



Overview of Organic Food Crop Systems in Hawai'i

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National and global perspective

Consumers' demand for organically produced goods has shown double-digit increases over the past decade, amounting to an estimated \$17.8 billion in 2007, almost 2.5 percent of total U.S. food sales. Organic agricultural production has followed demand and shown similar growth. In 2006, there were 78 million acres (31.5 million hectares) of certified organic crop acreage worldwide. This represents an increase of 20 percent a year since 2001, a trend that has continued in most developed countries since the 1980s (Aschemann et al. 2007). The world value of certified organic crop production was \$30 billion in 2005, having increased 14 percent annually during the period 2000–2005.

Organic production is best considered an agricultural system type rather than a separate agricultural industry, because it is comprised of a broad mix of farm sizes and production specialties and cuts across various commodity-specific industries. Information on organic acreage and animal numbers in the USA is available from the early 1990s, while U.S. data on organic farm and wholesale prices are available on selected fruit, vegetable, grain, and animal commodities only for the past decade or less (Economic Research Service [ERS] 2007, Agricultural Marketing Service [AMS] 2009).

In addition to tracking the sales of some organic commodities, AMS also houses the National Organic Program (NOP), which develops, implements, and administers national production, handling, and labeling standards for organic agricultural products. The standards emphasize ecologically based production practices and exclude most synthetic inputs as well as genetically engineered organisms, human manure, and radiation (AMS 2009). NOP also accredits the certifying agents

who inspect organic production and handling operations to certify that they meet USDA standards.

Historically, organic produce has been sold primarily through natural food stores more than any other venue. Although health food stores still represent an important market outlet for the sale of organic foods (47%), supermarkets have also become major venues (46%), while direct-to-consumer markets (e.g., farmers' markets) represent about 7 percent of sales (ERS 2009). Food-service demand is expected to provide a major source of growth in the future. Organic and natural foods enjoy a price premium in the market because of consumer interest in healthy food that is ecologically produced, although organic products may have relatively high production costs due to the increased labor requirements (Kremen 2006). Price premiums vary with commodity, and recent research has concluded that prices are generally decreasing as the supply of organic produce increases. Price premiums received by wholesalers are generally higher than those received at the farm gate, reflecting a higher mark-up for organic produce as compared to conventional produce by wholesalers (Olberholtzer et al. 2007).

Organic consumers were once identified as primarily females 30–60 years old, with more education and a higher income than the average food consumer. However, in recent years, this difference has become less distinct, although regular consumers of certified organic produce more often reside in urban areas, possess advanced degrees and have young children (Aschemann et al. 2007). In the USA, organic vegetables are more commonly purchased than organic fruits. The most commonly purchased organic vegetables are leafy greens, carrots, potatoes, squash, beans, and broccoli (Oberholtzer et al. 2007).

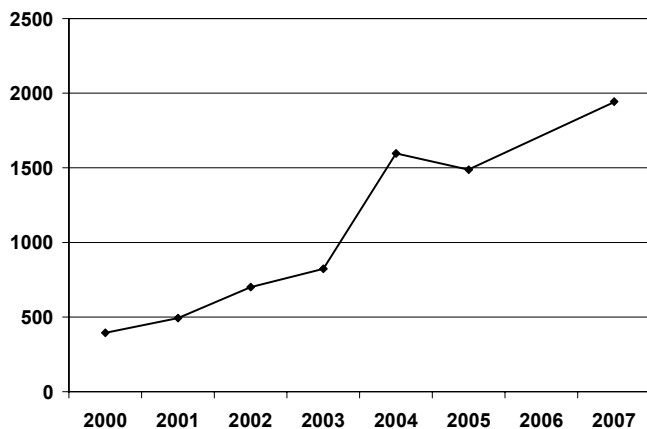


Figure 1. Hawai'i certified crop acreage (excluding forage) in production, 2000–2007
Source: ERS 2007, HASS 2009

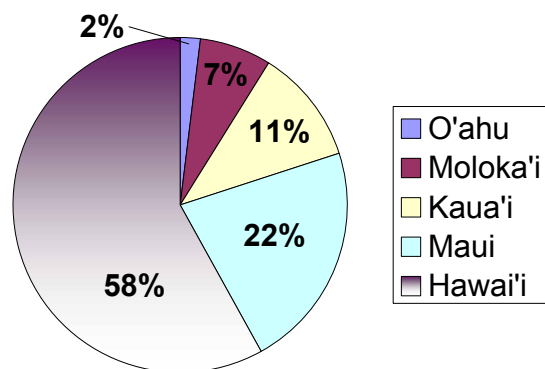


Figure 2. Distribution of certified organic acreage across in Hawai'i. Source: Hawaii Organic Farmers Association, 2007.

