

BigData and ICT for pest surveillance and risk mapping

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Abstract:

The date palm is prone to several pests and diseases under changing climate coupled with inadequate and/or lack of proper management, cultural practices and early detection. Red Palm Weevil (RPW) is the most devastating pest in the date palm. The foremost and most effective preventive measures to contain the pest is timely surveillance and early detection. The surveillance and early detection is done by close inspection of individual trees or often by population dynamics by trapping the RPW. The geotagging of the surveillance and trap data were carried out to develop structured geo-database to map and monitor the dynamics of the RPW, and resultant analytics feed into quantification of vulnerability of date palms to RPW risks in advance and across the scales with innovative use of BigData and Information and Communications Technologies (ICTs) tools and technology. A pilot research has been undertaken to develop and demonstrate the use of Big-data and Geo-ICTs from in-situ observations to spatial data analytics (SDA) for assessing pattern and trend of the RPW. The key activities were under taken in the initial phase-1 were; (a) develop and demonstrate geotagging of field data and tree level information, (b) data streamlining and geo-linking of the field data to farm typologies and (c) develop spatial models of RPW risks and web analytics for monitoring and management. The extension database with all day-to-day monitoring parameters were linked to farm typologies for spatial modeling. The geodatabase at trees and farm level referencing were used for time-step hotspot analysis of RPW. The results show that nearly 23% of the farms infested with RPW and nearly 31% of the farms found to be suspected with RPW. Hotspot analysis of the RPW pest risk shows that more than half of the farms (57%) were prone to infestation if there is no further treatment or action taken. Initial results of the one-extension systems can be found at the Geo-web portal <http://geoagro.icarda.org/datepalm/>. This is a pilot case study of one farm with some data gaps. This study needs further analysis with historical data such as population dynamics, climate and management practices to quantify the risk dynamics and drivers to mitigate the RPW infestation. We are also developing blockchain technology coupled with Oriented Database Kit (ODK) based open source geotagging tools/apps to make real time surveillance of RPW and other pests on date palm.

Key words: Date Palm, RPW, Monitoring, survey, Management