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Searching for Hens' Teeth: Information Scarce on Pesticide Usage

by Tom Mather

Despite the potential hazards of pesticides, the federal government and most states do not compile comprehensive information on the amounts applied by users. Detailed data on pesticide usage are estimates at best, particularly at the state level. However, such data could be compiled from records farmers are required to keep under the federal 1990 Farm Bill. Although collecting and evaluating the data could pose problems, the state has an existing agricultural statistics program that could tackle the effort with additional resources.

Agricultural authorities can tell you how many acres of corn farmers grow in the United States each year, how much it is worth, and the yield per acre. They can cite similar statistics for wheat, soybeans, cotton, tobacco—or virtually any crop. And they can break down that information by county, state, or the nation, dating back dozens of years. But there's one key question that agricultural authorities can't answer: How much pesticides are farmers using?

Despite their broad use and potential hazards, there is a general lack of specific information on the amounts and kinds of pesticides applied across the United States. The federal government does not collect or compile detailed records on pesticide usage, and neither do most states—including North Carolina.

"It's a big blur out there," says Dave Moreau, director of the University of North Carolina's Water Resources Research Institute. "Most people

can't even pronounce the names of a lot of these chemicals."

Congress took a step toward stronger requirements when it passed the 1990 Farm Bill. The law directed the U.S. Department of Agriculture to develop a record-keeping system for pesticide applicators. Those requirements, effective May 1993, require applicators to keep records on their use of all restricted-use products¹—which generally include the most toxic pesticides. Required information includes: the product name and registration number; the total amount applied; the location and size of area treated; the type of crop or commodity treated; the date of application; and the name and certification number of the person who applied the pesticide.

Pesticide users must maintain those records for two years following applications, and they can be fined if they don't.² They must supply their records—if requested—to regulators, inspectors, or licensed health-care professionals. But the law

currently does not require users to systematically report that information to the states or the federal government, although the U.S. Department of Agriculture plans to consult the records in conducting future surveys of pesticide use.

EPA Surveys Provide Broad Estimates of Pesticide Usage

Currently, the best-available information on pesticide use is produced by the U.S. Environmental Protection Agency. The EPA has published regular *estimates* of pesticide production and use for the nation based on surveys of selected manufacturers and applicators for a number of years.

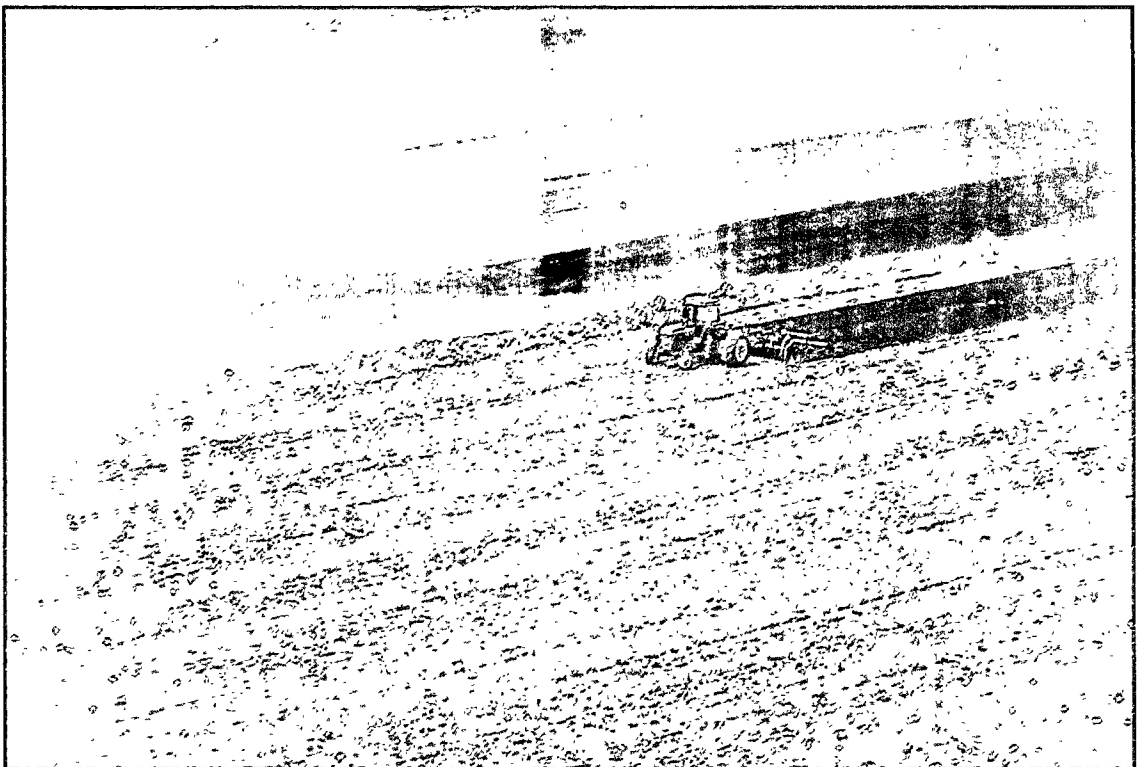
In 1991, United States manufacturers produced nearly 1.1 billion pounds of conventional pesticides valued at \$8.26 billion, according to EPA estimates. Total pesticide usage for agriculture and other purposes averaged about 4.3 pounds per person in the United States in 1991.³ Overall pesticide usage has remained fairly constant, ranging from 1.0 to 1.2 billion pounds a year since the mid-1970s after rising sharply in the 1950s and 1960s.

