

To the Members of the Hawai'i County Council,

My name is Karl Haro von Mogel, and I am a Ph.D. Candidate in Plant Breeding and Plant Genetics at the University of Wisconsin-Madison. I conduct research on basic genetics and biotechnology of plants such as sweet corn, and I have produced a series of educational videos about plant breeding for students and the public. I am also the Chair of an independent science-focused nonprofit organization called Biology Fortified, Inc., at www.biofortified.org. My research is not funded by any biotechnology companies, and Biology Fortified, Inc., does not accept funding from such companies, either. In the interest of full disclosure, I was invited by the Hawai'i Crop Improvement Association to speak at the GMO Summit and visit papaya farms in August, and they covered travel and accommodations. I declined an honorarium. This testimony is my opinion, provided voluntarily as a public scientist who is not only familiar with the science and societal issues of genetically engineered crops in general, but who has also actually visited farms on Hawai'i to interview farmers about the challenges that they face, and have faced when the papaya ringspot virus nearly wiped out their livelihoods.

I am submitting this testimony to express my disagreement with bill 113, the reasons given for implementing this bill, and the language as written could cause more harm than it aims to prevent. **I urge the Hawai'i County Council not to approve bill 113.**

Many of the findings of this bill with regard to risk have been addressed already. Biology Fortified, Inc., submitted a written testimony explaining how genetically engineered (GE) crops are regulated, when bill 79 was up for consideration. It is available at this address: <http://www.biofortified.org/2013/07/analysis-of-hawaii-bill-79/> In sum, GE crops are well regulated by three federal agencies (FDA, EPA, USDA), and a scientific consensus exists on the general safety of this process for creating new traits in crops destined for food, feed, fuel, or fiber. We maintain a database of studies that support this consensus, at www.biofortified.org/genera/. There is no reason to ban or restrict the growing of genetically engineered crops out of concern for safety because this is not an issue for these crops.

Bill 113 will not lead to the development of a non-GE market niche, but will curb the rights of existing farmers.

Bill 113, under (3) of the findings section aims to promote the development of a niche market of non-genetically engineered foods and seeds. Such a market niche can be developed – and has been developed around the country – without unneeded bans on GE crops. In fact, if the Council wished to promote such an industry, this is not the bill with which it can do that. Developing a non-GE seed industry on Hawai'i was expressed to me as a motivating factor by Councilmember Margaret Wille during the GMO Summit in August. Banning or restricting a competing industry will not make this non-GE industry simply appear. Operating a business – any business – on the Hawai'ian islands is expensive, including farming. Growing non-GE seeds will be more expensive in Hawai'i than on the mainland, where this industry is thriving even while coexisting with GE crops. There is no reason why this industry would move to Hawai'i on its own, considering that it will be less economically competitive as a result.

If the goal of the bill is to help those who do save seeds to replant or sell from accidentally having genetically engineered seeds in their collections, bill 113 is still the wrong approach for this purpose. Seed saving is different for each crop, but with a few simple practices, anyone can maintain the genetic identity of their seeds. I have developed a series of educational videos on how to make crosses and self-pollinate different crops, and save the seeds from these controlled pollinations. The Council could instead support a public education project and provide resources and support for extension education through the University of Hawai'i or other organizations to give people the knowledge necessary to make this possible, without curbing the rights of other farmers. I would be happy to help make the videos I have produced available for the people of Hawai'i for this purpose. You can view them at these links.

<http://plantbreeding.wisc.edu/educators/videos/>

<http://www.youtube.com/wiscplantbreeding/>

There are no 100% guarantees or control measures in existence, however, reasonable control measures for cross-pollination work to enable farmers to ensure that the genetic identity of their crops is preserved for whatever market they wish to sell to. The responsibility for maintaining high standards for premium markets falls on the farmer growing the crop for those markets. For instance, organic farmers are required by the National Organic Program to implement buffer zones and control measures to protect their crop from reasonable spillover effects from neighboring non-organic farms. In turn, they get a premium price for their effort.

Criminalizing the cultivation of GE crops without cause is wrong and will reduce the viability and competitiveness of Hawai'ian farms.