Organic production and sales in Hawai'i

Production statistics in Hawai'i are collected by commodity without regard to system type. This means, for example, that data on organic lettuce production is grouped with all other lettuce production. However, certified operations in Hawai'i are tracked as a group by the ERS, and additional statistics were published in the 2007 USDA Census of Agriculture. The available data indicate that organic agricultural production in Hawai'i has followed the national and international trends of sustained growth.

According to the 2007 Agriculture Census, the farm gate value of the state's organic crop production increased from \$5 million in 2005 to \$8 million in 2007, for a growth rate of 60 percent in two years (ERS 2007, HASS 2009). At the same time, crop acreage, excluding forage, expanded 30 percent, from 1465 to almost 1950 acres (Figure 1). Approximately 200 growers are certified in Hawai'i, and the median size of these ranges from 5 acres on Hawai'i, Maui, and O'ahu to 13 acres on Kaua'i and Moloka'i (HOFA personal communication, 2008). The island of Hawai'i hosts the most certified organic acreage, followed by Maui, Kaua'i, Moloka'i, and O'ahu (Figure 2). Producers who make less than \$5,000 annually in gross sales are classified as exempt from certification and may market their produce as "organic" without certification. Over 30 exempt growers have filed affidavits with an accredited third-party certifying agency. The number and acreage of growers who follow organic guidelines but are not certified is unknown.

Several third-party accredited certifiers are active in Hawai'i. The Hawaii Organic Farmers Association (HOFA), a private, non-profit organization formed in 1993, is the only Hawai'i-based certifier and certifies the majority of organic acreage in the state. Other agents certifying producers in Hawai'i are Organic Certifiers, Inc., Oregon Tilth, and CCOF.

Although organic crop production has a strong history in Hawai'i (Radovich and Valenzuela 1999), Cox and Shehata (2003) concluded that consumers in the state vary in their understanding of the word "organic" as it applies to agricultural production and are generally unaware of production standards as they relate to organic certification. Health food stores remain the primary markets in Hawai'i, but organic produce has made remarkable inroads into conventional markets and can be found in most Hawai'i supermarkets. The opening of a Whole Foods Market in the state in 2008 has renewed interest among growers in producing organically, although growing organically is not a requirement of that market.

As organic agricultural production continues to grow, policy makers have become increasingly interested in facilitating the efforts of producers that are interested in expanding in this area. At the national level, organic growers have indicated that they face a number of challenges, including the high managerial costs and large risks from shifting to an organic production system; a lack of technical knowledge about these types of systems; a lack of distribution and related infrastructure; and the inability to capture economies of scale in marketing or

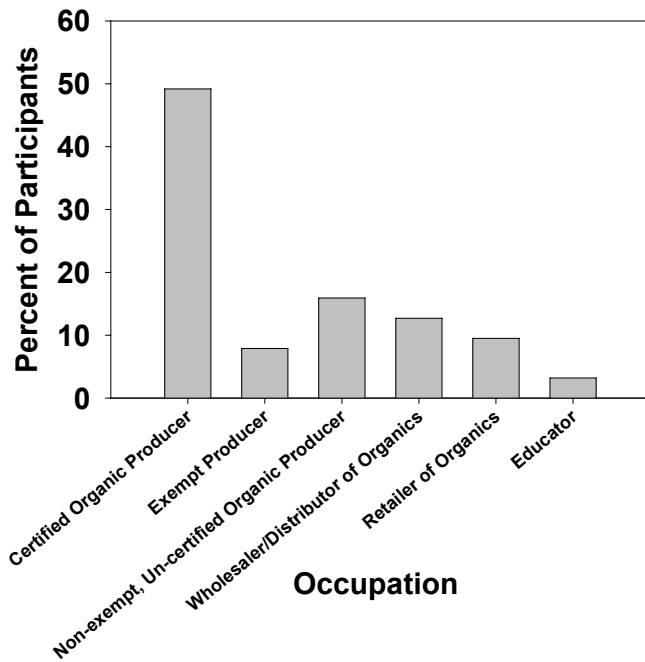


Figure 3. Occupations of organic needs assessment participants, June–July 2007.

