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Title: PREDICTING SUSCEPTIBLE AREAS OF MANGO MALFORMATION THROUGH REMOTE SENSING AND GIS

Type: Thesis

Abstract: Mango malformation caused by *Fusarium mangiferae* is a serious threat to mango cultivation in various countries. Since there is dearth of available information, the present investigations were undertaken using remote sensing and Geographic Information System (GIS) tools for identifying mango growing regions in India and for developing disease prediction models in relation to mango malformation and under climate change scenario. Since many mango orchards were small in size, the present investigations revealed that finer resolution remote sensing data was more reliable when compared with that of coarse resolution with respect to the statistical accuracy of estimated area. Time series MODIS NDVI profile could discriminate mango growing areas from other orchards through signatures of phenotypic changes due to flowering in mango. The experiment carried out to differentiate healthy and malformed flowers in mango using spectral reflectance data revealed that all the indices derived from hyperspectral reflectance data were very promising. The best suited approach for discrimination was red edge technique followed by hyperindices like hNDVI, SIPI and NPCI for differentiating the malformed and healthy panicles. The study suggests the use of hyperspectral satellite data of moderate resolution to prove its potentiality in discriminating mango malformed areas on regional basis. In Vitro culture studies revealed that temperatures 27°C followed by 25 °C with 65% relative humidity are optimum for better growth and sporulation of *Fusarium mangiferae*. The symptoms of malformation could be artificially induced under controlled conditions in phytotron at 27 °C with 60-65% relative humidity. The prediction of mango malformation susceptible areas was done by using threshold weather parameters conducive for *Fusarium mangiferae* growth and proliferation and logistic quadratic approach. The model predicted that probability of mango malformation occurrence was very high in Delhi, Uttar Pradesh and Haryana, Chhattisgarh, Gujarat, Madhya Pradesh followed by Punjab and Jharkhand. The comparison of the probable areas of mango malformation occurrence from current climate with that of changed climate scenario of future (2020) indicates a comparatively reduced area in southern part of India and an increased area towards the northern part of India. The climate change could overall cause a decrease in the occurrence of mango malformation areas in future.

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