

balls sprinkled in the yard or garden are effective as a repellent for armadillos. Also, where the damage is localized, small fences (10-12 inches high) may be used to keep the animals out.

Armadillos can be trapped in live traps (such as available from Havahart, P. O. Box 551, Ossining, NY 10502) or in homemade box type traps. Animals caught in these traps can be released unharmed into another area several miles away. Traps should be located near the entrance of armadillo dens or burrows and baited with spoiled or overripe fruit (e.g., apples, pears, etc.). If other species of animals get into these live traps, they can be released unharmed.

Fumigating burrows with toxic gases is another technique to reduce armadillo damage. This technique, however, is suggested only as a last resort due to the secondary poisoning hazard for other animals (gopher tortoises, lizards, snakes), which frequently seek shelter in burrows. The fumigation technique to control armadillos is usually chosen only if the burrow or den is located a short distance from the site of the damage. The armadillo is most likely to be using its den during midday and therefore this is the best time to use a fumigant or gas.

One fumigant that is easy to use, quite safe and effective is carbon disulfide. Carbon disulfide usually can be obtained at local farm-supply stores or possibly, the local drug store. This substance is best utilized by soaking a wad (softball-sized) of cotton or rags with carbon disulfide, and then placing the cotton or rags as far down the burrow as possible. Cover the den immediately with sod or heavy soil. Toxic fumes from this material will kill the armadillo (and sometimes, other animals) if it is inside the burrow. CAUTION: Do not use carbon disulfide near an open flame as it is a highly flammable material.

Carbon monoxide gas from internal combustion engines also can be used as a fumigant by attaching a hose to the exhaust, extending the other end of the hose as far into the burrow as possible, and closing off the entrance around the hole with compacted soil. Exhaust fumes should be expelled into the burrow for at least 20 minutes to kill the armadillo. This technique is not highly recommended since it also may result in a secondary poisoning hazard to other animals using the burrow.

Poison baits are not recommended; they are poorly accepted because of the armadillo's feeding habits and present another secondary poisoning hazard to other animals. One other method is frequently employed to control offending armadillos — and that is spotting them at night and shooting them. Make sure shooting is legal and safe in your area. The shot should be directed toward the animal's head, as these animals are difficult to kill otherwise. Remember that armadillo meat is edible if properly prepared and there is no bag limit or season on them.

If one of the above control methods is ineffective at discouraging or eliminating the offending armadillo(s), a combination of these will likely be more effective.

Scientist Defends Use of 2,4-D

The following is from a letter sent to the chairman of the Santa Cruz County board of supervisors about a hearing it held last October 30 on the possibility of banning use of 2,4-D. The board of supervisors voted to place a moratorium on the herbicide's use by the department of public works until additional information and testimony could be considered. Two more hearings were held, again with the same results. At the most recent hearing (December 11) the moratorium was continued until June at which time the county agricultural commissioner, county director of the extension service, and the department of public works have been asked to make recommendations on replacement herbicides and the "use of IPM in weed control." The writer is Dr. Kenneth Thimann who enjoys a worldwide reputation as a biologist, plant physiologist and bio-chemist. He is the possessor of a list of academic achievements and honors that is far too long to present here. The important thing insofar as this letter is concerned is that he is one of the world's true experts on the subject. — Editor

My name is Kenneth Thimann and I am professor emeritus of biology at the University of California-Santa Cruz. My speciality is plant biology and in particular the plant growth regulation substances (of which 2,4-D is one). I have written some 250 scientific papers and five books on this and related topics. I do not work for any firm that makes or sells 2,4-D (or indeed any other pesticide) and my sole interest in this matter concerns the truth.

2,4-D is the most generally useful of all herbicides. Its discovery arose from the work on natural plant hormones, to which it is related and not from the Army, as was claimed on Tuesday. This, by the way, was only one of some dozens of falsehoods to which I listened that evening. 2,4-D is the most generally useful herbicide because of three valuable properties: it is harmless to man, it is rapidly destroyed by bacteria in the soil (and to non-toxic breakdown products), and lastly it has the special ability to kill broadleaved plants (technically dicotyledons) without harming the narrow-leaved group (monocotyledons), a group that includes the grasses, wheat, barley, corn, rice, etc.

Thus it is most useful for killing weeds in corn or wheat; its use in Britain in the immediate post-war years is credited with causing a 30% increase in overall wheat yields. It has been in regular use throughout Europe and North America since about 1948; i.e. for 31 years, and in that time the only damage to humans ascribed to it, as far as I know, was to a few who deliberately drank it for suicidal purposes. Even then it has been hard to absorb a fatal dose.

It stands to reason, therefore, that the tiny amount one might take in from the spatter of a sprayer, etc., could not possibly exert a harmful effect. The man who claimed that, while working for the parks department he had sprayed some 2,4-D and the following day he "and all his team" had

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been sick, was therefore either (a) making up a story, or (b) mistaken as to the pesticide he was using. Even with 2,4,5-T (which is more complex because of the toxic dioxin present as impurity), the dose required for the minimum effect is excessively high.

In the often-quoted Bionetics Laboratory tests, the minimum dose of the impure 2,4,5-T needed to cause minimum birth defects in mice was 45 milligrams per kilogram, and was given daily for half the duration of pregnancy. Scaled up to a woman of 60 kilograms (132 pounds) she would have to eat nearly three grams of the solid every day for four and a half months. In normal spraying solution this would require drinking about half a gallon daily for that period. Since the substance tastes most disagreeable no one in his or her senses would drink even a glassful, let alone take it daily for 135 days. And 2,4-D, which is our present subject, does not contain dioxin anyway.

One trouble with many of the witnesses is that they were unable to distinguish between one compound and another. One said 2,4-D and 2,4,5-T are "about the same," thus completely missing the point about the toxin in the latter. Others declaimed against "pesticides" in general. Now some pesticides are indeed toxic to humans. When EPA made the mistake of banning the insecticide DDT, farmers and others resorted to malathion and other organophosphates which are toxic, and these have accounted for over 60% of the hospitalized cases of pesticide poisoning in 1976-77. (Almost 25% more were persons who took the insecticide intentionally!) Thus if the board makes the same mistake with regard to 2,4-D some more toxic herbicide may well come into use.

Many statements made at the hearing were incredible. The representative of Friends of the Earth claimed that 2,4-D was carcinogenic, mutagenic, caused birth defects and other illnesses, not a word of which was correct. Indeed, the only thing she did say that was true was that it killed the leaves of an apple tree (since it is an herbicide this would be expected). I pay the board the compliment of assuming that its members are interested in the facts and not in such hysteria . . .

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