

in attempts at market gunning. The duck hunter who baits under such circumstances really deserves no consideration. Let's not give him any.

I sometimes wonder, as we note more and more evidence of excessive gun pressure in this Flyway with its great urban centers, if the baiters are not just tipping the scales against us in our annual effort to return an adequate population to the nesting grounds and thus change the unfavorable trend in waterfowl which we have noted here for several years. We must awaken people to this threat and get public help in bringing to time the selfish group which is plundering the waterfowl resource.

The Service is most grateful for the assistance it is receiving from State conservation departments in carrying on the battle against the baiters. Here again, the big job is education. I'm confident that once our people understand what baiting is actually doing to this wildlife resource, there will be no sympathy for anyone who continues to practice it.

Yes. All of us do have responsibilities to be met if we are to continue to enjoy waterfowl hunting—a sport not just for kings but for all people in America. Let's take a close look at these responsibilities. They exist for our Fish and Wildlife Service, for the 50 States, and most of all for people generally.

In the final analysis, public responsibility, unquestionably, is the most important of all for upon it depends whether or not we can implement the waterfowl program. Only with public help is successful waterfowl management possible. But, I believe we can secure that public support if you and I, the States, the private conservation agencies, and the Federal Government work effectively together as a team to meet our waterfowl responsibilities. Let's each one of us make sure we do just that.

## THE UNCONTROLLED USE OF PESTICIDES IN THE SOUTHEAST

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### INTRODUCTION

It is an honor and a genuine pleasure again to be privileged to meet with my friends of the Southeastern Association of Fish, Game and Conservation Commissioners. To meet and participate again with you and your technicians and research workers brings back many pleasant memories. Through your untiring efforts and united approach great progress has been made. Still, we have difficult and perplexing problems currently confronting conservation workers and administrators but, through a united approach, these problems are perplexities will be appropriately resolved.

While it would be much more satisfying and perhaps more conducive to good friendship if we could dwell on progress made. I believe we will contribute more to progress if we review annoying and difficult problems confronting us and attempt to find solutions that are in the broadest and most enduring public interest. Some of us seem to gravitate to some of these problems and controversies.

### THE PESTICIDE ISSUE

The pesticide and specifically the fire ant control program in the Southeast is currently a major issue that needs clear thinking and united action of all conservationists. While the fire ant is currently found in but nine of our southern states, the problems and philosophies associated with control are of national and international concern and affect all of us. In fact, I am convinced some of

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the philosophies expressed and actions taken by the pest control arm of our Federal Department of Agriculture seems to me to strike at the very heart of American democracy itself. The problems, therefore, far transcend the control program of any entomological considerations. If some of their dogmatic and dictatorial approaches win out, much of our wildlife will be doomed.

The pesticide committee of the International Association recently summarized its findings in this regard. Because so many of you were not at the International meetings recently held in Clearwater, Florida, a few of those facts need to be repeated and re-emphasized.

We must remember that pesticides were developed in response to a genuine public need and demand. Despite abuses and extremes that we are now witnessing—and they are legion—chemical controls, I believe, are needed and are here to stay, although not necessarily the same compounds, formulations or methods of applications as now employed.

We can and should unite in a concerted effort to help eliminate abuses and insist on maturity of judgment and intellectual integrity in the control programs. We must not oppose legitimate pest control, *per se*, but only abuses and incompetence and insist that all interests and resources be appropriately considered in the operational programs. We are rendering a public service to insist that a reasonable degree of research precede rather than succeed gigantic operational application of highly toxic pesticides and particularly when this is guided by an arrogant federal agency that refuses to consider any but a single side of the problem.

The public need and demand for chemical controls undoubtedly gave birth to the powerful and lucrative insecticide industry. It also brought into being governmental agencies whose major or sole responsibility was to carry on pest control. We must remember that the bureaucratic tendency to grow bigger and bigger and to gain more and more power and authority is ever present in a strong centralized government. Also, the realization of possible high profits for industry presents an ever-present temptation to adjust formulations and to carry on wholesale campaigns of control that will materially increase sales and profits. Examples of the above are probably not hard to find. For mutual betterment, it is to be expected there would be mutual support and cooperation between pesticide manufactures and control workers—but we hope no collusion. These tendencies and possibilities do exist which should keep top administrators on the alert to maintain integrity among subordinates and to see that consideration is given all values and also to see that the control arm is appropriately held in check.

