

# PESTICIDES IN PARADISE

## HAWAI'I'S HEALTH & ENVIRONMENT AT RISK



HAWAI'I  
CENTER FOR  
FOOD SAFETY

**FREQUENTLY ASKED QUESTIONS**

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THE ANSWERS TO THE FREQUENTLY ASKED QUESTIONS ARE BASED PRIMARILY ON THE [FULL LENGTH VERSION OF PESTICIDES IN PARADISE](#), HAWAI'I CENTER FOR FOOD SAFETY'S GROUNDBREAKING REPORT ON THE HAZARDS OF AGRICHEMICAL USE BY HAWAI'I'S PESTICIDE-SEED INDUSTRY.

FOR FURTHER INFORMATION ON TOPICS DISCUSSED BELOW, SEE BOLDFACE SECTION REFERENCES (**E.G. 2.3**) TO THE FULL LENGTH VERSION OF PESTICIDES IN PARADISE AND HYPERLINKS TO OTHER SOURCES OF INFORMATION.

THE TERMS "GENETICALLY MODIFIED ORGANISM" (GMO) AND "GENETICALLY ENGINEERED" (GE) ARE USED INTERCHANGEABLY THROUGHOUT THE FAQs.

## GMOs AND PESTICIDES

### 1. WHY SHOULD PEOPLE TRUST THESE FAQs AND THE REPORT PESTICIDE IN PARADISE?

- ❖ *Pesticides in Paradise* is thoroughly documented, with over 270 references. It provides a unique synthesis of Hawai'i-specific information, such as pesticide use data and scores of scientific studies, including a landmark review of the medical literature by the American Academy of Pediatrics called "[Pesticide Exposure in Children](#)." This review distills the results of 195 medical studies that explore the linkages between pesticide exposure and childhood cancers, neurobehavioral deficits, birth defects, and asthma.

### 2. WHY DOES PESTICIDES IN PARADISE SOMETIMES REFER TO "HERBICIDES" AS "PESTICIDES"?

- ❖ Some people think that pesticides are only bug-killers or "insecticides," but that is not correct. As explained by the EPA, [pesticides also include herbicides used to kill weeds and fungicides for plant disease](#). Like other types of pesticide, many herbicides are hazardous.

### 3. IS HAWAI'I A MAJOR CENTER OF GENETICALLY ENGINEERED (GE) CROP EXPERIMENTATION? WHO GROWS THESE CROPS?

- ❖ Despite its small size, Hawai'i has had more open-air field releases of GE crops than any other state in the country **(3.1)**. Most of these field tests involve GE corn or soybeans, and 97% are conducted by five multinational pesticide companies (Monsanto, DuPont-Pioneer, Dow, Syngenta, and BASF). Barely more than 1% are conducted by public sector institutions **(3.2, 3.4)**.

### 4. WHAT IS THE DIFFERENCE BETWEEN GE SEED CORN GROWN IN HAWAI'I AND GE FIELD CORN GROWN ON THE MAINLAND?

- ❖ Hawai'i's agriculture is dominated by GE seed corn, which accounts for 95% of the value of the state's seed crop industry. Seed corn is grown for experimental purposes or for farmers' planting stock, but is not consumed directly as food or feed **(3.2)**. The mainland grows primarily GE field corn, which is used to feed livestock, make ethanol, or for corn-based foods like high-fructose corn syrup.

### 5. ARE PESTICIDES USED INTENSIVELY ON THE GE SEED CROPS GROWN IN HAWAI'I?

- ❖ Yes. According to Dr. James Brewbaker, University of Hawai'i's famous corn breeder: "Hawai'i's corn seed industry ... is compelled to use pesticides heavily" because the corn varieties they grow lack natural resistance to Hawai'i's pests and diseases. Dr. Brewbaker says that "insecticide and fungicide treatments are applied on a 5-7 day regime" – that is, every 5-7 days. In contrast, [most mainland field corn is not sprayed with any insecticide](#)

[or fungicide, although the great majority of corn seed is treated with insecticides and fungicides \(4.1 to 4.4\)](#). Herbicides are used intensively on both Hawai'i and mainland corn, but it is worse in Hawai'i because the pesticide companies are testing new GE corn and soybean varieties designed to withstand heavy applications of 2,4-D, dicamba, and many other toxic herbicides. In fact, 82% of the Hawai'i GE crop field releases in 2013 and 2014 involved herbicide-resistance **(3.4)**.

