



The Desolate Year

Does the world really need chemical pesticides? Are these compounds (used to control insects, rodents, weeds, parasites and plant diseases) better left alone? Is the public being sold a monstrous "bill of goods"?

The answers to those questions could be learned with finality by seeing what would happen if pesticides were not available. Imagine, then, that by some incomprehensible turn of circumstances, the United States were to go through a single year completely without pesticides. It is under that license that we take a hard look at that desolate year, examining in some detail its devastations.

LIFE-SLOWING WINTER LAY on the land that New Year's Day, the day that Nature was left to seek her own balance. Great drifts of snow cloaked the vast northland, and across the midsection of the country a thinner crust of whiteness was pierced by drab brown of brush and stone, naked tree, fence row and corn stubble.

Except for man's own small islands of sound and movement, most living creatures were silent, asleep. So it was that the grim reality of that defenseless year first sank home in the warm sub-tropics of lower Florida and California, Arizona and Texas.

It was warm that day in the citrus groves around Miami, and the glowing warmth drew a buzzing, harmless-looking fly from its place of rest. And she—for this was a female—was drawn into the golden air by some power that spanned the eons, that further drew her among the trees, and eventually to one weighted with growing grapefruit. The Mediterranean fruit fly turned her stiletto-like appendage into the first grapefruit, and when a tiny hole had been bored neatly through the

rind, she sent an egg inside. Then she went to another, and another, taking no count of the 800 globes she had desecrated. Others of her kind, warmed and driven by the same purpose, followed; some further infested the holes she had bored, others sank new wells of their own.

Quietly, then, the desolate year began. Not many people seemed aware of danger. After all, in the winter, hardly a housefly was about. What could a few bugs do, here and there? How could the good life depend upon something so seemingly trivial as a bug spray? Where were the bugs, anyway?

The bugs were everywhere. Unseen. Unheard. Unbelievably universal. On or under every square foot of land, every square yard, every acre, and county, and state and region in the entire sweep of the United States. In every home and barn and apartment house and chicken coop, and in their timbers and foundations and furnishings. Beneath the ground, beneath the waters, on and in limbs and twigs and stalks, under rocks, inside trees and animals and other insects—and, yes, inside man.

The most numerous and ferocious of all mankind's visible natural enemies lurked quietly that day, waiting. They weren't to be counted in the thousands, or millions, or billions. Nothing short of *trillions*, at least, could begin to account for their numbers. They were there, as eggs or larvae or pupae or voracious adults—waiting.

In a small subterranean cubicle, hardly large enough for a man to move about in: 100,000 mosquito mothers-to-be, ready to follow those only basic drives of the insect, to live and reproduce. In one cornfield: tens of thousands of caterpillars, snug in the balsa-like interior of fodder into which they'd fed. Along the sunnier south side of a single fence row in the Midwest: more thousands of tiny white-winged black chinch bugs. Scattered and broadcast across fields and meadows and ranges throughout the country: uncountable masses of grasshopper eggs and nymphs. Waiting.

But there is no more waiting for an insect when sun's warmth stirs it from its lethargy. Nor need there be any waiting when the warmth is otherwise available.

Thus, even as the Florida citrus grower stood petrified, a pierced and wormy grapefruit in his hand and the frightening Medfly flitting through his trees, a New York housewife caused more widespread alarm. Her apartment was crawling with ticks—supposedly harmless dog ticks that her pet had transferred there from Central Park. What could she do?

What *could* she do? For, without pesticides, the pest control firms had automatically gone out of business. Of a sudden, some of the starkness of the times dawned on other people. No more protection against moths in clothing, furniture, carpets; no weapon but a fly swatter against rampant bedbugs, silverfish, fleas, slithering cockroaches and spreading ants. More people shuddered, then, and still the desolate year was young.

Desperation grew in Florida; infested trees were hacked and burned and the diseased fruit consigned to the flames. The Medfly produced and reproduced and



spread, bent on making every orange and lemon and grapefruit over millions of acres so massively infested with maggots that humans would not ship or can or freeze or eat them.

