. The FS significance values of combinations of the *P. aduncum* essential oil with insecticides α -cypermethrin, β -cypermethrin, fenpropathrin and γ -cyhalothrin, may indicate that this essential oil as an alternative to PBO.

¹Belzile, A. S.; Majerus, S. L.; Podeszinski, C.; Guillet, G.; Durst, T.; Arnason, J. T. Dillapiol derivatives as synergists: Structure-activity relationship analysis. *Pesticide Biochemistry and Physiology* **2000**, *66*, 33. [[CrossRef](#)]

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