## 6. PLANTATION-ERA PESTICIDES MAY HAVE BEEN HAZARDOUS, BUT AREN'T THOSE USED TODAY SAFE?

- ❖ Thanks to citizen activism, some hazardous plantation-era pesticides have been banned, but only after enormous human suffering. For instance, a [Dow Chemical nematicide used on pineapples](#) in Hawai'i and bananas elsewhere caused [sterility or impaired fertility in tens of thousands of farmworkers worldwide](#). Hawai'i's seed corn operations are run by the very firms that produced many of the plantation-era pesticides and long assured the public of their safety. While the crops and chemical names may have changed, the people of Hawai'i continue to be threatened by pesticides such as chlorpyrifos, atrazine, and paraquat **(5.1)**. These and other pesticides currently used in Hawai'i cause acute health problems such as nausea, dizziness, vomiting, headaches, abdominal pain, muscle aches, and skin or eye irritation. Many can also have longer-term impacts, like cancer, developmental disorders, adverse birth outcomes, asthma, and other ailments **(6.1 to 6.6, Table 9 for a summary of findings)**.

## 7. LOTS OF PESTICIDES ARE USED IN CALIFORNIA, TOO, SO WHY SHOULD WE BE CONCERNED?

- ❖ The fact that pesticides are also used heavily in California does not mean Hawai'i's citizens are safe. Californians – including schoolchildren – are also heavily impacted by pesticide drift. The main difference between the two states is that [14 California counties have responded by establishing no-spray buffer zones around schools](#) to protect their children. When Kaua'i's citizens enacted a similar measure (Ordinance 960), the pesticide industry sued the county to have it overturned **(4.5)**. Don't Hawai'i's kids deserve as much protection as California's?

## 8. WHY ARE YOU SO CONCERNED ABOUT THE EFFECTS OF PESTICIDES ON CHILDREN?

- ❖ We know kids have been sickened by pesticide drift in Hawai'i, and that pesticides are regularly used near schools **(5.2, Appendix II)**. Milton Clark, a former EPA official who carefully examined the Waimea Canyon Middle School poisoning episodes, concluded that “they were far more likely related to pesticide exposures than exposure to stinkweed organics...” [\(see p. 81\)](#). Scientists tell us that kids are more vulnerable to harm from pesticides than adults. Toddlers are more exposed to pesticide residues in the dirt and dust (e.g. tracked in from outdoors, residing in carpets) because of greater hand-to-mouth activity. Studies show that fetuses exposed to extremely low levels of certain pesticides (via their pregnant mothers) go on to suffer neurological deficits like reduced IQ in later life **(6.2, Table 10)**.

## 9. ARE ADULTS AT RISK AS WELL?

- ❖ Pesticides in the air, water, and the food we eat can harm anyone. Farmers and farmworkers regularly exposed to certain pesticides have a higher risk of certain cancers, such as non-Hodgins's lymphoma; Parkinson's disease; reproductive problems such as low sperm counts; and depression, among other conditions **(6.1)**. In January of 2016, [10 Syngenta field workers were hospitalized after exposure to chlorpyrifos, an insecticide that EPA has finally proposed to ban](#) because of its extreme toxicity (see below). Syngenta chose not to report the workers' symptoms.

