

Integrated Vegetable Production Planning Considering Crop Rotation Rules Using a Mathematical Mixed Integer Programming Model

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Abstract : In this paper, a mathematical optimization model was developed to maximize the profit in a vegetable production planning problem. It serves as a decision support system that assists farmers in land allocation to crops and harvest scheduling decisions. The developed model can handle different rotation rules in two consecutive cycles of production, which is a common practice in organic production system. Moreover, different production methods of the same crop were considered in the model formulation. The main strength of the model is that it is not restricted to predetermined production periods, which makes the planning more flexible. The model is classified as a mixed integer programming (MIP) model and formulated in PYOMO -a Python package to formulate optimization models- and solved via Gurobi and CPLEX optimizer packages. The model was tested with secondary data from 'Australian vegetable growing farms', and the results were obtained and discussed with the computational test runs. The results show that the model can successfully provide reliable solutions for real size problems.

Keywords : crop rotation, harvesting, mathematical model formulation, vegetable production

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