Coping with seasonal climate variability in crop production: Applying systems research tools in agribusiness enterprise

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Advances in various scientific disciplines including information and computer technology (ICT) have accelerated the integration of data and information to generate new knowledge which facilitated the efficient use and management of resources. Systems research tools such as process-based dynamic crop simulation models, optimization techniques, GIS, databases, etc. have also provided opportunities for evaluating impacts of seasonal climate variability on agro-ecosystem and/or agricultural production systems. Also, recent developments in climate research including monitoring, modeling and forecasting have improved understanding and capabilities to predict medium-term seasonal climate with reasonable accuracy. This paper illustrates the opportunities for applying systems analysis approach using crop models and GIS in agri-enterprise-related activities such as crop management, crop forecasting, and crop insurance given advanced information on seasonal climate forecasts.

Eco-physiological crop models are used to evaluate and quantify the risk due to seasonal climate variability in rice and corn production across different locations in the Philippines at different seasons. The study demonstrates the opportunity to formulate strategies (e.g. adjustments in cropping technology) to cope up with expected weather and climate variability such as the El Nino phenomenon. Evaluating the expected rice and corn performance in the upcoming growing season considering reasonably accurate climate forecasts allows an objective and quick assessment of future crop harvests which aids decisions regarding monitoring of buffer supply and trading of cereals. Moreover, combined use of seasonal climate forecasts and crop models also facilitates the objective and efficient evaluation and quantification of risk due to seasonal climate variability which varies with location and time of crop growing period. Analysis of risk profiles of rice and corn production for specific growing period or season for a particular location provides independent basis and supports decision on appropriate insurance premium to be levied for crop insurance coverage as well as for assessment of compensation for crop loss. While opportunities for utilizing seasonal climate forecasts and systems research tools in accelerating knowledge-based management and decision-making in agricultural enterprise activities are now beginning to be recognized, their applications in developing countries are limited, and have to be further explored.

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