production. Prior to 2007, the specific challenges faced by organic producers in Hawai'i were unknown. Therefore, in that year, the College of Tropical Agriculture and Human Resources (CTAHR) of the University of Hawai'i at Mānoa initiated an analysis of organic agricultural systems, in partnership with the Hawai'i Department of Agriculture (HDOA) and The Hawaii Farm Bureau Federation (HFBF), to determine the issues faced by this group and the actions required to address critical issues. This publication describes this effort, gives a summary of the results, and includes a discussion of the implications suggested by the analysis.

Identifying Hawai'i's organic growers and their needs

The first step in the assessment was to assemble a list of stakeholders and to ask for their participation in the process. University extension agents and grower organizations, including HFBF, HOFA, and the Hawaii Cooperative of Organic Farmers (HICOF), cooperated by alerting their members about the effort and by participating in the process. Day-long listening sessions to gather input were held across the state, including in Kaunakakai, June 1; Kahului, June 2; Kealakekua, June 8; Hilo, June 9; Pearl City, July 18; and Lihue, July 21,

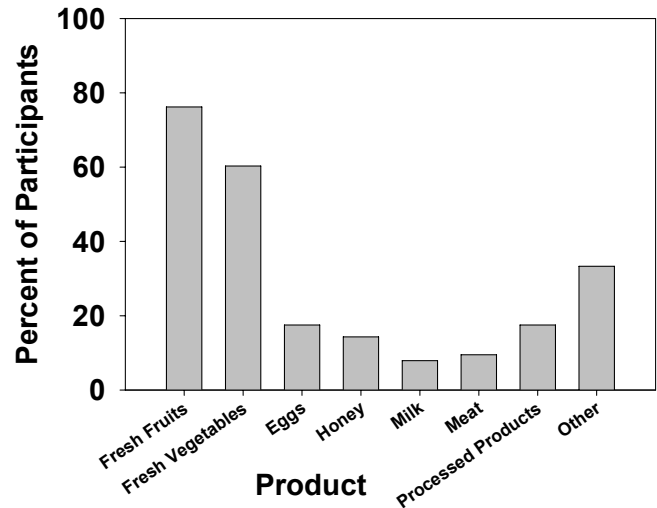


Figure 4. Products grown/produced by participants of Organic Needs Assessment, June–July 2007. The category "other" includes nuts, coffee, compost, and medicinal plants.

2007. At the same time, a survey (see Appendix 1) was fielded using an on-line survey service (SurveyMonkey®) to collect basic information about the respondent's role in organic systems and allow the respondent to provide input. For consistency, those attending the listening session were asked to complete the portion of the survey that collected basic information about the respondent's role in the organic sector and prioritization of bottlenecks.

Seventy-six people participated in the process. As Figure 3 indicates, 73 percent were organic producers, the majority of which were certified growers. Wholesalers/distributors, retailers, and educators accounted for 12.7, 9.5 and 3.2 percent respectively. Participants included representatives and members of HDOA, HFBF, HOFA, and HICOF. Participating farmers produced a wide range of commodities (Figure 4) and 60 percent indicated that they expected to expand their operations within five years.

Hundreds of comments, suggestions, and concerns were generated from the survey and the meetings. The wide range of comments reflects the diversity of experience, location, and vision of participants. Common concerns, comments, and suggestions were grouped and used to generate a prioritized list of issues and actions needed to address them. Issues were prioritized within

the five focus areas: infrastructure, production, genetic engineering, postharvest, and economics. Table 1 (page 6–7) provides the summary list, which is discussed below. A complete list of the comments is too lengthy to include here and is available at http://www.ctahr.hawaii.edu/organic/Needs_assessment.asp.

