



HAWAI'I  
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FOOD SAFETY

# PESTICIDES IN PARADISE

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

### [ EXECUTIVE SUMMARY ]

MAY 2015



**O**N O'AHU, KAUA'I, MAUI, AND MOLOKA'I, chemical and biotechnology companies Monsanto, Syngenta, DuPont-Pioneer, Dow Chemical, and BASF have purchased prime agricultural land, taking advantage of Hawai'i's isolation and year-round growing season, in order to field test crops that have been genetically engineered (GE) to withstand greater applications of pesticides.

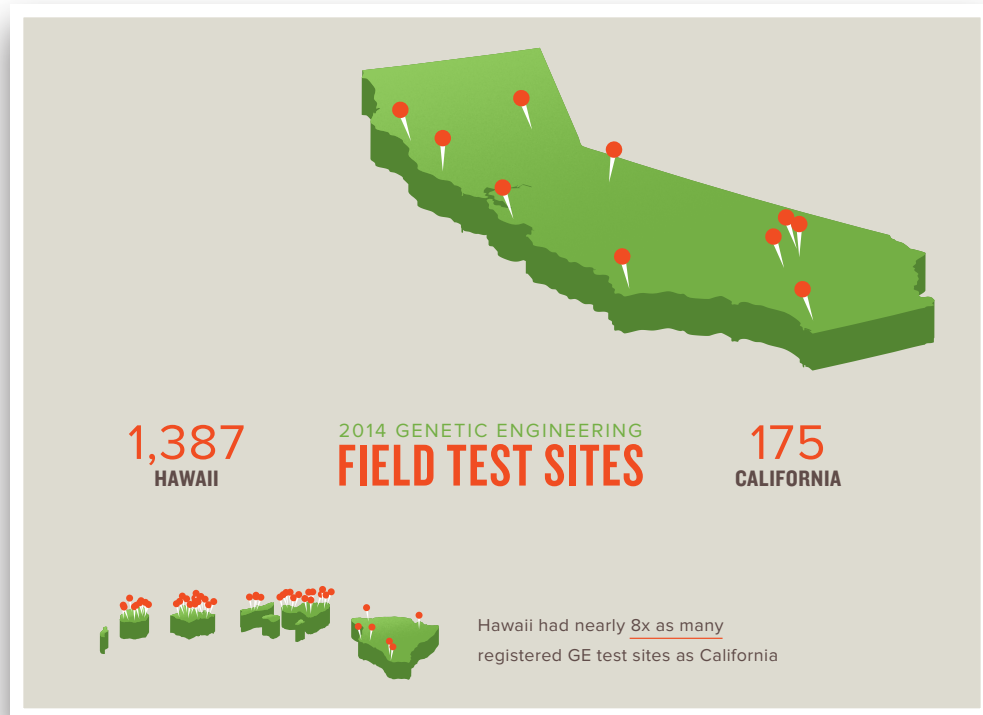
As this report details, the onslaught of pesticide-promoting GE crops on the Hawaiian Islands raises three main areas of concern:

- ❖ The impacts of pesticide exposure on public health;
- ❖ The threat to native biodiversity; and
- ❖ Food independence for the people of Hawai'i.

Due to Hawai'i's small size, it has a much higher density of field tests than other states. As a result, Hawai'i residents live in close proximity to field test sites, posing a direct threat to public health. Pesticide drift is the primary concern for communities living alongside these sites, as any pesticide can drift beyond the field where it is applied. Those exposed to pesticides via drift or other forms of contamination often suffer from immediate symptoms such as headaches, respiratory distress, nausea, vomiting, dizziness, eye irritation, and chest pain while *long-term exposure to toxic pesticides* may increase the risks of various serious diseases including cancer, autism, Parkinson's disease, and childhood leukemia.