Agriculture consumes the lion's share of pesticides, accounting for about three-fourths (76 percent) of the total pesticide usage by volume in 1991, according to the EPA. (See Figure 2 on p. 22.) Industry, business, and government represented another 18 percent of the total pesticide use, while home and garden use accounted for the remaining 6 percent.⁴ Despite the relatively small amounts used in homes and gardens, a recent EPA survey found that 85 percent of the 2,000 households it sampled in 29 states had at least one pesticide product stored on their premises.⁵

Herbicides are the most frequently used class of pesticides, accounting for 58 percent of the total estimated use in 1991. Insecticides made up 23 percent of the total use, fungicides 11 percent, and various other types of pesticides about 7 percent. (See Figure 1 on p. 5.) The use of insecticides and fungicides has declined since the 1960s, while herbicide use has increased dramatically.⁶

A few major crops account for most of the pesticides used on farms. Studies in the early 1980s found that 94 percent of the herbicides and 89 percent of the insecticides used in agriculture were applied to just four crops—corn, soybeans,

Agricultural pesticide use in North Carolina is highest in the Coastal Plain, where this tractor is shown plowing a field.



Ken Taylor, N.C. Wildlife Resources Commission

cotton, and small grains.⁷ However, pesticide usage can be locally intense on some "minor" crops, such as tobacco and peanuts, even though the total acreage of those crops is relatively small on a national basis. That is particularly true for states like North Carolina with highly diversified agricultural economies—that is, with farmers growing smaller acreages of many different types of crops, rather than large acreages of just a few crops.⁸ Pesticide use also varies by geography because insects and other pests generally are more prevalent in areas with humid and warm climates.

Pesticide Use Largely Untracked at the State Level

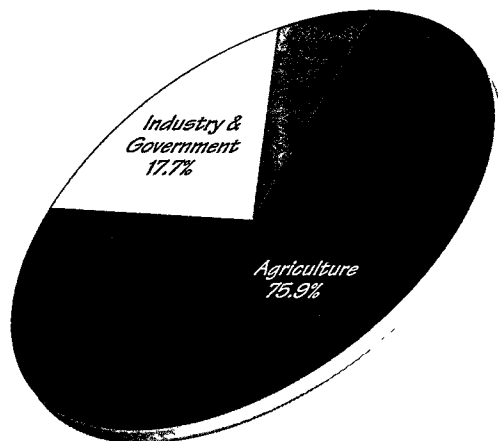
Although the federal government has just begun requiring detailed records on pesticide use, many states have more extensive requirements. In its nationwide survey of pesticide administrators, the N.C. Center for Public Policy Research found that 84 percent of the states say their record-keeping rules exceed federal requirements. (See Table 1 on p. 23. For a detailed discussion of the survey's methodology and other results, see the article "How North Carolina Stacks Up Against Other States in the Regulation of Pesticides" on pp. 61–95.)

