



UNIVERSITY OF HAWAI‘I SYSTEM

Legislative Testimony

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Senate Committee on Energy and Environment
and the
Senate Committee on Education
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by
Dr. William W.M. Steiner, Dean
College of Agriculture, Forestry and Natural Resource Management
University of Hawai‘i at Hilo

SB 1669 RELATING TO ENERGY

Chairs Menor and Sakamoto and Members of the Committees:

I am writing in support of SB 1669 because it is my opinion that this bill is necessary to support the potential developing biofuels industry in the State of Hawai‘i and strengthen the economy of the Big Island, Hawai‘i island. I am writing in my professional capacity as a Geneticist, taking my Ph.D. (Genetics) at the University of Hawai‘i in 1974 under Hampton L. Carson, Professor Emeritus, former National Academy of Sciences member, and now deceased. I have taught at the Universities of Illinois (Champaign-Urbana) and the University of Missouri (Columbia) and served as Director of the US Geological Survey Pacific Island Ecosystems Research Laboratory based in Honolulu coming to that position after serving as Acting Director of the USDA Agricultural Research Laboratory in Columbia Missouri. After retiring from 23 years in the Federal Service in 2005, I am currently Dean of the College of Agriculture, Forestry and Natural Resource Management at the University of Hawai‘i at Hilo.

HARC in its 2006 report on implantation of oil crop production in the state reported that the Big Island had more crop land for this endeavor than all the other islands combined. It makes sense, then, from this perspective alone, to locate research and development efforts on Hawai‘i island to guide this effort. As the Dean of the College of Agriculture, Forestry and Natural Resource Management (CAFNRM) at UHH I can testify that we have the facilities, faculty, and staff to carry out this effort. In partnership with Oceanic Institute and the feed mill they have purchased for research in developing livestock and aquaculture feeds with our faculty and students participating, a wonderful opportunity is offered to also further biodiesel development for the entire state.

Some of the largest landowners on the Big Island have recently organized to support biofuels development there. These men realize the potential of the Big Island and see it their civic duty to move Hawai‘i in a more sustainable direction. They have high concerns about the nature of our current energy structure and stand ready to contribute land to development of alternative solutions. Understandably, because they know not only what is at stake but that the key to the answer lies in the very lands they

own, they wish to see support for their efforts develop on the Big Island. I believe you will have supporting testimony from them in your case file for SB 1669.

I am here, though, primarily to comment on the role the UHH brings to this bill. Not only the College of Agriculture, Forestry and Natural Resource Management can bring effort here in research and development. The College of Business at UHH can provide research into the economic feasibility of producing particular oil crops on the Big Island and elsewhere in the state. The new College of Pharmacy can play a key role in developing new pharmaceuticals from the byproducts and waste stream in this effort as well. For example, several of the crops under consideration have known chemical applications of their products from insecticidal and purgative properties for *Jatropha curcas* to native medicinal properties of Kukui and cosmetic properties of avocado. As a facility, the University of Hawai`i at Hilo is uniquely situated with ability to bring a suite of expertise to bear on development in the biofuels industry. That we have research management infrastructure in place through the Research Corporation of the University of Hawaii (RCUH) should not need pointing out as I am sure the Committee is aware of this management feature. And finally, have the new USDA Agriculture Research Center located on campus at UHH only strengthens the overall facility picture. When one couples the support of the community into this equation, and especially that of the large landowners with their tens of thousands of acres including acreage for aquaculture farms and algae development for the future along the Puna coastline, what we have is a formula for success.

The College of Agriculture, Forestry and Resource Management has many assets it can bring to bear on biofuel development and to support the Oceanic Institute mill. These include the following:

1. A 110 acre farm with greenhouses, aquaculture facilities, and ready staffing and equipment.
2. Faculty that include micro-propagation and cell culture professionals, horticulturists, soil scientists, geneticists, open ocean and aquaculture professionals, entomologists, mechanical engineers, and our most valuable resource, student interns. Addition of a dedicated agricultural chemist, a nut and seed scientist and a product development professional would round this professional group and make them a force to contend with in terms of alternative energy development.
3. CAFNRM is uniquely located on a coastline well suited for energy crops grown on the Hamakua, Puna, Waimea and Kau districts. Our field scientists could readily access with an hour or two any growing section for the study and research that will be necessary to support the potential on the Big Island. It would make a lot of sense to locate an energy institute at UHH to support this endeavor, especially given the proximity to the Energy Lab efforts located in Kona.
4. The location of the cattle industry in Hawai`i, and the fact that development of food meal stocks as a byproduct of the Oceanic Institute Mill will benefit this industry, ties another economic engine to the biofuels industry on Hawai`i island. It should be pointed out that another host of scientist exists locally with CAFNRM Animal Science department and at the nearby extension facilities to support this

activity. In addition it ties with the aquaculture industry as well. I would hasten to point out that at least three of the best potential oil crops to consider for the Big Island, kukui, *Jatropha curcas* and oil palm, would each support cattle grazing between the trees once the plants had grown to sufficient size.

Table 1. Potential production of selected tree crops for oilseed (from Poteet 2006, A HARC report to the HDOA).

Crop Oil	content	lbs. oil ac ⁻¹	US gallons ac ⁻¹	Years to production
Oil Palm	kernel 50%, fruit 40-70%	5346#	760	3 to 10
Kukui	45-65%	2672*	380	6 to 10
Avocado	10-30%	1980	282	1 to 3
Coconut	60-80%	2018	287	5 to 10
Jatropha	43-59%	2106†	400†	2 to 3
Neem	33-45%	1161‡	165‡	10

Data taken from Journey to Forever, 2006, except where noted below.

Data taken from Wahid et al., 2004.

* Data taken from Duke, 1983.

† Data taken from Gaydou, et al. 1982 and estimate adjusted for two crops in Hawaii.

‡ Estimated 40 trees ac⁻¹ @ 33% oil content, with 88 lbs seed tree⁻¹

Table 1 outlines what we believe the potential crops are for biodiesel production on the Hawai`i island. All are tree crops that withstand the soil, climatic and elevation differences found there. Tree crops, unlike annuals like soy, canola or grains, do not need constant planting and high mechanization reducing harvest costs, planning costs and therefore energy input costs. Neem perhaps is a questionable crop given its propensity for bird distribution of its seeds to make it potentially an invasive species and the uncoordinated ripening of its seeds but the rest have great potential. *Jatropha*, which can grow well on marginal soils and under drought conditions, has a high nitrogen and insecticidal content of its compost which would be a side product of the OI milling process. Oil palm byproduct would fit well into development of livestock and aquaculture feeds. These two are especially suited for both the mill development and supportive of sustainable agriculture practices for Hawai`i.

In short, I support the building for the OI mill on Hawai`i island which would be owned by UHH; this would enable the mill to be assembled and make it ready for food and oil production. I support the addition of \$1.3 million to the UHH, CAFNRM budget for development of bioenergy on the Big Island. And I suggest that the Committee seriously consider putting the Institute for Bioenergy at UHH Hilo because of existing and supporting infrastructure, faculty, management and landowner considerations. I am available for more comment if such need may arise and thank you for this opportunity to comment on SB 1669. Finally, this bill is of interest to the University and supports the concept of the appropriation of resources to the University as long as the funds are in addition to the BOR budget request and is not in conflict with the priorities set by the BOR. Mahalo for the opportunity to present testimony on this bill.