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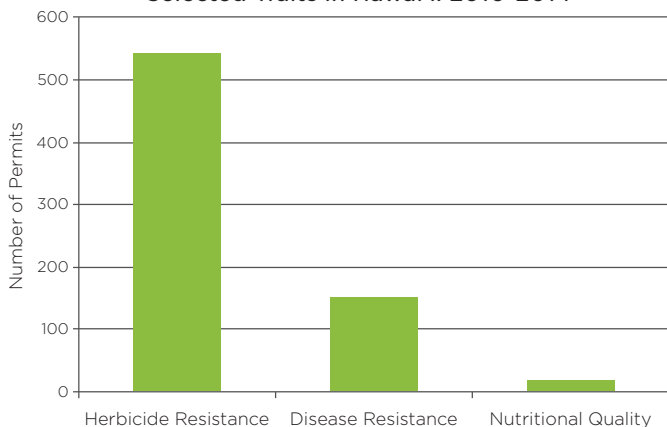
Hawai'i has hosted more cumulative GE field trials than any other U.S. state.



Our in-depth analysis of pesticide risks and impacts to the communities and environment of Hawai'i revealed the following findings:

### SEED INDUSTRY FOOTPRINT IN HAWAI'I

Figure 1: GE Crop Field Trial Permits for Selected Traits in Hawai'i: 2010-2014



Nutritional quality refers to permits for GE crop field trials involving the phenotype (trait) "nutritional quality improved." Disease resistance comprises three distinct trait categories: fungal resistance, virus resistance, and bacterial resistances.<sup>30</sup>

- ❖ Since 1987 Hawai'i has hosted more cumulative GE field trials (3,243) than any other state. In 2014 alone, 178 different GE field tests were conducted on over 1,381 sites in Hawai'i (vs. only 175 sites in California).<sup>1</sup>
- ❖ The seed industry's footprint (24,700 acres) is 72% of the total area planted to crops other than sugarcane or pineapple (34,400 acres).<sup>2,3</sup> The vast majority (91%) of the plants being tested are corn and soy—not niche crops such as papaya or banana.<sup>4</sup>
- ❖ The area planted to seed crops has grown ten-fold since 1982, while land growing vegetables and fruits (excluding pineapples) has declined more than 50% since the late

### WHAT IS A GENETICALLY ENGINEERED CROP (A.K.A. GMO)?

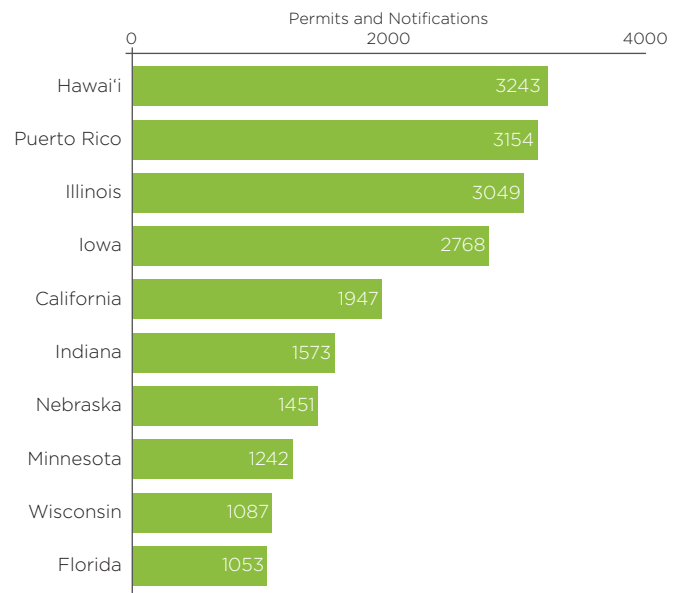


Genetic engineering involves the splicing of foreign genes, most derived from bacteria, into plants to generate new “traits.” The majority of GE crops grown commercially today have only one or both of two traits: herbicide-resistance<sup>6</sup> (HR) and/or insect resistance (IR). Insect-resistant GE crops generate up to seven insecticidal toxins in all their tissues. HR crops survive direct application of certain herbicides that would otherwise kill them, and lead to sharply increased herbicide use. HR traits are roughly twice as common as IR traits in the world’s GE crops.

