

# First order auto regression and simple regression models for prediction of grape powdery mildew in Northern Karnataka, India

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## ABSTRACT

Phytopathology has attracted people with different professional background, which deals with dynamics of plant pathogens infecting a host population. In the light above, present studies were undertaken to develop prediction models for grape powdery mildew disease. The auto regression models are one of the important epidemiological tools in prediction of disease. These models had good fit for the two seasons of late *kharif* 2002 and *rabi* 2002-03 for prediction of powdery mildew one week well in advance. The equation for late *kharif* was  $Y_{t+1} = 1.2890 Y_t$  with  $R=0.997$  and for *rabi* 2002-03 was  $Y_{t+1} = 1.3401 Y_t$  with  $R=0.994$ . However, during *rabi*, the prediction value at the end of the season was not admissible as it crossed 100 PDI. The powdery mildew occurrence was also predicted by simple regression model with equations for late *kharif* season, 2002 and *rabi* season, 2002-03 are  $Y = 2.01 + 3.44X$  and  $Y = -16.02 + 11.73X$  with  $R=0.926$  and  $R=0.978$ , respectively. By comparing the R-value it is clear that *rabi* season is suitable for powdery mildew occurrence. Therefore, both the models are good fit for powdery mildew prediction during *rabi* season than late *kharif* as it was favoured by cool and dry weather i.e., mean temperature 26.55 to 29.15°C and 42 to 62 per cent relative humidity and no rainfall during *rabi* season

**Key words:** PDI, First order auto regression, Simple regression, Prediction model and *Uncinula necator*.

## INTRODUCTION

Grapes (*Vitis vinifera* L.) is most important fruit crop of the world and is fairly a good source of minerals, vitamins, etc.,. Grape is a temperate fruit crop, its cultivation in India is distinctly different from the cultivation elsewhere and is grown in various climatic conditions. The crop is extensively grown in Karnataka and is affected by many destructive fungal, bacterial and nematode diseases. Among these powdery mildew caused by *Uncinula necator* (Schw.) Burr. is most destructive and a limiting factor in grape cultivation resulting in shedding of blossoms in early stage and shriveling and cracking of berries during ripening stage Ghure. and Shinde(1987) and cause enormous yield loss when it attacks at early of stages crop. The disease is influenced by various environmental factors such as, temperature, relative humidity, rainfall and wind velocity. It is favoured by dry and cool weather prevailing during crop growth period. According to Rewal (1993), in South Western regions of Punjab, the maximum temperature goes beyond 35°C during early berry growth period, the growth of fungus is more on the young berries than on leaves. Data on perennials are partially difficult to assess because consideration must be given to the effect of one season's disease development on future disease, in addition, the

effect of disease on the current season's yield and also on long term yield potential. Powdery mildew is serious disease in vineyards of northern districts of Karnataka. Therefore, we studied the relationship between disease development and its weather parameters to develop a prediction models using "First order auto regression" and "Simple regression" so as to predict the powdery mildew occurrence one week well in advance and can plan for effective management strategies.

## MATERIALS AND METHODS

Studies on powdery mildew disease development were undertaken at the Regional Agricultural Research Station, Raichur during late *kharif* 2002 and *rabi* 2002 – 03 on Thompson Seedless, a highly susceptible variety of grape with recommended package of practices except for the management of powdery mildew disease. Development of disease was studied in relation to previous disease intensity by using first order auto regression model and simple regression model.

The powdery mildew disease was recorded on 10 randomly selected vines by following 0-5 scale Thind *et al.* (1996) at weekly interval starting from the first appearance of disease till pruning / maturation of leaves or fruit bunches. Per cent Disease Index (PDI) was calculated as described by Wheeler(1969).

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