#### EXTENT OF CONTROL

By summary we can state that the pesticide industry is growing by leaps and bounds. Well over 12,500 brand-name formulations and more than 200 basic compounds are sold over the counter with little restriction or restraint, regardless of the potency or danger of the concoction produced. If that isn't enough, and assuming that a newspaper account is accurate, Agriculture's operational pesticide division has campaigned to give away to property owners such potent and dangerous chemicals as heptachlor, with an irresponsible assurance that no damage will result. Is it ignorance of the facts or criminal negligence that an unsuspecting public is advised to use 12½ pounds of heptachlor per acre? Benevolently, the account adds that the Government will loan "seeders" to spread the poison furnished at no cost. Heptachlor is such a powerful stable poison that 1¼ pound per acre placed on the land is expected to kill any invading fire ant for a period of three to five years or even longer. It is rated as 15 to 20 times more powerful than DDT. Therefore, an application of 12½ pounds of heptachlor per acre, assuming this refers to the technical and not the 10% formulation, is equivalent to 187½ to 250 pounds of DDT per acre. One pound of DDT last year placed out under carefully controlled conditions in a New Brunswick forest practically eliminated the year's salmon run, and a similar application was devastating to the brown trout and white fish in the upper Yellowstone River Watershed of Montana. What would 187 to 250 pounds per acre do?

Most of our commonly used pesticides today were not known five or ten years ago. Moreover, these newer pesticides generally are less specific and more toxic than those of but a few years back.

Last year these deadly chemicals were applied to more than 100,000,000 acres of land in the United States and millions more in Canada and Mexico. Mixed with dusts, oils, water, and other solvents, emulsifiers, and carriers, the volume totaled between two and three billion pounds and cost the consumers over 500 million dollars. Entomologists expect at least a fourfold increase in the use of insecticides in the next ten or fifteen years. The rate of application varies from a few ounces to 25 or more pounds per acre, and applications are frequently repeated. In the fire ant "eradication" program some 1,700,000 acres have been treated to date. The United States Department of Agriculture informs us that 27 million acres of land in the Southeast have a population of fire ants. "Eradication" was begun in 1957.

### WILDLIFE—FIRE ANT ERADICATION RESEARCH

Research on the effects of the fire ant program on wildlife was summarized as the Proceedings Symposium, October 19 and 20, at the 1958 Southeastern Association meeting held at Louisville, Kentucky. Here splendid reports with supporting data were presented by researchers in the field. It is hoped current progress reports can be given in the technical sessions which follow.

Perhaps a few highlights on these and other studies where chlorinated hydrocarbons are used may be of interest here. Studies have been conducted to determine the effects of the control chemicals in Decatur County, Georgia; Camden and Pike Road, Alabama; Sour Lake, Texas and in Acadia, St. Landry, West Baton Rouge and Concordia Parishes, Louisiana. On all of the above, except Pike Road, Alabama, which started in the spring of 1959, research on the effects of the control was started in 1957 or 1958.

### RESEARCH FINDINGS—EFFECTS OF CONTROL

Studies conducted this past summer confirm very well the general conclusions reached a year ago. In addition, they shed greatly needed information on the long-term and indirect effects of control when lethal poisons are broadcast. It is imperative that these field studies be continued for a number of years to give reliable field data on these profoundly important long-time and indirect effects. Data painstakingly acquired this year show the necessity of study plots being of sufficient size to cover the seasonal range of the various species of wildlife under consideration. If the home range of a covey of quail, for example, covers an appreciable part of untreated area we notice a distinct differential, at least concerning the immediate effects, upon the covey as against other coveys that spend all their time on the treated plot. This very factor accounts for most of the discrepancies between research workers studying this subject in the past.

Usually, if large areas are treated according to past standards of application, there is a loss within the first 30 days on cleared areas and pastures with few or no trees or shrubs of 80 to nearly 100% of almost all wildlife species residing full time on the area. Reproduction is usually greatly reduced. Where trees and shrubs occur, nesting success ranges from 6 to 45%. Field studies as yet shed no light on surviving  $F^2$  and  $F^3$  generations. Studies to determine this should be set up.

