

Commercial Use of Codling Moth Mating Disruption: A Success Story Despite the Limitations

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Forty years have past since the first publication demonstrating the potential of deploying sex pheromones for insect pest control. Following that landmark paper, extensive research has focused on the development of control tactics that employ synthetic copies of insect sex pheromones to control a wide variety of pests in agriculture and forestry. These tactics include attract-and-kill, mass trapping, and mating disruption. Sex pheromone-mediated mating disruption is the tactic that has emerged as a commercial success, most notably for the control of lepidopteran pests in pome and stone fruit, grapes, tomatoes and cotton.

Cardé and Minks (1995) identified constraints to the successful use of mating disruption in moth pest control including: the inherent population dynamics of the pest, the complexities of the mating system and the limitations imposed by management systems. They went on to argue that these limitations were the main reason why mating disruption could not be successfully implemented for all species. Pink bollworm, oriental fruit moth and tomato pinworm were held up as very amenable targets for the approach, with levels of control similar or better than that achieved with insecticides. Codling moth control using mating disruption was considered more problematic. For codling moth, Cardé and Minks (1995) stated that the technical reliability of the mating disruption technique had not been fully achieved and therefore, the routine large use of the mating disruption technique was not yet possible. They specifically identified 3 limiting factors including the need for: (1) low populations, (2) a high degree of isolation from adjacent non-pheromone treated orchards and (3) a limited number of generations per year (1 or 2).

Despite the concern that these limitations might preclude wide-scale adoption of mating disruption for codling moth, substantial progress had been made. In 1991, Isomate C became the first mating disruption product registered for the control of codling moth in the United States. The use of Isomate C and other codling moth mating disruption technologies soon gained acceptance in other apple producing regions. Codling moth mating disruption is now deployed to a lesser or greater degree in many countries around the world including Australia, parts of the European Union, South Africa, Argentina, Chile, Mexico and the United States. It is now estimated that codling moth mating disruption is used on approximately 162,000 hectares. It is deployed most widely in the western states of the USA, parts of Europe and areas of South America. In states such as Washington and California and the South Tyrol region of Italy, codling moth mating disruption is now deployed on well over 50% of the pome fruit hectares and is considered an integral part of pest management practices for this pest. It is important to understand why it has been so successful and adopted so widely in many highly prolific fruit growing areas. In this presentation, we will not only address the technical progress that has been made vis a vis formulation development and progress towards a better understanding of the mechanisms of disruption, but we will also discuss the other possible driving factors in different regions of the world that have expanded or curtailed adoption of codling moth mating disruption. Finally, we will discuss how this information might be used to develop more cost effective formulations and what impact this will have on wider adoption.