

Potato late blight disease forecasting and recommending appropriate control measures using artificial intelligence techniques

A hybrid intelligent system has been developed to forecast the onset of the Potato Late Blight (PLB) disease and to recommend appropriate control measures. Inputs to the system are PLB disease development and growth factors including relative humidity, temperature, and potato variety. Its output is a date range of a possible disease outbreak. Inputs of this system do not fit into any mathematical model as well as the input data set are incomplete. Due to these reasons, forecasting cannot be done by using statistical methods. Therefore, an Artificial Neural Network (ANN) is used to do the forecasting and an Expert System (ES) is used to recommend the appropriate control measures for the disease. This ANN comprises six hidden layers. It has been trained using 'Backpropagation' training algorithm. The output generated by ANN is used by the ES to recommend the control measures. The ES has been implemented as a rule-

based system and also incorporated facilities for explaining the reasons for the answers provided by the system.

Using this system, users can get to know a possible PLB disease outbreak in potato cultivation beforehand. Also, users can get to know the most appropriate control measures to prevent or control the disease effectively and economically. Moreover, this system can be used to store details pertaining to geographical areas, potato varieties and fungicides. Also, it can be used as a training tool too. This system can be adapted to use in many varying geographical areas by training its neural network using the data collected from those areas. The system was tested with the real data and 60% accuracy was achieved. It was evaluated using three different user groups i.e. technical experts (researchers, trainers and extension officers), system practitioners (AI professionals) and beneficiaries (potato farmers). Majority of the evaluators commented on the system as a good solution devised for a problem that is worth solving and will be extremely useful for the agriculture community in Sri Lanka. The system is ready to be used in the field.