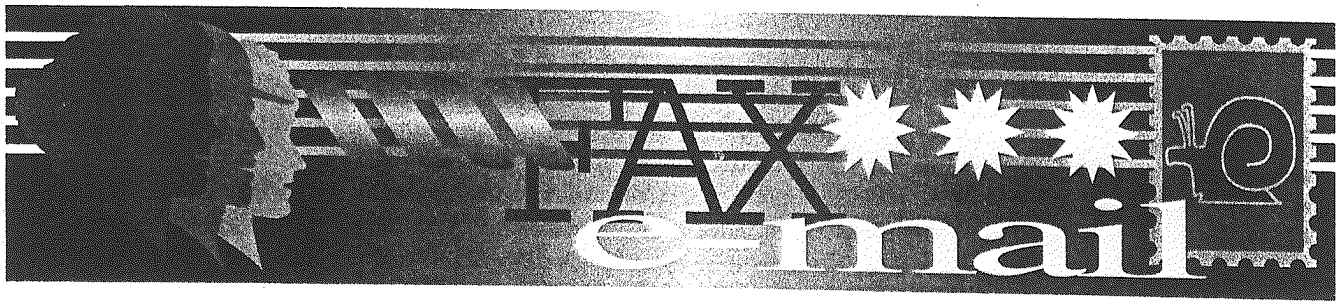
Letters



The Parathion Ban: A Modern-Day Parable of the Blind Men and the Elephant

Comment

■ Studies that estimate the economic impacts of banning pesticides generate considerable public policy interest. Although some research predicts large economic losses, other *ex post* studies claim no severe economic effects and that the large negative predictions are based upon subjective, untrustworthy analysis. A recent example of this *ex post* analysis is the article by Moore and Villarejo in *Choices* Third Quarter 1996 ("Pesticide Cancellations and Kentucky Windage"). The authors take to task the analysts who predicted serious economic impacts if EPA were to ban the use of the insecticide parathion for California lettuce (up to a 25% yield loss).

Moore and Villarejo studied the lettuce production data from six large produce growers in California and compared yields in the period before cancellation with yields after cancellation and found no difference in lettuce yields with and without parathion. They conclude that the original studies were biased toward a worst-case scenario. Although they claim to describe what really happened following the parathion ban, Moore and Villarejo simply observe that lettuce yields did not decline following the ban on parathion. Their only conclusion suggests that the original studies were wrong. However, a closer examination of what really happened following the ban on parathion indicates that most of what was predicted actually happened and that negative yield effects were mitigated by serendipitous events.

The original economic impact studies authored by Lichtenberg et al. and USDA predicted that if parathion were to be banned for California lettuce, growers would substitute an alternative insecticide, diazinon. In fact, that is what happened. Figure 1 displays parathion and diazinon usage data for California lettuce acreage 1984–92. The steep decline in parathion usage is matched by the significant increase in diazinon usage. While Moore and Villarejo's article included a chart depicting parathion's decline, they did not even mention the sharp increase in diazinon usage as a replacement. The sharp rise in diazinon usage confirms the original studies' substitution prediction. The original studies all predicted that insecticide costs for lettuce growers would rise following the parathion ban since diazinon is more expensive. Moore and Villarejo did not report any analysis of the insecticide purchases of their grower sample. A comparison of the University of California's "Sample Costs to Produce Lettuce in Monterey County" for 1986 and 1992 indicates a $51 per acre increase occurred in the cost of pest control materials.

The original economic impact studies predicted reduced yields would result if growers switched to the more expensive, but less effective, diazinon. Why didn't lettuce yields decline? Serendipitous events occurred in two different lettuce growing regions and prevented significant yield losses following the parathion ban. First, a significant decline occurred in cotton acreage in southern California (from 100,000 acres in the early 1980s to 30,000 acres by 1990). As cotton is harvested, massive hordes of insects typically move into adjacent crops such as lettuce. With the decline in cotton acreage (at roughly the same time as the ban on parathion), significantly less insect pressure occurred in lettuce fields and yield losses did not occur.

