G.P.S. CONTROLLED PRECISION SPRAYING MINIMIZING COSTS AND ENVIRONMENTAL IMPACT

Cleve Turner III
Agri-Management Associates
Millington, TN

Abstract

The single most expensive phase of producing a cotton crop (without consideration of equipment cost) is insect control. With the escalating cost of chemicals and environmental considerations the key to reducing the cost of pest management is precision application of materials.

Introduction

Pest management in cotton has evolved over the years from a burlap bag of DDT across the back of a mule trotted up and down rows to shake it out on the cotton to "dusting" by air to aerial "spraying" of liquids to today's high precision ground spray rigs. G.P.S. control is the next step in the evolutionary process.

Discussion

The cost of managing worm infestations is greater than the management of other pests. The beginning date of a program is often delayed for economic reasons. Through the use of Global Positioning System control to treat only those areas of the field experiencing insect pressure a plan can be implemented earlier with minimal buildup of resistance and at a cost much lower than the treatment of the entire field.

The general method followed by several Mid-South growers is to closely scout fields in a grid using a grid map and recording pressure for each square of the grid. The data is then transferred as "site values" to the mapping software. The computer will then create a "region" map of insect pressure. This map has the appearance of a contour map (as a bonus insect migrations can be tracked by this method). The regions on the map may be then assigned a treatment level.

The region map is read into a notebook computer running Agris MapLINK software. An integral component of MapLINK is a controller driver for most Variable Rate systems such as MidTech and Raven. (Experience has shown that for a wide range of control the MidTech injection systems are more accurate than the others). The notebook will control the spray rates as you move from region to region on the map.

The final component of the system is the Global Positioning System receiver. There are a number of adequate units available. The preferred receiver is a Trimble Submeter. The absolute resolution is about ten inches. This receiver is available with a Coast Guard or Corps of Engineers differential signal receiver where this service is available with no subscription fees. All of the Cotton Belt is covered by Satloc and several other all satellite systems under service subscription contracts for $500.00 to $1200.00 per year

Economics and Environmental Considerations

One of the benefits of utilization of this system is time saving. The pesticides are contained in approved storage tanks of 7.5, 15, or 25 gallons. For use the container is attached to a rack on the sprayer and a hose connected with a quick disconnect fitting which is self sealing. This prevents spillage while handling and minimizes time required to move from one chemical to another. No mixing is required and the only liquid in the main tank of the sprayer is water (and surfactant/crop oil). The chemical may be shut off at the controller prior to leaving a field and plain water is sprayed to flush out the plumbing precluding the requirement of rinseate disposal.

Worm infestation is rarely uniform across a field therefore it makes sense to spray according to level of infestation. An average field may go from high and dry at one end to a low damp bottom at the other end. This profile would probably have a minimum of three infestation regions with the heaviest in the damp area and few if any in the dry region. If application rates could be adjusted downward from the labeled high rate to the low rate on just half the field a tremendous saving is realized (see Table 1). Environmental impact is reduced by minimizing total product applied .

The computer will not allow the sprayer to turn on if the machine is driven to a location outside the defined area to be sprayed unless it is manually overridden. This helps to prevent spraying a field in error.

Summary

The G.P.S. controlled spray system can affect significant reductions in the amount of pesticide product required to produce a quality cotton crop. This translates to reduced exposure of farm labor to toxic chemical contamination and potentially reduces carryover and resistance. It also reduces pesticide levels in runoff. Components of the system such as the notebook computer and G.P.S. receiver can be used for other functions which improves system cost efficiency.

Reference

Turner, C. 1996. Case studies of actual realized cost reduction Agri-Management Associates.

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Simmons, H. 1996. Environmental White Paper, Midwest Technologies, Inc.

Table 1. Comparison of per application chemical costs (G.P.S. vs. Uncontrolled) per thousand acres.

Pesticide cost per 1000 acres				
Product	**Cost per gal.**	**Labeled Coverage**	**Low rate cost**	**High rate cost**
Decis	525.00	50-80 ac.	6562.50	10500.00
Baythroid	420.00	40-70 ac.	6000.00	10500.00
50% high 50% low	**Low rate cost**	**High rate cost**	**Total Cost**	**Savings over High Rate**
Decis	3281.25	5250.00	8531.25	1968.75
3 applications	9843.75	15750.00	25593.75	5906.25
Baythroid	3000.00	5250.00	8250.00	2250.00
3 applications	9000.00	15570.00	24570.00	6930.00