1990s.<sup>5</sup> Herbicide-resistance was the most frequently tested trait in GE crop field tests in Hawai‘i over the past five years. This means that plants genetically engineered in Hawai‘i, by and large, are engineered to resist the greater and greater application of herbicides, endangering neighboring communities and land.<sup>7</sup>

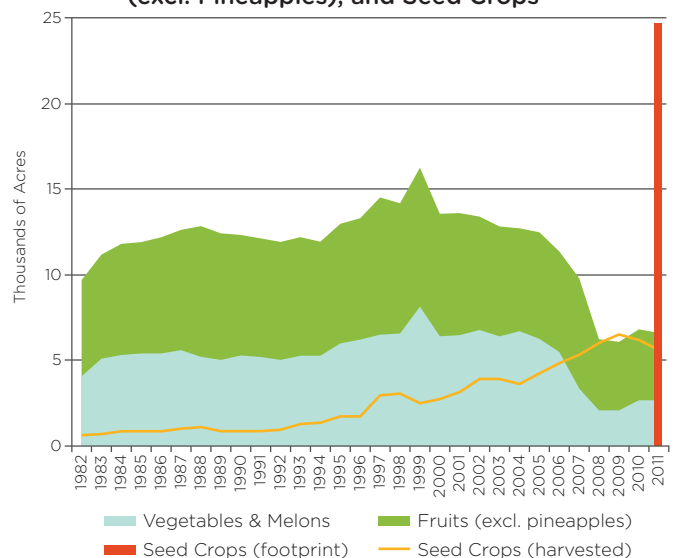
❖ Despite claims that the seed industry is a pillar of Hawai‘i’s economy—it only employed 1,397 workers in 2012, representing just 0.23% of total Hawai‘i jobs.<sup>8</sup>

**Figure 2: Top Ten Most Frequent Locations for Crop Release**



Cumulative number of GE crop field releases in leading states, from 1987 to present. Each release often involves tests on several different sites.<sup>11</sup>

**Figure 3: Area Planted to Vegetables, Fruits (excl. Pineapples), and Seed Crops**



Area planted to seed crops has been steadily increasing while area planted to vegetables and fruits (excl. pineapples) have declined by 50% since the late 1990s.<sup>12</sup>

**Figure 4: DuPont-Pioneer Pesticide Use on Kaua'i: 2007-2012**

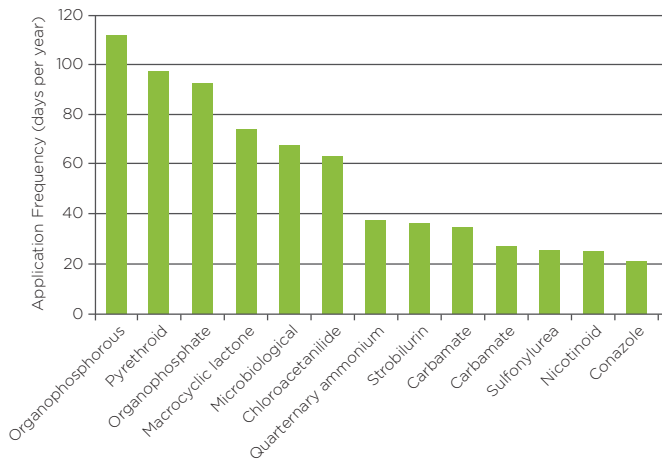
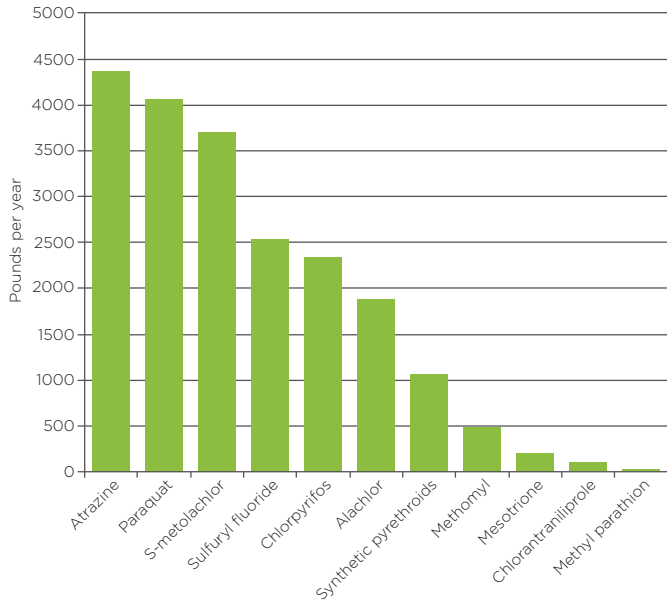