A second (not entirely serendipitous) event was the removal of all Lombardy Poplar trees within a mile of lettuce fields in the Salinas Valley. Moore and Villarejo correctly identify the lettuce

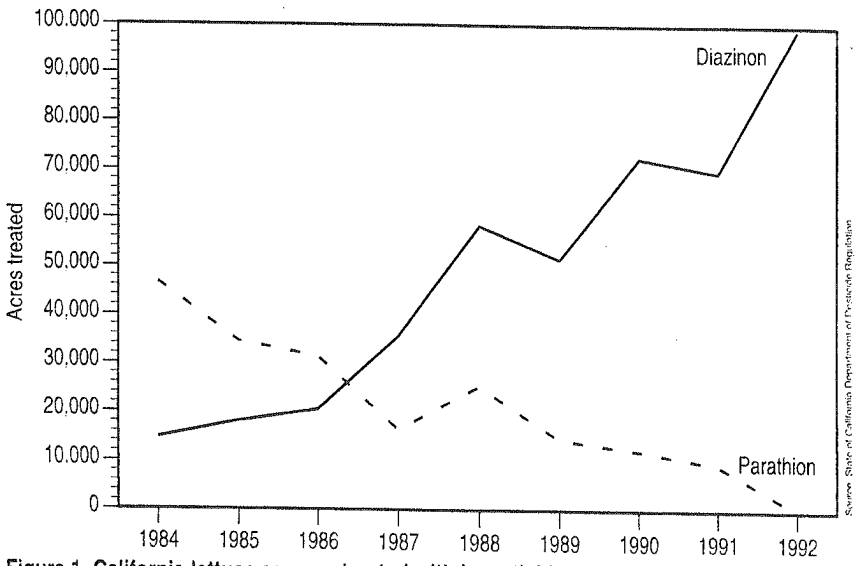
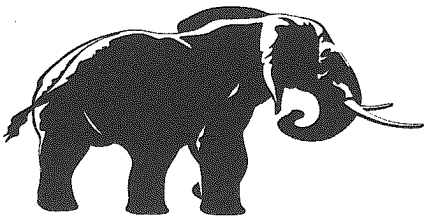


Figure 1. California lettuce acreage treated with insecticides

root aphid as a major target of parathion sprays in lettuce. Lettuce root aphids spend the winter on the bark of Lombardy Poplar trees. They migrate to lettuce in the spring and begin to feed and reproduce. Heavy aphid populations can cause collapse and death of lettuce plants. Following the ban on parathion, lettuce growers were left without a single material that could be used once an infestation was established. As a result of removing all the Lombardy Poplar trees, the overwintering habitat was destroyed and significantly less insect pressure occurred in lettuce fields. The original economic impact analyses noted the importance of Lombardy Poplars as an overwintering site for lettuce root aphid, did not envision the removal of the trees, and assumed that the growers would use the less effective material and incur yield losses.

Moore and Villarejo fault the economic models for failing to take into account the full set of costs and benefits that would accrue to society following a pesticide ban. Their complaint is that the models ignore the gains of reduced illnesses to farm workers and only calculate the potential loss in lettuce yields. However, Moore and Villarejo commit the same error in that they do not calculate the risk and environmental tradeoffs of substituting diazinon and tree removal for parathion usage. While parathion use resulted in greater risk to farm workers, diazinon use poses its own risks as well. EPA canceled diazinon usage for golf courses and sod farms because of bird die-offs. Did society really incur an overall net benefit following the parathion ban? Moore and Villarejo cannot respond with a positive answer because they fail to estimate the magnitude of the risk-risk and risk-environmental tradeoffs. A comprehensive study would consider both the tradeoffs between health and safety risks to field workers from parathion and (1) risks of bird kills from diazinon; (2) risks to workers using chainsaws to cut down the poplar trees; (3) risks to workers and the environment from using chemical herbicides to kill the poplar tree roots; and (4) the loss of scenic amenities from cutting down poplar trees. Thus, the Moore and Villarejo analysis suffers from the same lack of thoroughness for which they criticize the original studies.