Infrastructure

The infrastructure topics of highest priority were water, labor, and land. Overall, water issues were of the highest priority, most notably on Moloka'i. Maintenance to improve the existing irrigation systems and development of a sustainable water plan for each island were the actions identified to address water issues. The need to give agricultural water use priority over other uses and to protect the water rights of communities was consistently mentioned.

The lack of skilled, affordable labor is a concern for all agricultural systems in Hawai'i, including certified organic systems. Developing a University of Hawai'i internship program across the state was recommended as a means to address this issue. This approach was identified as having high potential for success because it would address grower needs and satisfy the strong interest in organic and alternative agriculture expressed by students. At the same time, strategies that promote agriculture as a viable career path were identified in order to encourage young people to pursue this occupation. Improved access to foreign labor programs successfully utilized by some growers was also identified as an action for consideration. A suggestion was also made that building codes be adjusted to make it more cost effective to house short-term laborers and interns.

The high cost of land and the lack of availability of long-term leases is also a challenge for organic producers. In order to become certified, organic growers need to have land that has not been exposed to restricted substances for three years, and they must demonstrate active stewardship of soil and other resources. This requires large investments in labor and other resources, which makes long-term land tenure even more important in this sector compared to conventional growing systems. A low-interest loan program was suggested as an option to increase the ability of growers to purchase land. Organic agricultural parks that provide long-term leases were also suggested.

Other interesting infrastructure issues that were identified include access to capital, encouraging agritourism,

and managing theft. Improved awareness and access to grant and loan programs would assist organic growers, as would any cooperative or shared-use arrangement of assets. Agritourism has the potential to strengthen and diversify the visitor experience while enhancing on-farm income. Since organic agriculture is often perceived by the public as being among the most “green” of agricultural systems, this sector may stand to reap larger benefits from increases in these sorts of opportunities. Adjusting regulations to allow for visitor stays on working farms and providing hospitality training for hosts would allow growers to tap into this potential market. Allowing growers and/or workers to reside on the farm would also be one deterrent to theft.

Production

Two groups of production concerns were identified based on the average priority ranking of all participants. The primary priority group, production issues 1–6 in Table 1, included disease control, plant nutrition, soil biology, water/irrigation, insect control and weed control. The secondary priority group included “other soil”, breeding and variety development, and harvest and mechanization.

The inability of participants to identify a single production issue of highest priority speaks to the interconnectedness of many of the issues in the primary priority group, particularly pest control, plant nutrition, and soil biology. Participants called for accessible, Hawai'i-relevant information that improves growers' understanding of the relationship between soil organic matter management, soil biota, plant nutrition, and pest tolerance. This is not surprising, as contemporary organic agriculture originated in the early 20th century largely as a movement to advocate for a continued, dominant role of organic amendments to enhance the physical, chemical, and biological properties of soil that promote healthy plant growth (Howard 1976, Kristianssen and Merfield 2006). The development of a “health index” for Hawai'i soils would be valuable in establishing recommendations for organic management practices such as rates and frequency of compost applications, cover crop species selection and planting density, and nitrogen fertilizer application rates. Specifically, determining threshold levels of organic carbon, free-living nematodes, microbial biomass, and other soil quality indicators associated with optimal plant growth in different Hawai'i soils would contribute significantly to addressing these questions.

Developing cost-effective strategies to utilize the plant growth promoting and disease suppressing properties of compost, particularly vermicompost, was also identified as being high priority. Specifically, participants called for scientific evaluations of the efficacy of aqueous extracts of compost (compost tea) to enhance plant growth and pest tolerance. Fertilizer trials using local inputs such as fishmeal and invasive algae are also needed.

Biological control of insect pests was also a topic of great interest. Although much information exists on the subject, growers were unaware of and had little access to this information. The development of outreach efforts to improve growers' knowledge of beneficial insects will enhance their ability to augment and conserve populations on their farms. Information on integrated organic approaches to weed management also is needed.

With regard to water, most concerns focused on quality and affordability of agricultural water. Actions identified to address these issues included providing information and support for rainwater catchment, maintenance and repair of irrigation systems, and shifting priority of water use from recreational to agricultural.

