

**PRECISION AGRICULTURE: CURRENT STATE OF THE ART  
INSECT PEST MANAGEMENT**

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**Abstract**

Uses of remote-sensing and precision-application techniques are not new to agriculture but their uses in cotton insect management are relatively new and in the experimental phase of development. Fundamental issues relative to the use of these technologies are (1) insects are too small to detect with remote sensing techniques, and (2) when damage is detectable it is too late for useful action. When faced with these constraints, how can these technologies be used in insect pest management? We can detect features of a cotton crop associated with high risk of infestation and damage. We can make prescription maps based on imagery data for precision application of insecticide to these high risk areas if scouting verifies the presence of an insect pest infestation. Research has shown that this can be done successfully with tarnished plant bug, stink bug, and thrips, and that it may have been done with a beet armyworm infestation. Good equipment is available for prescription applications of insecticides with ground equipment and site-specific aerial application equipment is not far behind. There are several additional issues that will influence the extent to which remote-sensing and precision-application techniques can be adapted in cotton insect pest management. A cotton crop must have distinct crop vigor zones that are identifiable with imagery data in order to be a candidate for site-specific insecticide treatment. The crop must be monitored (scouted) to verify an infestation before taking curative action (i.e. insecticide application). Detection of high vigor (higher infestation potential areas) with imagery should not be used alone as the basis for making an insecticide application. The spatial relationship of a potentially damaging infestation in a higher vigor area and non-damaging lower-infestation levels in a lower vigor area may be lost if curative action is delayed. A new concept of insect pest management may be needed. The old IPM notion was to make few or no preventive insecticide applications, but to delay as long as possible to conserve natural enemies of pests. The site-specific approach will probably be most successful when an invading insect pest infestation can be intercepted on a preemptive basis, i.e. limit the portions of fields to be treated as a means of conserving natural enemies. More knowledge is needed about (1) insects capability to discriminate differences in crop vigor, i.e. how much variation in crop vigor in a field is needed for insect pest infestations to become established in a spatially definable pattern, (2) reinfestation of a pest population, especially tarnished plant bug, after site-specific early intervention is used, (3) factors in the broader landscape that influence infestation patterns in a cotton field(s), (4) factors other than imagery that may be used as the basis for site-specific insecticide application, e.g. historical yield monitor data. The contribution of precision-agriculture techniques to farm profit will be the most important test of their value to cotton farmers. There is a need for rigorous economic studies of remote-sensing and precision-application techniques in cotton insect pest management.