The Center's survey found that three-fourths of the states (including North Carolina) require applicators to keep records on certain general-use pesticides as well as all restricted-use chemicals. Some states, such as New Hampshire, even publish their own lists of restricted-use pesticides. However, only about half the states require pesticide applicators to *report* their records back to the state or make those records available for public inspection. (North Carolina does neither.)

Less than one-third of the states have mandatory systems for reporting pesticide-related injuries, illnesses, or deaths. North Carolina does not require hospitals and medical centers to report pesticide-related health problems, although it requires records for other environment-related conditions, such as exposures to lead and other heavy metals. "That is something that is reasonable and ought to be done," says Dr. Greg Smith, a member of the state Pesticide Board and a physician with the state Department of Environment, Health, and Natural Resources. "It's not that hard to report, either."

Most states with reporting requirements have only recently begun their programs, and administrators say they haven't had time to analyze the

Figure 2.
Percentage of Pesticide Use in the United States by Applicator Groups, 1991



Source: U.S. Environmental Protection Agency

data. "We've got that information on paper in our filing cabinets right now," says James Moran, chief of the New York Bureau of Pesticide Regulation. "We're having discussions right now on how we might use it." A handful of states, however, have collected pesticide-use reports for 10 years or more. For example, the New Jersey Pesticide Control Program has required reporting since the early 1970s, and the New Hampshire Division of Pesticide Control has collected data since 1965. California initiated limited reporting requirements around 1970 and recently expanded the scope. "Since 1990, we have required 100-percent use reporting—even for farmers," says John S. Sanders, chief of environmental monitoring for the California Department of Pesticide Regulation.

States with long-standing reporting requirements say they use the information gathered to monitor and deal with health and environmental problems, such as groundwater contamination. For example, the New Hampshire Division of Pesticide Control discovered from its records that some applicators were misusing the herbicide clomazone. "We could go to our database and find out how much was being used and where," says Division Director Murray L. McKay. "We

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Table 1.
State Pesticide Record-Keeping and Reporting Requirements

Question (Number of states responding) ¹	All States (Percent Yes)	North Carolina ²
Do you require record-keeping for pesticide users beyond the minimum federal requirements? (45)³	84%	Yes
What chemicals do your record-keeping requirements cover? (45)		
General use pesticides	76%	Yes
Restricted use pesticides	96%	Yes
Other ⁴	18%	No
Must pesticide users <i>report</i> those records to the state? (45)	51% ⁵	No
Are those records available for public inspection? (45)	56% ⁶	No
Does your state have a <i>mandatory</i> system for reporting pesticide-related injuries, illnesses, or fatalities? (45)	29%	No

¹ Number of states that answered this question in the N.C. Center for Public Policy Research's survey of 50 states.

² Responses to survey questions from the N.C. Department of Agriculture.

³ Applicators of restricted-use pesticides are required to keep certain records as specified by the U.S. Department of Agriculture in the Food, Agriculture, Conservation, and Trade Act (FACT) of 1990, 7 C.F.R. Part 110.

⁴ Some states publish their own list of restricted-use pesticides, or only require records for certain application methods, such as aerial spraying or chemigation (application through irrigation systems).

⁵ "Yes" respondents include 13 states that "sometimes" require applicators to report records to the state.

⁶ "Yes" respondents include four states where pesticide applicator records are "sometimes" available for public inspection.

found that some of the users weren't following all of the restrictions on the label and were applying it too close to adjoining properties. So we had some contamination problems." In California, regulators used their records to track down applicators of methyl bromide after studies found that it could pose special health risks to people who fumigate buildings with the chemical. "These problems are being mitigated by us being able to see how much is being used and where," says Kathleen Harvey of the California Department of Pesticide Regulation. "And methyl bromide is just one example."

Pesticide Use Estimates: Best Guesses or Flawed Data?