Of the group of secondary priority production issues, breeding and variety development is probably the most important. Most comments dealt with the need for organically certified sources of locally adapted varieties, and the concern over potential cross-pollination of organic crops with transgenic pollen, specifically with regard to papaya and corn. Also expressed was the need for vegetable variety trials under organic conditions. In fact, the selection of disease-tolerant and nitrogen-efficient varieties may be considered critical to addressing the high-priority issues of disease control and fertility management.

Issues associated with mechanization and harvest largely dealt with the lack of capital among growers. Cooperative purchase and shared use of facilities and equipment was the solution most often identified.

Genetically modified organisms (GMOs)—genetically engineered (GE) plants

Organic growers are very concerned about the potential contamination of organic seed stock with transgenes from GE plants. Most of the survey respondents and meeting participants believe that organic production cannot co-exist with transgenic crops because contamination cannot be prevented. Perhaps most importantly, they feel that research and outreach on transgenic crops is currently

receiving a much greater percentage of public resources than other technologies more applicable to organic and ecologically based agricultural systems. This concern about equity has resulted in a feeling of animosity for various public institutions, particularly CTAHR, on the part of many who practice organic systems.

No straightforward solution exists for the contamination issue. Calls for increased transparency about the location and type of transgenic crops are an alternative that transgenic producers do not necessarily support. Development of "GMO-free" zones or islands, as was suggested for Moloka'i, would be well received by many organic system advocates, but these alternatives are politically challenging. Also, controversy exists as to whether or not the scientific literature has accurately quantified the risks associated with transgenic persistence and horizontal gene transfer. HOFA's statement on GE products (Appendix 2) summarizes the general attitude of organic growers towards GE organisms. Clearly, the conflict is now deeply rooted and will require significant resources to resolve, if that is possible.

Postharvest

The top-priority issue is the lack of cold storage and distribution for perishables. A shared-use facility was identified as an action solution, which means that planning and coordination, as well as resources, are needed. Transportation costs were ranked second, with bulk purchasing and more efficient packaging as the required actions. Food safety issues are third and would be addressed by training, which may be available through CTAHR (coaching) and DOA (auditing). Lack of capacity for processing value-added products is next, which could be addressed by community kitchens and better communication between suppliers and end-users. More education is needed to address issues related to using byproducts, while an affordable source of nutrition analysis is needed to address concerns about lack of information about nutritional quality. Concerns about the contamination of local composts and mulch with pesticide residues may be addressed by programs to test and monitor greenwastes and other feedstocks used by commercial composters.

Economics

High production costs were the number-one economic issue. While the HICOF research priorities (Appendix 1) suggests that these costs can be forecast, grower di-

Table 1. Organic industry bottlenecks and proposed actions**Infrastructure**

<i>Priority-ranked issues</i>	<i>Action(s) required</i>
1. Poor water availability, affordability, and quality.	Maintenance and repair of irrigation systems; shift priority of water use from recreational to agricultural; provide information and support for rainwater catchments.
2. Lack of skilled, affordable workforce.	Develop internship programs between colleges and farms; subsidized training to ensure qualified workers; promotion in the community of agriculture as a viable career; federal and state support/grants/policies.
3. Lack of affordable land and long term leases.	Agricultural land available for long term lease; affordable prices; low interest loans; government grants for land and equipment purchases.
4. Lack of available capital/ funding, particularly for infrastructure, labor, equipment, marketing.	Improved awareness of and access to existing loans, grant and cost-sharing programs; development of grower cooperatives and shared-use arrangements.
5. Lack of favorable agricultural labor laws; lack of enforcement of existing laws.	Reduce restrictions for labor housing. Increase resources for enforcement of agricultural use of agricultural land.

