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RE-EVALUATING CULTIVATION AND ITS POTENTIAL ROLE IN AMERICAN VEGETABLE WEED CONTROL

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Summary : Alternative weed control strategies are needed to address the recent trenc toward restricting herbicide use in U.S. vegetable production. In response to this situation, studies re-evaluating cultivation and its potential role in transplanted broccoli, snap bean, and sweet com weed control were conducted from 1993 to 1995. Cultivation implements included two flex-tine harrows and three inter-row cultivators (a brush hoe, a spider gang cultivator, and a danish-tine row crop cultivator). Each tool was used individually and the flex-tine harrows were used in combination with each of the inter-row implements. Additionally, banded herbicide appUcations were integrated with cultivation treatments in snap beans and sweet com. In transplanted broccoli, individual implements provided adequate weed control without reducing crop yield. Combinations of early-season flex-tine harrowing and an inter-row cultivation, or banded herbicides and row crop cultivation were necessary in snap beans. In sweet com, prehminary studies (1993) indicated that cultivation alone was not possible due to slow early-season com growth and competition from weeds within the crop row. Thus, in 1994, banded herbicides were applied over the com row in all cultivation treatments, effectively minimizing weed-crop competition. While succesful mechanical weed control strategies were identified, several surveyed vegetable growers indicated that increased cultivation was not feasible. Cited drawbacks of extensive cultivation include: 1) greater trained labor and time inputs; 2) cultivator damage in stony soils; 3) delayed cultivation in wet soils, and subsequent risk of weed control failure; and 4) soil erosion and/or compaction resulting from increased tillage.

Introduction

Prior to the advent of synthetic pesticides over a half cenUiry ago, cultivation was the primary method of weed control. However, the introduction of herbicides, beginning with the phenoxys in the mid-1940's, drastically increased weed control efficiency, which in tum allowed growers to increase their planted acreage. Herbicide dependence has increased in the past fifty years to tl point where there are few viable alternatives in many crops. However, there ecait trend toward restricting agricultural pesticide use, coupled with economic concerns of growers and aivironmental concerns of the public, has led to an interest in reducing pesticide use. Moreover, hCTbicides constitute 70% of U.S. agricultural pesticide use, and the present Presidaitial Administration's commitment to having 75% of American farmland under integrated pest management (IPM) by the year 2005 will require the rapid development of altemative weed control strategies.

Altemative strategies are particularly needed for minor crop producers, who are losing the few available herbicide options in current re-registrations mandated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in 1988, and for organic vegetable producers, who have limited weed control options. The increasing number of herbicide-resistant weeds has also stimulated an interest in reducing herbicide dependance in favor of integrated weed control programs that utilize several strategies, including cultivation.

Similar trends in Europe (mid-1980's) stimulated 'innovative' cultivator development for use