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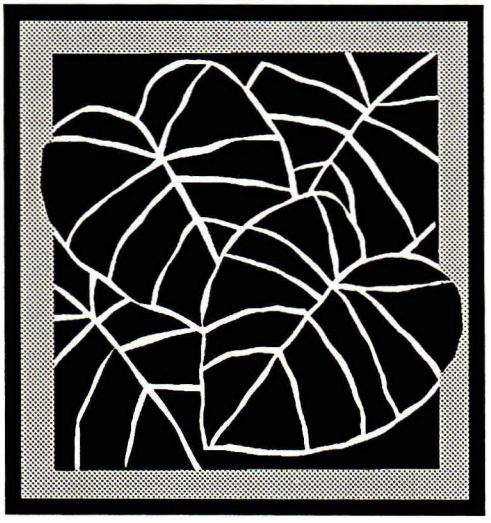
PROCEEDINGS OF

WHITE TARO

Another Opportunity: Allergen-free Food Products from Hawaii



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JAMES R. HOLLYER

HITAHR
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COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES
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UNIVERSITY OF HAWAII

Proceedings of

WHITE TARO

Another Opportunity: Allergen-free Food Products from Hawaii

Held at
The Pacific Room—Jefferson Hall
East-West Center
University of Hawaii at Manoa
Wednesday, October 24, 1990

Sponsored by
Hawaii State Department of Business, Economic Development and Tourism (DBED)
College of Tropical Agriculture and Human Resources, University of Hawaii (CTAHR)
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PREFACE

Taro is the 14th most consumed vegetable worldwide. It is grown in Asia, Africa, the Caribbean, the Americas, and the Pacific. In Hawaii, taro was the staple crop of the first settlers and today it still plays an important part in people's lives both nutritionally and culturally.

Taro is also a food that is considered by some to have many healthful characteristics, including an apparent allergen-free nature, a relatively high fiber content, and the fact that taro, in its poi form, is easily digestible. The seemingly allergen-free nature of taro is the reason this symposium was organized. There are several million people the world over who suffer everyday from food intolerances or food allergies. Such distress-causing foods (and ingredients) include milk, eggs, wheat, corn, soybean, and rice, to name a few. While the number of people afflicted with food consumption problems may represent only a small portion of our total population, the fact that they cannot consume many readily available foods makes mealtime very difficult. Consequently, this problem poses great opportunities for health, research, and business. In this proceedings (and the videotape) you will find information on all of these topics with the focus being the production of white varieties of taro in Hawaii for the eventual local conversion into allergen-free foodstuffs such as noodles, rice, bread, yogurt, and cookies.

James R. Hollyer
March 1991

ACKNOWLEDGMENTS

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Cover design by Miles Hakoda

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Opening Remarks

Mr. Roger A. Ulveling
Director of Business, Economic Development and Tourism
State of Hawaii
Honolulu, Hawaii

Good morning. Welcome to our presentations covering various aspects of white taro as an allergen-free food project. We at the Department of Business, Economic Development and Tourism find the topic of this symposium a timely one.

The choice of taro as an export product or as an allergen-free food product has come under discussion in the past. The then director, Dr. Shelley Mark of DBED's predecessor the State Department of Planning and Economic Development, had much to say 25 years ago. He told the Hawaii House Economic Development Committee that the use of poi as a health and baby food had the potential of developing into an industry status.

Further, Dr. Mark told the committee that a state-sponsored taro conference to be held in the following months was one of several projects planned to stimulate the state's economy. The use of taro was considered because of its allergen-free properties and its appeal for the manufacture of specialty items such as baby food.

The second taro conference was held in 1968 as a follow-up. The questions posed then by a speaker from the Chamber of Commerce of Honolulu are no less relevant today. He asked: "Is there land to grow the crop . . . can we grow and harvest it mechanically . . . (and) probably most important, is there a market for the crop?" Further, he talked about machinery that would assist in making taro a mechanized crop.

These are very prophetic words indeed. The linkage between the idea and the implementation was definitely lacking. Certainly, it wasn't for Hawaii's lack of experience with taro's capabilities.

Taro flour production was investigated in Hawaii in the late 1800s. Prior to World War II, taro flour was produced and shipped to the Mainland. A number of doctors, principally in allergy work, enthusiastically endorsed it.

Another example of taro processing occurred in 1937 when the Hawaiian Sugar Planters' Association sponsored a Hawaiian taro products company.

Taro for export also was considered as a business endeavor. Today, we will explore the possibilities of continuing this tradition by considering exporting a non-commercially grown and processed product, dryland white taro.

DBED enthusiastically supports any developments that could dovetail with our major mission to "improve the standard of living through the diversification of Hawaii's economy, the expansion of existing businesses and the attraction of new businesses."

Efforts to diversify the state's economy and make it less dependent on tourism have been under way for years. The state government has focused on diversified agriculture, and consideration of complementary uses for taro is certainly a move in the direction of diversified agriculture.

You may wonder how today's symposium differs from the earlier conferences. There are at least two very important differences. Back then, companies developing baby food products, such as Gerber Products Co., had been invited to send representatives to the 1965 state conference. These companies did not initiate their involvement, unlike the interest expressed by Japan's Kanematsu Corporation, which is represented here today by Mr. Teiji Fujii.

Secondly, over the intervening years, society has become more global. People now are becoming more aware of their physical well-being and health-related products, and perhaps are more willing to act on their desires to eat healthier.

Just as with the 1968 conference speaker quoted earlier, we invite all of you to learn, to develop an interest in processing white taro, and to find answers to some of the questions that undoubtedly will arise today.

I should stress that we are in the very early planning and certainly questioning stages of this endeavor. However, the Department of Agriculture, the University of Hawaii—College of Tropical Agriculture and Human Resources, and DBED all wanted to create a forum from which to begin working together.

Thank you for your interest and please enjoy the range of presentations today.

Opening Remarks

Mr. Yukio Kitagawa
Chairperson, Department of Agriculture
State of Hawaii
Honolulu, Hawaii

Good morning and welcome to all of you. It is most heartwarming to see that so many of you are interested in exploring new opportunities for the taro industry in Hawaii.

While taro is grown in many other parts of the world, taro has a special meaning for us here in Hawaii. Not only is it the first crop ever grown here but it is intrinsically tied to our heritage—taro was a staple food for our native people.

Most recently, there has been renewed interest in growing taro for new markets—taro chips in particular. Most of the data and information on this will be detailed by one of our other speakers on the agenda, but we find this renewed interest very exciting.

It is also exciting to note that this conference will focus on the potential for taro in a whole new field—as an allergen-free food source that may help millions of people around the world. It has long been felt that taro possesses some beneficial qualities and this symposium will bring all this into focus.

We at the Department of Agriculture are pleased with the opportunity for growth within the diversified agricultural sector, particularly with taro because of its significance in our culture. We are also pleased to note that many of you here today represent the private sector. Certainly the expansion of any industry will require cooperative efforts between us. We in government can't go it alone, and the more that we can work together with you, the better our chance of success.

Hawaii's business opportunities are turning more global, and the exploration of potential ventures such as this points to the pivotal role that we in government can play in bringing parties together and providing the mechanism necessary to increase dialogue.

We have long advocated the philosophy that we need to work together with the private sector to be able to expeditiously develop new diversified agricultural opportunities and this may represent one such opportunity.

I hope that you will find this symposium informative, since much work has gone into the planning of it to insure that a wide spectrum of issues are addressed.

I would like to take a moment to applaud the coordinators of this symposium—mostly because three state agencies were involved. We often receive criticism that state agencies can never work together on anything without it taking forever. Well, this is proof that it can happen and with relative speed.

To our honored guests from Japan, we thank you for sharing your aspirations with us, and to our participants, we hope that this symposium will serve as a springboard to further discussion and new opportunities.

Opening Remarks

Dr. Noel P. Kefford
Dean and Director, College of Tropical Agriculture and Human Resources
University of Hawaii at Manoa
Honolulu, Hawaii

Together with the Department of Business, Economic Development and Tourism and the Department of Agriculture, the College of Tropical Agriculture and Human Resources is very happy to present for your critical consideration a possible economic and health-related opportunity. I speak of enhancing Hawaii's current market-resource base for taro. At present, this base consists mainly of poi made from Hawaiian taros and chips made from Chinese taros. This new opportunity is to include another product: hypoallergenic or allergen-free foods made from the heretofore rarely used white-fleshed taros.

It is to the credit of the Hawaiian people that taro, processed as poi, the traditional Hawaiian staple, has endured the test of time. Thought to be the progenitor of the Hawaiian people, the taro plant has kept Hawaiians and members of other ethnic groups healthy for generations. It is this healthful trait associated with taro that we would like to share with those worldwide who are besieged by food allergies or intolerances, and also with consumers who feel they would benefit from eating taro in its various forms.

The symposium participants from overseas have already experienced the traditional ways by meeting with Hawaiian taro farmers in Hanalei and touring Ka Papa Lo'i o Kanewai of the Center for Hawaiian Studies.

Currently at the University of Hawaii, and especially in the College of Tropical Agriculture and Human Resources, there are about 20 research projects that are targeted toward enhancing the production, processing, and marketing of Hawaiian and Chinese taro. This year alone, it is estimated that grants from the federal government, the Governor's Agriculture Coordinating Committee, the Council for Agricultural Product Expansion, the Department of Land and Natural Resources, Office of Hawaiian Affairs, and the Administration for Native Americans will exceed $700,000. With this funding, there are high hopes of helping our current farmers, shippers, and processors lead more prosperous and fulfilling lives. It is also hoped that this work will create an adequate supply of Hawaiian and Chinese taros for all those who wish to consume them.

But we cannot stop there. Many times in the past, as Mr. Ulveling has aptly pointed out, taro from Hawaii has striven to become more than a locally consumed food—yet with little success. However, we feel that conditions have now changed in our favor, and today's speakers would like to tell you about them. Of utmost importance is that the Kanematsu Corporation of Japan, a $37 billion international marketing and trading firm, now wishes to sell a product that Hawaii farmers would grow, Hawaii manufacturers would process, and a Hawaii testing entity would certify as allergen-free.

While it may be possible that not all of your questions will be answered today, as the exploration of this new product line is in its embryonic phase, we feel that those of you in the private sector who investigate this prospect further may find it to be a project worthy of further consideration. I thank you for attending this symposium and I hope you will find the presentations informative.

Reviewing the Current Taro Market and a Look at the New Opportunity

Mr. James R. Hollyer
Junior Researcher, Department of Agricultural and Resource Economics
College of Tropical Agriculture and Human Resources
Honolulu, Hawaii

Abstract

In the first part of this paper the current production and market situation of Hawaiian (poi) and Chinese taros is discussed. The second half of the paper introduces the use of white taro–based products for the allergen-free food market.

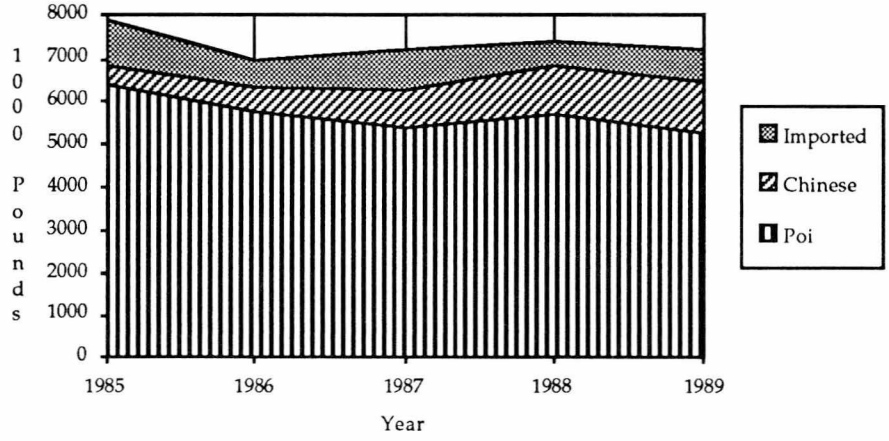
Introduction

I would like to start this morning by saying thank you to my colleagues on the organizing committee from the Department of Agriculture and the Department of Business, Economic Development and Tourism; they have contributed to this symposium with great enthusiasm and professionalism. I would also like to thank the many secretaries and student workers for their many hours of assistance.

