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SAFETY ASSESSMENT AND PROVINCIAL-SCALE SPATIAL VARIATION OF PESTICIDE USE IN CHINA

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Abstract

The safe use of pesticides is necessary to promote green ecological development and sustainable agriculture. Assigning pesticide use safety indices in safety assessment systems is challenging; therefore, this study adopted a real coding-based accelerated genetic algorithm-projection pursuit (RAGA-PP) model and spatial Markov chain analysis to assess China's pesticide usage safety index values during 2010-2020 and its dynamic spatial variation characteristics. The pesticide usage safety index values in China increased during the study period, while the resource security index had the highest weight, followed by the economic security index. The importance of the ecological environment security index also increased. The weight of the population security index was the smallest, with small fluctuations. The pesticide use safety index values were high in economically developed areas, had concentrated commercial crop cultivation, or a high food crop commercialization rate. Areas with low index values were concentrated in China's central and western regions, where the ecological environment was fragile with steep slopes. The spatial Markov chain analysis indicated polarization, although the provincial level pesticide safety use index was positively changed. Our results support policy decisions on pesticide use safety and promote zero growth agricultural fertilizers in China.

Key words: Markov chain, pesticide use safety, real coding-based accelerating genetic algorithm, spatial variation

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