Since it is not necessary to ban genetically engineered crops to reasonably protect non-GE crops from issues related to cross-pollination, bill 113 is left without a solid purpose for restricting the rights of farmers who grow genetically engineered crops, or who may want or need to in the future. At the August GMO Summit, Councilmember Margaret Wille said directly to me, "I have to hold the line against Monsanto." This is not a public-interest reason for restricting the rights of farmers on Hawai'i, but a socio-political one rooted in reasons that have little to do with genetic engineering itself. Monsanto is not genetic engineering, and genetic engineering is not Monsanto. Monsanto uses genetic engineering, but so does the University of Hawai'i, and farmers on the island. If the goal is to simply prevent the establishment of Monsanto research on the island, this bill is ill-suited for this purpose and will harm everyone except Monsanto, as there is no indication that the company has any plans to move to the island.

Bill 113 implicitly suggests that an emergency is the only appropriate time to allow a genetically engineered crop to be grown, but this is wrong. Most of the benefits accrued to farmers from the use of genetically engineered crops, such as yield gains, reductions in insecticide use (Bt corn and cotton), and reduced input costs have not been the result of "emergency" situations like there were with the papaya. Should GE solutions to non-emergency Hawai'ian agricultural problems arise, farmers will be prevented from using them and benefiting from them. Moreover, by allowing some farmers who currently use GE crops to continue to do so, while blocking future use of GE crops by other farmers, it will put some farmers at a competitive disadvantage – especially new farmers, and

economically disadvantaged farmers who have yet to adopt the technology, which Hawai'i should support.

When I visited Hawai'i, it was quite apparent that food security was a prominent issue on people's minds. Should new GE crops with potential market opportunities for Hawai'ian farmers to grow food for export or to provide food for the local populace be available, Hawai'ian farmers will be prevented from growing them under this bill. Let me give you an example: Tomatoes are an important crop in Hawai'i and there is a variety of genetically engineered purple tomato that contains anthocyanins – the same kinds of beneficial antioxidants found in blueberries and cranberries. Should this be approved, the county of Hawai'i would be unable to benefit from the local farming community growing these crops. After I left Hawai'i, I was contacted by several farmers who I met who were concerned about being unable to grow new GE crops that may become popular or beneficial, and thus be at a disadvantage. Bill 113 would make it more difficult for farmers to remain competitive, and produce safe and healthy food for the local population as well as for export. Bill 113 would not promote food security on Hawai'i, and may work against it.

Bill 113 will stigmatize farmers who lawfully grow genetically engineered crops such as papaya.

Merely due to the proposal and debate about bill 79, some papaya farmers have lost markets due to worries from distributors that they will be unable to meet future production needs. This has been published in the news, and I have confirmed these details directly with several papaya farmers. Bill 113 could exacerbate this problem, and not just for papaya farmers. <http://www.civilbeat.com/articles/2013/08/05/19629-papaya-nightmares-a-farmer-struggles-amid-hawaiis-gmo-debate/> Bill 113 does not acknowledge or support the right of these farmers to continue to farm papayas, but merely grants an exemption because these papayas are “pervasive” – which is a loaded and judgmental term.

The “Emergency Exemption” ignores how GE crops are developed and regulated and may lead to environmental and economic harm.

Bill 113 states that there is an emergency exemption that can be granted by appealing to the Council, however, this section is fraught with problems and will not work effectively to protect farmers from a “plant pestilence.” Indeed, while it implicitly acknowledges the benefits of genetically engineered crops, it could effectively prevent those benefits from actually being developed or used even if they are sorely needed, and can lead to harm to the environment. I will go into great detail on this section, because understanding its flaws requires understanding the subtleties of how agriculture works, and how GE crops are developed and regulated.

First, the section is entirely vague as to what constitutes “substantial harm” to a crop or plant. By leaving this undefined, it provides no assurance to farmers who need or may in the future need to use a genetically engineered crop to survive a plant pestilence. Indeed, it would leave those farmers vulnerable to a political process which may not be able to meet their needs in time to take appropriate measures to protect their farm.

Second, the stipulation that there be “no other available alternative solution” is vague as to what constitutes a “solution” to a pestilence, and provides no practical guidance as to whether or not a control measure is sufficient to be considered a “solution,” nor does it consider the drawbacks of these other approaches. For instance, an insecticide may be available that can control 50% of an infestation of a voracious insect – which would constitute an alternative control measure – but is 50% control sufficient enough to be considered a “solution?” What if this insecticide is particularly harmful to the environment, but provides complete control? Would this control method be considered a solution under the new law, despite any harm to the environment it may cause? If bill 113 is passed as written, **it may force farmers to use more harmful and less effective control measures.** This goes against (2) in the Authority section of the bill, which states “Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources.”