## 10. WHAT ARE THE EFFECTS OF PESTICIDE POISONING?

- ❖ It depends on the pesticide and how you come into contact with it. Exposure to pesticide drift often causes headaches, nausea, dizziness, vomiting, difficulty breathing, chest pain, fatigue, rashes, and/or eye ailments **(5.2)**. Studies suggest that one-time pesticide poisoning episodes can in some cases cause permanent neurological harm, such as depression **(6.4)**. Long-term, low-level exposure has been associated with increased incidence of various cancers, Parkinson's disease, neurological impairment, depression, and reproductive harm (lower sperm counts) **(6.1, Table 9)**. Because pesticide testing focuses on single active ingredients, very little is known about the human health or environmental effects of exposure to pesticide formulations or multiple pesticides. Studies that have been conducted often show additive or synergistic impacts **(7.3)**.

## 11. WHAT IS A "RESTRICTED USE PESTICIDE," AND WHY DOES PESTICIDES IN PARADISE FOCUS ON THEM?

- ❖ The Environmental Protection Agency (EPA) classifies some particularly hazardous agrochemicals as restricted use pesticides, or RUPs **(4.3, 4.4)**. RUPs cannot be sold in stores to homeowners; they can only be applied by licensed applicators. We focus on RUPs because they are especially hazardous, heavily used in Hawai'i, and because these are the only pesticides the individual usage of which is reported by the pesticide industry ([Kaua'i only](#), though).

## 12. ARE OTHER PESTICIDES ALSO HAZARDOUS?

- ❖ Yes, many general use pesticides are also hazardous. For instance, in 2015 the World Health Organization declared [glyphosate, the active ingredient in Roundup, to be "probably carcinogenic to humans."](#) 2,4-D, dicamba, and many other general use pesticides are also linked to increased risk of cancer and other adverse health effects **(6.1, Table 9)**.

## 13. ARE GENERAL USE PESTICIDES HEAVILY USED IN HAWAI'I?

- ❖ Very likely, but the industry chooses not to release information on which or how much general use pesticides they apply. And because the State of Hawai'i does not require this information, residents are in the dark. (But see next question).

#### 14. DOES DUPONT-PIONEER REALLY APPLY OVER 90 DIFFERENT PESTICIDE FORMULATIONS ON KAUAI?

- ❖ The only information on overall pesticide use on the Islands came to light in the course of a lawsuit by residents of Waimai, Kaua'i against Pioneer, a subsidiary of chemical giant DuPont. Records released by DuPont-Pioneer show that from 2007 to 2012, the company used over 90 pesticide formulations containing roughly 60 active ingredients. Pesticides were sprayed on 65% of the days over this period; and an average of 8.3 to 16 applications were made per applications day in various years of this period **(4.3)**. [See chemicals here.](#)

#### 15. BUT DON'T HAWAI'I'S FARMERS USE AS MUCH PESTICIDE AS THE SEED COMPANIES?

- ❖ Not even close. In 2013, Hawai'i's small farmers accounted for only 0.2% of the state's agricultural RUP sales (721 lbs.), while large users accounted for 99.8%, or 422,479 lbs. **(4.6, Table 8)**. The pesticide companies are major users of RUPs, along with sugarcane, pineapple, and coffee plantations. Data on overall pesticide use is not available.

#### 16. DOESN'T AGRICULTURE ACCOUNT FOR JUST A SMALL FRACTION OF RESTRICTED USE PESTICIDE (RUP) USAGE?

- ❖ This is one of the pesticide industry's most shameless tricks, designed to confuse the public. It turns out that the technical definition of "restricted use pesticide" (RUP) includes two substances – chlorine gas used to disinfect water, and termite insecticide used to fumigate homes – that have nothing to do with farming, but which together make about three-fourths of total RUP usage. But there's good reason to be far more concerned with the one-fourth of RUPs that are deployed in agriculture. Open-air spraying of agricultural pesticides is inherently uncontrollable, as evidenced by all-too-frequent drift poisoning episodes and contamination of soil and water. By lumping hazardous agricultural RUPs together with contained and controlled non-agricultural RUPs, the pesticide industry gives the misleading impression that it makes only a small contribution to hazardous chemical use on Hawai'i. Don't listen to the industry spindoctors – pesticide companies spray huge quantities of pesticides.

