THE POTENTIAL IMPACT OF THE FOOD QUALITY PROTECTION ACT ON MID-SOUTH COTTON

John R. C. Robinson and Malcolm Broome
Mississippi State University Extension Service
Mississippi State University
Mississippi State, MS

Abstract

The paper reviews the key provisions and implications of the Food Quality Protection Act. This new legislation could potentially restrict the uses extensively used products like organophosphate and carbamate insecticides. The paper discusses the implications and economic effects.

Introduction

Depending on its ongoing implementation, the Food Quality Protection Act (FQPA) of 1996 could greatly affect the regulation, cost, and availability of cotton pesticides. The issues of cost and availability are serious in relatively high input, high cost regions such as the Mid-South. This paper reviews, updates, and forecasts the economic effects from this legislation.

EPA's pesticide regulatory authority formerly derived from the Federal Food Drug and Cosmetic Act (FFDCA) and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The FQPA amended and reconciled FIFRA and FFDCA to a consistent standard for pesticide residues in food and new standards for aggregate exposure from all sources (e.g., air, water, home).

There are many aspects of the FQPA which will not be dealt with in this paper. From the standpoint of cotton pesticide impacts, three issues are significant: 1) tolerance reassessment, 2) the risk cup constraint, and 3) grouping by common toxicity mechanism. Together these provisions could affect the availability of cotton inputs like organophosphate (OP) and carbamate insecticides.

Tolerance Reassessment. FQPA requires that all 9,728 current pesticide tolerances be reassessed within 10 years (EPA, 1997). First priority will be given to those active ingredients thought to be the most risky, e.g., OP and carbamate insecticides by 1999. The FQPA implies a reduction in existing tolerances because of stricter standards. Establishing a tolerance involves finding the no observable effect level ("NOEL", see Fig. 1) for laboratory animals, and dividing the equivalent human dose by 100. The FQPA requires an additional 10% reduction to account for uncertain effects on children (EPA, 1997).

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The implication of the tolerance reassessment provision is that many pesticide tolerances will be reduced, which may ultimately restrict uses by creating a smaller "risk cup" constraint (Fig. 1).

Risk Cup Constraint. The FQPA authorizes EPA to regulate pesticide use to ensure a "reasonable certainty of no harm" from aggregate exposure to those pesticides. EPA approaches this safety standard with its concept of a 'reference dose', i.e., the daily pesticide exposure of a person over a 70-year period giving no significant risk of a long-term or non-cancer negative health effect. This reference dose is the maximum acceptable risk, and is termed "the risk cup" (EPA, 1997).

The risk cup is essentially an upper level constraint on assumed daily human pesticide exposures from dietary, home, and all non-occupational routes. Dietary exposure will probably account for 80% of the risk cup, with water, residential, and other non-occupational sources making up the remainder (Anonymous, 1977). If the risk cup for a pesticide is judged to be full, then no new uses (even emergency uses) will be approved. The FQPA does not require consideration of the economic benefits of the pesticide.

The risk cup approach is an interim procedure until formal methods are established for evaluating the aggregate risk potential of a pesticide. There is little or no information to establish a functional relationship between pesticide use, aggregate exposure, and health risk. Nevertheless, EPA is proceeding with risk cup assessments involving default assumptions and conservative guesses. Given the deadlines for reassessing OP and carbamate pesticides, their uses will likely be established under the conservative and arbitrary risk cup approach.

An early example of how risk cup assessments affect pesticide use occurred in July 1997. The EPA denied several Section 18 emergency exemption requests for the carbamate carbofuran (Furadan). This occurred because EPA made a tenfold reduction in the reference dose for carbofuran under the FQPA (Rawlins, 1997) – essentially they shrank the risk cup and concluded that no new uses were allowable.

Common Toxicity Mechanism. In the past, EPA set tolerances for individual active ingredients. FQPA now requires EPA to consider cumulative exposure from pesticides which work similarly. EPA will therefore likely group pesticides with common modes of action or similar chemical structure. For example, OP and carbamate insecticides (used extensively in cotton) all have the same mode of action.