This summer's data show a definite delayed effect of the poison. They also suggest that the stable and highly lethal poisons are effective in killing wildlife even a year or 15 months after application of the pesticide. Species of birds that feed and scratch the ground and dig out earth worms and insect larvae are especially vulnerable to secondary poisoning. Robins and brown thrashers, for example, are usually eliminated. New winter arrivals that may come six to nine months after treatment, or even a year later, are killed off. Brown thrashers and robins were common visitors in the shrubbery and woodland areas of the Fralise (Sour Lake), Texas area before treatment, but were readily killed off. Three brown thrashers were shot and collected as new arrivals in November of 1959. When their carcasses were chemically analyzed, they showed an average

of 16 p.p.m. of heptachlor. By January (1959), Lay could find no thrashers on the area (11).

Continuation of the studies in 1959 of plots established in the Texas area in the early spring of 1958 showed that nesting populations on these areas had decreased about 70.5%. This suggests that the old nesters had been killed off and that reinvasion was slowly taking place. It is also significant to report (1, 11) that nesting in the fields treated in the spring of 1958 was only about 68% as successful in 1959 as on adjacent non-treated areas. This further indicates that the poison put out the year before was still having an effect on nesting the following year. Population counts near roads one year after treatment showed a reduction of 44.7%; acre plot counts showed a 33 1/3% reduction; woodland counts showed a 68.5% reduction, while narrow untreated strips of woodland adjacent to and surrounded by treated pastures showed a reduction of 45.8% of bird populations one year after treatment.

Whistling cock counts of bobwhite quail this past summer (1959) in Decatur County, Georgia show a population, 1 1/2 years after treatment, of only about 1/2 that of similar untreated habitat. A spot-treated area in the spring of 1959 covering perhaps 1/2 the range of the quail caused about a 50% drop in the quail population by mid-summer.

Dr. Maurice Baker and Dan Speake found a significant bird die-off at the Camden experimental substation in the spring of 1959 after one year following the application of the pesticides. Bird populations on the treated areas were much smaller than on other adjacent, but untreated, lands of comparable habitat. Quail, robins, meadowlarks and other song birds were found dead on the treated plots. Robins apparently were completely eliminated from the treated area.

The Pike Road station, Alabama was reportedly treated with two pounds of heptachlor (active ingredient) per acre from April 30 to May 4, 1959. Nesting success on the treated area was 46.3% and on untreated areas, 76.7%. Ground nesting birds had 17.4% nesting success, while 53.8% were successful on adjacent untreated areas. Shrub-nesting birds had 42.9% success on the treated and 87.5% success on untreated comparable areas. For reasons not yet apparent, tree nesting birds showed relatively little affect from the treatment. Whistling cock quail declined 76.9% and meadowlarks 80.5%.

Indirect and delayed action affects of modern controls are clearly shown in the studies of Wallace (15) and Mehner (12). Moderate to heavy populations of robins and most desirable bird life were greatly reduced or practically eliminated in a number of northern communities, notably on the campus of Michigan State University, suburban Pittsburgh, and other communities in Michigan, Wisconsin and Illinois. Recent unpublished reports add much to confirm these conclusions. Control of the Dutch Elm disease resulted in poisoning of earth worms and insects and indirectly many species of most loved wild birds that frequent college campuses, city parks and suburban areas. Re-invaders a year later (spring and summer of 1959) showed that high mortality rates, considering the reduced populations, were still occurring, and these favored brooding and feeding areas were literally graveyards for many birds not produced on those areas. Laboratory tests shed further light on this.

Our most competent entomologists have long known that the indirect effects of poisonous pesticidal applications would represent delayed actions and, therefore, these long-time and side effects could not be fully appraised for a considerable period. Perhaps the clearest insight into these indirect effects on wildlife has come from a series of well planned cage experiments and studies (3, 4, 5, 6, 7, 8) conducted by Dr. James DeWitt of the U. S. Bureau of Sport Fisheries and Wildlife. A number of exceedingly important papers have been produced by him, and they give us cause for alarm.