Other insects brought other diseases to the ruined citrus, and the Floridians could not even find consolation in the fact that the great burden of scales and blights, blisters and scabs was likewise killing off rival groves in California and Arizona.

The garrote of Nature rampant began to tighten. The

winter vegetables of the sunlands were barely marketable. But the next early crop was plagued. First to feed were the unseen cutworms, rasping off tender stalks below the ground. Then the mites and aphids, and the pretty butterflies that winged over the fields—and dropped eggs onto cabbage and cauliflower and broccoli and kale. Green worms, tan ones, striped ones, spotted ones, all hungry and eating, leaving their various residues in labyrinthine runways inside fruit and in crotch of stripped stalk. Finally, the beetles and bugs and skeletonizers ripped the leaves from potatoes and bush beans and limas, and their fellow workers in



the field invaded hull and pod, and infested them with eggs and other matter.

So went the fresh, clean vegetables.

So went sweet corn, for that year hardly an ear from corner to corner of the nation brimmed with just its own sweet juice. If its stalk and ear escaped the harsh attack of the borers, along came the earworm, hatching from eggs that a brown-gray moth slipped into the receptive silks alongside the life-giving pollen. Her worm-children ate and defecated and ate more, working from the tender small kernels down into the large firm ones.

So the farmers planted and cultivated, and too often the harvest was garbage. The men at the packing plants and canning plants groaned. How could such refuse, even though whittled and carved and cored by hand, be cleaned and processed and pass for good food?

Inspectors for the Food and Drug Administration asked the same question, and were stumped for an answer. They couldn't approve food products containing what some of these did. But people had to eat. As food grew scarcer, prices spiraled.

It was a problem that grew; things got much worse that year. For now spring came to America—an extremely lively spring.

Genus by genus, species by species, sub-species by innumerable sub-species, the insects emerged. Creeping and flying and crawling into the open, beginning in the southern tier of states and progressing northward. They were chewers, and piercer-suckers, spongers, siphoners and chewer-lappers, and all their vast progeny were chewers—rasping, sawing, biting maggots and worms and caterpillars. Some could sting, some could poison, many could kill.

Hard-pressed men of the U. S. Department of Agriculture, besieged with pleas for help, could only issue advisories to rake and burn, to plant late or early, to seek the more resistant strains. But when insects and

diseases took over anyway, there was no recourse.

In nook and cranny and open field where plants were just in bud, the insects bred and re-bred, cross-bred and in-bred. Some didn't breed at all, or need to; females simply produced more females which gave birth to more hordes of females.

The insect hosts descended in earnest. Here are just a few of the things that happened:

A cattleman in the Southwest rubbed the back of a big red steer, and his hand found two large lumps under the hide. Sick at heart and sick at stomach, the man looked at the hairy flies swarming around his herd.

Then, gritting his teeth, he placed his thumbs at the sides of one of the lumps and pressed. The hair parted,



a small hole opened and stretched. A fat, brown inch-long maggot slowly eased through the hole. It fell to the ground and the man stepped on it. One insect controlled.

But there were too many thousands of cattle grubs that year for such counter-measures. The flies buzzed and laid their tiny eggs on the animals' "heel" hairs. The eggs hatched into small and ugly organisms that bored through the skin and coursed around the cattle's bodies between muscle and skin to the back—small moles moving under golf tees of sleek hair. There, they bored air-holes that damaged the hide for leather; infested the finest meat of the animal. Finally, each grub forced its air-hole open, pushed itself out and fell to the ground, another heel fly in the making.

Cattle—and sheep and hogs and fowls—suffered mightily that year. Ticks clamped onto their flanks and flies clouded their eyes. The screwworm flies planted their eggs in the scratches and sores that the others made. The screwworms ate out massive wounds that invited still more maggots. Many whitesides died that year, and many cattle of other breeds.

But food and fur animals weren't the only ones that died to the hum of the insects that year. Man, too, sickened, and he died.