Chart based on data released by DuPont-Pioneer regarding its pesticide use practices on its seed corn and GE crop test fields near the town of Waimea, Kaua'i.<sup>17</sup>

**Figure 5: Average Annual Sales of Restricted Use Pesticides on Kaua'i: 2010-2012 (lbs. a.i.)**



RUPs converted to pounds active ingredient based on EPA-approved labels for the respective pesticides. "Synthetic pyrethroids" are restricted use insecticides that include permethrin, tefluthrin, esfenvalerate, lambda-cyhalothrin, zeta-cypermethrin, beta-cyfluthrin, and bifenthrin. Because some pesticides are much more potent than others (applied at much lower rates), lesser use does not necessarily mean less concern for human health impacts. For instance, methomyl is a carbamate insecticide with high acute toxicity to humans.<sup>18</sup>

## PESTICIDE USE ON GE CROPS

- ❖ DuPont-Pioneer applied 90 different pesticide formulations containing 63 different active ingredients on Kaua'i from 2007 to 2012. The company sprayed on two-thirds (65%) of the days over this period; and made from 8.3 to 16 applications per application day, on average.<sup>9</sup>
- ❖ The third-most frequently applied class of pesticides is also among the most toxic: organophosphate insecticides such as *chlorpyrifos* were sprayed an average of 91 days each year.<sup>10</sup>
- ❖ Restricted use pesticides (RUP) sales data for Kaua'i show that 22 RUPs containing 18 active ingredients were applied in agriculture from 2010 to 2012.<sup>13</sup>
- ❖ 81% of RUP active ingredients by weight were applied to corn and 19% to coffee, with negligible amounts used on ornamentals, soybeans, sugarcane, tomatoes, and turf.<sup>14</sup>
- ❖ Total statewide pesticide use is estimated at 80,000 lbs. annually.<sup>15</sup>
- ❖ **Despite rhetoric that GE crops will bring about nutritional enhancement and disease resistance, the pesticide-seed firms have conducted extremely few field trials of such GE crops, and there are hardly any such GE crops grown commercially.**<sup>16</sup>

## PESTICIDE EXPOSURE RAISES SERIOUS HEALTH CONCERNS

- ❖ In general farmers, farmworkers, pregnant women, and children are at greatest risk: farmers are more highly exposed than the

general population; and children are more susceptible to the harmful effects of pesticides than adults.

- ❖ The American Academy of Pediatrics (AAP) recently published a major report entitled “Pesticide Exposure in Children”<sup>19</sup> that comprehensively reviewed 195 medical studies. Pesticide exposure in early life is linked to *childhood cancers*,<sup>20</sup> *neurobehavioral and cognitive deficits*,<sup>21,22</sup> *adverse birth outcomes*,<sup>23</sup> and *asthma*.<sup>24</sup>
- ❖ In adult populations, pesticide exposure has been linked to Non-Hodgkin’s lymphoma,<sup>25</sup> bladder and colon cancers,<sup>26</sup> Parkinson’s disease,<sup>27</sup> depression,<sup>28</sup> and disrupting hormonal or endocrine systems.<sup>29</sup>



**Pesticide exposure in early life is linked to childhood cancers, neurobehavioral and cognitive deficits, adverse birth outcomes, and asthma.**

