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Editorial

Can agrometeorology will be a frontier science

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It was in early 1930s, Lakshminarayanapuram Ananthakrishnan Ramdas (An Indian Physicist and Meteorologist) and Rudolf Oskar Robert Williams Geiger (A German Meteorologist and Climatologist) made a beginning for new science i.e. Agrometeorology. Initial studies were focused on monitoring physical processes in the cropped soils. Efforts were also made to explain the variations in crop yields using weather data recorded during the crop growth cycle. Multiple regression models were used to predict crop yields. It was established that the crops have to be sown during optimum periods to get better yield which lead to the crop weather calendars. It was in 1940s, India Meteorological Department started issuing weather bulletins for farming community.

The development of the concept of Potential Evapotranspiration during 1948 by Charles Warren Thornthwaite (A well-known American Geographer) and Howard Latimer Penman (A British Meteorologist) has led to estimation of evapotranspiration from cropped soils using weather data. John Lennox Monteith (A British Scientist) did pioneer research on application of physical laws to explain the physiological processes in crop plants. These discoveries established that the crop yields depend upon the amount of water used by the crop during its growth cycle. Crop yield indicated the economically significant yield expressed as a fraction known as Harvest Index. Total dry matter production was found to depend on the amount of water used by the crop for evapotranspiration. It is also found to depend on the amount of solar radiation intercepted by the crop.

Another important development that took place was to estimate the length of various phenophases the crop passes through its growth cycle depending upon temperature and length of photoperiod. Using these concepts, Crop Growth Simulation Models were developed for a number of crop growths. Decision Support Systems were developed to monitor crop performance and to guide farmers in input management. Such models are being extensively used in various farm operations and their management besides simulating the growth and yield of the crops under changing weather and climate.

In India, efforts were made in late 1980s, to develop medium range weather forecasts 3 to 10 days in advance so that farmers may have adequate time to plan for carrying out agricultural operations by mobilizing resources for the purpose. It laid the path for developing agrometeorological advisory services throughout India. Simultaneous growth and access to communication network made it possible for farmers even in remote areas to have access to agrometeorological advisory services. Research on application of remote sensing techniques to monitor soil moisture and crop conditions were found to be quite useful in formulation of agrometeorological advisory bulletins for rural community.

At the same time, it was realized that the climates are changing all over the world due to increase in air pollution triggered by growing population, industrialization, mining and increased transportation. The variability within the weather was found to cross the limits during cropping season leading to more intense storms, floods, droughts and other weather hazards like heat waves, cold waves, strong winds etc. The climate change necessitated to evolve dynamic crop weather calendars, to find out adaptation and mitigation strategies and to adopt resilient agriculture. Agriculture encompasses every aspect of food production including crop production, horticulture, animal husbandry and fisheries. In the water-food-land nexus system, the optimization is necessary to increase the irrigation water production and to optimize the

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allocation of scarce resources.

The occurrence of pests and diseases to field crops contribute to 20 per cent reduction in crop production. Techniques were developed to forecast pests and diseases that are known to during a particular phenophase of the crops. There is need to generate data base to forecast occurrence of sporadic pests and diseases in a more systematic way. The climate change has further aggravated the situation of pests and disease occurrences due to their adaptation as well as the evolution of new species. There are very limited efforts to use the products of meteorological services to provide weather based advisory services beyond crop production.

Agrometeorological education has made good progress in India. There are about 20 State Agricultural Universities and Institutes in the country offering M.Sc./Ph.D. programmes in Agricultural Meteorology. At the same time, there is a great demand for Agromet personnel in the country, however, the quality of education has been questioned at different platforms. This need to be addressed by the agromet fraternities. The research in agrometeorology has now spread out of the domain of National Agricultural Academic/ Research System of the country thanks to the burning issue of climate change and the development of new tools and techniques across the world. Hence, the education and research in agricultural meteorology must be equipped with the knowledge of handling big data, drone technology, machine learning, Internet of Things and Artificial Intelligence.

Since the *Journal of Agrometeorology* is entering into 25th year of its publication, its Silver Jubilee Publication is being brought out comprising the Invited Articles from well-known experts in the field of Agrometeorology and its associated domains from all over the world. All the four issues will include the invited articles. We place on record our appreciation to all the contributors of the invited articles for their thought-provoking scientific contributions.

We do hope that the Silver Jubilee Publication issues will motivate the young scholars, scientists and researchers in leading agrometeorology to the status of frontier science in the years to come.