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Editorial

Micro-climatological inputs in crop growth modeling

Crop growth models are very useful tools in formulation of agromet advisory services. However, we have not yet reached a stage wherein we can use output of crop growth models in preparation of agromet advisories to the farmers incorporating inputs from weather forecasts. This is mainly because, we have developed only a few of our own models and got used to borrowed models. These borrowed models in most cases are able to predict crop yields with correlation between actuals and estimates in the range of 0.75 to 0.90. Therefore the accuracy of the models has to be improved. However, Main issue is accurate calibration and validation of these models. Even through there will be good correlations between simulated and actual yields, these models failed to capture the extreme weather situations. This may be due to non-consideration of all parameters for calibration and validation. We normally calibrate the model with field experiments, where there will be no resource limitations. However, actual situations, there will be limitations of one or other input parameters. Hence, there is a need to validate the model under extreme situations also.

Crop growth models simulate information on crop development i.e; the successive phenological stages through which a crop passes through before it completes its life cycle from sowing to harvest. The models also provide an estimate of crop growth i.e; the increase in biomass of the crop on day to day basis as well as the partition of total biomass into roots, stem, leaves and storage organs. The models are also expected to generate information on Leaf Area Index on day to day basis. The accuracy of Leaf Area Index is pre-requisite for better assessment of crop growth. However, at present most of the studies restricted to yield and important phenological stages. The phenological stages through which the crop passes through have to be accurately assessed using Information on mean daily temperatures, length of the day etc. The accurate estimation of duration of different phenological stages becomes vital input in probing of partition of dry matter production.The biomass produced by the crop is directly proportional to the radiation intercepted by the crop in case of a crop grown with adequate water supply and better management.The radiation Interception is a function of Leaf Area Index. In most of the studies, researchers will use the sunshine hours data for estimating the radiation amount. This will also affect the accuracy. Do we have systematically generated information on the relationship between LAI and radiation interception for all the major crops grown in the Country?

The biomass produced by the crop depends upon the amount of water used by the crop for evapotranspiration. The actual amount of water used by the crop for evapotranspiration depends upon radiation interception by the crop as well as water availability to the crop. The ratio of water required by the crop for evapotranspiration to the potential evapotranspiration is called crop coefficient. The crop coefficient is also a function of Leaf Area Index.

From the above, it is obvious that we have to generate information on

- phenology of crop
- relationship between leaf area index and radiation interception of different crops
- relationship between water requirement of the crop and leaf area index of the crop when water is not a limiting factor
- estimation of crop water use depending upon radiation interception through energy budgeting
- the effect of water shortage on growth and development of the crop and
- partitioning of biomass produced into various components such as roots, leaves, storage organs etc.
- interaction effect of leaf area index, radiation interception, water requirement, crop water use under different irrigation and nutrient regimes.

There is also need to use micro climatic information such as leaf wetness and canopy temperature to predict the occurrence, intensification and spread of plant diseases in particular. Infrared thermometers were found to be useful in assessing moisture stress of the crops and irrigation scheduling for efficient water management of limited water resources. It is obvious that we need to focus more attention on promoting research in microclimatologywhich will ultimately help to provide accurate agromet advisories through linking crop models.

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