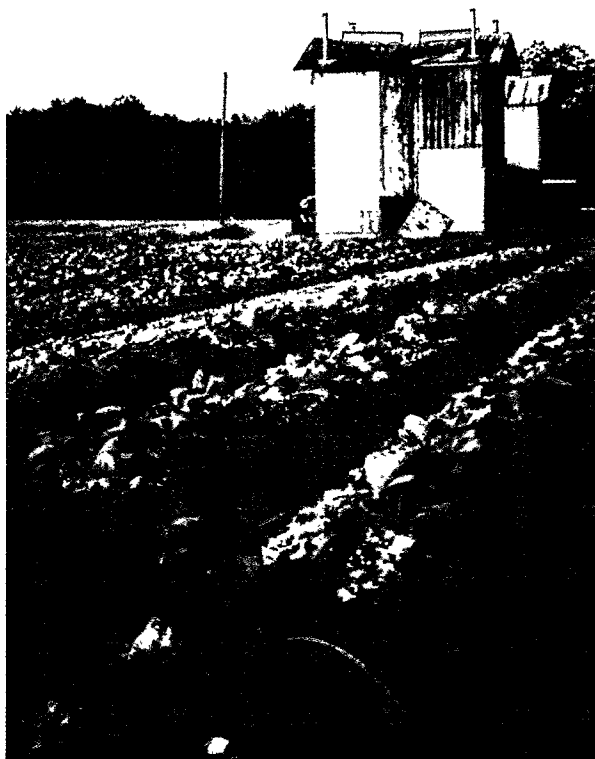
The lack of hard numbers in most states, however, has led some researchers to develop ways to estimate pesticide usage. Resources for the Future, a research organization based in Washington, D.C., has estimated pesticide use in each state by relating readily available information on crop production to the amounts of various chemicals typically applied to major crops.⁹ (Figure 3 on p. 25 shows the relative amount of pesticides used by state as estimated by Resources for the Future.) By that methodology—which excludes pesticides not applied for agricultural purposes—the group estimated that farmers used about 750 million pounds of pesticides a year in the late 1980s.

Resources for the Future estimated that North Carolina farmers used about 14.3 million pounds of pesticides per year, ranking 19th among the lower 48 states. On a per-area basis, North Carolina's usage amounted to 292.6 pounds per square mile a year, ranking 17th among the states. The UNC Water Resources Research Institute has applied a similar methodology in estimating pesticide usage in North Carolina by county. That study showed that pesticide application is heavily concentrated in Eastern North Carolina, particularly in the Northeastern Coastal Plain. (See Figure 4 on p. 26.)

Tobacco, although not a major crop nationally, accounts for much of the pesticide use for agriculture in North Carolina

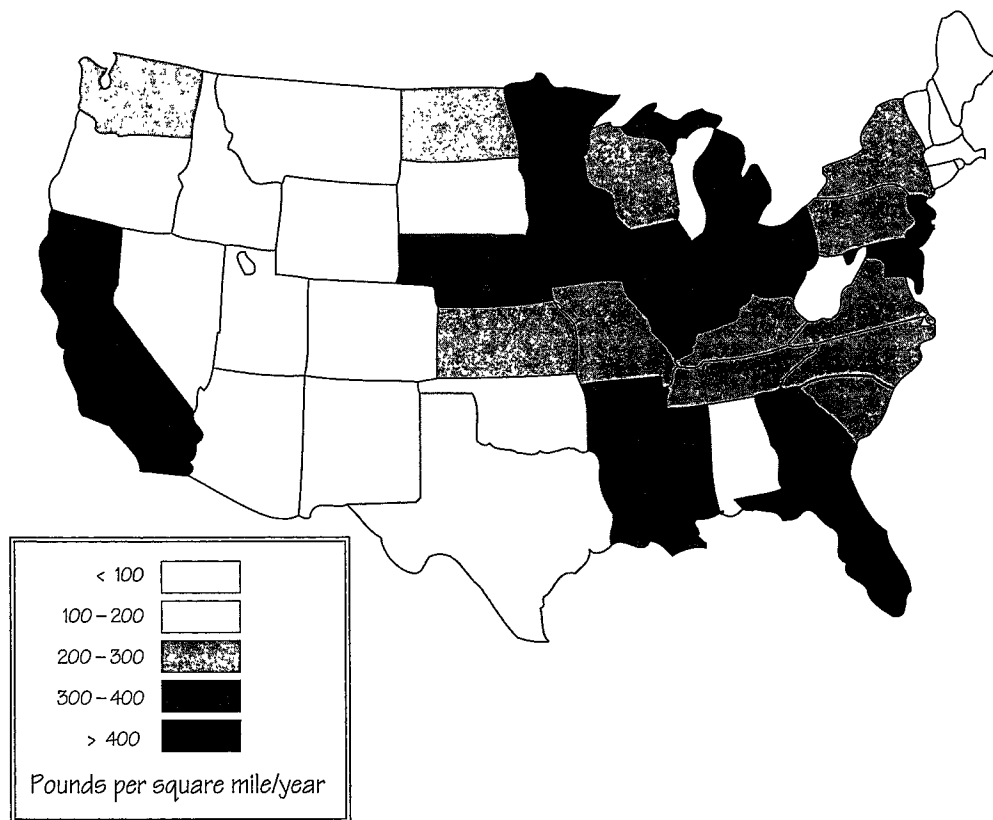
Leonard Gianessi, who co-authored the Resources for the Future studies, acknowledges that his estimates may not be precisely accurate for individual states. But he says the studies are useful for comparing the relative amounts of pesticides used by states, since the same methodology was applied nationwide. "That's the way we encourage people to use the data," says Gianessi, who now works for the National Center for Food and Agricultural Policy, a nonprofit based in Washington, D.C.

