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Sustainable collective pest management using a Graph-based Markov Decision Processes framework

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Abstract: For environmental, ecological and human health sustainability, there is a great need to limit the structural dependency of agriculture on pesticides while, at the same time, maintaining satisfactory levels of production and farmers' gross margins. A model was developed to explore the consequences of various management policies to contain blackleg on canola, on a long term basis. This model relies on the Graph-based Markov Decision Processes (GMDDP) framework, that allows representing and optimizing sequential decisions under uncertainty, taking into account interactions between fields (spore dispersal). The objective of the study is to help better enforce management practices such as cultivar choice, crop management, and soil tillage.

Keywords: Factored Markov Decision Processes; policy optimization; policy analysis; phoma stem canker; *Brassica napus*