Next-generation modelling approaches for sustainable crop protection

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The combined pre and post-harvest insect-pest and disease infestation causes an annual estimated 40-50% of total produce loss. Overall loss of attainable yield is more severe in the Asian and African continents because of transboundary insect pests, inconsistent access to crop protection products and lack of preparedness. Solicit innovative, digitally enabled low-cost climate smart pest management technologies for real-time pest forecasting and decision support systems (DSSs) are of great significance and inevitable. Considering this, efforts have been made to develop weather based forewarning models for pests in Chickpea and Pigeonpea (*Helicoverpa*, Phytophthora blight) and Cotton (Aphid, Leaf hopper, thrips, whitefly) for forewarning time of first appearance of pest, maximum severity/pest population vis-à-vis' crop age. Using weather indices, models were obtained through stepwise regression technique and machine learning (artificial neural network and Bayesian network) techniques. In general, the models fitted well for all the available data and have good agreement between forecasts and observed status. The predictive ability and accuracy of models will be further validated through cross-location and cross-year models. Further, development of Hybrid Mobile App with Microsoft Azure and promoting e/m-participation will help in dissemination of information to end users for real-time pest monitoring, prediction and crop protection advisory.