Some observers, however, harshly criticize the pesticide-use estimates derived by Resources for the Future. Allen Spalt, director of the Agricultural Resources Center, a nonprofit group based in Carrboro, says the RFF studies greatly underestimated pesticide use because they only considered agricultural usage and focused on major crops. Other studies of pesticide use in North Carolina, he says, have estimated annual application rates two to three times higher than the Resources for the Future estimates. For example, agricultural researchers at N.C. State University estimated in 1987 that North Carolina farmers used between 15.8 million to 49.8 million pounds of pesticides a year—just looking at the 10 most commonly used products.¹⁰



Tom Mather

Figure 3.
Estimated Pesticide Usage in the Continental United States, 1987-89



Source: *Resources for the Future*

“They may be the best numbers available, but they’re not worth very much,” Spalt says of the Resources for the Future studies. “I don’t know whether his estimates mean anything for other states. But I do know they’re completely wrong for North Carolina. That probably means that none of their numbers mean very much.”

Other observers disagree, saying that such studies provide reasonable estimates of pesticide use—given the absence of reporting requirements for pesticide users. “There are pros and cons, but I tend to agree that [the Resources for the Future] database is the best available,” says Steve Toth, an extension specialist in the NCSU Department of Entomology. “Generally, I would not discount his data. Many people say, ‘If it’s not perfect data, don’t use it.’ But if you do that, there’s not much data you can use anywhere.”

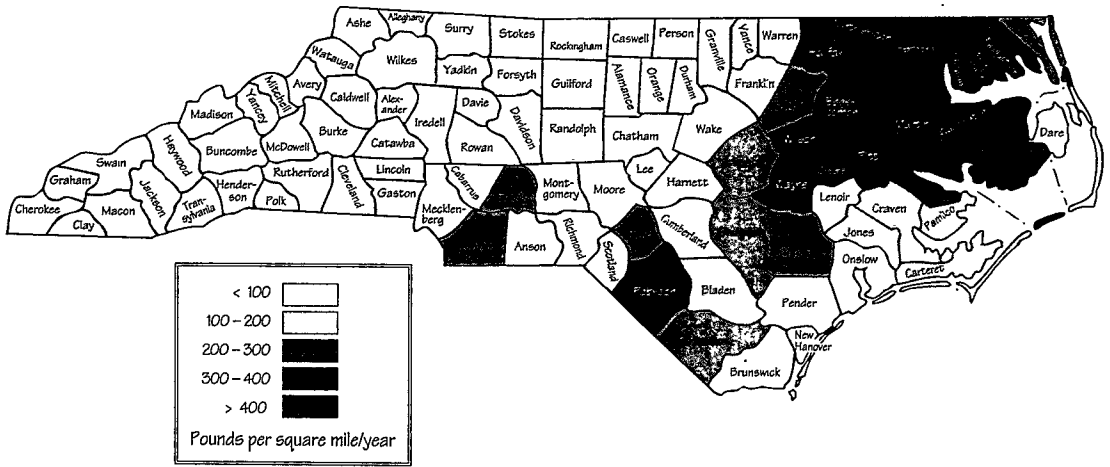
Pesticide Use Data Could Have Many Benefits

