

The Role of the Meteorologist in a Scheme of Grow More Food Crops

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The meteorologist has an important role in crop production where success depends upon a knowledge of the weather conditions. This is particularly so in controlling pests and diseases. The Entomologist will work out the detailed life histories of particular insects in relation to the manner of damage and method of control. The Mycologist again may be ready with a prescription for the control of fungi. But it has been brought to light from recent investigations that the periodicity and virulence of pests and diseases are intimately connected with the prevailing weather conditions. Thus the meteorologist will be of immense help to these scientists with the forecast of weather conditions in advance to forewarn them with suitable methods of control.

India is not wanting in intelligent farmers. In fact in every language there are sayings connecting the influence of weather conditions with the performance of cultivated crops. A thorough collection of all of the local 'folk lore' connected with weather and careful analysis of the same will certainly give one an insight into the influence of weather on crop growth. If the ideas behind them are scientifically scrutinised and interpreted, it should be possible to guide, with confidence, the agricultural operations in any particular locality.

Crop growth is a matter of applied physiology under the influence of the reaction of the crop to its meteorological environment. The extent of the reaction depends on the stage of development of the plant and the intensity of the major meteorological factors. Rainfall affects the crop directly and also indirectly by altering the surrounding temperature and the atmospheric humidity. The limit to which the changes in the temperature and the atmospheric humidity affect the crop depends on the length for which these factors are in operation. With the help of the thermographs and hygrographs or combined thermohygrographs one can get an idea of the periodic changes in temperature and humidity for working out their influence on cultivated crops from the records carefully maintained for the purpose.

If the data collected over a series of years regarding the microclimatic observations and crop observations are collated and interpreted, they will provide us useful and valuable information for our guidance.

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There may be some indications of periodicity which may be helpful in reviewing agricultural practices and operations and in adjusting them to weather conditions. The sunspot is a case in point. It has also been found in many countries that there is a periodicity in the weather especially rainfall at a certain locality. Another interesting thing is the prediction of weather at a particular locality judging from the weather conditions that prevail in certain other localities. Thus it has been found that the onset of the South West Monsoon and the incidence of precipitation are governed by such trivial and remote factors as the South Rhodesian rain and Java rain and the South American pressure.

It has been computed that there is a four to one chance that the total monsoon rainfall of June to September of 1948 will be between 82 per cent and 112 per cent of the normal in the Peninsula, between 79 per cent and 128 per cent of the normal in North West India and between 90 per cent and 110 per cent of the normal in North East India.

Another interesting study is Phenology, which is the science of relations between climate and periodic biological phenomena as the migrations and breeding of birds, the flowering and fruiting of plants etc. When sea birds fly out early and far to seaward, moderate wind and fair weather may be expected. When they hang about the land or over it, sometimes flying inland, strong wind with a stormy weather may be anticipated. As many creatures besides birds are affected by the approach of rain or wind, such indications should not be slighted by an observer, who wishes to foresee weather. For example, dragon-fly flying low, winged ants seen in large numbers, birds taking shelter in a hurried manner are some of the indications of impending rain. Particularly a knowledge of the amount and periodicity of rainfall is essential for preparing the soil and for ensuring good and even germination of seed in the first instance and subsequently in terms of evaporation and soil water relationships as controlled by atmospheric conditions, for favouring crop growth.

The importance of history of previous occurrence of drought or deluge in a particular locality is not to be belittled. There may be a law or rule governing such an occurrence. Statistical analysis of the existing data may throw some light on that law or rule in terms of past occurrences and their frequencies. The probabilities of the future occurrences and coincidence limits may even be worked out when sufficient data are available. The occurrences of floods in Bengal and Bihar can be taken as a typical example.

Liability of India to floods, droughts and storms. A careful scrutiny of the past records will give very reliable information on the parts of the country that have been now and then subject to famine due to the failure of the rains. Occasionally even the whole country is involved in famine.

Walford has recorded 34 famines in India during the 100 years ending 1879. The years 1877, 1899 and 1918 will ever abide in our memory as disastrous famine years, mainly due to the failure of the monsoon rains.

As contrast years 1878, 1892 and 1917 are to be remembered as the years in which floods or excessive rainfall occurred over a large part of the country. South Indians will remember the famous floods of the year 1924 as they will have always in mind the current year 1947-48 as the year of failure of both the monsoons.

The examination and collation of data collected over a series of years will give one very useful information on (i) whether on a scientific basis any periods or regions can be marked off in our agricultural year and country; (ii) the quantity and distribution of rainfall which may determine the success or failure of a crop in a given region; (iii) the percentage of deficiency in the normal rainfall that may be regarded as the minimum limit for a given crop in a given locality and (iv) the atmospheric conditions in relation to pests and diseases of plants.

The main role which the meteorologist will have to play will be to post the farmers with reliable knowledge of the nature and quantity of rainfall which they can expect to have at stated intervals. This takes us on to the question of forecasting of weather and organisation of weather services. A beginning has already been made by the Indian Meteorological Department for an all India interest and now and then for provincial interest also. But we have to develop this branch so that we may be able to forecast for a larger section of the people by opening a net work of observatories and thereby making a very thorough study of the elements of weather. The farmers are really interested in knowing whether, weather conditions will be such as will enable them to do timely agricultural operations and to produce a good crop during the coming season. Admittedly in Madras Province we have not yet attained that stage as to be of some service to the farmers in this connection. It is for this lack of sufficient information and warnings of weather that the farmers here often consult Indian almanacs which predict in some way rainfall in the light of the astronomical calculations on the position of stars and planets in relation to the Sun and the Moon. A close contact with any actual tiller of the soil will reveal two facts, namely, (i) the hopes and fears regarding the rainfall in which the majority of the farmers live and (ii) the importance which the older and experienced farmers attach to rainfall in a particular "Karthi" ... a term related to the position of constellations in the Zodiac—as a means of predicting weather and rainfall. Some of the beliefs are no doubt based on ages of experience but the majority are only popular beliefs. The local almanacs, which have a reputation in the villages, are based on the science of astronomy. Dr. S. N. Sen of the Indian Meteorological Department in his publication in *Science and Culture* 1937, on "Meteorological Interpretation of

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Kalidasa's 'Megha Duta' or cloud messenger, has stated that the knowledge of cloud movements and rain two thousand years ago is surprisingly similar to modern knowledge. It would, therefore, appear that ancient weather lore is not all trifle and that there is something in it that is worthy of scientific investigation and that too before the learned astronomers who prepare almanacs become extinct. The first thing to be done is to ascertain whether and how far there is any agreement between the predictions of rainfall made in the almanacs and the rainfall as recorded by the raingauges in the previous years. Such an investigation is bound to be useful. If one takes up this investigation, he will find that it offers a rich field for study of the actual weather conditions over long periods. From this point of view also collection of accurate weather data over long periods is very essential.

Conclusion. It is hoped that meteorology, which is nothing but applied physics, will very soon play as important a role as some of the applied sciences such as Agricultural Botany, Agricultural Chemistry etc. in a scheme of grow more food production. It is unfortunate that the branch of Agricultural Meteorology has been neglected so far particularly in the Madras Province. A beginning has however been made by the creation of a separate section of Agricultural Meteorology in the Agricultural Department. It is hoped that with the kind patronage of the Madras Government and able guidance of the Indian Meteorological Department, Poona, this newly created section will be able to help the farmer by codifying the weather data and issuing such warnings as are possible.

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