### REPORTED HEALTH HARMS FROM PESTICIDE USE IN HAWAI’I



Communities in Hawai’i are rightly concerned about pesticide drift that occurs from open-air GE seed corn operations. Teachers and schoolchildren in Waimea on Kaua’i became sick on at least three separate occasions following chemical applications to a nearby seed corn plot.<sup>31</sup> In a 2008 episode, 60 children and at least two teachers experienced headaches, dizziness, nausea, and/or vomiting; ten or more

children were treated at an emergency room; several were put on a nebulizer to relieve respiratory distress; and one was given an anti-vomiting medication intravenously. These symptoms are all commonly reported effects of exposure to pesticides.<sup>32</sup> Since 2007, at least three similar episodes have been reported at schools on O’ahu, sickening dozens of students and faculty.<sup>33,34,35</sup> Because Hawai’i does not have a “pesticide poisoning surveillance program” of the sort established in eleven other states,<sup>36</sup> these reports likely represent a small fraction of actual pesticide poisoning cases.



**Pesticides used heavily in GE operations in Hawai'i pose a serious threat to wildlife and degradation of natural habitats.**

## **ENVIRONMENTAL IMPACTS OF AGROCHEMICAL USE IN HAWAI'I**

Beyond the considerable threat that restricted use pesticides pose to the health of Hawai'i residents, these chemicals also threaten Hawai'i's precious environment.



- ❖ The Islands represent just 0.2% of land area in the United States, and yet they are home to over one-third of the nation's federally endangered species.<sup>37</sup>
- ❖ To date, roughly 75% of documented species extinctions in the U.S. have occurred on the Hawaiian Islands,<sup>38</sup> with 437 species on the islands listed as either threatened or endangered.<sup>39</sup>
- ❖ Studies show that pesticides used heavily in GE operations in Hawai'i, including atrazine,<sup>40,41</sup> chlorpyrifos,<sup>42</sup> synthetic pyrethroids,<sup>43</sup> and neonicotinoids,<sup>44</sup> pose a serious threat to wildlife and degradation of natural habitats.

## **REGULATION NEEDED TO ADDRESS PUBLIC HEALTH RISKS FROM GE FIELD TRIALS**

We would all like to believe that the Environmental Protection Agency (EPA) protects us from pesticide harms, but this is often not the case.

- ❖ EPA requires safety testing only on the pesticide product's active ingredient, even though "inert ingredients" in pesticide formulations can be toxic in their own right, or increase the active ingredient's toxicity.<sup>45</sup>
- ❖ In a failed attempt to better protect human health and the environment from pesticide drift, EPA proposed improved pesticide labeling in 2001, but has yet to finalize and enact the policy.<sup>46</sup>
- ❖ EPA began a phase-out of residential use of the toxic insecticide chlorpyrifos in the year 2000, specifically to protect children.<sup>47</sup> Yet EPA has left rural kids unprotected, even though ambient air levels of chlorpyrifos have been found to exceed health standards in agricultural areas.<sup>48</sup> Chlorpyrifos is by far the most heavily applied restricted use insecticide on Kaua'i.<sup>49</sup>
- ❖ As of 2014, at least nine states had established no-spray buffer zones around sensitive areas such as schools, hospitals, nursing homes, and public parks while eleven states have established notification

requirements for pesticide applications near schools.<sup>50,51</sup> These policy actions evince growing awareness of the serious health threats posed by pesticide drift.

- ❖ Residents of three Hawai'i's counties have demanded that their local governments take action, under the counties' authority to regulate agriculture, ensure the welfare of its residents, and fulfill its duty to protect public resources.

**Hawai'i residents live in close proximity to field test sites, posing a direct threat to public health.**

## CONCLUSION

The people of Hawai'i have the right to decide that the risks associated with the use of toxic pesticides in commercial agriculture near our schools are unacceptable, and the duty to take action to reduce and prevent the potential negative impacts of that use. Hawai'i's state officials must protect citizens and the environment from the irresponsible practices of the agrochemical-seed firms by enacting sensible, prudent restrictions. In the longer term, serious attention must be devoted to reversing Hawai'i's steadily declining food security. The state's agricultural policy must be re-directed from supporting continued expansion of GE operations towards increasing sustainable local food production. Together, we can ensure that the agricultural systems of Hawai'i promote the health and well-being of our islands now and for future generations.