Many researchers and environmentalists say there could be valuable benefits from compiling more accurate and complete information on pesticide use. One of those who believes there is a critical need for better pesticide use data is Dave Moreau of the UNC Water Resources Research Institute.

“I just think we need to remove a lot of the mystery from all of this,” says Moreau, who also chairs the N.C. Environmental Management Commission. “From an environmental standpoint, we clearly want to identify and study those chemicals that are widely used—and hazardous.”

Accurate information could be useful for a number of reasons, including: determining where

Figure 4.
Estimated Pesticide Usage in North Carolina by County, 1987-89



Source: University of North Carolina Water Resources Research Institute. (Data not available for Lenoir and Alexander counties.)

to concentrate regulatory and training efforts; assisting regulators in the recall of canceled pesticide products; establishing programs for monitoring surface-water and groundwater contamination; preventing and cleaning up potential pollution problems; and detecting and treating potential health problems associated with pesticide use. Such records could benefit farmers as well, who could use the data to evaluate the effectiveness of various pesticides in controlling pests and improving crop production. Farmers also are among those most susceptible to potential pesticide-related hazards, including health problems and groundwater contamination. "Pesticides have good and bad aspects to them," says Toth, the NCSU extension specialist. "In the long run, I think it would help farmers to know how much pesticides are being used."

Robert Fugitt, governmental affairs manager for DuPont chemical company in Wilmington, Del., says most states probably will need to start tracking pesticide usage in order to comply with

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 DIRECTOR OF UNC WATER RESOURCES
 RESEARCH INSTITUTE, CHAIRMAN OF N.C.
 ENVIRONMENTAL MANAGEMENT COMMISSION

the U.S. Environmental Protection Agency's requirements for monitoring groundwater contamination. "States are going to need to know what pesticides are used and where," Fugitt says. "They're going to have to get that information somewhere. And, in most states, that's going to mean use reporting."

But others question whether the information would be worth the cost and inconvenience of gathering and analyzing the data. "Our basic philosophy is that there's no need to regulate ourselves beyond what

the federal regulators already do," says Alan York, a professor in the NCSU Department of Crop Science and chairman of the Pesticide Advisory

Council, which provides technical advice to the N.C. Pesticide Board. "The catch is: What are you going to do with these records once you get them? Somebody has got to categorize them and sort them and evaluate them."

Some of the states that already have adopted reporting requirements reinforce that concern. "We have collected three years worth of use records," says Gail Kaprielian of the Massachusetts Pesticide Bureau. "But we haven't analyzed the data yet. . . . The problem as we see it is getting the data entered [on computers]."

However, administrators in states that have required reports for many years say that analyzing the data is not that expensive or difficult once the records are computerized. "I think the first year is probably the worst—just getting used to it," says Carmen Valentin of the New Jersey Pesticide Control Program. "But now I don't really think it's that bad. We've got it down pat." New Jersey eases the burden of collecting and analyzing data by requiring different applicator groups to file reports only once every three years. The data are computerized and then studied for trends. "What we're trying to do is analyze groundwater contamination based on the survey results," Valentin says. "It may even result in more enforcement actions, because it can help you pinpoint problems." The state also uses its data to analyze pesticide use by crop, monitor environmental conditions, and identify problem pesticides for potential use restrictions.

State Has Existing Agricultural Data Network

The task of gathering and evaluating pesticide data is not as daunting, however, as it might appear. After all, the federal government and the states have compiled detailed statistics on crop production for decades, based on representative samples of farms. In North Carolina, such data are produced by the Agricultural Statistics Division, a joint effort between the U.S. and N.C. departments of agriculture. The division's annual

report presents statewide and county-level statistics on more than a dozen major crops and at least six different types of livestock.¹¹ The division also began publishing data on pesticide use in 1992, based on a sample of about 450 farmers—representing less than 1 percent of the state's 59,000 farms.

