

Development of an early warning system for brown planthopper (BPH) (*Nilaparvata lugens*) in rice farming using multispectral remote sensing

ABSTRACT

The spread of rice pests such as BPH in tropical areas is one of the best-known yield lost factors. Remote sensing can support precision farming practices for determining the location of spreads and using pesticide in the right place. In a specifically conducive environment like high temperature and heavy rainfall, BPH population will increase. To address this issue, detection of sheath blight in rice farming was examined by using SPOT-5 images. Also, the extraction of weather data derived from Landsat images for comparing with the BPH infestation was undertaken. Results showed that all the indices that recognize infected plants are significant at $p = 0.01$. Examination of the association between the disease indices indicated that band 3 (near infrared) and band 4 (mid infrared) in SPOT-5 images have a relatively high correlation for detecting diseased part from healthy ones. The selected indices declared better association for detecting healthy plants from diseased ones. Image investigations revealed that BPH were existing at the higher limits of tolerable temperatures when in the form of nymphs. With the knowledge that the late growth stage of plants has more severe BPH attacks, the results stated that BPH outbreak is particularly obvious in the north-west corner and middle regions of the maps and it is more likely to happen in specified ranges of temperature and RH, i.e. $29\text{ }^{\circ}\text{C} < T < 32\text{ }^{\circ}\text{C}$, and $88\% < \text{RH} < 93\%$.

Keyword: Binary logistic regression analysis; Humidity; Pest population; Rice yield; Temperature