ROUNDUP READY FLEX COTTON TECHNOLOGY Kent A. Croon, Rob A. Ihrig and J. Walt Mullins Monsanto Company St. Louis, MO

Abstract

Since Roundup Ready cotton was introduced in 1997, it has redefined weed management in cotton production. Now, research and development has set the stage for a new weed management standard – the Roundup Ready Flex cotton system. Tested across the U.S. Cotton Belt since 2001, Roundup Ready Flex cotton offers an increased margin of crop safety due to its increased tolerance to glyphosate during cotton fruiting. This allows for a more flexible window of over-the-top applications of Roundup agricultural herbicides, extending from cotton emergence though layby, the key timing for the control of economically damaging weeds.

Benefits of Roundup Ready Flex Cotton. Research shows that the Roundup Ready Flex cotton system would be expected to provide additional grower benefits and efficiencies gains including: (1) Enhanced flexibility and convenience due to season-long application options, (2) Increased production efficiency as Roundup agricultural herbicide applications are combined with other crop chemical products, (3) Less dependence upon selective spray equipment, (4) Potential for greater weed control efficacy (due to current label restrictions and weather/equipment limitations), (5) Enhanced crop safety during sensitive cotton reproductive stages, and (6) Ability to tailor herbicide applications to weed height/stage instead of to the cotton stage of development.

A Technical Description of Roundup Ready Flex Cotton. Roundup Ready Flex cotton is based upon a transformation event identified as MON 88913. Roundup Ready Flex cotton (Event MON 88913) utilizes a *cp4 epsps* gene sequence that encodes for the CP4 EPSPS protein. The CP4 EPSPS protein expressed in Roundup Ready Flex cotton is the same protein currently used in Roundup Ready cotton which has an extensive history of safe use. This protein provides the necessary tolerance to glyphosate, the active ingredient in Roundup brand agricultural herbicides. The increased level of glyphosate herbicide tolerance in Roundup Ready Flex cotton has been achieved through the use of improved promoter sequences that regulate the expression of the *cp4 epsps* coding sequence.

Testing of Roundup Ready Flex Cotton. Roundup Ready Flex cotton has been tested at field locations across the Cotton Belt. This field work includes agronomic and tolerance testing, regulatory studies and development of weed management recommendations by local University scientists. University and third party testing to date has accounted for three of every four Cotton Belt research locations. Ahead of the variety development step, extensive greenhouse and field trials were conducted to evaluate the agronomic characteristics and composition of cotton containing the Roundup Ready Flex cotton trait. In all, 458 comparisons of over 50 agronomic characteristics were made including seed germination and emergence, plant growth and development, and harvest quality. Further, an additional 69 different compositional components of the cottonseed were evaluated.

Varieties. Monsanto will broadly license the Roundup Ready Flex cotton trait through seed company licensees. It is expected that seed companies will incorporate Roundup Ready Flex technology alone and in combination with other technologies such as Bollgard II into their leading cotton varieties. As the length of the growing season and environmental conditions vary across the Cotton Belt, variety performance may also vary. Monsanto strongly encourages the grower to utilize seed company and local university resources in making variety decisions.

The targeted launch for Roundup Ready Flex cotton is 2006. This product launch depends on a variety of factors, including successful completion of the regulatory process. Roundup Ready Flex cotton is not currently approved for sale or distribution in the United States and Roundup agricultural herbicides are not yet approved for certain postemergence applications. It is a violation of federal law to promote any unregistered herbicide use.