DeWitt found that highly toxic chlorinated hydrocarbons pesticides (and some others) not only are extremely lethal in minute quantities, but also are accumulative. Further, young birds hatched from parents that had ingested minute sublethal doses of poison showed a much higher mortality after hatching. Furthermore, sterility or partial sterility may follow in those young that do survive. As little as 1/200,000th of an ounce of dieldrin per day in the food of pheasants resulted in eggs of low hatchability and chicks subject to abnormally high death rates. We can see little reason to expect that the indirect effects

of these highly dangerous poisons, in quantities now applied, will be any less damaging to man or to his domestic livestock.

### QUESTIONABLE PROPAGANDA

It is my opinion that there has been more misinformation, unfounded assertions, inaccurate reporting and scare campaign propaganda, if not bold deception, fed the American public in attempting to win support for the ill-conceived and irresponsible fire ant "eradication" program than for any other control program ever attempted in this generation. Charles D. Kelly (10), Secretary of the Alabama Wildlife Federation and a high and responsible official of the Alabama Game Department, has appropriately remarked that the program "was ill-advised, hastily conceived, poorly planned, and a glaring example of riding rough-shod over the responsibilities of other public and private agencies. From its conception, the program has been one of exaggerations and misrepresentation, combined with the deliberate withholding of known facts." Kelly's address contains many examples of this. It would be interesting and perhaps enlightening to know who, besides the government, has paid for all the "official" propaganda.

Despite all the "scare" campaign, motion picture propaganda and false reporting, isn't it rather significant that only two states, Louisiana and Mississippi, have listed the imported fire ant among their 20 most important economic insects? Even in these states, it is placed near the bottom of the list and grouped with nuisance insects rather than with those that are a menace to agriculture. Isn't it also significant that Alabama, where perhaps more than 1/3 of all American fire ants are to be found, and where they have thrived for 40 years, has recently turned thumbs down on contributing any appropriation to cooperate with the Federal Department of Agriculture in the fire ant "eradication" program. In my personal opinion, those who defeated this measure deserve the gratitude of every citizen who loves democracy and our free enterprise system.

In the more detailed "International" paper (1), account is given of the false and misleading report sent the congress in supporting the annual \$2.4 million dollar Government Appropriation for fire ant "eradication." While I firmly believe the high Department officials who signed the misleading request was unaware of the facts, the subordinates and field workers who supplied the information should have known the facts.

It is amazing that Agriculture pest control workers and, still more startling and perplexing, that Federal Control officials continue to belittle and deny any significant loss or damage to wildlife or other interests when such potent stable poisons as dieldrin and heptachlor are broadcast at the amazing rate of two pounds of technical material per acre. This amount they broadcast by airplane over extensive areas, and they expect the poisons to continue to kill insects for a period of three to five years or possibly longer. The U. S. Public Health Service (14) has shown that these two pesticides are so poisonous that they have a 96 TL<sub>m</sub> value of 7.9 and 19 p.p.b., respectively, for bluegills. This means that if healthy bluegills are placed in a tank of water at least one-half of them will be dead within 96 hours if the water contains as much as 7.9 parts per billion of dieldrin or 19 parts per billion of heptachlor.

As evidence that Agriculture recognized that these poisons were dangerous, they sent out an official warning where control was to be practiced, which reads: "Cover gardens and wash vegetables before eating them; cover small fish ponds; take fish out of pools and wash pools before replacing the fish; don't put laundry out; keep milk cows off treated pastures for 30 days, and beef cattle 15 days; cover beehives or move them away; keep children off ground for a few days; don't let pets or poultry drink from puddles." These officials are like the three oriental "Wise Monkeys"—they refuse to see any evil, hear any evil or speak any evil. Obviously, their conclusions are first arrived at and the supporting "facts" are garnered later!

### FIELD EVIDENCE ON EFFECTS OF CONTROL

Many thoroughly documented records could readily be given of serious wildlife loss following application of heptachlor and dieldrin in the fire ant program. A few of these have been referred to.

A 3,600-acre tract in Wilcox County, Alabama experienced an 87% reduction of bobwhite quail following treatment, and at Climax, Georgia an 86.4% reduction was noted. A year later, this latter area still was 56.1% below quail population in adjacent untreated land.

Recently, I visited areas in Georgia and Alabama and made it a point to call on some farmers in these states whose property had been treated. Not all were aware of the damage that I believe occurred. This is understandable if they had no chickens or livestock running loose over the property and if they were unfamiliar with their native wildlife.

