Evaluation of Farmer Applications of TopGuard® (Flutriafol) for Cotton Root Control in the First Section 18 Exemption Year

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Abstract:

Cotton Root Rot (CRR), a fungal disease, caused by *Phymatotrichopsis omnivora* reduces yields, fiber quality, and harvest efficiency on an estimated 1.5 million acres in Texas and is important in other areas of Southwestern North America. The fungicide Topguard®, active ingredient Flutriafol (11.8%), received a Section 18 emergency use exemption label in Texas for an at planting treatment in the 2012 cotton growing season. The label specified a rate range between 16 and 32 fluid ounces per acres applied in a 3 to 5 inch spray band over the seed bed as part of the sowing operation. It is estimated that between 150,000 and 170,000 acres were treated in 2012 throughout the state. Producer applications varied greatly in acreage treated, irrigated and dryland crops, fungicide rate used, as did the crop and disease control response to treatment. The control affects were difficult to estimate in many situations because the hot and dry season was not conducive to disease development, producers did not leave untreated areas for comparison, and large acreages of dryland production were not harvested due drought induced crop failure. However, satisfactory control was measured and observed in most areas of the state with more significant differences in disease incidence and measurable yield in irrigated production. Overhead irrigation and/or significant and timely precipitation showed a positive interaction with disease control. The general observations during 2012 from multiple sites over significant acreage suggest a positive benefit to Topguard® use and support the need for continued applied research for refined disease control.

Introduction:

Cotton Root Rot (CRR) or Phymatotrichopsis root rot (PRR), caused by the fungus *Phymatotrichopsis omnivora*, occurs in many of the cotton production areas of Texas. This disease causes losses of $29 million annually (unpublished survey data of Gaylon Morgan *et al*., 2011) and limits where cotton can be grown. The fungicide active ingredient flutriafol, sold as Topguard® by Cheminova Inc. was previously shown to have activity against PRR when applied at planting (Isakeit *et al*., 2011 and Isakeit *et.al*., 2012). Based these experimental results a section 18 exemption use was applied for and received for control of CRR during the 2012 growing season in Texas.

Materials and Methods:

The fungicide Topguard®, Cheminova Inc.; active ingredient Flutriafol (11.8%) received a Section 18 emergency use exemption in Texas for an at planting treatment in the 2012 cotton growing season. The label specified a rate range between 16 and 32 fluid ounces per acre applied in a 3 to 5 inch spray band over the seed bed using a spray nozzle attached to the planting unit behind the opening discs and in front of the closing wheels. See Figure 1. The acreage was limited to 288,000 acres and designated counties in Texas that included known areas of significant CRR disease incidence (Figure 2). Use, crop growth, disease development and control were monitored by the authors and others through out the state including some large plot replicated trials, (data not shown). Other sites were observed and monitored as communications from producers, county extension agents, crop consultants, and industry representatives were received. Producer surveys are being conducted to better determine producer use and the agronomic and economic impact.

Figure 1. Application method of Topguard® by spray nozzle mounted on the planting unit behind the disc openers and in front of closing wheels.

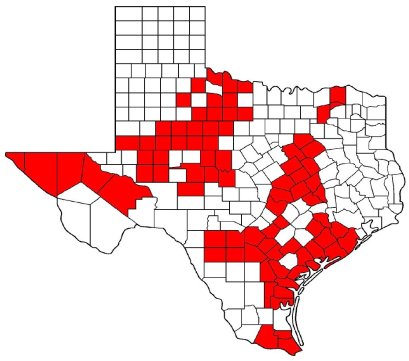

Figure 2. Counties in Texas specified for the use of Topguard® to control Cotton Root Rot in 2012

Results and Observations:

