GROWER PERCEPTIONS OF TWOSPOTTED SPIDER MITE CONTROL

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Introduction

In 2006, like other regions of Wisconsin in previous years of low moisture to drought conditions, saw significant increases in twospotted spider mite, (TSM) infestations. Lessons learned from these other regions and previous outbreaks in 1983, 1988, 1995, and 2005, indicated that soybean damage could be anticipated. Research trials for developing Integrated Pest Management (IPM) recommendations are difficult. Further, specific economic thresholds do not exist for twospotted spider mite in soybeans (Cullen, 2006).

Northwestern Wisconsin observed moderate to severe drought conditions in 2006. In Northern St. Croix County, WI, soil moisture conditions were described as severe from May through Early August. Moisture stress for soybean was also severe and the conditions were right for TSM populations to increase to damaging levels. Crop consultants, dealers and UW-Extension agriculture agents in Northwest Wisconsin reported early observations in mid-July. Peak reports of damage occurred during the first week of August. Evaluating grower perceptions when TSM infestations occur, studying grower decisions and connecting grower decisions to observed outcomes of their decisions is core to this study. The study is both quantitative and qualitative and is based upon the 2006 UW-Extension Grower Survey on Twospotted Spider Mite in St. Croix County, Wisconsin.

Twospotted Spider Mite Abbreviated Review

TSM are very small and are difficult to see with the naked eye. Their small size (one to two-tenths of an inch) typically requires the scouts and growers to use the aid of a hand lens. Detection of TSM can be overlooked. TSM have long pointed mouthparts that extract nutrients from individual leaf cells. The extraction of cell contents leads to the depletion of chlorophyll content in cells. As the cell content depletion escalates, the presence of small oval white or yellow specks becomes more apparent. These symptoms are know stippling and are usually first observed on the undersides of leaves. As more feeding occurs under moisture stress conditions, data suggests potential yield reductions of 40 to 60% (Klubertanz, 1994).

Scouting and monitoring of TSM in soybean should begin at the field edges and borders. The presence of TSM does not predict that spread of this pest further into the interior of fields. However, the monitoring of the entire field is recommended, especially if moisture stress conditions continue. Stippling of soybean leaves is indicative of TSM feeding. The full range of the leaf canopy should be observed. Tapping the soybean leaves to dislodge TSM over a white sheet of paper is an accepted practice to check for the presence of TSM.

The primary natural enemy TSM is the fungal pathogen *Neozygites floridana.* This host specific pathogen infects TSM under environmental conditions that are cooler than 85^{o}F and with at least 90% humidity lasting 12 to 24 hours. Under these conditions and once infection occurs, death of TSM usually occurs within 1 to 3 days (Cullen, 2006).

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Grower Perceptions

For soybean growers in St. Croix County, 2006 was likely the first year that TSM was a serious management challenge and economic threat. Following the soybean harvest in 2006, a grower survey was completed. The first reported observations of TSM occurred on July 15 and the latest first observation by growers was on August 8. Nearly half of the growers surveyed learned about TSM at the Pierce/St. Croix Soybean Diagnostic Field Day on August 2, and subsequently found TSM in their soybean fields later that day or in the days following. It should be noted that Dr. Eileen Cullen identified and demonstrated TSM scouting awareness for the growers.

The majority of growers (76%) reported that actual detection of TSM populations was the primary determination for recognizing that an infestation and damage potential existed. Growers also reported that the observation of TSM damage (stippling, yellowing, and bronzing) influenced how they recognized the problem. Growers credited independent crop consultants, dealer agronomists, UW-Extension agents and themselves in near equal proportion for the scouting or the training necessary for scouting. While not asked in the grower survey, it can be inferred that considerable networking and sharing of information among growers, UW-Extension agents and agronomy professionals was key to grower's capacity to deal with the TSM infestations in the region.

Understanding the management decisions made by growers was integral to the grower survey. The length of time between first observing TSM in soybean and the time when applications were made varied from 1 to 15 days. While this may not seem significant it could suggest that growers continued to scout and monitor fields and base their application timing according to the severity of the infestation. The majority of growers made decisions on a field by field basis. Portions and perimeters of fields were sprayed. In only one case did a grower spray all of the field area in all of the fields. Again, this reaffirms that growers were making evidence-based decisions with professional advisors. The majority (68%) of the treatment recommendations were made by dealer agronomists. Treatment recommendations by Independent Crop Consultants, UW-Extension, and fellow producers were followed by (32%) of the growers. Costs for treatment of TSM varied from $4.50 to $13.50 per acre. Some included custom application costs while others did not.

A post-harvest survey measured grower estimates for soybean yield on treated and non-treated locations. Nearly three-fourths (73%) of the growers felt that treatment for TSM reduced yield losses. Some growers reported mixed results. Reported yield saved ranged from 2 to 10 bushels and the average response was 6 bushel per acre. However, growers were also asked if they saw a "marked difference" between treated and untreated acres. Only half of the growers responded yes. Qualitative comments by growers ranged from "Didn't have to spray some fields because I watched them closely", to "Better color....more growth....better yield". Based on grower perceptions, TSM is a soybean pest with little predictability other than scouting soybeans routinely. Continue to scout for TSM throughout the growing season recognizing that economic thresholds are not yet determined but are a priority for ongoing research. Experimental designs for establishing economic thresholds are difficult because moisture stress and drought are associated factors with TSM damage. Growers and agronomy professionals need to keep this pest on their scouting list throughout the growing season.

References

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