Some people retreated to the coolness of the mountains to pitch their tents, although life outdoors was beset by whirring gnats, flies and mosquitoes that summer. Among them was a man who had returned from a sojourn in the Far East. One day, he was stricken by an old foe that had returned violently—malaria.

While he suffered, the mosquitoes kept biting, and as each keen proboscis siphoned off his blood it also sucked in deadly gametocytes that were in the red corpuscles. Inside the mosquitoes, after a complicated reproductive cycle, microscopic organisms split and multiplied with-

in their own expanding walls until, after two weeks, the walls broke. Out of each came thousands of minute sporozoites to circulate through the host insect, to settle in the salivary glands.

Unmolested, the mosquitoes whined over the mountainside, piercing and sucking. Each time a proboscis plunged into a camper, a droplet of saliva was forced in, too—Nature's way to make the blood flow freely. And in some of the droplets, there lived malaria.

Half a dozen campers, infected by the first onslaught of the host mosquitoes, suffered the fiendish torture of chills and fever and the hellish pain of the world's greatest scourge. Eventually, nearly three dozen people were brought down, and no one knew how many mosquitoes had bitten how many of the new patients, and so had become able to spread the outbreak further. Who could curb the mosquitoes?

South and West, in the miles and miles of cotton fields, the situation went beyond control. The worst plant-loving demon of them all chewed into the tender squares of young cotton plants. The long-snouted boll weevil, tragically belying her comical mien, inserted one egg into each of the meekly vulnerable buds after she ate, and the eggs ushered in disaster.

Three days as eggs, ten as greedy larvae hollowing out square and boll, four more as pupae, and the new boll weevil generation bored its way out, mated, and sought out every undamaged boll to deposit more eggs. Not very many bolls were left for them, however, because the bollworm—thief of several aliases—had moved in, too, chewing its way in and out of boll after boll. Nor had these co-wreckers the fields to themselves; the dreaded pink bollworm broke from the confines where it had been fought desperately for 50 years and joined in to destroy the seeds themselves.

So went the vital cotton crop. So went the apples and pears and peaches; they had no chance from the start, because the numbers and deadliness of the insect enemies of fruit and berries were simply overwhelming—a bewildering battery of scales, aphids, mites, borers,



curculios, moths, maggots, hoppers, thrips, beetles, slugs, flies, chafers, worms, rollers, grubs and weevils.

A plant plague came too, that year, adding its weight to the growing burden. Weed and insect raced each other for strawberry patch, garden plot and field of grain. They both emerged as victors in the jungle-like snarl of the strawberry runners and thick stands of wheat and rye. Tough grasses—crab, foxtail and Johnson—grew sometimes as rapidly as corn, and whole

fields were abandoned to them. Thistles and wild oats could not be pulled successfully by hand in the grain and flax fields; it would have been far too costly, anyway.

Unneeded and unwanted insect reserves poured into the fray, and for man the outlook became bleak, indeed. For now came the turn of the grasshopper, most awesome plague of the plains and heartlands of America.

The hoppers never had been shy, and this year they rushed on, unchecked, in churning, boiling clouds that blotted the sun. Arizona, Colorado, Nebraska, Oklahoma, Kansas, Missouri. A hundred of them to the square yard. The remains of alfalfa, clover, soybeans and garden vegetables, already ravaged by their "own" caterpillars, seed midges, plant lice, mites, slugs and skip-pers, were pillage for the grasshoppers. In many places, the clicking swarms completely denuded the land of vegetation, and moved on.

On they went into the cornlands of the Midwest. But much of the corn was already doomed, doomed from the time the ant-aphid teams moved in to feed on its roots until the European borer wriggled and ate in the stalks and the earworms lay waste to the milky kernels.

The Eastern truck farmers had to give up, too. Tomatoes, sweet peppers, beans, sweet corn, cucumbers, melons — deformed, wormy, rotting on the vine. Half



their tomato crop disappeared in the wilting yellow and brown leaves of blight alone, and the worm-makers sought every break in the skin of the fruit that lived.

Beetle and worm fed on top and tuber of the potato, from Idaho to Maine. Then the really notorious villain, Ireland's awful late blight, took over, and the firm brown "spuds" were gone, turned into black slime.