Taro is a vegetable known mostly in the developing countries of Africa, Asia, and the Pacific. Some 12.6 billion pounds were reportedly produced there in 1987, making it the 14th most consumed vegetable worldwide (FAO). Taro is a root crop that came to Hawaii with the first human inhabitants several hundred years ago. In Hawaii, taro has been grown under both wetland paddy–like and dryland corn–like conditions for years. In 1989, 6.5 million pounds of all general types of locally grown taros were reportedly marketed (Figure 1) (HASS). While taro in Hawaii is consumed mostly in its processed poi form, since 1941 it has also been commercially chipped.

Since the days of King Kalakaua in the latter 1800s, there was still another set of products that were being heavily promoted at one time or another: European-style foods, such as taro-based breads, noodles, baby food, milk-bar drinks, and so forth. The latter groups of products have met with little success over the years, perhaps due to their esthetic quality, or a lack of knowledgeable and needy consumers who were willing to incur the extra costs associated with this type of starch. Still another reason

Figure 1. A 5-Year Trend of Marketings of Poi, Chinese, and Imported Taro in Hawaii



may be that we never had marketers who believed in taro enough to come to us and say that they would like to sell a product that we could produce. Regardless of the real reason or reasons for past unsuccessful attempts, it is important to note that the basic thread that ties all of these traditional and Western products together is the natural healthful qualities that are intrinsic to the taro plant itself.

The Market for Poi and Chinese Taros and Their Respective Products

I would like to take a moment now to bring everyone up to date on what is happening with taro in the state of Hawaii. This background information will give us all a common starting place when we talk about our new opportunity.

Production

Commercial taro farming in Hawaii is currently being done on about 150 farms covering some 430 acres (Table 1). In the case of Chinese taro, 11 percent of the farms farm 42 percent of the total acreage in that crop in areas of 5 acres or more. For the poi farmers, 23 percent of the farmers control 58 percent of crop on farms of 5 acres or more. Despite the fact that some farms are large enough to mechanize, little has been done to date. However, researchers at the College feel that this is about to change; last year I visited a 400-acre taro farm in Florida that was totally mechanized, and we are planning to take advantage of this knowledge very soon.

Table 1. Acreage and Price of Hawaii-grown Taro in 1989 for the State

General Taro Type	Acres of Taro Commercially Grown in Hawaii	Percent and Direction of Change Over Year Previous	Farm-gate Price ($/lb)	Percent and Direction of Change Over Year Previous
Poi	290	-7%	$.285	+10%
Chinese	140	+21	$.401	+2%
TOTAL	430	+23		

Source: Hawaii Agricultural Statistics Service, 1990.

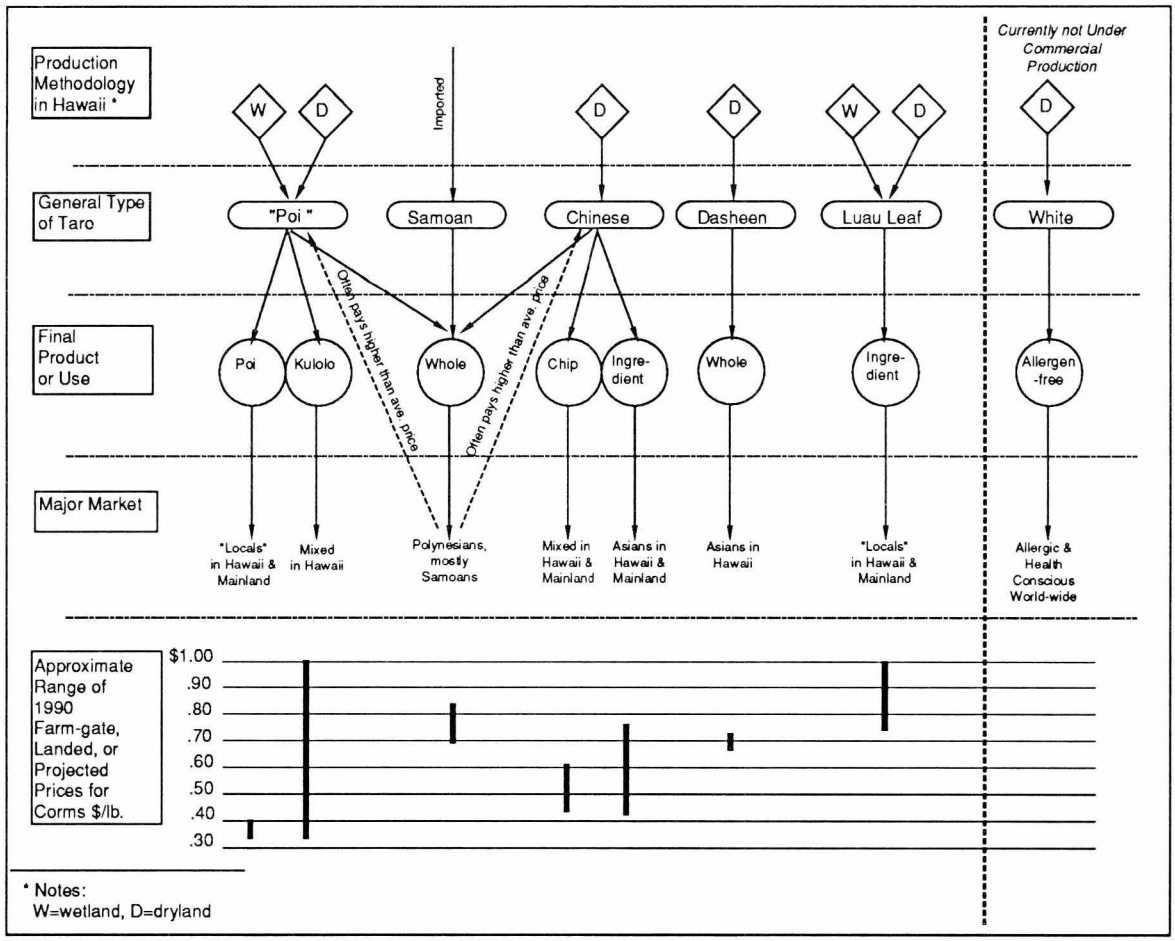
Market

In the past year we have seen the market for taro and taro-based products change. In the poi market we are experiencing one of the worst shortages that anyone can remember. However, because of this shortage and the resulting rise at the farm gate for poi taros, in the next year or so we should see more poi available. This is because these taros take 10–14 months to grow, and it appears that the price jump was sufficient to keep some farmers in the business and bring others back into it. Of course, only time will tell whether or not the price jump to a high of around $.40/lb from an average of approximately $.30/lb last year will be enough to keep farms in their lo'i.

In the market for chips made from Chinese taro, sources say it's hot and it looks like it's going to get hotter before leveling off. This is also true for the Los Angeles market for fresh whole taro corms—at least when the market is not flooded with Dominican or Mexican taros. It is during the good times when the Chinese taros from Hawaii command up to $.65/lb at the farm gate. Currently, the L.A. market is softening due to a lack of product promotion and definition, inconsistent quality, and heavy competition.

Yet for us to stay in either game, it's going to take close coordination like none seen before between farmer and buyer. The consequences are going to be devastating if we don't plan to sell before we plan to plant. For whom we should plan to sell to, let's take a look at Figure 2.

Figure 2. Market Interaction and Range of Farm-gate Prices for Taro 1990



Notice that the markets are pretty distinct with only a little crossover buying by the Polynesians.

To wrap up this section let me say that the farmers of the Hawaiian and Chinese taro varieties should have something to cheer about—this year farm-gate prices have been very good for those with a quality product to sell. However, you in the audience that represent the taro growers' organizations, please tell your members that all this prosperity can come to an end if they fail to plan for the long run.

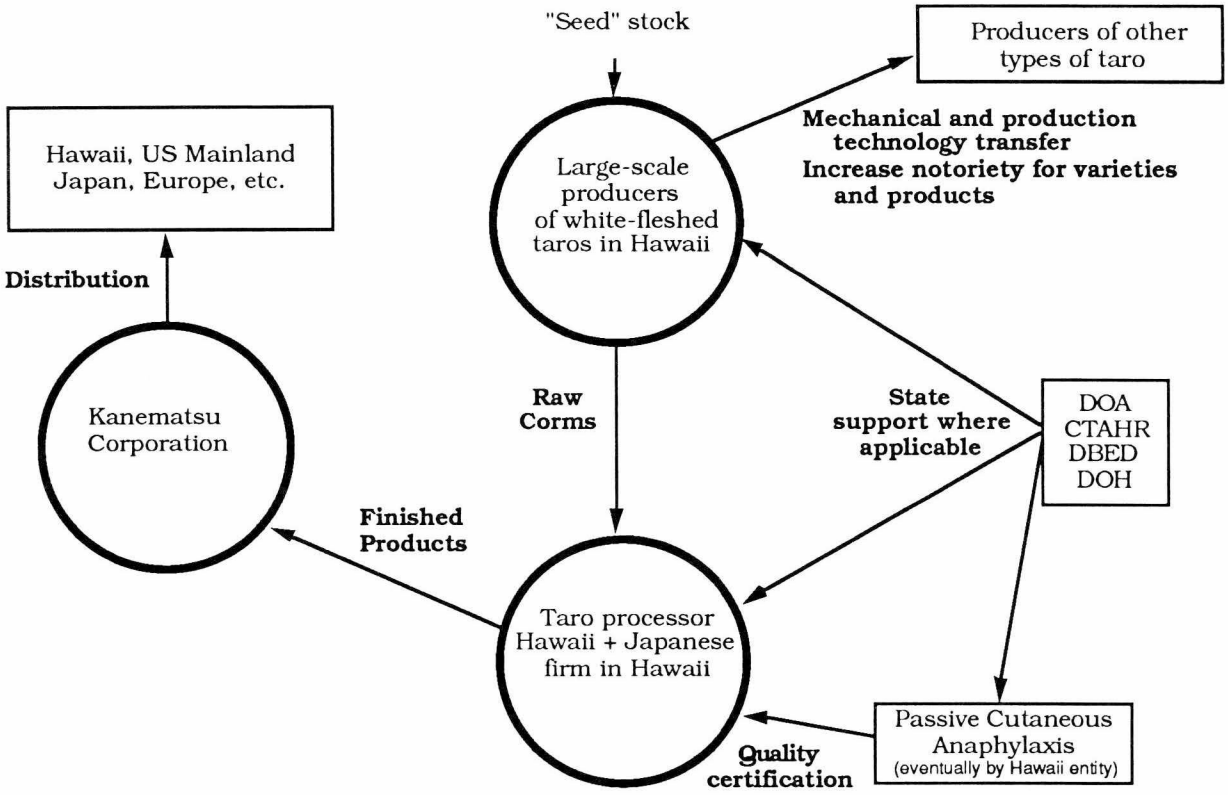
And speaking of the long run let us now take a look at Hawaii's newest agricultural opportunity.

The New Opportunity—Allergen-free Taro-based Products

Since the days of King Kalakaua and the Alden Fruit and Taro Company, the world is a very different place; there is more economic prosperity, better food technology, more efficient farming techniques, greater concerns over our environment and the food we eat, and the realization that some folks have intolerances and even allergies to food. It is in this setting that we bring before the private sector today what can be an economic and health opportunity: allergen-free taro-based products from Hawaii.

Some months ago, through a number of chance and intentional connections, Kanematsu Corporation of Japan came to Hawaii with this offer (Figure 3).

Figure 3. The Basic Organizational Plan of the New Opportunity



Kanematsu would like to buy finished, certified allergen-free, taro-based products from Hawaii. They told the governor's office on February 27, 1990, that they would like to put together a team of interested groups from the private sector: farmers, landowners, and processors who would work with them in a long-term project as worldwide distributors of a number of taro-based products. They stated that these products, however, should be as white-colored as possible. Thus the idea for the use of white-fleshed taros was born. Looking again at Figure 2, note on the right side the appearance of white-fleshed taros. Notice that there does not appear to be any crossover with the other two major taro products.