Based on product sales and producer reported use rates it is estimated that between 150,000 and 170,000 acres were treated with Topguard® (Cheminova Inc., personal communication). Both dryland and irrigated acreages were treated with irrigated production treated at a higher frequency and use rate. The growing season was characterized in the entire state as hot and dry therefore reducing the incidence of CRR disease and confounding estimates of control from Topguard® treatment. Many dryland acreages were not harvested leaving producers without measuring yield differences and feeling that the treatment applied at planting was a wasted input. Furthermore, most producers did not leave untreated areas to evaluate crop growth and development differences associated with treatments therefore treatment benefits were undetectable or speculative based on past experience. Some untreated areas, both planned and unintentional did provide many impressive and valuable comparisons for determining the affects of treatment (Figures 3 and 4). However, CRR control by Topguard®, was not discernible in all areas including different areas in the same field (Figure 6). Overhead irrigation and/or significant rains of at least an inch seemed to favor conditions for disease development and observable control. Table 1. describes the general production practices, Topguard® use rates, and observed treatment affects in the major CRR affected areas of Texas.

Figure 3. Comparison of Topguard® treated rows, right, and untreated rows, left in a subsurface drip irrigated field near San Angelo, TX during the 2012 growing season.

Figure 4. Pattern of Cotton Root Rot diseased plants from areas untreated with Topguard® due to a sprayer malfunction in a pivot irrigated field near San Angelo, TX during the 2012 growing season.

Table 1. The primary cotton growing areas of Texas affected by Cotton Root Rot (CRR), the primary cropping system where Topguard® was applied, rate used, and general response to treatment during the 2012 growing season.

Cotton growing area of Texas	Primary Cropping system where applied	Rate Used	General Response to treatment
Rolling Plains	SDI Irrigated	32	Good Control Observed, disease and control hampered by hot dry season
P. Basin and Transpecos	SDI Irrigated	32	Good Control Observed, Lower disease incidence
Winter Garden	Pivot Irrigated	16 –32	Good control observed under Pivot Irrigation
Blacklands	Dryland	16	Disease reduced by hot dry season
Upper Coast	Dryland	16	Disease reduced by hot dry season
Coastal Bend	Dry and some Irrigated	16-32	Good Control Observed, disease and control hampered by hot dry season
Lower Rio Grande Valley	Irrigated	16-32	Good Control Observed, disease and control hampered by hot dry season

Figure 5. Slightly smaller cotton seedlings observed in Topguard® treated rows, left as compared with rows on the right

Figure 6. High disease incidence in rows on the right side despite treatment with 32 fl. oz per acre of Topguard®

Planned untreated control areas in multiple locations provided valuable comparisons and insights into areas for additional research and refinement. Delayed seedling emergence was observed in some locations where there was high soil moisture at the time of or shortly after planting (Figure 5). These conditions were created by excessive irrigation before planting, rainfall or overhead irrigation within a day or two of planting. In most cases there were other complicating conditions that did not favor seedling emergence including high salinity, high temperatures, high winds, deep planting depth, and soil compaction or crusting. Although emergence and seedling establishment was delayed in most cases other yield limiting differences later in the season did not develop. There were some instances of replanting especially where there were multiple stress factors.

Conclusions:

- Topguard® use was enthusiastically adopted on significant acreage in Texas on the first year of a Section 18 use exemption despite relatively few years of limited use research and potentially persistent drought conditions. However, in many areas disease losses are historically frequent and severe. Additionally, early 2012 season cotton prices were very favorable.
- Topguard® use as labeled provided some level of CRR control including significant disease reduction with increased production and economic returns in many locations and cropping systems throughout the state but, not all.
- Evaluation of control and increased economic returns would have been facilitated by producers leaving untreated areas of the field for comparison and by a more productive growing season.
- Overhead irrigation and/or timely rains of significant quantity appeared to enhance CRR control in many locations.
- Effects of Topguard® use as labeled, on emerging cotton seedlings was insignificant in most cases but in some few conditions of abundant soil moisture and accompanied with other environmental stresses at or immediately after planting, seedling emergence appeared to be delayed.
- Producers have expressed interest in use strategies to improve performance and reduce cost for example: other application methods and timing, different use rates, and site specific management.

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