Production (issues 1–6 are the primary priority group)

<i>Priority-ranked issues</i>	<i>Action(s) required</i>
1. Lack of understanding of disease control, particularly with regard to soil management.	Improved research and outreach of organic disease control measures and inputs; Increase the number of agricultural inspectors.
2. Prohibitively high costs of organic fertilizers, especially high-N fertilizers.	Improve the cost effectiveness of locally produced organic fertilizers through innovative strategies; expand the production of local, high-N fertilizers (e.g. bone/blood meal).
3. Lack of knowledge about links between soil biology, managing soil ecology, and soil quality.	Develop soil health index on which to base management recommendations; Improved access to cover crop seeds other elements to enhance soil ecology and plant health.
4. Lack of year-round availability of high-quality agricultural water.	Provide information and support for rainwater catchments; maintenance and repair of ag irrigation systems; shift priority of water use from recreational to agricultural.
5. Lack of information on effective, organic insecticides; lack of grower knowledge regarding beneficial insects.	Improved outreach on how to attract and identify natural enemies; develop product recommendations for organic insect control.
6. Lack of cost-effective methods for weed control.	Develop Hawai'i-relevant resources on integrated weed management for organic systems.
7. General lack of information regarding organic management of soils.	Improve CTAHR soil analysis programs for all soil types and include recommendations suitable for organic production.
8. Lack of recommendation and availability of varieties for organic production in Hawai'i.	Develop an organic component to existing public breeding and germplasm evaluation programs; enhance capacity for seed saving by growers.
9. Lack of capital for production and processing machinery.	Develop regional equipment cooperatives among growers.

Table 1. (continued)**GMO/GE crops**

<i>Priority-ranked issues</i>	<i>Action(s) required</i>
1. Concern of contamination of organic and conventional seed stock with transgenic through cross-pollination.	Establish inexpensive GE testing program for papaya; greater transparency of location and type of transgenic crop research; increased effort to objectively evaluate scientific literature regarding potential for transgenic persistence and horizontal gene transfer.
2. Strong feeling that co-existence of transgenic-crop agriculture with organics is not feasible.	Greater equity in resource allocation to organic and sustainable agriculture research by public institutions; creation of "GMO-free" zones, i.e., Moloka'i, West Maui etc.; restrict some if not all GE crops from being grown in the state (i.e., taro, coffee, papaya, corn).

Postharvest

<i>Priority-ranked issues</i>	<i>Action(s) required</i>
1. Lack of cold storage and distribution for truck crops and other perishables.	Develop distribution centers, shared use facilities and transportation cooperatives among organic growers
2. High time and cost of packaging, especially for in-store sales.	Bulk purchasing for cheaper shipping; develop more efficient (cheaper) packaging methods
3. Concerns regarding food safety.	Food safety training for all workers; establish proper storage/food tracking program
4. Lack of capacity for product processing and value addition.	Building certified community kitchens on all areas of the islands; develop website to link supplier with end-users.
5. Lack on knowledge on how to use byproducts most effectively.	Develop education programs on how to turn discards into biofuel.
6. Lack of information on nutritional quality of commodities.	Improve access to affordable nutritional analysis of agricultural products.
7. Lack of confidence in quality of local composts and mulch; specifically, concern of chemical contamination of green wastes and manures.	Develop community based composting programs with a focus on feed stocks un-contaminated (i.e., pesticides and other industrial chemicals); improved access to mulching equipment; processing plants to better utilize byproducts of food (i.e., fish and meat) industries.

Economics

<i>Priority-ranked issues</i>	<i>Action(s) required</i>
1. High and unknown cost of production.	Better tracking of costs and practices; collectives to reduce overhead/equipment costs; increased federal/state financial support.
2. Lack of reliable access to local and off-island markets; lack of marketing skills and technical support.	Connect farmers to consumers through better distribution; local co-ops and markets; marketing education; better support of small farm production.
3. Need for better business skills, proper recordkeeping, organization of business plans.	Business management education workshops for farmers.
4. High taxes; lack of tax breaks for small operators.	Tax cuts for small farms; subsidies for supplies, workers comp, and health care.

versity will make cost and income projections difficult to compile. Also, the dynamic nature of agricultural markets makes accurate prediction challenging. The second-priority issue is lack of reliable access to local and off-island markets, coupled with a lack of marketing skills. Marketing education combined with efforts to facilitate distribution from growers to final consumers is needed. The third-priority issue calls for better business skills and proposes educational work to address this issue. In fourth place is high taxes, which growers propose be addressed by tax breaks or subsidies.