Kanematsu was informed of the current situation in taro and we reasoned that this is a win-win situation for all. We can put resources that are not being used by other taro growers into use; increase the notoriety of all types of taro and taro products from Hawaii; transfer mechanical and production technology to farmers growing other types of taro; provide a healthful product to many people worldwide, especially children; and also make some money in the bargain. But you and I know this will not happen overnight and will not happen by watching from the sidelines. For this opportunity to work for your company, it will take some resources and time.

Mr. Bill Cook would now like to introduce the gentleman from Kanematsu Corporation who has a vision of this new endeavor.

References

FAO (Food and Agriculture Organization of the United Nations). 1987. FAO Production Yearbook. Rome: FAO.

Hawaii Agricultural Statistics Service. 1989. Hawaii Vegetables Annual Summary. Honolulu, Hawaii.

Market News Service, Hawaii State Department of Agriculture, 1984–1988. Honolulu Arrivals, Fresh Fruit and Vegetables 1984–1988. Honolulu, Hawaii.

Marketing Strategy in Research and Development Activities: Insight for the White Taro Project

Mr. Teiji Fujii
Deputy General Manager, R&D Division
Kanematsu Corporation
Tokyo, Japan

Abstract

This paper describes Kanematsu Corporation's interests in taro and Hawaii. It also provides some general guidelines for the establishment of a marketing and development strategy for their White Taro Project proposal.

Introduction

Ladies and gentlemen, I am most delighted to be here this morning and to partake in this symposium. I'd like to start my talk by telling you a little bit about our company.

The Kanematsu Corporation was established in 1889; we recently celebrated our 101st anniversary. Our Australian company celebrated an anniversary this year; it was their 100th. In Sydney there is the Kanematsu Memorial Institute; another name is the Sydney Memorial Hospital. It was Kanematsu's gift to the people of Australia. In recent years, three M.D.s at the Institute have received Nobel Prizes, for which our company is very proud.

Revenues of our company were approximately ¥5000 billion, or $US37 billion, in 1989. We handle a variety of products from coffee to jet planes and from crude oil to pharmaceuticals.

Kanematsu is not, however, just a trading firm. As marketing specialists we are also assisting new small businesses in Japan and overseas to get started.

At the present time, I am on my way home from Moscow, where the Soviet Academy of Sciences invited me to address them on advanced techniques in Research and Development (R&D) management. The Soviet Union has many young intelligent scientists, yet they are unaware of how to translate that knowledge into finished, marketable products.

Now that I am in Hawaii, I am able to relax from my long journey.

Let me now turn my discussion to taro. Last summer, my wife and I spent 10 days vacationing on Maui. On our way home through Honolulu I met a friend, Mr. Motoomi Eguchi, President of The Art Board. We got to talking about business opportunities and he mentioned that the College of Tropical Agriculture and Human Resources at the University of Hawaii was doing some field and laboratory development work with dryland taro. He suggested that I convince Kanematsu Corporation, one of the nine leading trading companies in Japan, to investigate the possibility of working with these researchers in the area of marketing. I made contact with Mrs. Mitsue Cook-Carlson and Mr. Jim Hollyer, both avid promoters of taro, and they influenced me to pursue this task. I learned from them and the information they provided that taro was one of the safest foods in the world to consume. This was especially good news for infants who suffer from food allergies.

On my return home to Japan a splendid idea occurred to me. My eldest daughter, who when younger suffered greatly from an asthmatic condition, was treated by Dr. Kouji Tateno, a friend of mine who was six years my senior in high school and college. The idea was to commercially process white-fleshed taros into allergen-free products, which would then be checked for purity with a test Dr. Tateno had developed. The test, called the Passive Cutaneous Anaphylaxis, or PCA, test, identifies the presence of food allergens. It is this opportunity for Hawaii and the Kanematsu Corporation, combining white-fleshed taro from Hawaii, allergen-free certification by PCA in Hawaii, high level food-processing technology from Japan, and the marketing of allergen-free food products worldwide, which I would like to speak about today. However, before I do I would like to introduce to you Dr. Kouji Tateno and

Professor Kikuko Kishi, two of today's speakers who have come from Japan with us.

Dr. Kouji Tateno, a distinguished pediatrician, is the Chief of the Division of Pediatrics of Tomo Gunma Prefecture Hospital in Japan. He has over 30 years experience in the treatment of allergic diseases. His in-hospital patients number about 30 a day while his yearly outpatient total is close to 1500. Dr. Tateno says that due to food allergies, it is estimated that approximately 3 to 4 million people in Japan are not able to enjoy many of the traditional Japanese foods, such as rice and noodles, at one time or another in their lives. Dr. Tateno has developed an immunology-based test method, the PCA, to help identify foods these people can eat. The test can be applied not only to raw materials of potential allergen-free foods, but to the finished product as well.

Many children from all over Japan who are suffering from serious allergic reactions are hospitalized at Tomo Gunma Prefecture Hospital. Dr. Tateno is like a "father" to them.

Professor Kikuko Kishi is Professor Emeritus at Gunma University and also Chief, Division of Home Economics, Gunma Women's Junior College. She says the lack of allergens in allergen-free foods is not the only concern of researchers; the foods themselves must be tasty and easy to prepare as well. Along with Dr. Tateno, Professor Kishi has spent a considerable amount of time developing substitute foods that mimic traditional foods in all their qualities, but which are made out of allergen-free ingredients. Substitutes have already been developed that replace rice, wheat flour, egg, soybean, cow's milk, and pork, among others. Their work has been published in books and videotapes that are distributed throughout Japan.

Today, we will hear both of these recognized experts speak on their experience with regard to the production and certification of allergen-free foods. In addition, we are very anxious to have their thoughts on our White Taro Project proposal.

On this trip we have also brought with us many kinds of allergen-free foods from Japan and Germany. The ones from Japan are mostly distributed through Shin Shin Kaken, whose representative, Mr. Akihiro Sato, is here with us today. We invite you to take a look at these fascinating products during the break.

The White Taro Project

I would like to take a moment now before I get into a discussion on marketing to discuss why Kanematsu is interested in white taro from Hawaii.

First of all, Kanematsu is a firm interested in providing a variety of quality products to our customers worldwide. One of the product areas includes allergen-free foods. Currently, there are hundreds of allergen-free foods on the shelves in Japan. However, in many cases the final products are still not up to a quality standard of the products we would like to sell.

As far as we have learned, taro does not have any naturally occurring hazardous components. Further, *white-fleshed taros* would not need any extra processing or bleaching to turn them into a product that mimics traditional white rice, noodles, or any number of products eaten worldwide; this is not only a cost saving, but again reduces the chance of contamination during processing.

Now the question becomes this: where is a place that we can share our concern for product quality and get finished products produced out of white taro? To us the answer is clear: Hawaii.

Hawaii has a long history of taro production and we feel that there are current or potential large-scale growers who would be willing to sell white-fleshed taros to a local Hawaii food processor, which would then sell the finished product to Kanematsu for worldwide distribution. We see this project as *not* competing for resources or markets with the current poi and taro chip industries, as it would probably involve large-scale mechanized dryland production techniques of a taro that is not currently suitable for these two markets. However, we *do* see some potential technological benefits for these other industries coming out of this endeavor.

Marketing Strategy

Now I would like to talk about marketing strategy, especially in research and development (R&D) activities. Currently high-tech development is taking place in every major country of the world. Biotechnology is just one of the areas that is being explored. Unfortunately, however, researchers or engineers who are engaged in R&D sometimes are not interested in the marketing of finished products. Very often, they do not care about the time schedule for commercialization. We feel this is because they

Figure 1. Past and Present Definitions of Research, Development and Marketing

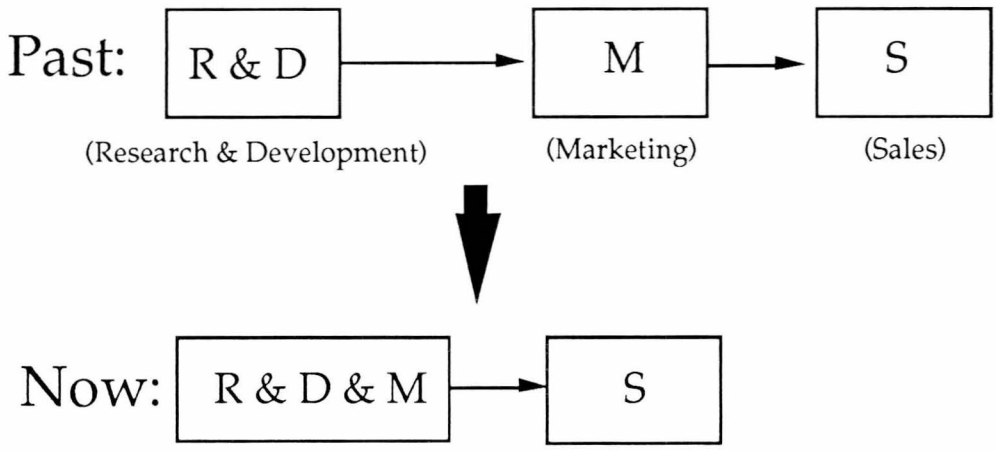
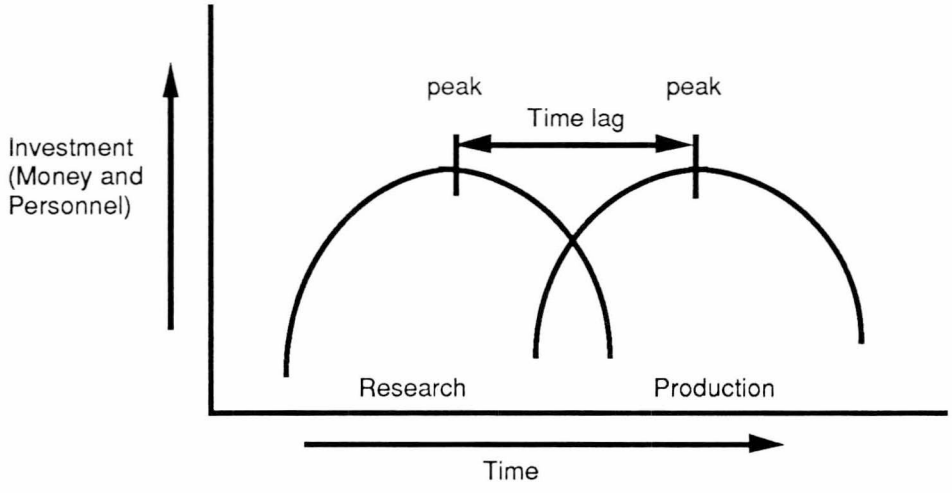


Figure 2. The Time Lag Between Research and Commercial Production Phases



do not know at which stage of the development process they stand, or how important they are to the success of the whole project. To this end, if there is to be joint public and private sector cooperation in examining the possibility of allergen-free foods coming from Hawaii, I would like to offer some insight into possible marketing and management strategies so that such a project would get off on the right foot.

Please look at Figure 1 as I explain briefly the definitions of research, development, and marketing.

R is research. In other words, it is a scientific stage. Researchers invent some new phenomenon or material.

D is development. In other words, it is a technological stage. Engineers will convert the new material the researchers have just invented into industrial materials to be used in commercial production.

M is marketing. Marketing is not a simple sale or sales promotion. Marketing is a way of commercialization and setup of the sales mechanism

In the past, marketing or sales staff did not start working until R&D on a product was completed. However, the time lag between the peak of research and that of production is made necessarily shorter each year by the forces of competition (Figure 2). Therefore, it is important that the R&D staff and the marketing staff work closely together from the research stage in order to take full advantage of the total earning period of the product. In this way, R&D&M is now the advanced way to develop and sell a product (Figure 1).

Parallel Stage Analysis of R&D and Marketing Activities

Now that marketing is tied to R&D from the outset we must have a way to plan the course of a project. This planning process is broken down into six stages. Figure 3 shows the more up-to-date approach while Figure 4 reviews past attempts.

