Cotton Root Rot (CRR) is a fungal disease that essentially eliminates harvestable cotton on affected acres. In 2012, the fungicide TopGuard®, active ingredient Flutriafol (11.8%), received a section 18 emergency use exemption label for use in Texas. It is estimated that TopGuard® was applied to nearly 170,000 acres in 2012 and usage is expected to continue to increase. TopGuard® has proven to be an effective control for CRR, but that control can cost in excess of $40/AC. Texas A&M AgriLife Extension has developed a spreadsheet based decision aid to assist producers in evaluating their cotton root rot options by identifying economic thresholds for expected yields and percent of field affected by CRR. This decision aid can be found at: http://sanangelo.tamu.edu/extension/west-central-agricultural-economics/analytical-tools/.

### Methods

The Texas A&M AgriLife Extension Service Cotton Root Rot Return to Treatment calculator only measures per acre changes to gross revenue (GR) directly attributable to the application of TopGuard®. Most other production practices are assumed to remain unchanged. As a result, this calculator only requires input of 10 variables by users. The decision aid calculates return to treatment as:

1. **Return to Treatment** =
   \[
   \Delta \text{Gross Revenue (GR)} - \Delta \text{Production Costs (PC)} - \text{Cost of Treatment}
   \]

2. **GR** = Gross Revenue\(_{\text{treated}}\) - Gross Revenue\(_{\text{untreated}}\)

3. **Cost of Treatment** = (Lint Yld - Lint Price) + (Seed Yld - Seed Price)

Producer input in the revenue calculations includes the expected lint yield in the absence of root rot and the anticipated yield response to the TopGuard® treatment. Practical field trials suggest that numerous extraneous factors can influence the efficacy of the TopGuard® treatment, thus a producer’s experience based input is sought for this variable. It is assumed that the effective yield of both saleable lint and seed is zero in acres that are affected by CRR. Producer price expectations are also required; the expected net price per pound of lint and the net price per ton of produced cotton seed. The seed yield is calculated as a function of the lint yield.

Production costs in the context of this decision aid are limited to harvest costs, ginning and associated costs and possibly additional fertilizer costs.

4. **Production Costs**\(_{\text{Treated and untreated}}\) =
   \[
   (\text{Lint Yld (bs/AC)} \times \text{harvest cost}) + (\text{Lint Yld (cut (seed cotton) + Gin and Haul cost}) + (\text{Lint Yld (Bag and Tie Cost}) + (\text{Nitrogen (ac) + Fert. Cost})
   \]

Harvest costs can consist of either a custom stripping or picking charge per pound of cotton, or a producer calculated cost per pound to strip or pick and build modules with owned or leased equipment and labor. The decision aid also provides flexibility in accounting for differences in how various ginning costs are assessed to producers. The input of a “0” in any of these ginning cost fields will cause that variable to be ignored.

If a producer makes the decision to increase fertilizer because of the decision to apply TopGuard®, then a price per pound of applied nitrogen will be entered into the calculator. Again if a “0” is entered into this field, the variable will be ignored.

5. **Treatment Costs** =
   \[
   \left(\text{Cost of TopGuard®} / \text{unit} \times \text{Application Rate (Units/AC)}\right) + $1.76
   \]

The last factor on Equation 5 is a nominal expense to account for a variety of other per acre expenses incurred applying TopGuard®. These expenses include additional fuel and labor hauling water and chemical to the field/planter, and amortized planter modifications.

### Acknowledgements

The authors would like to thank the many producers, Extension Agents, crop consultants, technicians and industry representatives that shared information and expertise. Cotton Inc. and Cheminova were also invaluable in providing support for this project.