Mrs. A. A. Jones and her son and two daughters were emphatic that losses had been serious in their area following the "government" treatment. They reported loss of cattle, pigs, turkeys and chickens along with household pets and wild birds. They volunteered the information that quail, crows, jays, mockingbirds and "all little birds" seemed to be eliminated by the "eradication" program. Mrs. Jones remarked that she "set" several hens, following the complete coverage of fields and woodland areas with the poison, and for reasons she did not understand, very few young were hatched or survived.

Mr. A. C. Scarborough was frank to announce that so far as he could tell, his high population of quail was wiped out and that "mockingbirds, red birds and all tree birds were largely eliminated." Some of these are now coming back and he had re-introduced quail. He reported that wild turkey and doves were also eliminated in his area. He raises hogs and he remarked that for fully nine months after the broadcast of poisons, he could raise no young pigs. The litters were born dead or they died after birth.

A Mr. Harmon in the same section of the state was irate against the control workers, as he said he buried or otherwise disposed of 19 carcasses of his cows that had been killed by the poison and he knew of three or four additional cows that died as a result of the same treatment. Calves died that had been given only milk since birth. Mr. Harmon also raises pigs. Some of these died. He reported that of 37 litters of possibly 250 young, only 31 little pigs survived. He had been unable to raise chickens since the application of the poison 15 months before. Mr. Harmon felt that his area had largely been left a biological desert since the poison was broadcast uniformly over farms, pastures and wooded areas. His quail and wild turkey were destroyed along with all other native wild birds. He had suffered no abnormal loss of cattle, calves, pigs, game or other wildlife prior to this time, and none occurred on adjacent untreated areas during this time.

The local veterinary, Dr. Ottis L. Poitevint, of Bainbridge, Georgia, despite government claims to the contrary, was adamant that this loss was the result of the insecticide treatment. He found losses wherever the poison had been broadcast, but nowhere else. He assured me that the symptoms in the affected animals he treated were typical of chlorinated hydrocarbon poisoning. Furthermore, chemical tests of dead animals confirmed the poisoning.

In a report to Ray E. Tyner for the Georgia Sportsmen's Federation Dr. Poitevint states, "I would like your people to know some of the facts concerning the fire-ant eradication program in Decatur County and its obvious effects on livestock and poultry.

The aerial application of heptachlor and/or dieldrin was begun in November, 1957 and continued into early summer 1958.

Livestock losses of an alarming nature began to occur in February and March, 1958. I would like to list some of the facts concerning these losses.

1. A condition affecting the nervous system of domestic animals and poultry was seen at periods of two weeks to several months following the aerial application of fire-ant poison. This condition was in most cases fatal.
2. The condition was seen to affect several different species such as cattle, goats, horses and chickens as well as wild animals and birds.
3. The condition was seen only in species which had access to contaminated food or water or both. Stabled animals were *not* affected.
4. The condition was seen only in those areas of the county which had previously been treated for fire ants.

5. The symptoms observed by myself and reported by others were the same as those described in authoritative textbooks for poisoning by dieldrin and heptachlor.
6. Veterinarians in the employ of the U.S.D.A. suggested rabies and listeriosis as possible causes of the condition. Laboratory tests for these and other known diseases were negative.
7. It has been reported that dieldrin and heptachlor disappear within one month, usually two weeks after application. They say, therefore, that poisoning could not occur later than one month after application.

An interesting case history is as follows. On April 15, 1958, a two-month-old calf was picked up by agents of the State and Federal governments. The animal showed symptoms not unlike those described for poisoning by heptachlor. The animal was carried to Tifton and was subjected to exhaustive laboratory tests with negative results. Fat from this animal was analysed by federal chemists and found to contain 79 parts per million of heptachlor. This occurred approximately five months after application of heptachlor. Did the calf get this from grazing or from milk? If from the milk, why were not special precautions taken to protect our children who drank milk from local dairies? By the way, this calf was never paid for.

Losses of cattle exceeded 100 and numbers of other animals died. Abortions in swine and sterility may have been due to insecticide also."

I encountered several areas where quail had been restocked following the fire ant treatment.