Stage 1: The Search for Seeds and Needs from the Market. Researchers and marketing or sales people should be closely connected from this point on. Selection of development projects is very important. In addition to the seeds-oriented items that are normally identified in the research institute or inside the company, needs-oriented items are to be identified in the marketplace.

Stage 2: Laboratory-scale Testing and Market Research. Laboratory personnel will work toward new products that require about two to three years' development time. Concurrently, the marketing staff should conduct feasibility studies and market research. Managers of R&D and marketing departments should clarify the risk involved in the new technology or products (Figure 5; also see Risks of Research and Development).

Stage 3: Compilation of Different Ideas and Various Information. Active interchange of personnel and information between different fields in the public and private sectors should take place. Horizontal specialization or comparative advantage should be discussed.

Stage 4: Trial Manufacturing and Marketing. A pilot plant is constructed to develop and confirm production technology. Semicommercial production to be tailored to fit "repeat sample orders" from current and potential customers.

Stage 5: Conclusion of Marketing Studies and a Decision to Commercialize. Marketing studies will normally be concluded by confirming the intentions of customers who repeatedly purchased trial products. Assessment of information gathered during marketing and semicommercial production will occur. However, deciding to go with semicommercial production is not necessarily a decision to go into full-scale production.

Stage 6: Commercial Production and Sales Promotion. The technical division will construct a commercial plant and prepare a network for technical service. Concurrently, the sales division will make sales promotion tools and start advertising (Figure 6). In addition, the present sales organization will be rechecked and strengthened as necessary. This would be the *real* start of the white taro business.

Risks of Research and Development (Figure 5)

I see our taro project, currently, as what we call Technology A. A market for allergen-free food already exists in Japan and Europe, particularly in Germany. However, these special foods do not have an established market in other countries at the moment. Also, the PCA test and the high level of food-processing technology required to start commercialization have not yet been established in Hawaii. All these unknowns are business risks with which we must contend.

Risk Analysis of New Technologies. In order to use investment (money, personnel, and time) more efficiently, the management or leader of the project should clarify the risks of new technologies at the earliest stages of project development. From the point of view of marketing, new technologies are basically classified into two categories:

- Technology A (Incomplete Technology)
- Technology B (Unproven Technology)

The word "incomplete" found in Technology A means that the production technology suitable for full-scale commercialization is not yet complete. On the other hand, "unproven" in Technology B does not mean that the technology itself is not proven in R&D activities, but rather it means that marketability (possible applications, potential sale, etc.) of the product to be manufactured by the said technology is not proven. Therefore, it is rather difficult to immediately develop a marketing strategy for a new product, such as white taro–based rice, if it is Technology A. Let me give you a few examples to make my point a little clearer.

Risk of Incomplete Technology (Technology A) in the Marketplace. Technology is not completely developed, but the application of

Figure 3. Parallel Stage Analysis of R&D and Marketing (R&D&M)

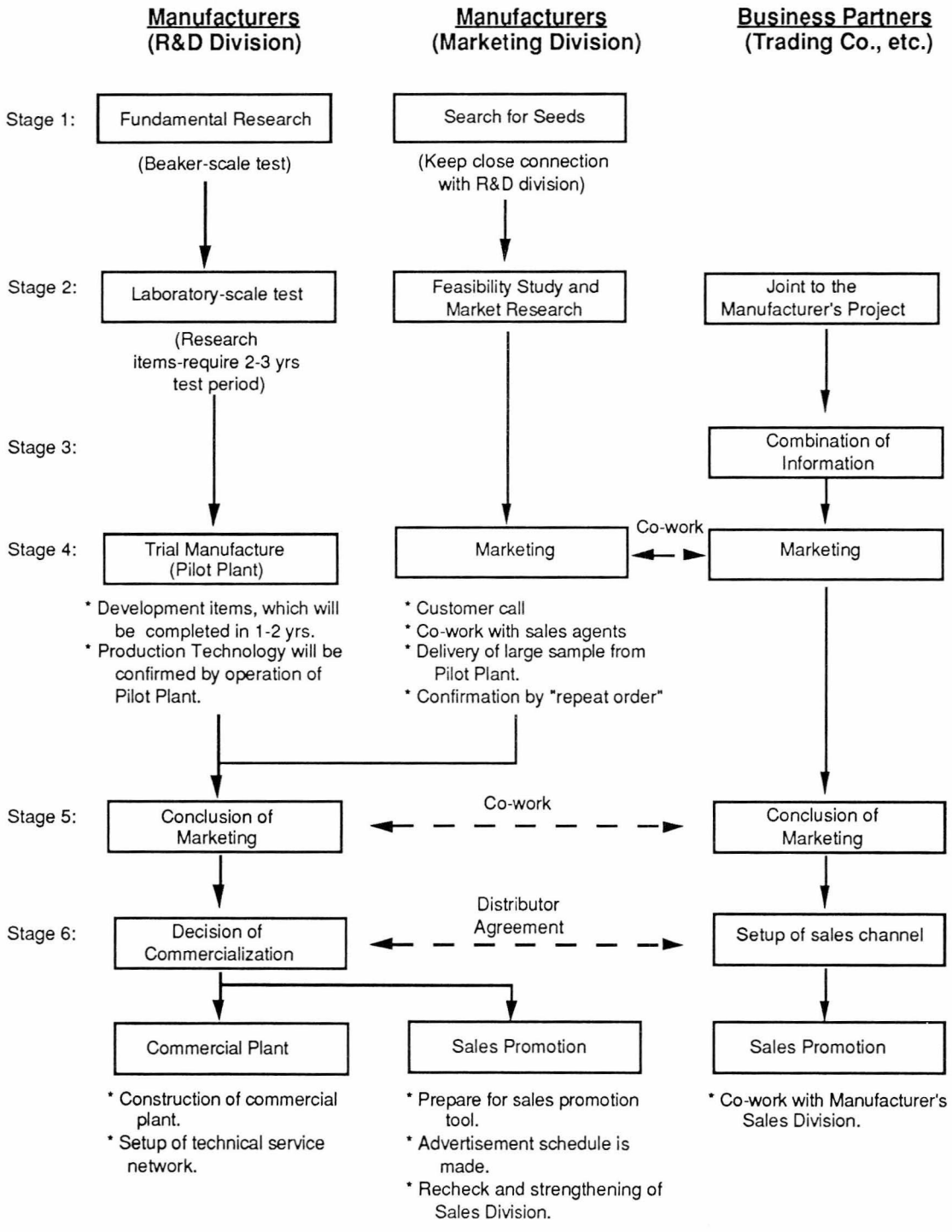
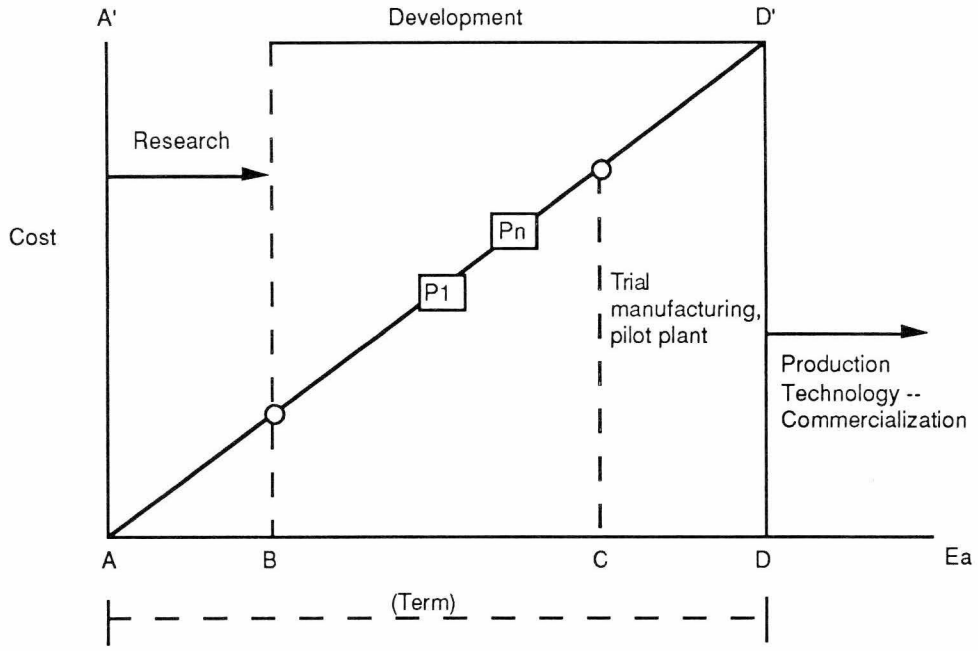


Figure 4. The Standard Form of Research and Development



D-D' New technology completed (based on marketing)
A-A' Cost of R&D (from budget developed at starting stage)
A-D Term of R&D (scheduled term at Stage 6)
A-B Term of fundamental research (the scientific basis is confirmed)
B-D Term of development (the economic basis is confirmed)
C Point of stage that technology is confirmed (Stage 4-5)
D-Ea Completion of production technology (Stage 6-)
P1, Pn Application for patents

the technology, the size of the market (sales volume), and potential customers can be clearly foreseen. Therefore, a feasibility study can be conducted with relative ease and the marketing of a new product can be achieved within a short period of time.

The case of the "instant chilling can," developed by Hungary Technical Corp., is a good example of Technology A. An instant chilling can is created by installing a special cooling device inside a beverage (beer, soda, etc.) can. Once activated, the cooling device will make the beverage cold within three to four minutes. The Hungary Technical Corp. had made only prototype samples of the instant chilling can (handmade) and proposed to the Kanematsu Corporation the concept of selling this technology to businesses in Japan. The idea had merit as we have close contacts with many breweries and can manufacturers. That is to say, Kanematsu had known the potential of the industry and could estimate a volume of sales despite the fact that the can technology itself had not been perfected for commercialization at the time.

All parties involved (breweries and can manufacturer) worked aggressively at this project, yet it failed within half a year. The cause for the failure was that researchers could not develop the methodology to install the cooling device in the can fast enough to fit into the very efficient, several-hundred-piece-a-minute production lines.

Risk of Unproven Technology (Technology B) in the Marketplace. Production technology is already completed, but the application of the finished product (materials, devices, machinery, etc.) and potential customers are not foreseen. In other words, technology is not proven in the market and the marketability of the product is unclear. Therefore, a feasibility study in the earliest stages of the project's development is