"We get a lot of requests for [the pesticide-use information], just with the limited data we have collected," says Bob Murphy, the state agricultural statistician. "If the requests correlate with a need, there's a lot of need for that data."

The data now collected by the Agricultural Statistics Division are useful for estimating what *types* of pesticides farmers are using

on various crops, including corn, soybeans, cabbage, peppers, cucumbers, snap beans, strawberries, tomatoes, and watermelons. But those data are inadequate for determining the *amounts* of pesticides used statewide or by county, due to the sampling methods. However, Murphy says his division could readily compile more detailed pesticide-use data—if it had additional resources.

"We could do it here, as long as we had the funding to do it," he says. "It would be a big project, if it was required and put in place. But it could certainly be done."

The cost of compiling such data is hard to estimate, Murphy says, without knowing more details—such as whether to collect pesticide-use reports from all applicators or from a smaller sample pool. Environmental groups advocate the collection of pesticide-use reports from all or most applicators. "While a statistical sample would provide much valuable information, it would not serve all the purposes of gathering comprehensive pesticide use data," says Erick Umstead, research director for the Agricultural Resources Center. Umstead's group also advocates the collection of usage reports for *all* pesticides, not just restricted-use products. Some general-use pesticides are just as toxic as restricted-use chemicals, he says, plus restricted-use products accounted for only 3 percent of the 12,391 pesticides registered for use in North Carolina in 1992.

But compiling comprehensive usage reports

"[C]ollecting use data from all over the state at this point would be of questionable value given the costs and other environmental issues."

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CHEMICAL INDUSTRY COUNCIL OF N.C.

could be expensive, according to Gianessi, the researcher who produced the pesticide-use estimates for Resources for the Future. "For a state like Washington or North Carolina, you're talking about \$1 million a year tabulating and making sense of this data," Gianessi says.

George Everett, executive director of the Chemical Industry Council of North Carolina, says such costs could overwhelm the potential benefits from collecting pesticide-use reports from all applicators. "If there are significant environmental or public health problems associated with pesticide use in North Carolina, I have not seen the data reported yet," says Everett, former director of the N.C. Division of Environmental Management. "If there is a significant impact on public health, it is likely to be on farmers, and efforts would be better targeted at them than at collecting use data. If there is an environmental impact on groundwater, the state-sponsored study is likely to identify it, and data on use in a problem area might be warranted. However, collecting use data from all over the state at this point would be of questionable value given the costs and other environmental issues."

But Moreau says that North Carolina could compile accurate pesticide-use data for much less money by taking a statistical sample of applicators—probably involving less than 1,000 people statewide. "It isn't going to take \$1 million a year to do it," Moreau says. "I feel very confident that they could do it for less than \$100,000 a year. They've got the names and addresses of these applicators. All they've got to do is draw a statistical sample and send a letter to those people. With a relatively small number of samples, properly drawn, we could track the major pesticides being used in this state."

The N.C. Pesticide Board apparently has the authority to require record-keeping and reporting

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for pesticide applicators. As the state Pesticide Law of 1971 states, the board can "collect, analyze and disseminate information necessary for the effective operation of the programs."¹² Currently, the board requires *record-keeping* for: certain sales of restricted-use pesticides by dealers; applications of restricted-use chemicals by licensed users; and use of *all* pesticide products by aerial applicators. But the Pesticide Board has shied away from adopting *reporting* requirements, and Pesticide Administrator John L. Smith fears such requirements could draw resources from existing enforcement programs.

"As a program administrator, I can see a need for the data," Smith says. "From a bureaucratic standpoint, it's nice to be able to collect the data and say we've got it. . . . I think we could make some decisions on a more knowledgeable basis, with respect to groundwater contamination and some of the other environmental concerns—or even crop concerns.

