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Synthesis of the Pheromone of *Duponchelia fovealis* Zeller, 1847 (Lepidoptera, Crambidae) for Pest Control in Strawberry Crops

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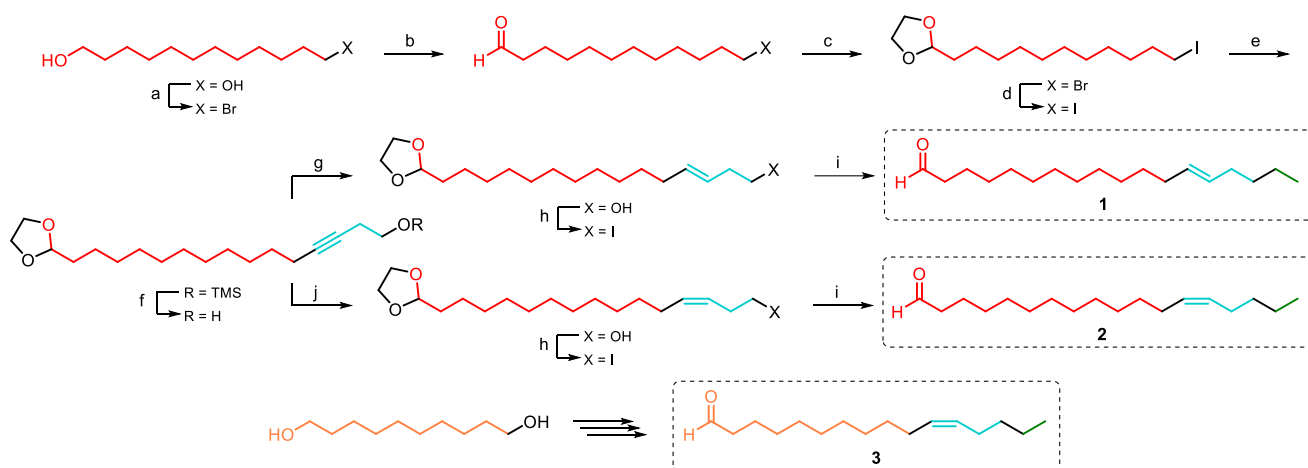
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ABSTRACT

Strawberry (*Fragaria x ananassa*) production has increased in Brazil, but the *Duponchelia fovealis* has been a key pest of the crop, causing losses in yield and even plant death. Mouár et. al. (2018) identified the pheromone used by this pest females as the aldehydes: (*E*)-octadec-13-enal (**1**), (*Z*)-octadec-13-enal (**2**), and (*Z*)-hexadec-11-enal (**3**) in a 10:1:0.1 ratio. In this context, our objective was to synthesize pheromones **1-3** for application in pest control. In the synthesis shown below, a substitution reaction with alkynyl anion was a key step leading to a triple bond intermediate. This compound can be stereoselectively reduced to the *E* isomer in the synthesis of compound **1** and to the *Z* isomer for the synthesis of compound **2**. Pheromone component **3** was synthesized in a similar way. The compounds were used in field tests and around thirteen males were collected in traps for 28 days.



Reagents and conditions: (a) HBr, toluene, reflux (*Dean Stark*), 10h; (b) TEMPO, NaOCl, KBr, CH₂Cl₂, buffer pH 8,6, 0 °C, 1 h; (c) Ethylene Glycol, toluene, reflux (*Dean Stark*), 4h; (d) KI, acetone, reflux, 4h; (e) 3-((trimethylsilyl)oxy)prop-1-yn-1-yl lithium, TMEDA, THF, reflux, overnight; (f) TBAF, THF, r.t., 2h; (g) LiAlH₄, diglyme, reflux, overnight; (h) I₂, PPh₃, imidazole, CH₂Cl₂, r.t., 4 h; (i) MeOH/H₂O, pTSA, r.t., 2h; (j) H₂ (5 psi), Pd/C, quinoline, hexane, 2h.

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