Moore and Villarejo make a very valid point that there should be considerably more research to develop sophisticated models for individual crops so that the true behavior of dynamic industries could be identified and modeled following a predicted change in pesticide registrations. The available economic models for most fruit and vegetable crops are simplistic. However, the authors should realize the enormity of their recommendation. There are 80–100 significant fruit and vegetable crops for which sophisticated economic models need to be developed. Such



models would be very complicated and would have to be maintained over time to stay current. Additional models regarding the efficacy of pesticides and the infestations and potential losses from uncontrolled pests (weeds, diseases, insects) would have to be developed for all significant growing regions in the country. A conservative cost estimate for this model and data development is approximately $100 million over ten years.

Until society spends the necessary resources to develop economic and pest models for fruit and vegetable crops, regulatory agencies such as EPA will still need to rely on Kentucky Windage (the advice of experts) to predict economic effects of particular pesticide bans. Critics need to understand what the experts are saying with their predictions of potential yield losses: "this is an important chemical, and some negative effects can be foreseen." It may not be a yield loss as predicted. However, those are the terms of the questions posed to experts. Perhaps the questions need to be more sophisticated—but there is a research cost in the development of better questions as well.

Moore and Villarejo discount contacting the experts for their opinions and rely instead on a statistical analysis to conclude that there were no negative effects following the parathion ban for lettuce. In actuality, there is no substitution at this time for the opinions and predictions of Cooperative Extension specialists in the field. Moore and Villarejo should have at least contacted the experts for explanations of what really happened. Without the help of Extension Service specialists in trying to understand the realities of crop protection techniques, society would be like blind men, each touching just a part of an elephant, and each claiming to understand the whole.

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The Parathion Ban
Authors' Response

■ We regret our failure to make clear the critical elements of our Kentucky Windage article, (*Choices* Third Quarter 1996). First, our mission was to challenge Lichtenberg et al.'s 1987 assertion that cancellation of the pesticide ethyl parathion for control of the lettuce root aphid would have a major impact on both producers and consumers (E. Lichtenberg, D. Parker, and D. Zilberman, *Economic Impacts of Canceling Parathion Registration for Lettuce*, Western Consortium for the Health Professions, Inc., San Francisco, 1987). Lichtenberg et al. state in their executive summary: "There are presently no alternative chemicals (to parathion) available for control of lettuce root aphid. ...Left untreated, a typical infestation would reduce yields by as much as 20–30 percent; the impact of canceling parathion on growers affected by lettuce root aphid infestations would therefore be yield reductions on the order of 25 percent." Second, the geographical focus of our article was the Central Coast of California, the only production area where lettuce root aphid in-

festations were sufficiently serious to be a cause for concern.

Gianessi takes us to task for failing to give credit to the substitution of the chemical diazinon for the more effective ethyl parathion. He expresses concern that our statistical results showing no difference between lettuce yields before and after cancellation of ethyl parathion was somehow due to the shift to diazinon. This is contrary to Lichtenberg et al.'s statement above saying there are no chemical substitutes for parathion on the lettuce root aphid. He is correct, however, in pointing out our failure to assess the socio/economic impact of this substitution. We should have pointed out that reported cases of acute agricultural worker illnesses due to exposure to diazinon in the period 1984–89 numbered 28, compared to 117 for parathion for the same period (W.S. Pease, R.A. Morello-Frosch, D.S. Albright, A.D. Kyle, and J.C. Robinson, *Preventing Pesticide-related Illness in California Agriculture*, California Policy Seminar, University of California, 1993). Clearly diazinon is a far safer pesticide than parathion the pesticide now banned due to persistently high injury rates. Also he notes producer costs have increased due to the substitution; however, Gianessi should have deflated his cost increase using the index of Prices Paid by Farmers for chemicals between 1986 and 1992. This price index increased from 89 to 103 during the period and softens the blow a bit in real terms.

Gianessi suggests that serendipity is the root cause of our inability to find a statistically significant change in lettuce yields. Serendipity is an odd term to use in scientific investigations. Maybe "incomplete analysis in the original Lichtenberg et al. study" would be a more accurate descriptor. Nevertheless, Gianessi raises two interesting points. First, he describes the major decrease in cotton acreage in southern California (located in the inland deserts of Imperial County adjacent to the Mexican Border) as contributing to the lack of lettuce yield losses. A cotton insect attack on the Salinas Valley lettuce crop, located along the Central Coast, would require those Imperial Valley cotton insects to cross a rather large desert and fly over two mountain ranges, a total of 500 miles, to reach Steinbeck's "East of Eden."