Conclusion

Many of the issues identified by the organic sector may also apply to most small growers in Hawai'i. Producers of all types and farm sizes often cite the infrastructure concerns articulated here. Conventional producers also often express concern about high costs and low returns associated with agriculture in Hawai'i, along with the challenges of marketing their products to consumers across the state and in export markets.

Growers felt that the investment in organic research and education by public agencies, particularly CTAHR, has been insufficient in the past. However, many were unaware of resources already developed by CTAHR and other groups to address their production issues. This means that effort must to be focused on improving communication with those involved in organic agricultural systems. Clearly, organic growers are in particular need of tailored and comprehensive information to combat pests and enhance soil fertility, with an emphasis on cost-effective use of locally available resources.

The issue of genetic engineering is of major concern to the organic sector. While the introduction of GE organisms into the environment is strongly opposed by the majority of participants, molecular biology, or the development of molecular markers for disease resistance, is viewed as having potential value to organic agriculture. Resolving this conflict will require significant resources, and a solution is likely years away. However, an increase in the amount of public support for organic agriculturally relevant research and development, the establishment of testing for GE papaya at CTAHR, and similar actions should help to facilitate productive discussion among groups on both sides of this contentious issue.

This analysis is a working document to serve as a starting point for identifying what constitutes success for organic systems and what strategies will most rapidly

facilitate that success. Growers can work through existing grower organizations to identify resources and update the analysis. CTAHR's Sustainable and Organic Agricultural Program will interact with other programs and industry groups to conduct and facilitate research on tools that can be used to address priority issues identified in production and marketing. Ultimately, relevant individuals, institutions, and groups in the public and private sectors must collaborate to focus in depth on single issues or closely related groups of issues for more rapid progress in fulfilling the potential of certified organic systems.

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Organic Industry Questionnaire

Aloha Organic Industry Members!

The College of Tropical Agriculture and Human Resources (CTAHR) is conducting this survey as part of an assessment of the organic industry in Hawai'i. Participation in this survey will take 10–20 minutes of your time. Data from the survey will be summarized and you will remain anonymous.

We strongly believe that there is little or no risk from participating in this survey. However, you may feel uncomfortable as you complete the survey and participating in this research may be of no direct benefit to you. Your participation is completely voluntary. You are free to withdraw from participation at anytime with no penalty. It is believed that this project will assist in addressing the needs of Hawai'i's organic industry and your participation is greatly appreciated.

The research data will be confidential to the extent allowed by law. Agencies with oversight, such as the UH Committee on Human Subjects, have the authority to review the data. All records will be secured in a locked file in the primary investigator's office and they will be destroyed upon completion of the project.

If you have any questions about the survey, please contact Ted Radovich, (800) 956-7909. If you have any questions regarding your rights as a research participant, please contact the Committee on Human Subjects (808) 956-5007.

Please tell us about yourself.

1. Which best describes you?

- Certified organic producer
- Exempt organic producer
- Un-certified organic producer
- Wholesaler/distributor of organic products
- Retailer of organic products
- Extension agent
- Other (please specify) _____

2. Please indicate which products you are directly involved with:

- Fresh fruits
- Fresh vegetables
- Eggs
- Honey
- Milk
- Meat
- Processed products
- Other (please specify) _____

3. If you are a producer, how many acres of crop or pasture do you manage?

4. If you raise animals, how many?

5. If you are a wholesaler or retailer, how many stores do you service, manage or own?

6. What do you expect the size of your operation to be in the next five years?

- Static (the same as it is now)
- Expanded (larger than it is now)
- Contracted (smaller than it is now)

7. Where are you located (town/district and island)?

8. Please tell us anything else about yourself or your operation that you would like.

BOTTLENECKS

9. Please prioritize the infrastructure issues below

	First	Second	Third	Fourth	Fifth
Water					
Land					
Capital					
Labor and education					
Rules and regulations					

10. What specific infrastructure-related problems or “bottlenecks” most hinder the growth and development of your farm/business?

11. What specific actions are required to partially or fully remove these infrastructure-related bottlenecks?

12. Please prioritize the production issues below.

	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth
Soil biology									
Soil, other									
Plant nutrition									
Weed control									
Disease control									
Insect control									
Variety development, availability									
Mechanization									
Water/irrigation									
Harvest									

13. What specific production-related problems or “bottlenecks” most hinder the growth and development of your farm/business?

