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**“Integrating Weed Management Tools in Cotton and Corn:
Herbicide Tolerant and Conventional Herbicides in
California”**

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ABSTRACT

Integrating herbicide resistant crop technology and conventional herbicides makes sense for many reasons. One of the main concerns is preventing weed resistance. There is a high probability of developing resistant weed species and/or weed shifts when solely relying on one type of herbicide. For example, we have Roundup resistant annual ryegrass and marestail in California. Growers have also reported poor control of barnyardgrass and lambsquarter in some cases. Some of this reduction in control could also be due to applying glyphosate to drought stressed weeds. There are many reports of reduced control of barnyardgrass with continual use dinitroanilines in cotton in the San Joaquin Valley. Some California growers have observed reduced nutsedge control with continuous use of thiocarbamate herbicides in corn.

Herbicide tolerant crop acreage has increased dramatically in the United States and amounts to approximately 30 percent of the California cotton and corn acreage (Table 1.) The herbicide tolerant acreage of both cotton and corn should continue to increase as higher yielding varieties receive these traits. Fig. 1 and Fig. 2 show the dramatic increase in herbicide tolerant acreage in just a few years. Because of air pollution concerns growers are given credits by reducing cultivations and other tillage as part of the San Joaquin Valley Air Pollution restrictions.

The decision to use herbicide tolerant crops is largely based on the following criteria: 1) Can the crop be marketed? 2) Does the acreage of the weed infestation justify this use? 3) Is the

weed pressure enough to impact yield? 4) Is hand weeding or cultivation eliminated or reduced? 5) How does this compare to the cost of alternative herbicides? 6) Cost of technology fee? 7) Are there well-suited transgenic varieties with favorable agronomic characteristics for both yield and quality?

Roundup Ready Technology in Cotton

The Roundup Ready technology has provided growers with an excellent tool for managing many annual and perennial grasses, broadleaves such as nightshades and annual morningglory, and nutsedge in cotton. Some of the advantages to this system include the following: 1) Glyphosate can be applied post emergence so growers can wait and see the weeds present. 2) There are no plant back restrictions. 3) Glyphosate has a wide spectrum of weed control controlling or suppressing many annuals and perennials.

Some of the problems associated with this system include the following: 1) There is a narrow window of application. 2) It must be applied before cotton has 5 leaves. 3) Hooded sprayers are needed to safely apply later directed applications. 4) Nutsedge and annual morningglory are still a challenge. 5) Variety selection can be limited in that the technology is somewhat behind. The highest yielding varieties often do not have this trait. Even with the herbicide tolerant technology weeds like annual morningglory are increasing especially when growers are only relying on glyphosate.

Integrated Weed Management Costs

The herbicide tolerant cotton and corn systems have allowed growers to effectively control most annual and perennial weeds, to reduce or eliminate hand hoeing, and reduce the number of cultivations. Cost savings range from \$25 to \$120/acre is achieved. Even if growers use an herbicide tolerant system it is still advisable to use one of the following preplant incorporated herbicides in cotton: Prowl, Treflan, Caparol, or Caparol + Treflan/Prowl. The cost is low (\$6-\$8/A) and controls most annual grasses and many broadleaves. Ultimately the decision to use one herbicide tool over and how to integrate different herbicides will depend on costs and effectiveness.

Summary

The herbicide tolerant systems in cotton and corn has reduced weed control cost and given growers greater flexibility. This has allowed growers and researchers to explore alternative production systems such as conservation or reduced tillage, double row configurations, and ultra narrow row systems. In 2005 we look forward to Roundup Ready varieties that have more crop safety with a greater application window; Liberty Link Cotton by Bayer, Sulfonyureas by Dupont, and more Stacked Genes/Multiple Genes with both herbicide tolerance and insecticidal properties together. A resistance management approach must incorporate crop/herbicide rotation and control of weed escapes by tillage or hand. An integrated weed management system supplements an existing transgenic or conventional weed control program and uses a variety of the available pre-plant, selective over-the-top and layby herbicides along with tillage.

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