Second, Gianessi, without documentation (more Kentucky Windage?), further suggests that the act of removing the Lombardy poplar trees in the Salinas Valley also contributed to our finding of no yield loss due to cancellation. He then faults us for not showing the societal loss from removing these trees. On a recent drive through the Salinas Valley, we noted the loss of the poplars. However, the poplars had been replaced by acres of wine grapes whose rich red foliage was aesthetically much more pleasing, and the varietal wines

produced from these vines have become the envy of many European vintners. A loss? We think not.

Gianessi's support for the development of more comprehensive economic models for pesticide reregistration analysis is praiseworthy. Although he laments the high cost of such a model and data base, $100 million over ten years, we would point out the following: Lichtenberg et al. estimated the net loss in producer's surplus due to cancellation of parathion, attributed damage primarily caused by the lettuce root aphid, at $24 million per year and the loss in consumer surplus at $48 million per year. Simple arithmetic shows the payback period for such an investment would be only 1.39 years.

Finally, Gianessi offers his critique as a "parable"; we would offer our own, as follows:

"On the Political Economy of Pesticide Cancellation"

Cast of characters

1. Chicken Little
2. Henny Penny–consultant
3. Duckey Luckey–consultant
4. Chicken Licken–close friend and consultant
5. Wilbur–"some pig"–understands farm worker illness and environmental damage caused by pesticides
6. Farmer McGregor–grows lettuce and supports Chicken Little's hypothesis
7. Br'er Rabbit–an ardent lettuce consumer
8. The King–has the power to prevent sky from falling
9. Little Boy who cried "Wolf"–lobbyist

Story Line

Once upon a time, Chicken Little, while walking through the lettuce patch, was hit on the head by a small unidentified object. Chicken Little raced through the barn yard crying, "The sky is falling! The sky is falling!" Farmer McGregor upon hearing these cries became so concerned that he concluded not only should the King be informed that the sky was falling but the King should also do something about it. Farmer McGregor hired the consulting firm of Penny, Luckey, and Licken, who are all friends of Chicken Little, to estimate the potential damages to his lettuce patch if the sky fell.

Each economic consultant developed her own model because economists can't agree on much of anything. Henny Penny choose a partial budget model because she knew that, based on the armchair guesstimates of her "experts," the greatest damage to Farmer McGregor could be demonstrated if no adjustments in production or consumption were allowed. Duckey Luckey choose an economic model that allowed the people who bought Farmer McGregor's lettuce to adjust to higher lettuce prices, but Farmer McGregor could not change the amount of lettuce he grew even though Br'er Rabbit would pay him more to grow it. Chicken Licken chose an economic model that allowed for adjustments in production and consumption but took Farmer McGregor's word that his let-

tuce yields would decrease 25% if the King didn't save him. The sky was not only going to fall, it was going to land right on Farmer McGregor's lettuce patch. Farmer McGregor then hired a Little Boy from the village who had experience in crying "Wolf" on several other occasions to warn the villagers and the King that the sky was falling.

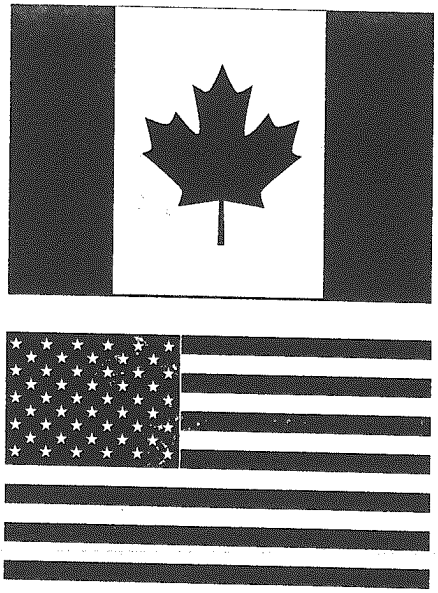
Unbeknownst to Chicken Little et al., Wilbur, "some pig," a keen observer of the sky, took a wait-and-see attitude while also closely watching Farmer McGregor's lettuce patch. By careful observation and measurement he found that the object that had landed on Chicken Little's head was not the sky falling but rather an acorn from an oak tree. Wilbur also found that Farmer McGregor grew the same number of heads of lettuce after the acorns fell as he had before. Wilbur, speaking for those who worked in Farmer McGregor's lettuce patch also pointed out to the King that he should include in his sky management decisions the illnesses the workers incurred in the lettuce patch as well as the loss of the flowers and birds that have no say in what is to be done about the sky. Finally, Wilbur found there were many kinds of acorns in the forest, Parathion acorns, Methyl Bromide acorns, MeviPnphos acorns, etc. Each time one of the acorns fell, Farmer McGregor hired the Little Boy who cried "Wolf" so well to carry the message to the King. However, after a time, no one paid him any attention because, in fact, the sky did not fall.