Enough? No; it should be remembered well, this terrible year of the insect and rodent and weed. How the termites felled innumerable buildings, destroyed a state's valuable papers, wiped out a library, brought a service station tumbling down. How the great forests wilted; how tent caterpillars stripped every leaf from 800 acres of trees in one place, and masses of beetles beneath the bark killed off 6,000 pine trees in another.

The mosquitoes were everywhere, and no one knows what harm they did—60,000 cases of "breakbone fever" in Galveston and Houston alone. Half a million cases in Texas. How many others across the country? How many epidemics, and what kind, did they cause? Yellow fever hung like a spectre over that enormous "receptive area" of the southern U. S., and public health officials dreaded the day when some infected person might arrive at a dock or airport in that region. Only the mos-



quito, transmitter of a dozen human diseases, could launch an epidemic of deadly yellow fever.

And the ticks leaped onto people. While the sharp and grasping pincers held fast, the razor-like curting tools sliced deeper and deeper into the flesh. The ticks gorged that year, until they were many times their normal size, and many left disease and death behind. Rocky Mountain spotted fever, Colorado tick fever, "Q" fever, relapsing fever, tularemia. Some of them just as painful as malaria, and some more lethal. How many thousand cases were there? And the tick paralysis that also killed, if the animal weren't torn from its hold on scalp or neck or spine.

There was more that year, far too much to tell. The invading fire ants, for instance, which someone once pictured as minor pests at worst and not worthy of full-scale extermination. They sent 300 people to the hospital in just one community, and all but killed three of them. They killed fish that ate them. They marched on.

The fine lake trout was turned back to the rasping, blood-sucking lamprey that once had riddled its numbers nearly to extinction, and the species began to die off again. Weeds clogged streams and lakes again, and harmful plants reclaimed the duck marshes and feeding grounds that had been so carefully managed.

Finally, of course, there was the chilling news that spread as a wracked nation surveyed the damage: there could be no falling back on much of the surplus food in storage. Practically no farm commodity could be stored in its natural form and not be vulnerable to contamination by other dozens of kinds of insects and their numerous aides. Rats and mice multiplied prodigiously. Freed from pesticidal opposition, they, too, burgeoned in elevator, bin and crate. And what was left was hardly food.

What, at the end of such a year, would be the fate of the United States of America?

The Desolate Year

The terrible thing about the "desolate year" is this: Its events are not built of fantasy. They are true.

All of them, fortunately, did not take place in a single year, because so far man has been able to prevent such a thing. But all the major

events of the "desolate year" have actually occurred. They have occurred in the United States. They could repeat themselves next year in greatly magnified form simply by removing this country's chemical weapons against pests.

ITEM: In April, 1929, the Mediterranean fruit fly was discovered in Florida grapefruit. It spread over 10,000,000 acres of citrus and threatened to wipe out the entire industry. Lacking modern technology, 6,000 persons carried out a \$7 million eradication program, a large part of it the destruction of infested trees and fruit. When the fly appeared again in 1956, it was eradicated by 800 men utilizing chemical attractants in plastic traps and large-scale spraying and baiting with modern insecticides. Another appearance in June, 1962, was stamped out by the end of July. At present, the U. S. is the world's only source of worm-free citrus fruit.

ITEM: Field tests and careful studies indicate that no commercial crops of apples, peaches, cherries, sweet corn, grapes, strawberries, cranberries, raspberries, potatoes, tomatoes, carrots, kale, mustard, collards, spinach and other food plants could be grown in this country without chemical insecticides and/or herbicides.

ITEM: One hundred cattle grubs are often found in the back of an untreated animal, reducing milk flow by as much as 25 per cent, drastically damaging the hide for leather and ruining several pounds of meat. Three-fourths of the nation's cattle may be infested with them, even with treatment available, and the annual loss due to the grub is probably over \$100,000,000. Screwworms attacked more than 1,350,000 animals in the Gulf states in 1934, killing more than 200,000.