Figure 5. Risks Involved with Various Technologies

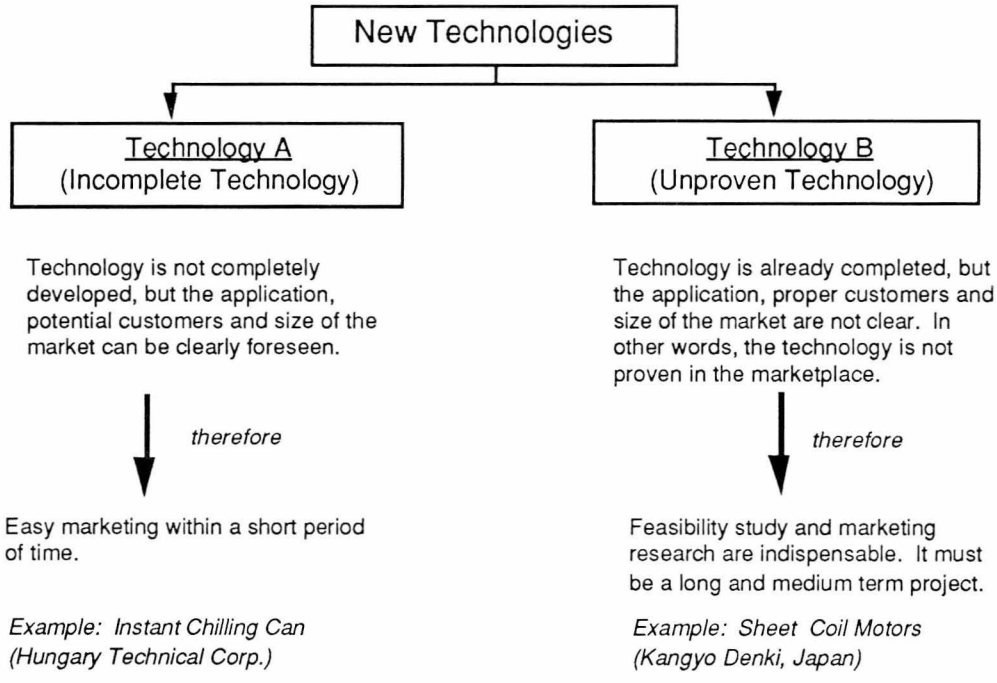
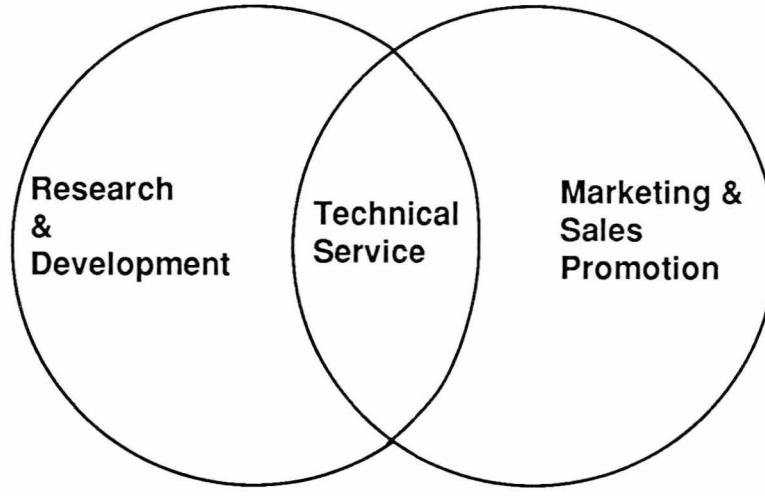


Figure 6. The Overlap Between R&D and Marketing is Technical Service



very important and it should be foreseen that the marketing of the product would take some time. However, a big return (profit) can be expected in this case if successful, as you have placed your product in a market with no competition.

Such an instance of Technology B is that of "sheet coil motors," developed by Kangyo Denki. Sheet coil motors are paper-thin motors that could be used to drive thinner and smaller electrical appliances than are available today. Kangyo Denki had invested approximately $60 million in R&D and built a new factory to build these unique motors. Unfortunately, however, the venture went bankrupt within a year. The cause of the failure is attributed to the fact that there were no good power sources for the new motors and no concrete applications could be created. In retrospect it is felt than Kangyo did an insufficient feasibility study of the market and then failed in marketing once the product was developed.

Maturity Study of R&D Management

Life Cycle of Finished Products. There are four periods in the life of a finished product: the embryonic period (E), the growth period (G), the mature period (M), and the aging period (A) (Figure 7).

It is clear from Figure 7 that big profits will not be obtained unless we launch into the market before the end of the growth period. On the other hand, the time lag between the peak of research and that of production is shortened year after year. Therefore, it is important that marketing and R&D work closely together from the research or embryonic stage in order not to miss this earning period.

Maturity Study of R&D Items. Basically, we need to assess the current status of research and production for any project with regard to Figure 2. Note that as time goes on and more competition enters the business arena the time lag will have to be made shorter to in order to stay competitive.

The horizontal axis of Figure 8 indicates technological maturity of a project, while the vertical direction is an indication of market maturity. The maturity stage is again divided into four sections as was done for the life cycle study (Figure 7). That is: E: embryonic, G: growth, M: mature, and A: aging.

Figure 7. Life Cycle of Finished Products

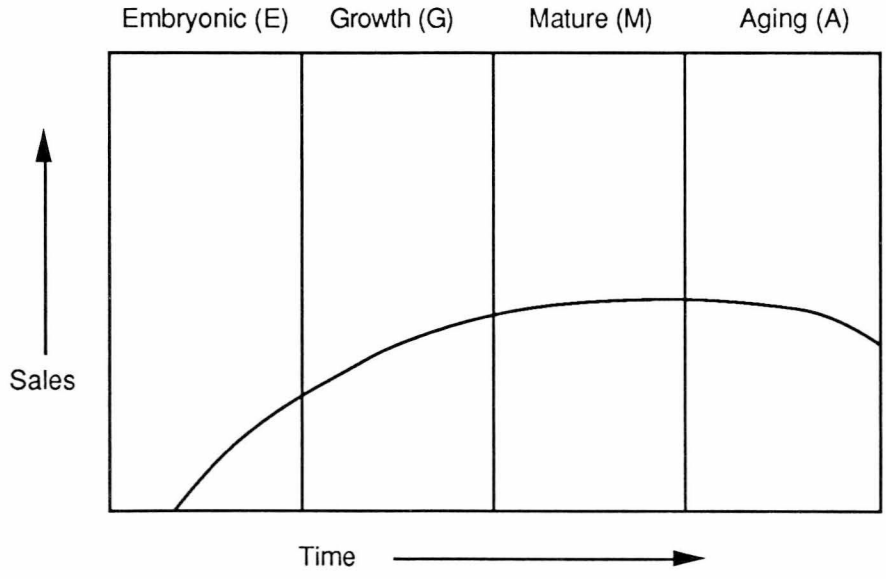
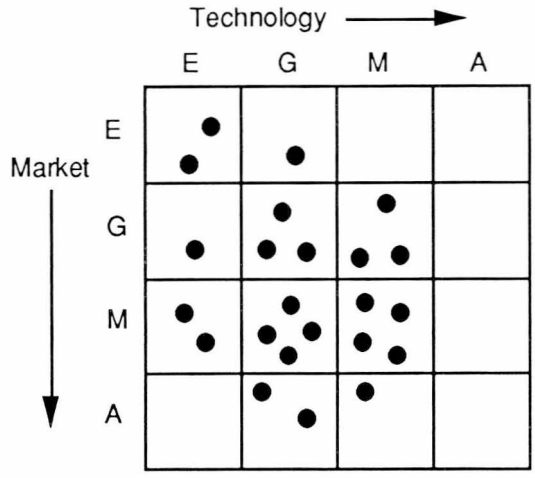


Figure 8. Maturity Study of R&D Items



Department or section managers then plot research agenda or established (concrete) projects, respectively, in the above 16 squares. It is hoped the budgets for each project or item can also be added to the matrix at this time. The spread of data clearly shows the present stage of a business and the direction of the future of the department or project (Figure 8).

Figure 9 shows what would be the mature case scenario for a well developed company or department; note the future is limited at least for the current projects. An influx of new research items or projects would shift the balance of the matrix to the upper left quadrant as seen in Figure 10.

Figure 9. Mature Case Scenario

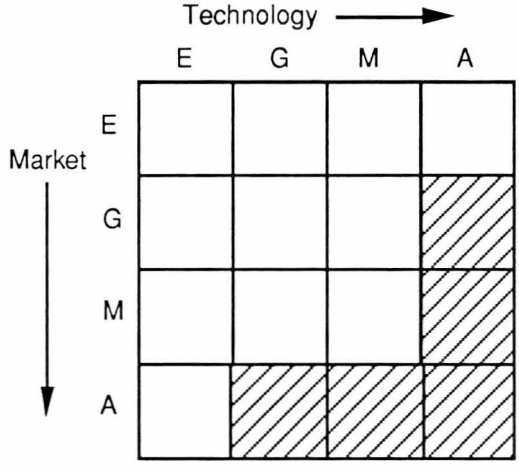


Figure 10. Optimal New Situation

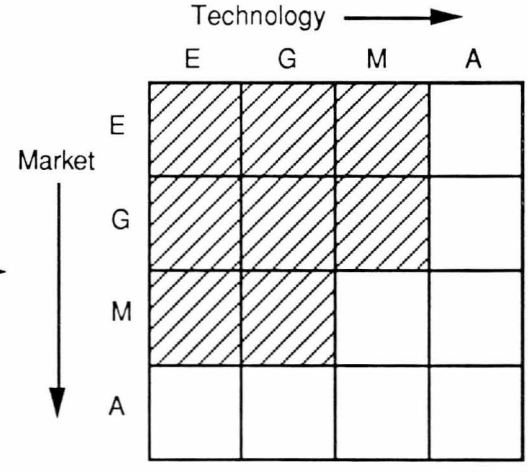
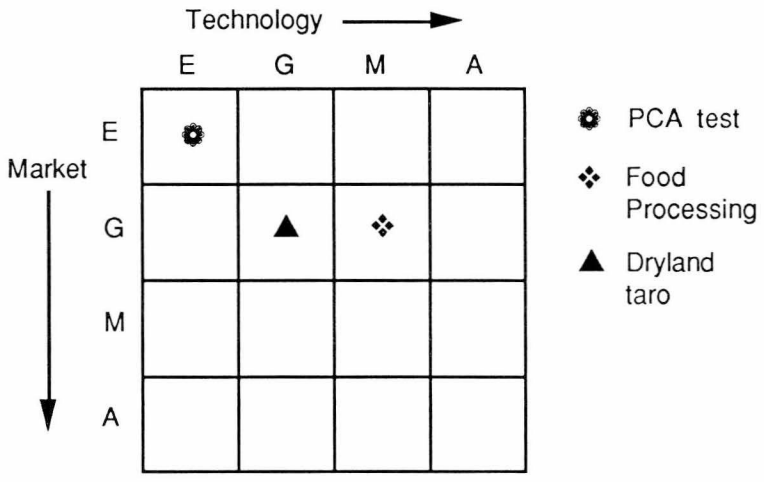


Figure 11. Estimation of Maturity of Taro R&D in Hawaii



I have taken the liberty to plot where I see the current status of our White Taro Project is on the matrix (Figure 11). The present state of taro cultivation is noted by ▲, processing technology of allergen-free food products is ❖, and the PCA test method is ✪.

Considerations and Summary

Let us again refer to the Parallel Stage Analysis of R&D and Marketing drawing (Figure 3). From the study of where we are at the present time, it is possible to arrive at some logical suggestions with respect to the next steps of this proposed project:

1. It should be confirmed that the taro project is to be a joint development project of the public and private sectors in Hawaii. San-Gaku-Kan Joint Project format is very popular these days in Japan (Figure 12).

2. We currently stand at Stage 2 in Figure 3. A market feasibility study of Hawaii, the U.S. Mainland, Europe, and Japan should begin as soon as possible. Kanematsu will investigate the European and Japanese markets. At the present time we cannot say anything about how much finished product we can sell or what the raw material price would be—no one knows taro in Japan and Europe.

3. A special management committee, for instance, the Taro Project Development Assistance Committee, could be started with state or private sector support.

4. A lab for the use of the PCA test could be established at the University of Hawaii (Stage 2). It will take several months to train the chemists or lab technicians in the PCA methodology in Dr. Tateno's lab in Japan. In the meantime, you should assemble a marketing staff for this project.

5. A pilot processing plant (located preferably at the site of dryland production of white-fleshed taros) could be established with state and private sector support. Experimental food processing can be done in Japan if the situation in Hawaii is not conducive to a quick start-up (Stage 4). And finally, once at this stage we will decide whether or not to go commercial.