#### 17. I'VE HEARD PEOPLE SAY THAT ROUNDUP (GLYPHOSATE) IS NO MORE TOXIC THAN TABLE SALT. IS THAT TRUE?

- ❖ No. This is another deceptive industry talking point. It is based on a narrow measure of toxicity called "lethal dose 50" (LD50), which is the amount of a substance – consumed in a single dose – that kills 50% of a group of test animals. [Glyphosate and table salt have similarly high LD50 values](#), meaning that it takes an awful lot of either to kill an animal outright. But does this mean they're safe in the real world, where people don't drink from jugs of Roundup or pour salt down their throats? Of course not. There are many supposedly "safe" chemicals (as measured by LD50) that can be quite harmful when people are exposed to low levels over a long period of time. For instance, the World Health Organization's determination that glyphosate is "probably carcinogenic to humans" was based in part on evidence of higher cancer rates in farmers exposed to it over years. Or

take table salt. [Years of consuming too much salt raises your blood pressure](#), which increases your risk of strokes and heart failure. Another example is [chlorpyrifos, which has an LD50 value very close to that of caffeine](#). Despite this, chlorpyrifos is so neurotoxic at such low exposure levels that EPA has proposed banning it, while caffeine is comparatively safe (see Pesticide Regulation, No. 2 below).

#### 18. I HAVE FRIENDS AND FAMILY WHO HAVE USED PESTICIDES FOR MANY YEARS, AND THEY ARE HEALTHY, SO HOW CAN YOU SAY PESTICIDES ARE DANGEROUS?

- ❖ Think about smoking. We all know someone who smokes, but doesn't have cancer (at least, not yet). But there's absolutely no doubt that smoking increases your risk of getting lung cancer. It's similar with pesticides. Scientific studies show increased risk of certain cancers and other adverse health effects in those exposed to particular pesticides. Whether it's smoking or pesticides, it depends on your genetic makeup, how and when and to how much you've been exposed, and many other factors. We can all hope we will be the lucky ones, but isn't it far better to avoid/reduce the risk by banning/scaling back the use of hazardous pesticides? This is known scientifically as the "[healthy survivors fallacy](#)" – we form a false impression of safety by excessive attention to survivors and neglect of those who have become ill or died.

#### 19. GE CROPS ARE SPRAYED HEAVILY WITH PESTICIDES, BUT ISN'T THAT JUST A PART OF INTEGRATED PEST MANAGEMENT THAT IS RECOMMENDED BY UN'S FOOD AND AGRICULTURE ORGANIZATION (FAO)?

- ❖ No. [FAO defines Integrated Pest Management \(IPM\)](#) as "an ecosystem approach to crop production and protection that combines different management strategies to grow healthy crops and minimize the use of pesticides" (our emphasis). For instance, crop rotation (growing different crops over time on a given field) cuts pesticide use by reducing pest and pathogen populations, but Hawai'i's pesticide companies grow primarily one crop, corn, year after year. So it's no surprise they use pesticides so heavily. Cover crops (plants grown after the main cash crop is harvested) provide "cover" to what would otherwise be bare soil, to prevent soil erosion; they also provide weed suppression benefits and so facilitate reduced herbicide use. Hawai'i's pesticide companies don't grow cover crops. Instead they test out crops genetically engineered to dramatically increase herbicide use (**3.4, Table 5, Figure 13**). In short, Hawai'i's pesticide companies rely so heavily on pesticides because they ignore IPM.