The common toxicity mechanism has the potential to place more restrictions on pesticide use in combination with the risk cup approach. There are 36 OP chemicals which are registered for use on cotton (Schnaubelt, 1997). If EPA lumps all OPs together as a common chemistry or mode of action, then the entire class will be considered as one pesticide with a common risk cup. Under that scenario, the use of OPs in agriculture, golf courses, home, garden, etc. would all contribute to the same constraint. As the constraint becomes binding, proposed new uses on cotton must compete with other uses on other crops, as well as non-agricultural uses. It anticipated that consideration under a common toxicity mechanism provision, together with lower tolerances, would result in a large reduction of agricultural uses (Rawlins, 1997).

Impacts on Cotton Industry

The potential impacts of the FQPA on the cotton industry could be large given the extensive use of OP and carbamate insecticides. The latter are broad spectrum insecticide products used to suppress boll weevils, plant bugs, aphids, and other non-worm pests. It is estimated that OPs and carbamates account for 75% to 80% of the typical insecticide sprays on cotton in the Mississippi Delta (Layton, 1997). National surveys show that OPs and carbamates accounted for 89% of the 19.2 million pounds of insecticide applied to U.S. cotton in 1992 (Benbrook, 1996).

The extensive use of these pesticides on cotton has good and bad implications. A positive implication is that cotton is a demonstratively profitable market for these products. If risk cup constraints force companies to forego various uses of their pesticides, the least profitable crops will be dropped first, e.g., minor and specialty crops. Therefore cotton should stand relatively well among agricultural commodities in retaining uses of these pesticides. (It is also relatively beneficial to cotton that the FQPA will focus harder on pesticide uses on food crops.)

The negative implication of extensive insecticide use is the potential economic cost of forced substitution. What substitutes exist for OPs and carbamates? To some extent, boll weevil eradication could substitute for some of the annual use of these products to control boll weevils. Bt cotton and newer insecticide chemistries could substitute for the small portion of the carbamate treatments aimed at worms. Lastly, pyrethroid insecticides have activity against plant bugs and some (but not all) remaining pests.

Under the worst case scenario of no OP or carbamates, three major economic effects include 1) profitability effects, 2) acreage effects, and 3) long-term resource (i.e., resistance) effects.

Profitability Effects. To the extent that other chemistries or technologies could substitute for OP and carbamate insecticides, then product cost increases will cause declines in net revenue. If elimination of OPs and carbamates left some cotton pests uncontrolled, then potential yield losses would be a relevant impact.

Acreage Shifts. The instability and decline of cotton acreage in the Mid-South region has become a major issue since the advent of planting flexibility. For example, harvested cotton acreage declined from prior years to 1.12 million in 1996 and again to 960,000 in 1997 (USDA-NASS, 1998). At the same time, the acreage of substitute crops like corn and soybeans has increased. The destabilization of the cotton acreage has serious implications for the regional infrastructure (Robinson and Mancill, 1997).

The potential for substituting away from cotton can be examined using a simple partial budgeting exercise using typical cost and returns for cotton and corn in the Mississippi Delta (Agricultural Economics, 1997). At $0.69/lb and $2.80/bu, cotton returns only $30/acre above variable costs compared to corn. Such a slim difference could easily be erased by increased pest control costs or by a 5% yield decline.

Resistance Effects. Insect resistance management involves the use of multiple insecticide chemistries to retain insect susceptibility. The elimination of classes of pesticides is therefore a resistance management issue as much, if not more, than it is a profitability issue. Considering insect susceptibility as natural capital, then spraying with limited classes of chemistry (e.g., pyrethroids) constitutes depreciation or consumption of that capital. Insect resistance (with future yield losses and cost increases) becomes the future negative payoff. Although potentially significant, insect resistance effects are difficult to model in a partial budgeting framework since they involve a process of resource disinvestment over time.

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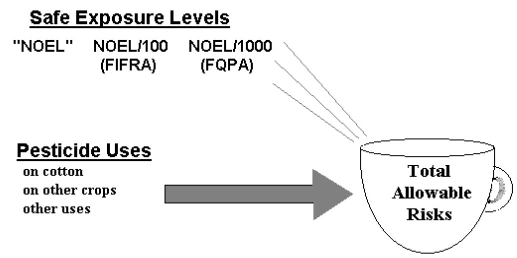

Figure 1. Schematic diagram of interaction between pesticide use and tolerance levels in EPA’s risk cup.