6. Lastly, the form in Appendix 1 can be used to tabulate information about this project—we use it quite extensively.

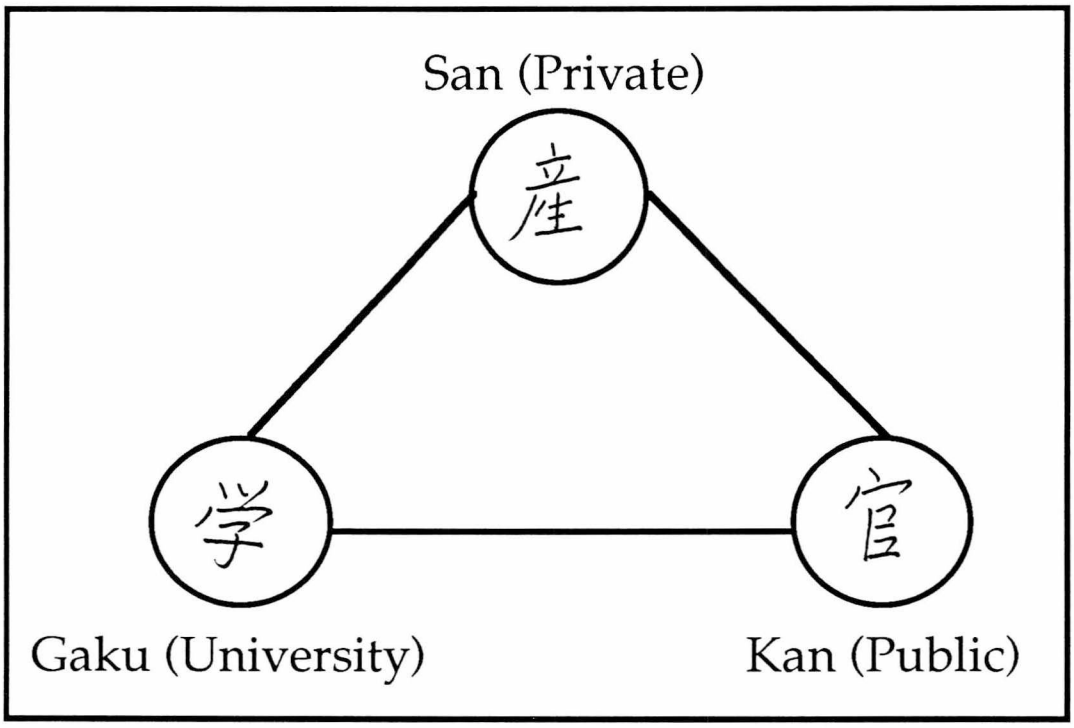
Summary

In summary, all members of the public and private sector involved in this endeavor should follow the project to Stage 4, the point at which a decision to go into full-scale production is made.

The above are suggestions from the Kanematsu Corporation to our friends in Hawaii. We earnestly hope that Hawaii will become a business center for taro-based allergen-free food products for the entire world. We also hope that a branch PCA testing center gets established here in either a public, private, or joint-venture format. Lastly, I hope that we can avoid double investment of resources by taking advantage of our respective specializations.

Thank you very much for your attention.

Figure 12. San-Gaku-Kan Joint Project Format



DEVELOPMENT PLAN

① Project No. [ ]

② ☐ New Item ☐ Continued ☐ Discontinued

③ Title of Project	④ Strategic Field	⑤ Code No.	⑥ Team Leader Name: Dept: Phone:

⑦ Division in Charge	⑧ Related Divisions		⑨ Related Companies
	1.	3.	1.
	2.	4.	2.
		5.	

⑩ Development Stage
- ☐ a. Fundemental Stage
- ☐ b. Feasibility Study
- ☐ c. Marketing Stage
- ☐ d. Commercialization

⑳ Share of Budget		㉑ Staff Members	Phone		
Dept.	$ Mil.	1.		5.	
Head office		2.		6.	
Other		3.		7.	
		4.		8.	
				9.	

⑪ Objective of Development

⑱ Characteristic of Development
- ☐ a. New Idea
- ☐ b. Differentiation
- ☐ c. Improvements

㉒ Development Period: Start: End:

㉓ Development Schedule Timeline

Project/ Task	1991 Month 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.	1992 Month 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

⑫ Contents ⑬ ☐ Incomplete Technology ☐ Unproven Technology

(Explain key points of technology and/or characteristics of products)

⑲ Maturity Analysis

<---Marketing \ Technology --->	E	G	M	A
E				
G				
M				
A				

E: Embryonic
G: Growth
M: Mature
A: Aging

⑭ Target of Development
a) Final goal/Estimated Time:
Estimated Sale: Estimated Profit:
b) Present Results
Cumulative Sale: Cumulative Profit/Deficit:

⑮ Measure of Development (Explain concept, measure, existence of co-partner, etc.)

㉔ Unit (1,000) \ Year		Balance (Previous Year)	1991	1992	1993
Expenses	Travel Expenses (Overseas)				
	Travel Expenses (Domestic)				
	Samples (Valued)				
	Entertainment				
	Tax				
	Other				
	TOTAL				

⑯ Existing problems and measure of solution

⑰ Protective Measures
- ☐ Secrecy Agreement
- ☐ License Agreement
- ☐ Distributor Agreement
- ☐ Patent applied
- ☐ Other

㉕ Unit (Mil) \ Year	Result (Previous Year)	1991	1992	1993
Estimated Sale				
Estimated Profit				

㉖ Notes:

that it was contaminated with milk and soybean allergens. We called them on the phone and wrote letters and they denied that they were using milk or soybean, yet our PCA test identified otherwise. We discontinued the use of their product.

Where Does Taro Fit In?

We feel strongly that taro has a chance of becoming a valuable ingredient in allergen-free foods. As far as we can tell no one is allergic to it when it is properly cooked. Some possible products are shown in Figure 3.

Note, for instance, if you would like to enter the allergen-free food market with your taro-based rice substitute, you will need to pass the PCA test.

Summary

While food allergies are problems for many people the world over, I have described the problems found in Japan. However, the lessons learned and processes developed in Japan can be shared with other people such as those in the United States and especially in Hawaii. One of the major contributions would be the use of the PCA method for certifying allergen-free food products produced in Hawaii. Such products may include those made from white-fleshed taros grown here in the state.

Figure 3. Possible Applications for Taro in Allergen-free Foods

Market	Taro Product	Requirements
Allergen-free	Substitute for: Rice Wheat In alternative diets as: Rice Wheat Sweet potato Barley Millet	Pass PCA for: Rice allergen (- response) Wheat allergen (- response) Have a weak reaction in the: RAST and skin test for each antigen
Healthful food	For staples such as: Bread Noodles Spaghetti, macaroni Gruel Taro rice Snack foods Taro cracker Taro dumpling	Develop new methods for cooking taro

Appendix 1: The PCA Test

The actual testing process is as follows:

a) Make antisera against each food antigen.

b) Make a series of dilutions of the antisera and inject it intradermally into a rodent.

c) Next, extract the allergen from the food under examination.

d) Blend the food extract with Evan's blue solution and inject it intradermally into the rodent.

e) If a food allergen is present in the food extract, a small patch of the rodent's skin will turn blue. *Note, however, that this test does not cause the animal harm, and perhaps saves the life of a child.* Other nonanimal testing methodologies are currently being developed.

The Development of Elimination Diets for Patients with Food Allergies

Professor Kikuko Kishi
Chief, Division of Home Economics
Gunma Women's Junior College
Takasaki, Gunma, Japan

Abstract

This paper describes the considerations necessary for establishing an allergen-free food in a substitution diet. Examples of some substitute foods are given.

Introduction

As was discussed by my colleague, Dr. Tateno, there are a great number of people in the world, many of them children, who suffer from food allergies. In Japan, up to 90 percent of the newborns have an allergy to milk, eggs, or soybean. As a food technologist it is my job to find or invent foods that these people can eat. These new foods, which are part of what we call an *elimination diet*, typically must have the taste, color, fragrance, and appearance of commonly eaten foods to convince the littlest allergy sufferers to consume them. The hardest part of the job of food formulation, however, is finding ingredients that do not cause an allergic reaction when eaten.

Requirements for Substitute Foods

Many of the foods that children and adults in Japan enjoy contain eggs, milk, or soybean. Some children, however, cannot eat these foods, often causing problems for the family at mealtime. When we develop foods for these patients we look at how the food addresses the following concerns:

- Free of allergens
- Certified through Passive Cutaneous Anaphylaxis (PCA) testing
- Delicious
- Can be carried in a lunch box
- Approximately the same nutritional value of the food for which it substitutes
- Raw ingredients are easily available and relatively inexpensive
- Provides the consumer with a pleasurable eating experience

Results of Research

Over the years we have developed a variety of substitute staples and snack foods for our patients. Many of these foods are discussed in *Food Allergy in Childhood (Vols. I and II): The Way of Eating, Living and Curing,* and include:

1. **Frozen micropaste carrot,** which is used as an egg substitute. The paste mimics the natural

egg in color and texture and has been used to make sponge cake, pancakes, and cookies.

2. **Marine beef** is a highly valued chicken, pork, and beef substitute. It can be used to make hamburgers and meatballs, among other products.

3. **Nonmilk-milk** is made from alphalized oat powder and looks just like regular milk. This milk substitute can be used in the formulation of white sauces.

4. **MA-1** is also an egg substitute. It is used to make nonegg mayonnaise and can be used in making seafood curry.

Summary

Foods that are to substitute for traditional foods in an allergic person's diet need to be not only chemically pure, but functionally tasty and attractive as well.

The Use of Allergen-free Foods in an Institutional Setting

Ms. Deanna Napualani Nakamura, R.D.
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Castle Medical Center
Kailua, Hawaii

Abstract

This paper describes the job of a hospital nutritionist. It gives some insight into criteria for selection of foods for patients with food intolerances.

Introduction

One in every six persons in the United States has an allergy problem. When individuals are hospitalized, their illness may be further affected by allergen(s) in conjunction with the admission diagnosis. Patients with known allergies need special treatment from the dietetic staff in regard to their menu planning.

Clinical dietitians must be creative in their menu planning to eliminate allergens from the food selections and to accommodate the nutritional needs of the patient. For instance, patients may not be able to tolerate milk products due to a lactose intolerance. The dietitian must be able to identify all foods on the menu and understand all the technical aspects of food processing, to restrict the distress-causing components from the patient's diet.

To prepare for today I took a survey of eight hospital dietary departments on Oahu. Six of the eight served poi on a daily basis. Taro was served as needed for special diets, but on a limited basis because of the cost. Poi, a taro product, is available on hospital menus as a staple for the Polynesian population who are part of the patient population in Hawaii. Ethnic mix is an important factor in hospital menu planning, which is incorporated with regional influences by the hospital dietitians to meet the needs of their patients.

A major obstacle to increasing utilization of some ethnic foods such as poi is the description used—such as "yuk food"—by individuals who are unfamiliar with eating a food that is purple and soft textured, an ethnic staple to the original people who inhabited these islands. Poi and taro products are used in many Polynesian and Oriental families for baby food, because its properties appear to be nonallergenic.

Appearance is an important part of the experience of eating food. Since it's been said that "we eat with our eyes," it is difficult to get past some of our own perceptions of food.

In regard to poi and taro products it is important that a more positive attitude be transmitted to newcomers regarding the benefits of these items. Positive information, such as an informative and well-illustrated brochure, is very

important not only for the patient's information, but also for dietitians who have moved to the Islands and are unfamiliar with the new products that are being discussed today.

Another concern is that a food has the ability or characteristics that make it possible to be substituted for similar products. Many of our vegetable protein substitutes are based on soy and wheat derivatives—both can cause allergic responses. Therefore, if you could produce a variety of products from a food such as taro, with its nonallergic properties, you might be able to capture a segment of the market. People with allergies must spend more time on their meal planning and shopping. Reading labels becomes an absolute necessity for their health.

Below are some basic concepts concerning food allergies, patients' needs, and possible food substitutes.