Third, and finally, while the bill acknowledges the utility of GE to protect crops against harm from pathogens, pests, and environmental conditions, it may actually prevent the development of GE solutions to problems on the island of Hawai’i. Plant breeders and genetic engineers constantly have to look ahead to future environments to change the genetics of crops to meet future challenges, whether they are changing patterns in diseases, droughts, floods, etc. The development of a new crop variety does not (and cannot) happen overnight, so this development has to be able to begin when these problems are first anticipated. It can take ten years or more to develop a new GE crop, and get it approved by the USDA, FDA, and EPA for farmers to plant. In order to develop such a crop and have it ready when disaster strikes, it needs to be grown in the open air in a field trial under real field conditions – something that bill 113 prohibits unless there is a present emergency. But the point is that this testing process *must* occur before the emergency has struck, to give the federal regulatory agencies time to evaluate crop performance and safety data *that must also be gathered in the field*. Furthermore, if the crop is approved by the regulatory agencies, time is still needed to produce seeds for farmers who may need them.

Hawai’i has a clear historical example of this process – the Rainbow papaya. Its development was started in the 1980s when the movement of the ringspot virus into the Puna region was predicted, and it wasn’t until 1992 that it was approved for a field trial by the USDA. This is the same year that the virus was first discovered in the Puna region. Within a few short years, it began to devastate the papaya farms. It took six years for the Rainbow papaya to be deregulated by every regulatory agency, and there were not enough seeds for every farmer who needed them. Some farmers were on the cusp of losing their farms – some did – and the deregulation of the papaya was just in time for many of these farmers. Had there been any delay in the ability of Dennis Gonsalves’ team being able to conduct their field trials, the regulatory approval would have been delayed. The consequences would have been much worse.

There were other control measures proposed at the time – such as spraying pesticides to control the aphids that spread the virus, to eliminating all hosts of the virus for several years and then replanting. We should ask ourselves, would this have prevented the development or deployment of the GE ringspot virus-resistant Rainbow papaya, if bill

113 was passed 22 years ago? If you cannot absolutely answer this question as a no, then you cannot say this bill will not cause problems in the future.

The ability to grow the plants in a greenhouse or other enclosed space has been added to bill 113 presumably as a measure to allow the development of GE crops, however, this is inadequate. In order to know whether a GE crop will perform properly – or any variety produced by breeding for that matter – it must be grown in conditions that are similar to the environment where it will be grown – and that is in the field. Greenhouses are different environments, and plants that grow well in a greenhouse may perform poorly in the field, and vice-versa. Regulatory agencies will also only accept data produced in the field, since levels of nutrients and other data necessary for evaluating the plants as a plant pest risk or health risk are different in greenhouses and the field. In sum, even the exemption for plants grown in an enclosed space will not allow the proper development and safety testing of GE crops, and is inadequate to allow their development. Developing them on other islands cannot be depended on, which bill 113 actually agrees with under (2) in the findings – that each island is different in terms of agricultural conditions.

New crops are like preventative medicine, like vaccines against diseases that may be important in the future. The Emergency Exemption in bill 113 is trying to treat preventative medicine like something that you can throw together in an emergency room. It doesn't work that way, and because bill 113 throws everything we know about the development of new crop varieties out the window, **it makes as much sense as banning the development of medicine to prevent a disease until the patient enters the emergency room.**

Bill 113 invokes the Precautionary Principle – which is exactly the reason why this bill as written *should not* become law. It prevents agricultural scientists from being able to develop new varieties of genetically engineered crops in Hawai'i as a precaution against disasters like the ringspot virus – until the disaster has already hit.

I remain at your disposal should you wish to contact me with any questions about this testimony or other matters. I think there are better ways to address the concerns that citizens and Councilmembers have about genetically engineered crops on Hawai'i than with bill 113. Like its predecessor, bill 79, it is a solution looking for a problem, and will not improve agriculture in Hawai'i or elsewhere. I trust that you will keep these issues in mind when you vote on the bill.

Regards,
Karl Haro von Mogel
karl@biofortified.org

