

Agricultural droughts: Role of crop growth modelling*

The prime objective of the 3rd SERC school on agricultural droughts was to discuss the nature of droughts, and assessment and management of droughts through crop growth models in association with Geographical Information System (GIS) and satellite imageries. Jodhpur being a desert area was aptly suitable for the venue. Thirty-one participants from different backgrounds in agriculture sciences, mathematics and agrometeorology participated in this course.

The course director S. K. Kathju highlighted the importance of the SERC school. It is anticipated that the scope of the crop growth simulation model may assist in integration and organization of the research data across various disciplines and also assist in evaluation of risks associated with the crop modelling practices.

Ram Gopal (Defence Laboratory, Jodhpur) stressed the need for national, economic, health and environmental safety, with food safety being the most important. Also, he drew attention towards imbalance in future demand and supply of water, food, fiber, etc. which may be disastrous at times due to droughts.

The first lecture was delivered by Y. P. Abrol (IARI, New Delhi), who dealt with the physiological process of crops and their behaviour in different environmental conditions. Next, Y. S. Ramakrishna (CRIDA, Hyderabad) dealt with the importance and role of the weather parameters in dry land agri-

cultural production, classification of drought and its impacts, plausible climate change and its impact on agriculture. While discussing about the General Circulation Model (GCM), he pointed out that doubling of CO₂ concentration by the year 2030 would increase global temperature by 1 to 3°C. This will lead to an increase in biological activities as well as in the physical and chemical processes within the crops. Climate change is also expected to bring about changes in the amount, intensity and distribution pattern of rainfall. He highlighted the effects of temperature on phenology and the yield of various crops grown in different regions. Ramakrishna also stressed the need for future thrust on research. It is important to develop yield-forecast models for major crops of the country using remote sensing techniques and GIS. Further, the use of information technology for effective communication between farmers, policy makers and researchers for issuing real time weather-based agro-advisories would also be important.

M. C. Varshneya (CASAM, College of Agriculture, Pune) delivered a lecture on 'Crop simulation model – Sorghum: Growth and development'. The phasic development of CERES Sorghum model describes the duration of attainment of different phenological stages of the crop. He covered the details of growth stages of Sorghum, its genetic coefficients and described different sub-routines of the models, particularly the biomass production sub-routines, which are primarily based on solar radiation and stress indices. He also showed the effect of photoperiod and thermal time on the phenology of the crop. N. L. Joshi (CAZRI, Jodhpur) dealt with the

concept of system analysis and simulation. He said that enhanced understanding of biological and physical systems and their interaction, and conceptualization of multi-disciplinary activities has a role in the interpretation of data from field experiments in explaining indifference in a range of environments of yield attributes.

P. K. Aggarwal (IARI, New Delhi) also focused on the 'System simulation on agriculture: Concepts and application'. He explained that a system is a part of the real world with many interacting components and processes and one has to deal with the system boundaries rather than disciplinary boundaries. The system approach is particularly relevant to problem definition and hierarchization in complex agricultural system. He also described the various steps of system simulation such as calibration, validation, sensitivity analysis, simplification and use of models in decision support. Models apart from predicting crop yields may also provide information on major processes. It is often believed that models will slowly replace conventional field experiments. L. S. Rathore (MCMRWF, DST, New Delhi) spoke about the use of crop model implication on drought management. He stressed that for a model to be of practical value the data requirements must be reasonable. He showed how these models could be used for irrigation scheduling. He also dealt with the different components of water balance in the CERES model. Lecture notes were also made available to the participants.

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