1. The term "food allergies" is often misapplied to a variety of conditions including food intolerances, food toxicities, food idiosyncrasies, and true food allergies.

a. Food intolerances are adverse symptoms resulting from ingestion of (a) particular

1) Specific component of food, such as lactose

2) Antioxidants, such as BHA (butylated hydroxyanisole), BHT (butylated hydroxytoluene), MSG (monosodium glutamate), and FD & C yellow dye No. 5 (tartrazine)

3) Histamine-inducing agents, such as egg whites, strawberries, and shellfish

4) Sulfites, formerly used in lettuce preservation

b. Food toxicities are toxic elements that may be present in food itself or may be produced by microorganisms contaminating the food:

1) Shellfish toxins
2) Aflatoxin (from mold in peanuts)
3) Pressor amines (in bananas)
4) Pesticide residues
5) Ergot
6) Penicillin
7) Dyes
8) Nitrites
9) Yeast
10) Cyanide (from fruit pits)

2. An allergen-free food is a food or foods that will not cause an immunological mediated response to food antigens, general glycoproteins.

a. Evidence of true allergens may be the basis of a variety of symptoms-complexes:

1) GI tract
2) Respiratory system
3) Nervous system
4) Skin
5) Behavior
6) Urinary tract
7) Musculoskeletal system

b. Most common food allergies:

1) Milk
2) Soy
3) Corn
4) Egg white
5) Wheat
6) Shellfish
7) Tomato

3. Current dietetic practice in several hospitals on Oahu:

a. Dietitians interpret the physician's diet prescription by interviewing the patient, evaluating the diet history, then planning a menu incorporating the patient's eating preferences within the allowed category of food

1) The menu is adjusted by using products available in the kitchen supplies initially, or a staff member will go to the store for a specialty item(s)

2) Patient's family may elect to bring in favorite foods

b. Difficulties with specialty items:

1) Not available on the food and supply purchasing program, since use is minimal in most community hospitals

2) Must be purchased on retail level at health food stores or a specialty supermarket section at a higher cost

3) Extra handling increases labor cost

4) Quality of the product may not be acceptable to the dietetic staff or patient(s)

c. Use of local allergen-free products depends on the menu cycle planning, clientele preferences, and budget. Some products that can be featured daily or on special theme days include

1) Plantain banana
2) Breadfruit
3) Rice
4) Poi
5) Long rice (mung bean noodles)
6) Sweet potato
7) Taro

The U.S. Market for Health Foods

Mr. Fred Stapenhorst
General Manger
Kokua Co-op
Honolulu, Hawaii

Abstract

This paper identifies the value of the natural foods industry and discusses some important considerations for entering that marketplace.

Introduction

The natural food business in the United States is about a $6 billion industry. It is segmented at retail level: 6000 natural food outlets total. Sixty percent of the $6 billion comes from 4000–10,000-sq-ft natural food stores. This type of store is the fastest growing outlet, and includes such stores as Mrs. Gooch's out of L.A., Bread & Circus in Boston, and Whole Foods of Texas. If you can make it here in these stores you've got it made.

Another 30 percent of the total sales goes out through conventional supermarkets, such as Safeway and Piggly Wiggly, where before they had special sections and now they have usually integrated natural foods into their traditional product line and include products like Knudson's juices, Milk Creek products, and Lundberg rice cakes. These supermarkets are dealing with only 1000 or so proven national brand winners.

About the last 10 percent of the sales go out through other mass marketers such as Longs Drugs. They are even more selective than the supermarkets, taking only the top 200–300 proven items—mostly brought in on a promotional basis.

The market for natural foods is growing and the fastest growing outlets would be the natural food supermarkets. Honolulu is still missing a natural foods supermarket, which is why I am here. I am helping Kokua Co-op to try to open a new supermarket-type location.

The marketing channels for natural food products are pretty well defined after 20 years: large wholesalers with sales of $30–100 million and a product line of 6000–10,000 SKU (stock-keeping units or items). So, any attempt to seriously penetrate the U.S. market would mean that you would have to convince these wholesalers of the value of your product. Another factor is that in order to keep from getting lost in the great array of products at the wholesale level, you would need to have a fairly extensive line of items, not just one, if for instance, you want to introduce taro. Examples of these wholesalers include Tree of Life, Florida; Natures Best, California; Stow Mills, Northeast U.S.; and Nutra-Source, Pacific Northwest.

My experience with taro is somewhat limited, being in Hawaii for only a short while. However, I am familiar with one product and that is Ray's Taro Chips out of Boulder, and to be blunt it has not been a successful product on the Mainland. I believe it is because it is a little unknown, a little pricey, and I don't think consumers would know why to buy that product over another natural chip. For instance, if taro has allergen-free qualities the consumer is not getting that message.

This is not to say that it can't be sold, as your idea is similar to a number of new vegetable-based pasta lines (spinach, artichoke) and would be similar to a lot of the wheat-free products. Basically, you would need to identify the two or three main quality attributes, such as the allergen-free one, and then really promote them.

Strategy

Any marketing strategies you are going to use to get into the market are going to have to overcome some barriers: for instance, the fact that taro-based products are generally unknown outside of Hawaii. There may also be some negative attributes about the product, which include price. There have been a lot of attempted entries such as this. An example is *Quinoa*, a grain out of South America that was sort of a fad

in the business two to three years ago, but it sort of failed. The main reason was that the marketers left it mostly in the grain form with few processed products.

Packaging is a critical component of any food product and especially so in the natural food business. The packaging reflects the type of consumer. One company that has done well primarily because of packaging is Celestial Seasonings.

Any attempt to enter the market will also have to be coupled with an aggressive promotional campaign. It will need to be pretty diversified and educationally slanted—why taro, why not some other base? You will need to get the message out through the trade publications, point-of-sales material, mass media campaign, a testimonial campaign from nutritionists or doctors that would go into nationwide newsletters.

If I were to attempt to capture some of the Mainland market, I guess I would segment the United States and go after the West Coast first.

Editor's Note: Mr. Stapenhorst kindly replaced Mr. Johnson (the next scheduled speaker, whose paper is included in this text) on two days' notice.

Marketing Hypoallergenic Food Products

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Abstract

This paper discusses the findings of a 1989 study on the natural food industry and also outlines some useful marketing techniques for those wishing to enter the industry.

Introduction

There is speculation—and debate—within the medical community that as much as half the U.S. population may suffer from some form of food allergy or food sensitivity. Certainly, within the natural foods industry, this potential market has been recognized. During the past decade, there has been a proliferation of products created as substitutes for foods commonly associated with allergies.

The most common food allergies involve wheat, yeast, dairy products, corn, beef, citrus, and potatoes. A number of soyfoods have been developed to replace milk, cheese, and eggs and have been relatively successful in natural foods markets. This success, however, is propelled by a broader base of consumers who appreciate the low-fat and low-cholesterol aspects of these products—not the fact that they are allergy substitutes.

Food substitutes for wheat, corn, and other grains have achieved a niche in the natural products market, but not an impressively large one. Many of the original products were based on rice, which, lacking gluten, is not a good ingredient in making bread or pasta. And there are people who have rice allergies, too. More recently, the focus has been on ancient grains and underutilized vegetables, such as amaranth, quinoa, teff, and taro root. Also, there are variant strains of wheat and corn that pose fewer risks to people with food sensitivities. Though each of these products commands shelf space and receives strong retailer support, none of them has taken off in the market based solely on its hypoallergenic merits.

Other than the soyfood substitutes, total sales for any of these other ingredients amount to, at the highest, a few million dollars

From *The Natural Products Market: A Wellspring of Consumer Trends,* published by New Hope Communications, 1989. Used by permission.

SALES OF NATURAL PRODUCTS BY CATEGORY—Independent Store Sales

(in millions of dollars)

Product Category	Independent Health/Natural Food Stores	Chain Health/Natural Food Stores	Mass Market Stores	All Stores
Vitamins	$580	$351	$26	$957
Personal Care	144	21	28	193
Herbs	129	30	4	163
Packaged Grocery	629	74	583	1,286
Frozen Foods	107	2	18	127
Dairy/Refrigerated	184	4	98	286
Bulk Foods	226	-	-	226
Produce	266	-	-	266
Organic Produce	131	3	34	168*
Natural Meat/Poultry	41	-	28	69
Food Service	211	-	-	211
Other (Books, housewares and other non-foods)	114	21	13	148
TOTAL SALES^	$2,631	$503	$798	$3,932

*A subset of all produce sales.

^ Does not include "Organic Produce" category.

INDEPENDENT STORE SALES BY REGION

(in millions of dollars)

Region	Sales*	Percentage share
North Atlantic	$595	22.6%
Great Lakes	253	9.6
South Atlantic	324	12.3
South Central	218	8.3
Plains	69	2.6
Rocky Mountain	182	6.9
Pacific	990	37.6
TOTAL SALES	$2,631	100

From *The Natural Products Market: A Wellspring of Consumer Trends*, published by New Hope Communications, 1989. Used by permission.

Retailing: The Interface with the Consumer

Retailers are accorded far more power in the natural products industry than in the conventional grocery or drugstore industries. The chief reason for this is that the success of most natural products ultimately depends upon the support and merchandising efforts of the retailers. Few natural products manufacturers have the resources to create consumer demand through mass media advertising. Most of their budgets are devoted to either specialty publications (which are found primarily in natural foods stores) or to point-of-purchase promotions.

Since the industry distinguishes itself by its principles, retailers frequently see themselves as guardians of natural foods ideals. Retailers usually establish a set of product standards that conform to their views of what is healthy and natural—and feasible within their market areas. These standards vary from retailer to retailer. Some are in writing, others just in the retailer's mind. The net result of these standards, however, is that retailers may refuse to carry a product even though it may have strong consumer demand. On the other hand, retailers may build up sales of a product that they really favor.

Retailers Build Organic Product Market

A good example is organic produce. Certainly the producers of organic fruits and vegetables, predominantly very small farmers, had no marketing clout. It was up to retailers to create demand, and that wasn't easy. Initially, organic produce was prohibitively expensive, cosmetically unappealing and subject to supply shortages. Yet a number of retailers were staunchly committed to the idea of organic food. They promoted it in their own newsletters and ads. They sampled it. They sold it at cost or at low gross margins to reduce the price gap between organic and commercial items. Eventually, this began to pay off. Even before last spring's controversy over Alar-sprayed apples, organic produce sales had been increasing rapidly.

Successful retailers stay in touch with the needs and desires of their customers, both informally and through formal surveys. "I view myself as a buying agent for my customers, not a selling agent for the manufacturers," says Rudra Altman, president of Cheese 'n Stuff Ranch Markets in Hartford, Conn., a statement that sums up the general philosophy of natural products retailers.

This retailer independence leads to immense differences in product mix from one store to another. In the conventional grocery industry, a shopper can expect to see the same products—even the same brands—in supermarkets throughout the country. In natural products industry, product mix may vary dramatically among stores in the same town. The absence of uniformity, however, tends to neutralize any manufacturer's efforts at mass media advertising, unless its product is also well-distributed in the mass market. Without consistent and widespread placement in the natural food stores, a manufacturer can't expect much of a return on money spent for media advertising. Thus, there is no way to create a consumer pull for specific natural products—unless a product happens to be the beneficiary of a fortuitous medical report or news story.

There are some factors that will eventually change this structure. The larger retail chains—such as General Nutrition Centers—are entering into cooperative advertising agreements with national natural products companies to engage in mass media advertising. The independent stores, too, are cooperating more closely with their brokers and distributors. Most distributors provide advertising flyers, which can be bag-stuffed or inserted into the local newspaper. Each store participating in such an ad program must carry all the products promoted in the flyer, thus instituting some sort of standardization into the retail sector.

As is it stands now, however, retailers remain in the driver's seat.

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The Currents of the Natural Food Products Industry

In compiling the information for this report, we have discerned several general trends within the natural products industry:

1. Growth of the natural products industry is a matter now of clearing away obstacles between the producer and the consumer.

Retailers who open clean, well-merchandised natural foods supermarkets suddenly create several million dollars of new natural products business. Retailers who operate smaller, more specialized shops also can post substantial volumes if they are in convenient locations. Manufacturers who provide convincing information along with their products can woo consumers to even the most esoteric items. Manufacturers that are able to get it right on pricing, packaging and distribution can become big hits in the mass market. It's as if consumers are saying, "Yes, I want natural products, but I want them on my terms. I won't go very far out of my way for them and I won't buy anything that looks too unfamiliar." The need is there, it's up to natural foods companies to fill it.

2. Success is accelerating industry growth.

This may seem obvious, but what it means is that each year, more companies are reaching the critical level in sales volume where they can attract first rate management, engage in broad-based marketing and raise capital for larger facilities. There also are better track records to point to. Mrs. Gooch's retail chain has the ability to roll out a large new store almost every year. Other retailers can use the success of Mrs. Gooch's to finance larger stores in their areas, as well. At this time, most of the industry's growth is being generated by existing companies, rather than start-ups, as was the case in the past.