14. What specific actions are required to partially or fully remove these production-related bottlenecks?

Organic Industry Questionnaire (cont.)*15. Please prioritize the postharvest issues below.*

	First	Second	Third	Fourth	Fifth	Sixth	Seventh
Food safety							
Storage							
Packaging and transport							
Biomass/waste management							
Product processing/value addition							
Product nutritional analysis							
Byproduct use and development							

*16. What specific postharvest-related problems or “bottlenecks” most hinder the growth and development of your farm/business?**17. What specific actions are required to partially or fully remove these postharvest-related bottlenecks?**18. Please prioritize the business issues below.*

	First	Second	Third	Fourth
Business management				
Cost of production				
Marketing				
Taxes				

*19. What specific business-related problems or “bottlenecks” most hinder the growth and development of your farm/business?**20. What specific actions are required to partially or fully remove these business-related bottlenecks?*

Appendix 2

Hawaii Cooperative of Organic Farmers

HICOF Research Priorities for Organic Agriculture

11/01/2006

Crop Management

Pest (insect and disease) control- This is an obviously a broad topic of high importance. Three priority areas of focus were identified:

- 1 Effective utilization (production and application) of compost for disease management,
- 2 Conservation and commercial production of natural enemies for control of insect pests, and
- 3 Evaluation of commercially available pest control products for efficacy under local conditions.

Cultivar selection- The identification of crop cultivars (varieties) that are well-suited to certified organic conditions in the tropics was identified as a high priority. Approaches to achieve this end include

- 1 Evaluating locally adapted cultivars,
- 2 Screening the large collections of germplasm for high performance under low-input environments and
- 3 Developing new cultivars specifically for certified organic conditions in the tropics.

Soil and Nutrient management- No priority area was identified. Current work at UHM includes:

- 1 Application and mineralization rates of manures and other organic nutrient sources,
- 2 Mycorrhizae management in vegetables and other crops, and
- 3 Cover-crops management.

Weed Management- No priority area was identified.

Economics

Cost of production for organic production of a wide range of crops is a critical need. Also of high priority is developing the ability to project income for organic growers, a complex task that requires data regarding historical and projected market price and yields and well as cost of production factors. It is suggested that a few model crops be evaluated first to develop the methodology. Suggestions for model crops were limited to fruits: Mango, Lychee, Breadfruit and Avocado.

Processing and Value-added

It was recognized that a plan for developing value added products from local organic products is critical and would require the guidance of food processing and food science professionals. The lack of readily available/affordable organic milk, sugar and other products for large scale processing of local was identified as a potential bottle-neck.

Animal Management

No priority was identified.

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Appendix 3

Hawaii Organic Farmers Association

HOFA Policy Statement on Genetic Engineering in Agriculture

The Hawaii Organic Farmers Association believes that the life of the land and a sustainable economy will both improve without the implementation of genetic engineering, provided that, more research and education are put forth for organic, ecologically sustainable land care practices. Therefore, we generally oppose the use of genetic engineering in agriculture. Our specific directives on the use of genetically modified organisms are as follows:

Impose a moratorium on the release of genetically modified organisms (GMO) into the environment until a regulatory regime has been adopted that includes extensive evaluation of environmental consequences and secondary ecological effects, as well as pre-market safety testing of genetically modified foods and ingredients.

Liability for any external costs to individuals and the environment caused by physical spillover effects, such as genetic contamination from pollen drift, must be borne by the manufacturers and distributors of genetically engineered products.

In conjunction with the establishment of an adequate regulatory regime such that the release of some GMOs for use in non-organic agriculture is justified, the resulting products, byproducts, and derivatives of genetic engineering must be explicitly labeled as such at every stage of manufacturing, production, and sale to provide adequate information to growers and consumers. The costs of such labeling and verification must completely be borne by the manufacturers of genetically engineered products.

U.S. certified organic products as overseen by the National Organic Program rules must remain GMO-free and the products of genetic engineering should continue to be excluded from organic production and handling systems.

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