### ECONOMIC EFFECTS

The loss of quail can have high economic significance in Alabama and throughout the South. Assuming control on 1,750,000 acres (the acreage treated probably exceeds that figure by now) and further assuming that this land carries one bird to four acres (which figure is below better quail lands, even in areas of high fire ant populations), this would indicate a population of 437,500 birds. If 1/2 of these could be harvested, that would amount to 218,750 birds. If the average take for your seasoned and enthusiastic hunters is 50 birds per season, this would afford hunting for 4,375 persons. If each spent 10 days vacation in quail hunting, it would represent a total of 43,750 man days. If even a substantial part of these were wealthy visitors, the amount these people, their families, or guests brought with them, would spend would be considerable and would add much to the income of your communities. Certainly the loss would be significant and alarming, and I can't conceive of a Chamber of Commerce, local civic club, or any loyal and patriotic citizen not wanting to do all in his power to prevent this unnecessary waste. I merely want to suggest that, in my opinion, you are only doing your duty in rising in rebellion against this ill-conceived, irresponsible, and unnecessarily destructive fire ant "eradication" program.

### OTHER CONTROL PROGRAMS

The fire ant program is relatively a minor part of the national control picture. It would be much more pleasant to stress the successful and cooperative projects but, because this program is a departure and, I believe, a very dangerous trend in government, and also because it is a major project in your section of the country, this has been stressed. Certainly, we know of no other project in its administration, publicity, operation and effects on other interests that deserves the criticism that this one does. We do not expect perfection either in the administration or operation of such a tremendous program. We do expect honesty, a reasonable degree of competence and sufficient maturity of judgment that other interests and national resources will be given fair consideration.

It isn't only in the field of entomology that problems may arise. The predatory and rodent control programs of Interior constantly need review and objective appraisal. Likewise, the problem of herbicides needs constant review and surveillance to prevent public damage. Herbicides are an excellent tool in plant management but, unless used with skill and understanding, great damage instead of benefit can result.

## A PARTIAL SOLUTION TO THE PESTICIDE PROBLEM

It seems to me that the first step in the solution of entomological pesticide problems is a more logical administrative set up to direct it. If my understanding is correct, the operational activity is widely separated from the research branch. The research arm should not be under the domination of the operational branch. A common administrator, however, should direct both and insure that an operational program is appropriately guided by sound research. Obviously, this has not occurred in the fire ant program. To have the operational branch also conduct the research in effect makes it both "judge, jury, and executioner". In a democracy, this is rarely satisfactory or successful, as the high-handed fire ant "eradication" program clearly illustrates.

That the public needs protection from over-zealous, uninformed, or irresponsible control groups already has been recognized by Federal legislation. The Insecticide, Fungicide and Rodenticide Act of 1947, requiring all pesticides to carry accurate labeling instructions, if followed with understanding, will help to protect man and domestic and wild animals. The Miller Amendment to the Food, Drug and Cosmetic Act provides for establishment of tolerances limiting quantities of toxic materials in foods or feedstuffs moving in interstate commerce. Neither of these acts prohibits, nor regulates, the contamination of the environments of man, animals or plants. We are unaware of legislation that prohibits or provides penalties for improper or excessive use of toxicants that directly or indirectly may seriously injure man and his resources.

It should be emphasized that current legislation is inadequate to protect the public against indirect effects of poisons. They are entirely ineffective as they relate to wildlife because the lethal pesticides are placed out in wildlife habitat, on wildlife foods, and usually the wild creatures are exposed to the direct effects of the poisons. Their water and foods are often dangerously contaminated.

I believe that further federal protective legislation is needed (1, 2) to establish a national control policy requiring that the total toxicants applied shall not result in hazardous conditions to man and his domestic and wildlife resources. This policy should provide that toxicants be applied only after the value of the control has been objectively and carefully weighed against the probable harm that will result. It is essential that the long-term or indirect effects of control, as well as the immediate consequences, be considered. Because there are too many examples of poisonous compounds being promiscuously applied where there are few or no pest insects (as for example in the fire ant program), it seems that the national policy should clearly state that the dangerously poisonous pesticides may be applied only in areas *where* there is a proved need and *when* and *where* the poisons can be expected to do more good than harm.