#### 20. AREN'T OTHER CHEMICALS JUST AS DANGEROUS AS PESTICIDES?

- ❖ True, there are many hazardous industrial chemicals in our environment, but that's all the more reason to reduce/eliminate dangerous pesticides. [Hawai'i's pesticide firms have a long history of producing hazardous chemicals and lying about their toxicity](#). Monsanto and Dow manufactured Agent Orange and DDT. [Monsanto poisoned the town of Anniston, Alabama with highly toxic PCBs](#). [DuPont massively contaminated West Virginia with highly toxic compounds used to make Teflon](#). But does the existence of other hazardous chemicals somehow make toxic pesticides okay? Of course not. We should reduce/eliminate all hazardous chemicals.

## PESTICIDE REGULATION

### 1. IF THESE PESTICIDES ARE SO BAD, WHY WOULD THE EPA ALLOW THEM?

- ❖ EPA pesticide regulation is deficient in several respects **(8.1)**. The Agency only evaluates the “active ingredient,” not the full pesticide formulation that contains other, often undisclosed, chemicals that can also be harmful. EPA rarely considers the dangerous impacts of exposure to multiple pesticides, which can have additive or synergistic effects **(7.3)**. The limited avenues for public participation in EPA’s registration process mean that EPA relies heavily on unpublished studies conducted or commissioned by the registrants (pesticide companies), and regularly ignores independent medical science (e.g. epidemiology), which is much more likely to demonstrate harm. Finally, [EPA is under intense pressure from pesticide companies](#) to approve their toxic products.

### 2. DO YOU HAVE AN EXAMPLE OF POOR PESTICIDE REGULATION BY EPA?

- ❖ Chlorpyrifos is an organophosphate insecticide associated with lower IQ, delayed development, impaired memory, and increased incidence of attention deficit hyperactivity disorder (ADHD) in children who were exposed in the womb, via their pregnant mothers **(6.2.2)**. EPA banned residential uses of chlorpyrifos in 2000, but allowed agricultural use to continue. [EPA recently proposed a ban on chlorpyrifos](#), but it continues to be the most intensively sprayed insecticide in the country and the most heavily used restricted use insecticide on Kaua’i. [Chlorpyrifos sickened 10 Syngenta workers in January 2016](#). Even if EPA does eventually ban chlorpyrifos (Dow, its manufacturer, is opposing the move), the Agency’s long delay has been extremely costly. Dr. David Bellinger, a Harvard University neurologist, estimates that [Americans lose, collectively, 16.9 million IQ points due to fetal and early childhood exposure to organophosphates](#).

### 3. PESTICIDES ARE ALREADY HIGHLY REGULATED, WHY DO WE NEED MORE REGULATION?

- ❖ Most pesticides are not highly regulated. For instance, anyone can buy the probable human carcinogen glyphosate (e.g. Roundup) in lawn and garden stores. Those pesticides that are subject to stricter regulations often still cause harm, because the regulations are inadequate or not followed. For instance, pesticides are frequently sprayed when wind speeds are too high, causing hazardous drift **(8.1)**. In general, pesticides toxic enough to require extensive regulation should probably be prohibited altogether. As noted above, there is very little testing for or regulation of the adverse impacts of exposure to multiple pesticides.



#### 4. DO BUFFER ZONES ACTUALLY PROTECT CHILDREN AND THE PUBLIC FROM PESTICIDE DRIFT?

- ❖ Because drift tails off sharply with increasing distance from the application site, adequately sized buffer zones can greatly reduce, though not eliminate, exposure to pesticide spray drift. That’s why fifteen government public health scientists recommended “adoption of pesticide spray buffer zones around schools” in an [article](#) investigating the problem in the prestigious Journal of the American Medical Association **(8.1.1)**. However, vapor drift (when a pesticide volatilizes from plant surfaces after spraying) can travel for miles, so buffers zones are no substitute for banning particularly hazardous, drift-prone pesticides like chlorpyrifos.