"From a policymaker's standpoint, I'm trying to look at the practicality of the system you put in place that yields the data. . . . The drawbacks are the accuracy of the data and the cost of collecting it on any kind of meaningful frequency. You're talking about a significant expansion in staffing and computer time to generate these kinds of reports."

Others, however, say the state could compile valuable data on pesticide usage at a reasonable cost by collecting reports from a sample of farmers and other applicators. "That's the way I would do it," says Toth, the NCSU researcher. "If you

Farmworkers Seek Training About Pesticide Safety

NEWTON GROVE—The sun has set when five farmworkers trudge back to their migrant labor camp in southern Johnston County. They've just toiled 14 hours in the fields planting sweet potatoes. They haven't had time to shower, eat dinner, or change out of their dusty work clothes. Yet they've gathered in a mobile home for a training class.

The class is about pesticide safety. It's being taught by the Farmworkers Project, a Benson-based nonprofit group. Project director Victoria Martinez says her group organizes such training sessions because few farmers teach their migrant workers about safe pesticide use—although a new federal law will require such training starting Jan. 1, 1995.

"The general rule is that they never receive any training on pesticides," Martinez says. "We try to educate farmworkers about the health hazards of pesticides and also make them aware of what the law requires."

Martinez and her assistant, Antonia Ventura, take about 45 minutes to deliver their presentation—all in Spanish. They use colorful posters depicting the symptoms of

pesticide poisoning and showing workers how to avoid such problems. The five Mexican laborers pay close attention to the presentation, frequently interrupting with questions—while a pot of chili simmers on the stove. They're still asking questions when the session ends about 9:15 p.m.

Farmworker advocates say such training sessions are needed because farm laborers are among those most vulnerable to potential health problems related to pesticide exposure. Most farmworkers, they say, have first-hand experience with pesticide-related illnesses or know others who have gotten sick.

"Farmworkers every year suffer from pesticide poisoning," says Caroline Cardona, a health educator with Farmworkers Legal Services of North Carolina, a nonprofit group based in Newton Grove. "Every month and every day that people have to wait [for training], there will be more sicknesses and injuries."

Pesticide poisoning can be hard to identify because the symptoms vary and often mimic other sicknesses. Common symptoms
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take a sample in a valid way, you would get just about as much information—and you wouldn't burden everybody. We need to have information on pesticide use. . . . More information will help the farmers as well as the general public."

FOOTNOTES

¹7 Code of Federal Regulations 110.19014.

²U.S. Department of Agriculture regulations specify that violators will be fined not more than \$500 for initial violations and at least \$1,000 for additional violations.

³Arnold Aspelin, et al., *Pesticide Industry Sales and Usage: 1990 and 1991 Market Estimates*, U.S. Environmental Protection Agency, Office of Pesticide Programs, Washington D.C., 1992, Publ. No. H-7503W, pp. 1-11.

⁴*Ibid.*

⁵*Ibid.*, p. 3.

⁶See National Research Council, *Pesticides in the Diets of*

Infants and Children, National Academy Press: Washington, D.C., 1993, p. 15.

⁷See George W. Ware, *The Pesticide Book*, Thomson Publications: Fresno, Calif., 1994, p. 6.

⁸Tobacco was North Carolina's largest crop in 1992, with \$1.05 billion in cash receipts. Other leading crops, by rank, included: (2) greenhouse and nursery stock, \$317 million; (3) soybeans, \$201 million; (4) corn, \$194 million; (5) cotton, \$144 million; (6) peanuts, \$126 million; (7) wheat, \$83 million; and (8) sweet potatoes, \$40 million.

⁹See Leonard P. Gianessi, "A National Pesticide Usage Data Base," 1986, and L.P. Gianessi and Cynthia Puffer, "Herbicide Use in the United States," 1990. Both studies published by Resources for the Future, 1616 P Street, NW, Washington D.C., 20036; telephone (202) 328-5000.

¹⁰From an unpublished report, "Pesticide Use Estimates in North Carolina in 1987," prepared for the N.C. Department of Agriculture.

¹¹For the latest report, see *North Carolina Agricultural Statistics*, N.C. Department of Agriculture and U.S. Department of Agriculture, 1993.

¹²N.C.G.S. 143-437.3.