Further, this policy should provide that the minimum amount of poison for effective control be used, and not an excess. That there is need for a declaration of such a policy, we can point out that the Department of Agriculture is now recommending a 37 1/2% decrease in the amount of poisons used in the control of fire ants, after two years of applications and spraying well over a million acres of land. Furthermore, the present dosage of 11/4 pounds of heptachlor or dieldrin per acre is so high that one application is expected to remain sufficiently toxic that it will kill any invading ants for a period of three to five years, or possibly longer. The national policy should provide that if the need for control is clearly indicated then only the most selective, safe, and effective control agents, formulations, and procedures be utilized.

Legislation is needed to insure that operational control of mammoth proportions, or "eradication" programs, be preceded by a reasonable degree of research on the economics of the problem, including a cost-benefit study, the need of it, the direct and indirect effects of specific control procedures upon man, domestic and wild animals, crops, soil organisms, and upon the economy and well-being of our society. It would seem wise that the national policy provide that before any blanket aerial spraying of a large area (*i. e.*, 1,000 acres or more in a single block) is initiated, notice of intent, with a descrip-

tion, location and designation of the area be published in advance and a public hearing held to determine whether there is significant opposition to the contemplated program. If appreciable opposition develops at the hearing, and if differences of views and proposals cannot be reasonably well ironed out, we recommend that the National Research Council (or the National Academy of Science) be asked to investigate the problem for an impartial recommendation which would then be submitted to the Secretaries of Agriculture and Interior. On the basis of these facts, the Administration could intelligently proceed.

It will be recalled that the Food and Drug Administration came into being to establish and maintain safe standards of purity for our foods and drugs and to give the public some protection against quacks and swindlers who happened to be in these industries. There is urgent need that the Congress give consideration to protecting our whole environment from dangerous contaminations. The lucrative possibilities involved in spewing poisonous chemicals over the landscape make it imperative that a closer watch be maintained over pesticide operations. The pesticide industry or the federal operating agencies involved in control cannot and should not be expected to do this.

In addition to needed Federal legislation, we believe that most of the states also need legislation to curb questionable pesticide projects and to establish some degree of supervision over approved programs. Present Federal legislation affecting pesticides is designed to control the labeling and quality of products that are shipped from one state to another. Because field application of pesticides is largely an intrastate matter, it appears that the individual states can best cope with the situation through state laws and regulations. The State of Connecticut and a few others already have legislation designed to control or regulate pesticide operations and applications of poisons within the state. The various states would do well to study this problem. In Connecticut, the State Fish and Game Commission has a voice in reviewing proposed operational programs. All state game and fish departments should have similar authority.

## COMMENT

It is apparent that our current approach to the pesticide problem needs a new look. Instead of seeking evermore toxic, broad spectrum compounds, we should strive to develop materials which are selective or specifically toxic to particular insect pests that need control. We should strive to use less rather than more toxicants through better and specific cultural practices, and we should give far more consideration to effective biological control methods. In some instances, biological control has been eminently successful (9).

Some 50 species of our worst insect pests already have developed resistance to increasingly large and evermore poisonous dosages of pesticides, and the list is rapidly lengthening (13). Also, by the wholesale use of generalized programs, beneficial insects have been killed off. Because of this, some destructive insects and related pests have developed to plague proportions and much crop loss has resulted. The eruption of red mite plagues, the epidemic of sugar cane borers, or rice stink bugs in Louisiana are illustrations of this.

We must remember that dangerous toxicants are poisonous to man and his domestic livestock as they are to other biological organisms. There is an increasing array of evidence that man is being adversely affected by them. It is foolish to accept unnecessary risks. We recognize the public need of chemical control but feel that agencies directing it should deal honestly, maturely, and responsibly. They should have sufficient breadth of vision and understanding to appreciate other interests and values.

Without doubt, there are times and circumstances when Federal participation in the control program is needed. I believe it is in the public interest that this be kept to a minimum and not handled as a public dole. When control becomes extreme, the cure may be more damaging than the depredation or annoyance of the insect. May I remind you that your tax dollar, extracted and sent to Washington and then sent back to you to carry on insect control or perform any other function for individuals they can easily do for them-

selves, loses much of its purchasing power in that round trip. Furthermore, it is well to remember that any government that can give you all you might wish can also take from you all you own. Let us not become mere numbered pawns of the State.

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