#### 5. HAVE OTHER STATES OR COUNTIES ADOPTED BUFFER ZONES?

- ❖ As of 2014, nine states (up from seven in 2004) had established buffer zones around schools, hospitals, nursing homes, public parks and/or playgrounds. Responding to rampant pesticide drift in their state, 14 California counties had established similar buffer zones as of 2010. While some of these buffer zones do not involve prohibition of all pesticides, and are deficient in other respects, their enactment nevertheless signals growing awareness of the serious health threats posed by pesticide drift **(8.4, 8.5)**. Find more information [here](#) and [here](#).

#### 6. HAS THE EPA OR HAWAI’I STATE GOVERNMENT DONE ANYTHING ABOUT PESTICIDE DRIFT?

- ❖ EPA has done very little. The Agency proposed changes in pesticide labeling intended to reduce drift in 2001, but they were never finalized. In response to this federal inaction, farmworker and public interest groups petitioned the EPA to protect kids from pesticide drift in 2009. To our knowledge, the State of Hawai’i has done nothing to protect citizens from pesticide drift. As noted above, people are no longer waiting for EPA. They’re taking action at the state and local level to protect themselves and their children **(8.3 to 8.5)**.

#### 7. WILL INCREASED REGULATION OF RESTRICTED-USE PESTICIDES AFFECT LOCAL FARMERS GROWING OUR FOOD?

- ❖ In 2013, large users of agricultural RUPs accounted for 99.8% of total RUP sales in Hawai’i. This category includes pesticide-seed companies and plantation growers of sugarcane, pineapple, and coffee. Small farmers who grow food for local consumption use little if any RUPs **(4.6, Table 8)**.

## GMO INDUSTRY, FOOD & JOB SECURITY

### 1. WHAT ARE GE CROPS GROWN FOR?

- ❖ Hawai'i's pesticide firms test out experimental GE crops under rubber-stamp permits issued by the US Dept. of Agriculture; these seeds cannot be sold to farmers, and cannot be used as food. The companies may also grow some approved GE crops (primarily corn) to produce seed for farmers, but such "seed increase" plantings occur primarily on the mainland (**Part 3, especially 3.2**).

### 2. DO PESTICIDE-SEED COMPANIES LEASE OR OWN THE LAND THEY USE TO TEST GE CROPS?

- ❖ Real property tax records indicate that five pesticide-seed companies control roughly 25,000 acres on Kaua'i, O'ahu, Moloka'i and Maui. Real estate records suggest that most of this land (20,800 acres) is leased to them by Hawai'i's large private landowners (such as Gay & Robinson, Grove Farm LLC and Bishop Estate) and the Hawai'i Department of Agriculture (**2.3.3, Tables 2 & 3**).

### 3. ISN'T THE PESTICIDE INDUSTRY AN IMPORTANT ECONOMIC DRIVER?

- ❖ Not really. The pesticide-seed companies love to tout the "value" of their seed crops, but they're mostly valuable to the companies themselves, not Hawai'i or its citizens. Based on state government economic statistics, we estimate that the pesticide-seed industry represents just 0.18% of Hawai'i's gross domestic product (**2.3.2, Figures 3 & 4, Appendix 1**). That's right, just two-tenths of 1 percent! University of Hawai'i studies show that agriculture directed to producing more food for local consumption would make a bigger economic contribution to the state (**see inset "Diversified Agriculture – An Opportunity Missed," p. 13**).

### 4. DOES THE PESTICIDE INDUSTRY MAKE HAWAI'I LESS FOOD SECURE?

- ❖ The pesticide-seed industry has grown dramatically to occupy much of Hawai'i's best land while the state's food security has plummeted. Consider the following facts. The seed industry controls roughly four times more land (23,720 acres) than is planted to vegetables and non-plantation fruits (6,000 acres). Since the early 1980s, harvested seed crop acreage has increased ten-fold, while the area planted to vegetables and non-plantation fruits has declined by 50%. Since 1990, the share of Hawai'i's fruit market supplied by Hawai'i producers has fallen sharply, from 57% to just 32%. Hawai'i has never been more food insecure, importing an estimated 88% of its food. The seed industry's expanding control of prime farmland, along with new owners without agriculture intentions, makes it ever more difficult for Hawai'i to stop and reverse its dramatically declining food security (**2.3.3, 2.3.4, Figures 5, 6 & 7**).

