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Reviews

Agrometeorological Aspects of Operational Crop protection

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The Commission for Agricultural Meteorology (CAgM) set up a working group at its eighth session to study agrometeorological aspects of operational crop protection. The working group comprises of ten members belonging to the different parts of the globe. The results of the work of these scientists are reported in this Technical Note.

In the first chapter crop losses due to occurrence of diseases, insect pests and weeds and the problems associated with control of pests and diseases by chemical and weeds by herbicides are discussed. It is emphasised to reduce use of pesticide without decreasing pest control which will minimise health hazard. The proper use of meteorological information may result in not only less application of chemical and hence slower development of resistance, but better pests and diseases control through better timing of sprays and reduced environmental pollution.

The relationships among climate, plant and disease are discussed in the 2nd chapter. The various points which are important in the strategy and tacties of plant protection have also been dealt with. Influence of meteorological factors on release and transport, retention, infection and incubation of some important pathogens have highlighted the need for similar investigation on other important pathogens. This chapter also provides a review of the available knowledge on the predictive models to forecast the appearance of risk periods for crops and on the quantitative models aimed at estimating the magnitude of these risks.

Chapter 3 deals with the meteorological aspects of protection against insect pests with special emphasis on pests of maize, grapevines and cotton. This chapter gives a detailed review of the available knowledge on the influence of weather parameters particularly temperature on the development of three important pests. The indirect impact of climate by influencing factors that in turn have an influence on the biology of pests also indicates some clue for integrated pest management. In addition, this chapter provides information pertaining to the climatic conditions required at the time of insecticide application. A review of the available knowledge on the predictive models of some pests have been discussed and suitability of these models have also been brought out. Though information compiled in this chapter is crop and pest specific yet gives insight to the problems of pests management in the world. However, a discussion on integrated pest management would have made the chapter more meaningful.

The desert locust is one of the great menances of crops in large area of the globe. An adult locust eats approximately its own weight of vegetation daily, hence crop losses from attack by a swarms would be very heavy. The study has rightly brought out that migration is essentially from one breeding area where seasonal rainfall is ending to another where it is starting. Migrants tend to concentrate swarms into regions where opposite air streams meet and the temperature is favourable. The current techniques to predict the movement of the locust on a suitable scale discussed is very useful. The authors have brought out different aspects of locust in respect of Africa. A large part of Asia is also affected by locust. The information would have been more useful if some examples were cited from Asian countries. A discussion of the use of satellite in detection and movement of locust would have made the study more rich.

Weeds also create serious problems that reduce agricultural production in a number of ways such as extracting available nutrients, soil moisture and light. Their growth is rapid, especially in many tropical countries where rainfall is high and temperature remains favourable. The methods discussed to control weeds are very interesting and can be used by the developed countries where adequate resources are available. Instead, traditional methods of weed control such as ploughing before the new crop established are more effective, if carried out conscientiously, in the developing countries.

It is extremely difficult to state on the minimum weather data set required for pest and disease management as it depends on type of models used and accuracy required. As perview of a group of scientists, temperature and humidity represent the bare minimum data set required for pest management. But it is certain that all three of historical, present and forecast data are required. The historical data are required to test how potential operational mode's of pest and disease development might have predicted the past epidemics. Present data are needed in running of operational schemes in order to give current information on likely pest and disease development. Forecast data are used along with the present

data to know further behaviour of pests and diseases. The extensive use of climatic factors to predict the prevalence of several pests and diseases have been studied by various workers. The current techniques to predict pest and disease incidences using climatic data discussed in this report are very useful. Development rate models are explanatory and require a careful compilation of information on the dynamics of pest life cycle.

In chapter 8, the production and dissemination of agrometeorological information are discussed. At present many of the developed and a few developing countries can produce information, advices and warnings for crop protection. The selection of meteorological variable differs from country to country and also crop to crop. It is noted that a great emphasis is placed on producing analyses rather than forecast of likely pathogen progress which are more useful for crop protection. In many countries a single agency prepares this information. Being a inter disciplinary subject better results in framing advisories and warnings could be achieved by involvement of multidisciplinary group of meteorologists, pathologists, entomologists, soil scientists and crop specialists. The examples cited for preparation of advisories under various climatic conditions and for different crop are very interesting and useful to all, especially to those who have not till started or at initial stage.

Whatever quality information is produced for protection it will not be effective unless it reaches to end users in appropriate time. The means suggested in this report are postal services, press, telephone, radio, television, personal contact etc. In general, they are effective in developed countries but in developing countries most of the systems are not very effective to reach information on real time basis. The proposals of curricula for multidisciplinary training and creating awareness among farmers and end users, especially of developing countries are very interesting and realistic.

The economic benefits of crop protection scheme using biological and agrometeorological data have been discussed in chapter 9. The selection of exact weather condition for spray helps in reducing frequency of spray hence also cost of chemicals, labours, saving of fuel and depreciation of instruments. There is a subsequent reduction of air, soil and water pollution and more scope of integrated pest management. The discussions on reduction of cost of handling mesoscale phenomena like locust are appropriate and useful.

Conclusions and recommendations given in the last chapter are well thought. Recommendations, although realistic, but most of them are difficult to apply to developing countries.

The wide range of topics on pest and disease, forecasting and dissemmination covered by this publication makes it a very valueable reference not only for those involved or interested in pest and disease management, but also in the different aspects of agrometeorology. Of course, being a compendium written by different persons, not all topics are covered to equal extent and hence this reviewer feels that more attention could have been paid to tropical problems.

In general, all the chapters are extremely readable. Considering how hard this can be coming from so many authors of so many nationalities, much of the merit must go to the editor. At parts the test is witty, and in general the chapters are not only well presented but also well thought out, making for most interesting and useful reading.

— B. C. BISWAS