## ENDNOTES

<sup>1</sup> ISB Locations (2015) Information Systems for Biotechnology. See chart at: <http://www.isb.vt.edu/release-summary-data.aspx>. Downloaded 2/14/15.

<sup>2</sup> HASSa Hawai'i Agricultural Statistics (various years), see tables entitled "SUMMARY: Acreage in crop and total farm acres, by County," and "SEED CROPS: Number of farms, acreage, outshipments, and value, State of Hawai'i" in various annual reports. See text for "seed crops (footprint)."

<sup>3</sup> HASSb Hawai'i Agricultural Statistics (various years), see tables entitled "Market Supply: Fresh market fruits, State of Hawai'i" and "MARKET SUPPLY: Fresh market vegetables, State of Hawai'i" in respective annual reports.

<sup>4</sup> ISB Release (2010-2014) Information Systems for Biotechnology, a USDA-sponsored, searchable database of GE crop field releases. Searches for releases in "Location" Hawai'i and "Date Ranges" 1/1/14 to 12/31/14 (2014) and similarly for the years 2010 to 2013. Search conducted on 2/12/15.

<sup>5</sup> HASSa *op. cit.*

<sup>6</sup> Also incorrectly called "herbicide tolerance" by the agrochemical-seed firms and those who follow their faulty naming convention. The Weed Science Society of America clearly defined such GE crops as "herbicide-resistant" in 1998. WSSA (1998) Technology Notes. Weed Science Society of America. *Weed Technology* 12(4): 789-790. <sup>7</sup> ISB Release (2010-2014) *op. cit.*

<sup>8</sup> Loudat T, Kasturi P (2013) Hawai'i's Seed Crop Industry: Current and potential economic and fiscal contributions. [http://www.nass.usda.gov/Statistics\\_by\\_State/Hawaii/Publications/Sugarcane\\_and\\_Specialty\\_Crops/SeedEcon.pdf](http://www.nass.usda.gov/Statistics_by_State/Hawaii/Publications/Sugarcane_and_Specialty_Crops/SeedEcon.pdf).

<sup>9</sup> Jervis G, Smith K (2013) Presentation by plaintiffs' attorneys in lawsuit by Waimea, Kaua'i residents against Pioneer, DuPont. July 13, 2013. <http://vimeo.com/70580803>.

<sup>10</sup> *Ibid.*

<sup>11</sup> ISB Locations (2015) Information Systems for Biotechnology. See chart at: <http://www.isb.vt.edu/release-summary-data.aspx>. Downloaded 2/14/15.

<sup>12</sup> HASSa *op. cit.*

- <sup>13</sup> Restricted Use Pesticides Sold on Kaua'i: 2010–2012. A spreadsheet obtained from Kaua'i County Council member Gary Hooser.
- <sup>14</sup> *Ibid.*
- <sup>15</sup> Jervis and Smith *op. cit.*
- <sup>16</sup> ISB Release (2010–2014) *op. cit.*
- <sup>17</sup> Jervis and Smith *op. cit.*
- <sup>18</sup> *Ibid.*
- <sup>19</sup> Roberts JR, Karr CJ (2012) Pesticide Exposure in Children. Council on Environmental Health. *Pediatrics* 130(6): e1757–e1763. <http://pediatrics.aappublications.org/content/130/6/e1757.full.html>.
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- <sup>30</sup> ISB Release (2010–2014) *op. cit.*
- <sup>31</sup> Leone D (2008) Odor that got kids sick debated. Honolulu Advertiser, February 24, 2008. <http://the.honoluluadvertiser.com/article/2008/Feb/24/ln/hawaii802240350.html>.
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