## 5. BUT ISN'T THE PESTICIDE-SEED INDUSTRY AT LEAST A BIG EMPLOYER?

- ❖ Not at all. In 2012, the pesticide-seed industry employed 1,400 workers, or 0.23% of Hawai'i's work force (612,800 jobs). Moreover, about 40% of these jobs are part-time, and so likely pay too little income to support a family. Studies by the University of Hawai'i show that even modest increases in "farming for food" (rather than inedible seeds) would generate thousands of more jobs, but the state has provided little or no support for aspiring farmers (**2.3.1, Figure 2, see inset "Diversified Agriculture – An Opportunity Missed"**).

## 6. HOW ARE YOU GOING TO REPLACE ALL THE JOBS?

- ❖ If anyone is taking away jobs from farmworkers, it's the pesticide companies, which cut farmworker employment in Hawai'i by 25% from 2008 to 2012 (**2.3.1**). This question is based on pesticide industry scare tactics. The companies threaten to leave Hawai'i in order to scare their workers into opposing buffer zones and disclosure requirements. But complying with these reasonable measures to protect schoolchildren and others will not put any company out of business, not even close. After all, these companies have GE seed fields in other states, like California, that have buffer zones and disclosure requirements. At worst, it would increase production costs a bit. But isn't the health and well-being of Hawai'i's keiki worth a small dent in the pesticide industry's profits?

## GMO CROP BASICS

### 1. HAVEN'T WE BEEN EATING GMOS FOR THOUSANDS OF YEARS?

- ❖ No, this is a pesticide industry “talking point” that intentionally confuses the millennia-long history of traditional breeding, which is based on natural sexual reproduction (e.g. cross-pollination), with the radical new technology of genetic engineering used to generate GMOs. Experimentation with GMOs began in the 1980s; the first commercial GMOs were grown in the mid-1990s.

### 2. WHAT IS THE DIFFERENCE BETWEEN HYBRIDIZATION AND GENETIC ENGINEERING?

- ❖ Genetic engineering involves breaking down species boundaries by adding DNA derived from bacteria, viruses, animals or other organisms to plants. Hybridization is the use of conventional breeding techniques to first create in-bred strains of a crop (such as corn), which are then crossed to generate a “hybrid” variety with desirable characteristics, such as higher yield. However, farmers cannot save and replant the seeds of either hybrids or GE crops. In the case of hybrids, the reason is biological (2nd generation seeds do not “breed true”); while with GE crops it is because seed company patents make seed-saving illegal. Some crops like corn are both GE and hybrid; others like soybeans are GE but not hybrid. One finds both hybrid and non-hybrid versions of other GE crops like cotton.

### 3. DO GE CROPS REDUCE PESTICIDE USE?

- ❖ No, they sharply increase it. The most comprehensive study to date finds that the major GE crops (corn, soybeans and cotton) have increased overall pesticide use by 404 million lbs. over the 16 years from their introduction in 1996 through 2011. The huge increase in weed-killer use with herbicide-resistant GE crops (527 million lbs.) is offset by a smaller decline in the quantity of chemical insecticides sprayed on GE insect-resistant corn and cotton (**see inset “Biotechnology = Pesticides + Patented Seeds,” p. 15; 3.4**). Pesticide companies play on the widespread misconception that pesticides are ONLY insect-killing (but not weed-killing) compounds to spread this myth. However, one must also consider that pesticide companies introduced neonicotinoid seed treatments over the same period as GMOs, and the study cited above does not account for the amount of these seed treatments, which are now found on nearly all corn and most soybeans, and have been implicated in bee die-offs (**7.2.5**).

