Chapter 1

Introduction

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Pesticides, in general, are chemicals used worldwide in agricultural production to destroy or control weeds, insects, fungi, and other pests. Some of those pesticides remain on food as residues. When pesticides are applied improperly, resulting residues can pose significant health risks to consumers. To protect U.S. consumer health, Federal and State programs have been established to monitor levels of pesticide residues present in domestic and imported food and fodder and to prevent the marketing of food containing residues that either exceed specific levels (known as tolerances) set by the Environmental Protection Agency or for which no tolerances have been established for that food.

Public concern over pesticide residues in food has been increasing during the last decade. For example, a recent 1988 national survey by the Food Marketing Institute showed that approximately 75 percent of consumers are very concerned about pesticides in their food; that percentage is higher than that of consumers worried about cholesterol, fats, salt, additives, or any other components (2). Contributing to such concerns have been the discovery of hazardous effects from certain pesticides once deemed safe, e.g., ethylene dibromide (EDB) and chlordane, and publicized acute food poisonings from improperly used pesticides, e.g., the aldicarb contamination of watermelon in the Western United States and Canada in 1985. Finally, the high level of uncertainty concerning the health effects of pesticide residues has heightened consumer concern.

One factor in this uncertainty is the technical capability of Federal and State programs to analyze food for all pesticides. These programs are faced with an enormous number of pesticide/food combinations to test, and the difficulty of the task is compounded by a lack of information on what pesticides actually have been used on specific crops (especially for imports). Analyzing for all pesticides on all types of food products is currently impossible because of limitations in testing methods as well as time and resource constraints. Although the number of pesticide/food combinations to address can be narrowed by focusing on the potentially moderate to high health hazard combinations, current analytical methods are not adequate to identify and quantify all residues of these pesticide/food combinations within available resources.

Although Federal data show that only a small percentage of food samples tested violate established tolerances, a gray area exists for those pesticides and pesticide/food combinations that are not being analyzed because of the cost or time of analysis or that cannot be detected by existing analytical methods. Also included in this area are a number of pesticides not yet addressed in the monitoring programs, such as significant pesticide metabolizes, new pesticides, foreign-used pesticides not approved for use in the United States, and pesticide ingredients categorized as inert. Thus, analytical methods have become one of the limiting factors in enforcing pesticide tolerances in food. The uncertainty over this gray area often is interpreted as a lack of proof of the safety of food and so contributes to public concerns over pesticide residues.

Recent evaluations of Federal pesticide monitoring programs have highlighted the gap between the number of pesticides that could potentially be found in food and the number of pesticides that can be detected by methods routinely used. Although the size and the public health significance of this gap are debatable, a general consensus exists that improved analytical methods could help enhance the effectiveness of monitoring programs.

Toward this end, increasing interest exists, including in the U.S. Congress,[1] in expanding the capability of current analytical methods and developing new methods to detect pesticide residues in food. Emphasis is being placed on making methods more practical, e.g., able to identify increased numbers of pesticides, be less time-consuming, and use equipment commonly found in analytical laboratories. Emphasis also exists on improving methods to address those pesticide residues with the greatest potential health hazards. Furthermore, attention is being given to potential applications of new, emerging analytical technologies, such as new instrumentation, technologies based on biologically produced reagents, more rapid semiquantitative and qualitative techniques, and technologies that could be easily used outside the laboratory.

Although increased interest exists in improving analytical methods, no consensus has yet developed on the importance of doing so. In contrast to the general public's uneasiness over pesticide residues in food, the Federal agencies responsible for regulating foods do not have the same level of concern for the situation as it exists. Based on the low violation rates found in food under current testing programs, the Food and Drug Administration (FDA) of the U.S. Department of Health and Human Services and the Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture consider that pesticide residues in foods is not the most important food safety issue.[2] The agencies consider other sources of food contamination such as microbiological and animal drug residues as having higher priority in allocation of their resources.

Because of growing congressional interest in pesticide analytical methods, the Office of Technology Assessment (OTA) was requested by Congress to examine the state of the art of analytical technologies and methods to detect pesticide residues in food and offer options on how Federal agencies, especially FDA, could improve their analytical capability through the adoption or improvement of technologies and analytical methods. This OTA report provides a brief assessment of existing, new, and emerging analytical technologies and methods to detect pesticide residues in food. Second, the report addresses Federal research and programmatic issues relevant to the development and adoption of technologies and methods.[3] Information presented in this report was gathered from 1) telephone interviews with some 50 experts; 2) visits to 7 pesticide analytical laboratories: 3 FDA, 1 State, 2 private, and 1 foreign; 3) OTA staff research; and 4) a 2%-day OTA technical workshop. The workshop participants and observers are listed in appendix A and the 13 peer-reviewed technical papers presented at the workshop are in appendix B.

[1] Several bills have been introduced in 1987-1988 of the Iooth Congress that include sections on the development and implementation of more "practical" analytical methods for the detection of pesticide residues in food.

[2] FDA believes, and has frequently told the Congress, that the low incidence of illegal pesticide residues in the American food supply and the results of FDA's Total Diet Study indicate that pesticide residues in food do not pose a health hazard (l).

[3] The issue of the actual public health hazard due to pesticide residues in food was outside the scope of this OTA study.

CHAPTER 1 REFERENCES

1. Food and Drug Administration, Office of the Associate Commissioner for Legislative Affairs, official Agency response to OTA June 1988 draft report, June 29, 1988.

2, Food Marketing Institute, Trends: *Consumer Attitudes and the Supermarket* (Washington, DC: Food Marketing Institute, 1988).