Two altenative models for farm management: Discrete versus continuous time horizon

B. Vitoriano Villanueva; M.T. Ortuño Sánchez; B. Recio Aguado; F. Rubio González; A. Alonso Ayuso

Abstract-

The agricultural production process entails taking a large number of decisions aimed at improving productivity and achieving the best yield from available resources, which are usually limited. Assuming that there is a certain technical path of tasks to be carried out within a period, and that each task can be done in different ways, the problem consists on choosing how and when to carry out each one, in such a way that the tasks are scheduled in sequence at the lowest possible cost, taking account of any relationships of precedence among them, and in such a way that each task is done within its time window and with the resources being assigned in a feasible way. This paper presents two alternative mathematical programming modeling frameworks to attain the proposed objective. The first model takes the approach of dividing time into discrete units spread throughout the planning horizon, and a model is presented based on the models developed in connection with flexible manufacture. In the second model, time is kept continuous, and a scheduling model is used for which a family of incompatibility conditions is developed to avoid the simultaneous use of resources.

Index Terms- Planning, Scheduling, Integer Programming, Farm Management