#### 4. DON'T WE NEED HIGH-YIELDING GE CROPS TO FEED THE WORLD?

- ❖ GE crops are not engineered for higher yield, but rather to withstand herbicides and resist attack by certain insects. In fact, [some GE crops have lower yields](#). An authoritative, four-year assessment by the United Nations and World Bank ([International Assessment of Agricultural Knowledge, Science and Technology for Development](#)) concluded that GE crops are not the solution to reduce hunger and poverty in developing countries; instead, they recommend agroecological farming methods and reform of unfair global trade rules, among other measures.

#### 5. SOME CLAIM THAT GE CROPS WILL BENEFIT THE ENVIRONMENT BY ALLOWING MORE FOOD TO BE GROWN ON LESS LAND, THEREBY PRESERVING NATURAL HABITAT.

- ❖ This assumes that crops are genetically engineered for higher yield, which is not true (see response to last question). In fact, increasing herbicide use driven by GE crops degrades the environment. For instance, [massive spraying of glyphosate herbicide has been a major factor in the catastrophic decline in monarch butterfly populations](#) by nearly wiping out the monarch's host plant, milkweed, in Midwest farm fields. Because most GE corn and soybean production in the Americas goes to feed livestock and fuel automobiles in wealthy nations, the most effective way to spare the environment while increasing the food supply would be to end federal support for biofuels (corn-to-ethanol) and to eat less meat.

## MISUNDERSTANDINGS

### 1. WHAT IS CENTER FOR FOOD SAFETY'S STANCE ON GMOS?

- ❖ Center for Food Safety opposes harmful GMOs like herbicide-resistant crops. We support a moratorium on all GMOs until the federal government enacts:
  - 1) Scientifically sound, mandatory testing of GMOs for health and environmental impacts;
  - 2) Mandatory labeling of foods with GM ingredients; and
  - 3) Assumption of liability by the GMO patent-holder for harms suffered by traditional farmers from transgenic contamination of their crops.

### 2. AREN'T YOU JUST USING THE PESTICIDE ISSUE TO STOP GMOS?

- ❖ Pesticides in Paradise speaks for itself. It describes pesticide use in Hawai'i (especially Kaua'i), how it is related to the cultivation of GE seed crops, and the known and suspected adverse impacts it has. Nowhere do we advocate an end to GMOs on Hawai'i or elsewhere. Those who make these claims are simply trying to distract attention from the harms their pesticides are causing.

### 3. WHY DON'T YOU OBJECT TO PESTICIDE USE BY HOMEOWNERS?

- ❖ Our mission at Center for Food Safety is to promote safer and more sustainable farming and food production, so we focus on use of hazardous pesticides in agriculture. Besides, [over ten times more pesticide is applied in agriculture than by homeowners](#) nationally (we don't have corresponding figures for Hawai'i). And as a general rule, the restricted use pesticides used in agriculture tend to be more hazardous than the general use pesticides available to homeowners.

### 4. IF YOU ARE AGAINST PESTICIDES, THEN WHY DON'T YOU TARGET THE PESTICIDES USE IN TERMITE TREATMENT, OR THE COUNTY'S APPLICATION OF PESTICIDES ON ROAD, OR THE SPRAYING FOR DENGUE MOSQUITOES? ARE YOU GOING TO STOP THEM ALSO?

- ❖ Once again, pesticide industry propaganda is behind this question. We do not seek to end all pesticide use. We support disclosure requirements and modest no-spray buffer zones around schools and other institutions to protect children and others from pesticide poisoning. These measures would apply to other large users of agricultural RUPs as well as the pesticide companies. Yes, we would also like to see more safe, sustainable farming to meet Hawai'i's food needs. This would involve less pesticide use, and generate more jobs and revenue, than the current agricultural model based on seed crops (**Part 2**). We have no position on termite fumigation or spraying for mosquitoes (our focus is on food and agriculture).