Charles V. Moore and Don Villarejo

Canadian Wheat Board
A Comment

■ It was interesting to read yet another version of the claimed high level of market performance of the Canadian Wheat Board (CWB) in *Choices*. Some of us who have researched and written on Canadian grain marketing welcome economic exposure after sixty years of marketing regulation. There have been at least seven major pieces of economic analysis released on the operation of the CWB since 1992. This work is seen to fall into two camps: one which is paid for by the CWB and is claimed to be based on CWB "open book" but confidential data; and one which has no direct interest affiliation and depends on secondary but verifiable data.

The first study was conducted in 1992 *by the CWB* on its barley sales into the United States; that piece provided a very favorable assessment of market performance. Carter (UC Davis) conducted a study of the continental barley market in 1993 for the Canadian federal minister of agriculture and an industry panel consisting of over twenty members. Carter recommended that single desk selling (SDS) of barley to the U.S. should be replaced with a dual marketing system. Johnson and



Wilson (NDSU) produced evidence in 1994, and Clark (Nova Scotia Agricultural College) in 1995, that was generally consistent with Carter's conclusions. The CWB has repeatedly criticized Carter's study for its use of poor data.

The 1996 Kraft, Furtan, and Tyrchniewicz report was *commissioned by the CWB*. It was the first of the selected "open book" (in terms of data) studies and claimed significant benefits at the *port* level from SDS of ordinary wheat. Carter and Loyns reported to the Alberta Government in 1996 that there are significant costs associated with SDS (larger than any of the CWB reported benefits) and that there was no evidence of farmer returns under SDS exceeding those available to U.S. producers. Rutter (a policy analyst for United Grain Growers Ltd.), in a 1996 submission to a Canadian Panel studying grain marketing and updated later in a (University of Manitoba) M.Sc. research paper, found no consistent evidence indicating Canadian farmers beat their U.S. counterparts in returns for CWB-controlled wheat and barley. Two 1997 reports, Schmitz, Gray, Schmitz, and Storey on barley, and Kraft on soft wheat, both *commissioned by the CWB*, found benefits from SDS.

This level of economist interest in the performance of a government agency is unprecedented. There had never been a public performance review undertaken in the sixty-year history of the Board, and serious independent economic analysis has been limited because the fundamental data are not available. Goodwin and Smith (1995 NAWG report), Loyns and Carter (1984 Economic Council of Canada report), Carter (1993 Continental Barley Market report) and other economists have been criticized, mainly by the CWB, for their misuse of information and wrong conclusions because of data deficiencies.

The results of the CWB studies that used "full information" also deserve some comments:

(1) The only evidence of overall positive performance or significant benefits from SDS has come from CWB studies.

(2) The data for the three recent CWB studies are confidential, unavailable to other analysts, and unlikely ever to be available for independent analysis. The results of these studies are neither verifiable nor replicable, and there is no indication that these studies were subjected to peer review. (3) The three studies commissioned by the CWB have addressed only returns *at the port* level; they say nothing except by assumption about farmer returns. The CWB and the authors of the *Choices* article insist that the impact of SDS *cannot be measured at the farm level.*

(4) The CWB studies claim that SDS reduces, not increases, marketing costs.

(5) Two of the *Choices* authors in