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MODELLING THRIPS INFESTATIONS ON GROUNDNUT USING WAVELET ANALYSIS AND ITS COMPARISON WITH ARIMA MODEL

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Groundnut (*Arachishypogaea* L.), a major oilseed crop grown in India suffers serious damage due to many insectpests ranging from sap feeders to defoliators besides diseases of soil, air and insect borne nature. Species of thrips (*Scirtothripsdorsalis* (Hood), *Farnkliniellaschultzei* (Trybom), *Caliothripsindicus* (Bagnall), *Megalurothripsusitatus*(Bagnall) and *Thripspalmi* (Karny)) occur on groundnut and cause not only direct feeding damage but also transmit virus diseases thus reducing attainable yield levels. Plant damage caused bythrips, commonly referred as infestations are expressed as per cent calculated based on number of plants showing symptoms of thrips out of 10 plants sampled per spot across five randomly selected spots in an acre of groundnut field. Forecasting of thrips infestation based on their dynamics over seasons would be of immense utility towards management of thrips in groundnut fields. Empirical models like multiple linear regressions with weather parameters as explanatory variables and time series models based on thrips populations are available across crops including groundnut. Since the pattern of pest dynamics is both linear as well as nonlinear, the parametric models like linear regressions and autoregressiveintegrated moving average (ARIMA) models are often considered inconsistent in terms of prediction accuracy. Hence, attempt was made to apply “wavelet analysis”, a non-parametric decomposition approach to describe the pattern of dynamics of thrips infestation on groundnut during *kharif* season. Dynamics of thrips infestations were collected from twenty fields each across locations of Junagadh (Gujarat), Kadiri (Andhra Pradesh), Dharwad (Karnataka) and Vridhachalam (TN) through weekly field observations over five seasons (2012-16). Mean seasonal infestation of thrips across years varied significantly in each of the locations. Time series data of each location were subjected to “wavelet analysis”, and compared its accuracy with ARIMA in terms of root mean square prediction error (RMSPE). The computed RMSPE values indicated performance of ARIMA model for thrips infestation to be better than wavelet analysis at locations of Junagadh (GJ) and Kadiri (AP) and *vice versa* with respect to Dharwad (KA) and Vridhachalam (TN) indicating spatial variability possible arising out of temporal variability in thrips infestations at these two sets of locations. It is to be mentioned that the difference in mean seasonal thrips infestations across years has been 1.2 and 1.6 at Junagadh (GJ) and Kadiri (AP), respectively where ARIMA performed better. On the other hand, the difference of infestations amongst seasons for was 4.3 and 4.0 in respect of Dharwad (KA) and Vridhachalam (TN) where wavelet methodology showed better performance. Thus, there are no single general or space neutral models that can be considered better for prediction of thrips infestations but a combination of methods need to be adopted to arrive at suitable and better performing models. Both ARIMA and wavelet methods of the present study have considered the behavior of the response variable with no explicit account of other ecosystem parameters such as thrips abundance, associations of biotic and abiotic (weather) factors. Development of additional models with incorporation of additional variables are expected to further improve our prediction capabilities.