ITEM: The boll weevil has done an incredible amount of damage to cotton in the U. S., once leaving entire counties destitute. Given one female weevil at the start of a season, she and her offspring will produce 2,000,000 weevils by fall under ideal conditions! Even with the best defenses available, they destroy 3-5,000,000 bales of cotton yearly, and since invading this country have cost Americans at least \$5 billion. Each year, despite controls, they still cost each of us \$10 or more.

ITEM: In July, 1952, a returned Korean war veteran with malaria suffered a relapse while camping near a Camp Fire Girl retreat in the California mountains. Mosquitoes which bit him during the relapse transmitted malaria to nine other persons, who suffered attacks that fall; the next spring, 25 more people came down with the disease in various parts of the state. All cases were traceable to the original patient. As late as 1935, there were 900,000 cases of malaria in the U. S., with 4,000 deaths. Modern insecticides, particularly DDT, have played a key role in practically stamping out the disease in this country—and in 23 others.

ITEM: In 1874-76, grasshoppers swept across the western states, particularly Kansas, Colorado, Nebraska and Missouri, in an invasion that caused over \$200,000,000 damage and was termed a national disaster by Congress. Many other serious outbreaks have occurred in the years since, with damages running into untold millions of dollars. An infested acre sometimes is alive with 16 bushels—2 million—grasshoppers, and they are known to strip more than 99 per cent of all vegetation from some areas. A Utah county paid bounties for over 2 billion dead grasshoppers in a single year.

ITEM: Before chemical pesticide controls of any kind, nearly a century ago, the ravages of chinch bugs, grasshoppers, armyworms, potato beetles and other hosts of insects literally forced many farmers to sell out or abandon their land in the Midwest. It was there, in 1867, that Paris Green was used in the first large-scale application of an insecticide; man's effective defenses against insects date from that time.

ITEM: The European corn borer alone attacks at least 200 kinds of plants, and has literally destroyed many crops. Thousands of acres of sugarbeets have been abandoned to webworms. Blight has destroyed half the tomato crop in the East (1946), and cracked or torn fruit, even in transit from field to processing plant, has been infested by several hundred eggs and larvae per tomato by the drosophila fly.

ITEM: Successful production of potatoes has depended on chemical pesticides since 1870. Spreading across the U. S. at the rate of 85 miles per year, the Colorado potato beetle decimated the crop until Paris Green checked it. Without pesticides, the potato crop also is subject to the same late blight that caused the notorious famine of 1845 in Ireland. Ironically, Europeans have been reduced to eating insects only once—in Ireland, during that famine.

ITEM: Termites alone destroy more wood annually than all the howling forest fires, and in combination with other insects cause from seven to 10 times the damage of the destructive flames. Among their depredations, they have destroyed a collection of books and papers of Illinois, ruined a school library in South Carolina during the summer recess, gutted a government vault and brought a California service station crashing down, triggered by a truck's noise.

ITEM: Just two cases in the annals of forest protection describe an 800-acre block of quaking aspen completely denuded by tent caterpillars (and restored to health by aerial spraying) and of 6,722 lodgepole pines in one forest section laid low by the bark beetle.

ITEM: Tick-borne diseases have been reduced and their fatality rate lowered in the U. S. by inoculation, antibiotic drugs, insecticides (against ticks) and rodenticides (against rats and other rodent reservoirs). Yet cases—and deaths—still occur. At least five men work-

For Better Years

ing at eradicating spotted-fever ticks and host animals in the West have themselves been stricken with the disease and died. The fever has spread across the country, and the dog tick has become a vector. Typhus, with a mortality rate as high as 70 per cent and for which no successful treatment is known, has been controlled in the U. S. largely by insecticide eradication of body lice. At least 25 kinds of fleas living on rats and wild rodents can transmit bubonic plague—the "black death"—and large areas of the U. S. are endemic (rodents and fleas there are infested).

