In light of the severe impacts that climate change has been having on the agricultural sector, there is an increasing need to identify and develop suitable techniques and strategies that can be used to significantly reduce or mitigate the effects of this phenomenon. Agriculture, like many other economic sectors in the Caribbean is extremely vulnerable to the unstable climatic conditions that are prevalent. Climate change has brought with it; increasing sea levels, heat waves, droughts and floods among other natural disasters that have become monstrous and much more frequent. In recent times, the region has suffered from more devastating hurricanes that ever before. In 2010, the agricultural sector was hard hit by Hurricane Tomas that destroyed most of the banana industry in St Vincent and St Lucia accounting for damages of over 80% and a monetary loss of over USD 700,000 per week; between St Lucia and St Vincent it is estimated that over USD 22 million dollars were lost.

In addition to the losses caused by natural disasters, the changes in weather and climatic patterns have presented a more suitable environment for the development and proliferation of pest and diseases. In the Region, crops are currently under threat from the increasing emergence of new and more potent weeds, arthropod and microbial pests. Millions of dollars are lost each year because of pest infestation leading to crop losses and also on implementing suitable management strategies for these pests which usually requires significant time, capital and labour.

In order to obtain maximum potential from crops that are established, many farmers have relied mainly on the use conventional methods of pest control such as applying chemical treatments or pesticides to the crops. While the application of pesticides may be a solution, it is often short lived and is not economically and socially sustainable due to the high cost and negative environmental impact.

According to the warnings of local, regional and international climate studies groups, organizations and professionals, the Region has just seen the “tip of the iceberg” as far as the impact of climate change is concerned and much is still to be done especially in crop production to adapt to the hazards of climate change. One strategy that has been investigated is the use of pest and disease simulation models to predict the events of the development of pests and diseases. The use of sustainable plant protection strategies heavily relies on accurate pest and disease forecasting tools in order to avoid unnecessary chemical treatments.

Pest and disease simulation models are a decision support system that aids agricultural decision makers, especially farmers in managing their production, specifically in the area of pest and disease management. The technique utilizes inputs relating to the most favourable conditions for
which the particular pest thrives and the output is information on the development of the pests in real time. The prediction of the incidence of a pest or disease allows the farmer to take timely evasive action which will result in reducing the possible loss which would be caused by this pest or disease. These models generally require quantitative data to make them more precise; however, an added advantage of a simulation model is that some output can be obtained even when the data is largely qualitative. This is a real advantage especially in the Region, where data collection is not always at its best.

Generally, models require weather and climate data such as: rainfall, temperature, relative humidity, solar radiation, dew point, wind speed, height and direction among others. Also of import is biological data including; leaf area index, crop variety, crop growth, growth stages of pest and pathogens and pest population and intensity. Hourly weather data are usually required throughout the growing season, although in many cases historical data is required to be used as the baseline to define the climatic characteristics of the target environment.

With the Region focusing on obtaining food security and food sovereignty, decision support tools such as pest and disease simulation models are expected to help in the realisation of these goals. Pest and disease modelling has the potential to reduce pesticide applications which will make food and the working environment safer, whilst making the Region more compliant on the international markets hence increasing the potential for maximum earning.

As part of the Caribbean Agro-Meteorological Initiative (CAMI) which was initiated in 2010, staffs of the Caribbean Agricultural Research and Development Institute (CARDI) and the Caribbean Institute of Meteorology and Hydrology (CIMH) were trained in the development of pest and disease simulation models by a consultant, Dr Simone Orlandini of the University of Florence. This training was carried out in the Caribbean as well as in Italy.

As a part of the training, simulation models were developed, using available data on published pest models, for some pest and diseases of economic importance in the Caribbean. The selected pests were the pathogenic pests Black Sigatoka (Mycospharella fijiensis) which affects bananas and plantains (Musa spp.) and Soyabean Rust (Phakopspora pachyrhizi) and an arthropod pest, the Asian Citrus Psyllid (Diaphorina citri) which is the vector for the devastating citrus disease known as Huanlongbing (HLB) or citrus greening as it is commonly called. These pests were selected after consultations with the national Crop Protection Specialist of the Caribbean Region.

At present the models are being validated through the collection of crop and weather data in the Caribbean. At the end of this validation process these models are expected to significantly enhance the producers’ ability to predict the onset of these pests and so take timely evasive action.