ITEM: Mosquito-borne St. Louis encephalitis, which appeared as an epidemic in that city in 1933 with more than 1,000 cases, struck Hidalgo County, Texas, in 1954. Of 600 patients, at least two died. Physical eradication of the mosquitoes was found impossible, and a continuing insecticide control program was put into effect. An outbreak of the disease in Florida in the summer of 1962 caused several deaths. Equine encephalomyelitis, also mosquito-borne and highly fatal to horses (400,000 of them suffered from it in 1935-39 in America, and 33,000 were killed by it in 1937 in Kansas alone), has become a human disease and in the great outbreak of 1941 it struck 3,000 persons in three upper midwestern states and Canada. In 1922, mosquitoes launched an epidemic of less serious dengue fever which ultimately affected as many as 600,000 Texans alone. The entire southern third of the U. S. has been designated a "receptive area" for yellow fever by the U. S. Public Health Service because of the abundance of mosquitoes capable of transmitting the disease.

ITEM: The imported fire ant, still relentlessly marching northward through the Gulf Coast states, invaded Fort Benning, Ga., in 1956, and eventually 300 persons were treated for stings. Three cases could have been fatal without prompt attention—a girl and two middle-aged officers, all of whom suffered violent reactions to the ants' poison. Fifty tons of insecticide finally rid the post of the ants.

ITEM: Sea lampreys, which attach themselves to, and feed on, valuable fish, are being brought under control after threatening to eliminate the lake trout from the Great Lakes. A special chemical pesticide has proved the only effective means of killing the lamprey. Wildlife and conservation groups have made wide use of chemical pesticides to improve the habitat of fish and game; an example is widespread utilization of herbicides to free marshes and waterways of undesirable vegetation.

ITEM: Insects take a \$500,000,000 annual toll of food and fiber in storage and transit, even with controls used now. Rats ruin up to \$2 billion worth of food each year, are carriers of at least six diseases, and have attacked—and killed—many humans.

- Pesticides are essential to maintain and improve our food supplies and our public health; they must be thoroughly pre-tested for safety before use, and they must be carefully and wisely used.—Conclusions, in general terms, of all major investigations of the merits of pesticides, including those conducted by both houses of Congress.
- "If all the food of the world — including surplus stores — were distributed equally and each human received identical quantities, we would all be malnourished. If the entire world were fed on the United States level, all available food would be only enough to feed less than half the human race."—Dr. Georg Borgstrom, Michigan State University Department of Food Science.
- "It seems evident that the American people cannot be fed adequately unless crops and livestock are protected from insects and other pests."—Pesticides Subcommittee, National Academy of Sciences.
- "There is no confirmed record of clinical effect from eating food treated with pesticides according to approved agricultural practice."—Journal of the American Medical Association, July 28, 1962.
- "It is estimated that malaria alone is the direct or indirect cause of over one-half of the entire mortality of the human race."—Public Welfare Subcommittee, U. S. Senate.
- "To my knowledge not one death (excluding accidental deaths) or serious illness has been caused among the people exposed to the insecticide (DDT) in connection with the control of insects. . . . I estimate that no less than 5,000,000 lives have been saved; no less than 100,000,000 illnesses have been prevented, through the use of DDT for controlling malaria, typhus, dysentery and many other diseases."—E. F. Knipling, Agricultural Research Service, U. S. Dept. of Agriculture.
- "During years of investigation, it has been impossible to confirm the allegation that insecticides, when properly used, are the cause of any disease either of man or animals."—Dr. Wayland J. Hayes Jr., Public Health Service, U. S. Dept. of Health, Education and Welfare.
- "Furthermore, evidence of spraying programs throughout the country demonstrates that the fish, bird, and bee loss has been inconsequential."—Ruling by Federal Judge D. J. Bruchhausen.
- "Industry, government and non-profit institutions have labored to create these chemical tools, and to research, develop, test, and establish safety standards for them. Nevertheless, like other tools of our civilization, they are susceptible to misuse and abuse which can result in destruction to crops, harm to humans, and pollution of our environment. But instances of such misuse and abuse must not be allowed to obscure the fact that these tools are vital to the health and even the survival of humanity."—Manufacturing Chemists' Association, Inc.