3. Natural products continue to "outgrow" the industry.

Every year, a large number of natural products, like rookie baseball players, move up to the major leagues of the grocery industry. Some become mass market stars. As this occurs, they cease being specialty products and therefore are not counted in our tabulations of natural products industry sales. Thus, sales of all natural products continue to grow well beyond what we define as industry sales.

4. The impetus for growth is shifting from "demand pull" to "marketing push."

Consumer demand virtually forced small natural foods businesses to grow during the 1970s. Now growth-minded, these companies actively seek new sales. The increased professionalism of store merchandising has probably had as big an impact upon industry sales as the publicity around Alar and cholesterol during the past two years.

From *The Natural Products Market: A Wellspring of Consumer Trends*, published by New Hope Communications, 1989. Used by permission.

Large Natural Foods Stores

The natural foods supermarket originated as an attempt to mass market natural foods. Today, however, most of its operators consider themselves a specialty niche of the grocery market.

There's a fine distinction in this attitude. Rather than being the big fish in the small natural foods pond, they are small but highly mobile fish in the entire ocean of food retailing.

This change in perspective has had a major impact on pricing and gross margins. Few big stores any more attempt to operate at gross margins below 28 percent, which has been the average for several years. For the past two years, the average gross profit margin for these stores has been right around 31.5 percent.

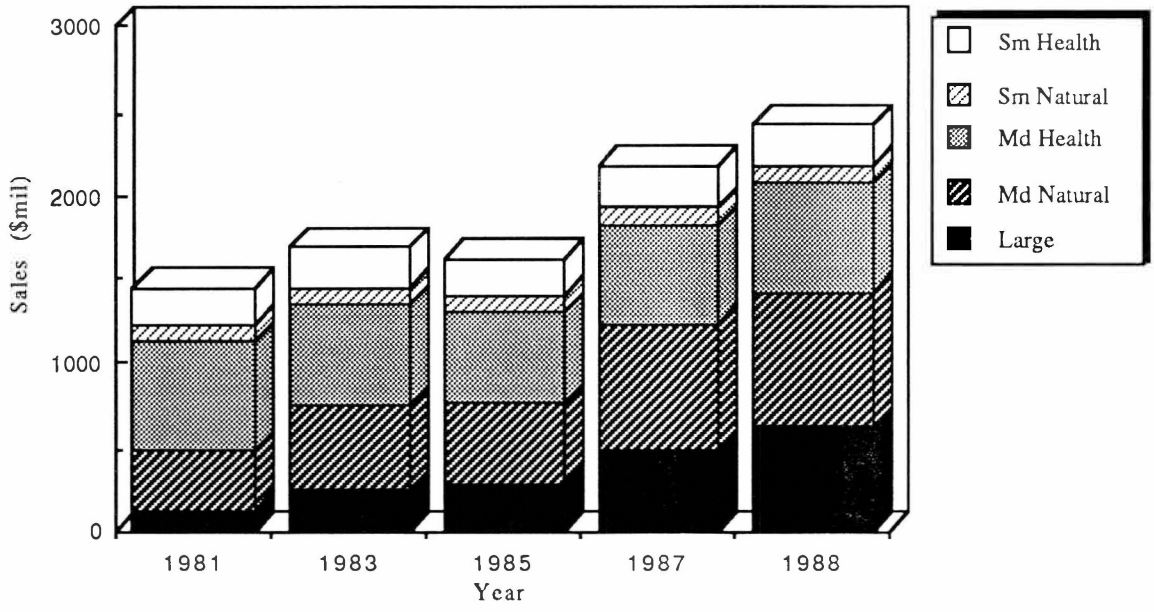
The higher margins have been achieved both through their ability to buy at the best volume discounts and by diversifying into higher profit areas, such as delis. Some stores not only make all their own deli take-out foods, but smoke their own specialty meats and run catering operations.

With average sales volumes just under $3 million a year, these stores are becoming very attractive to investors and banks. As a result, there are more of them every year. In 1987, the survey found just six new large stores. Last year, 18 were opened and two were closed, for a net increase of 16. As of this year, 17 new large stores had either opened or were under construction. Most of these stores were projects of existing retailers.

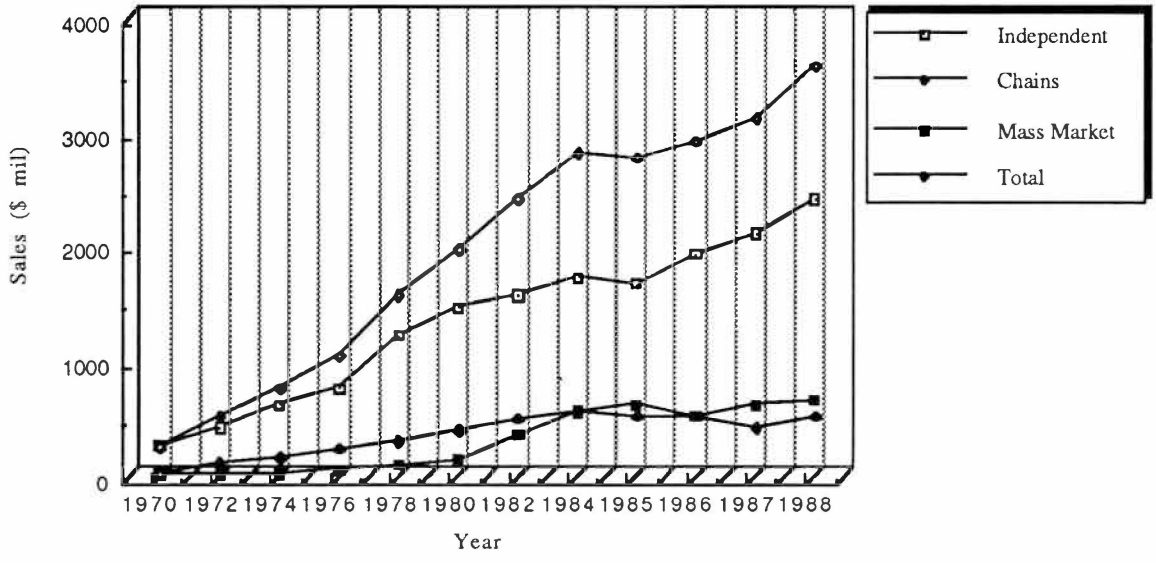
With their prominence and visibility in the industry, it seems as if there are hundreds of large stores. In fact, the survey counts just 193—and only 135 different retail organizations. Thus, 26 retailers operate more than one large store. In fact, these retailers control 43 percent of the large stores and nearly $400 million worth of sales.

From *The Natural Products Market: A Wellspring of Consumer Trends,* published by New Hope Communications, 1989. Used by permission.

Sales by Store Format ($ millions)



Natural Products Industry Sales ($ millions)



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Retailers Reap Rewards with Food Allergy Options

Food Sensitive Category Requires Knowledge, Understanding and Lots of Recipes

by Diane O'Donnell

PRAIRIE VILLAGE, Kan.—"Food allergies," "food intolerances," "adverse reactions to food" . . . so much confusion surrounds the question of food sensitivities and your customers.

No matter what they're called or how much confusion exists, one fact remains clear; retailers are seeing increased requests from customers with "food sensitivity" problems.

Some sources suggest that as much as half the U.S. population may suffer from some form of food allergy or sensitivity. Since the medical community has strict standards for defining an "allergy" and negative responses to certain foods may not test out as an allergy, "sensitivity" appears to be a wider—and safer—term to use when referring to these problems.

The most common food sensitivities seen by retailers and authors in this field involve wheat, yeast (in reactions to yeast in breads and as the *Candida albicans* condition), corn, eggs, milk and other dairy products, beef, citrus and potatoes. Some customers, retailers report, are even allergic to soyfoods and rice.

Symptoms may range from stuffy or runny noses, rashes and other simple physical complaints to more complex conditions such as headaches, fatigue, respiratory and digestive problems, irritability and even hyperactivity in children, according to William G. Crook, M.D., and author of *The Yeast Connection.*

Customers often enter natural foods stores after self-diagnosing their symptoms or upon the recommendation of a physician, allergist, naturopath, nutritionist, homeopath or chiropractor. Consequently retailers note a wide disparity in the knowledge their customers possess about food sensitivities

"Some customers know a lot about food allergies and have done a lot of research. They just need to know where things are. Others know nothing and are totally overwhelmed," says Roberta Johnson, owner of the 800-square-foot The Good Earth in Prairie Village, Kansas.

There's plenty a retailer can do to help. Perhaps most important is to be knowledgeable and have a sensitive, well-trained staff. Some people enter stores with a physician-provided list; others look for information and products that can help.

Nadine Agrawal, co-owner of the 1,800-square-foot Honeysuckle Health Foods in Memphis, Tennessee, provides a three-page list of yeast-free foods, many of which are available in the store. The five-store Bread and Circus chain, based in Newton Highlands, Massachusetts, offers a 10-page *Yeast-Free, Anti-Candida Shopping Guide.* Prepared by a nutritionist, the guide directs customers to food categories and substitutions, supplements and an informative book section in the stores.

Dietary Management

Food-sensitive customers face a major lifestyle change, notes Virginia Nichols, owner of Virginia Nichols Cookbook, a 1,600-square-foot store in Dayton, Ohio. She says that "dietary management" is the key to succeeding with food sensitivities. "It has to be a constant discipline for them; they can't ever let up."

Build up an allergy free selection of titles within your book section, retailers suggest. They note a strong need for cookbooks with updated information, a wide range of recipes, and recipes for those with multiple food sensitivities—both yeast-free and dairy-free recipes, for example.

Whether customers have a rotation diet or an elimination diet, they still need the personal care "for which health food stores are known," says Margaret Wittenberg, writer and researcher for the eight-store Whole Foods Markets Inc. in Austin, Texas. "That 'TLC' is what makes our industry stand out."

An elimination diet is usually attempted first by a food-sensitive customer to see exactly which foods are causing the problems. The diet usually lasts between two and three weeks. Once the problem-causing foods are identified, customers often choose to rotate the allowable foods in a four-day or other interval rotation diet.

Retailers report taking food-sensitive customers on a personal store tour, pointing out allergy-food products and substitutions, and helping customers read labels properly. Tact, understanding and a good listening ear are all needed especially with newly diagnosed customers, they say. Since many stores do not break-out allergy-free foods in a separate, easily identified section, it's important to have well-trained employees who know the exact locations.

What's New?

Knowledge of new products is also critical to successfully catering to food-sensitive customers, as is awareness of consumer newsletters, support groups and special programs in the community.

Nichols nurtures a referral relationship with a group of holistically oriented physicians in Dayton. "We are a support system for them and enjoy a good cooperative working relationship. They're the reason we're in business," she says.

Joanna Haley, a physician's assistant in Dayton, leads weekly classes to orient newly diagnosed patients to the diet changes and regimen they'll have to undergo. Haley distributes store-provided samples so that patients can learn how to "visually sample the products"—read the labels closely and learn what to look for in terms of ingredients and other information. Haley recommends Nichols' store as a primary source of products and Nichols offers a gift certificate/coupon to winners of a weekly drawing.

Nichols emphasizes that "this kind of relationship doesn't just happen overnight. It takes time to build up this confidence with doctors." She adds that patient education programs such as this one are an excellent way to build sales in allergy-free products while also providing a needed community service.

Recipe handouts provide another way to boost sales, say retailers, but few stores admit having the time or personnel available to develop them. Retailers recommend scanning the cookbook shelf, selecting a variety of recipes in several highly requested areas of food sensitivity and reproducing them as index-card or one-page handouts.

Retailers tell NFM they would like to see more manufacturers offer such handouts to meet increasing consumer demand for allergy-free recipes. They stress that easy-to-try recipes on individual cards or sheets would be a good way to persuade these customers to try the new foods they now have to buy or prepare. Recipes are needed in all sensitivity categories, but especially yeast-free and wheat-free, retailers report.

Spreading the Word

In-store demonstrations and mentions of new products in store newsletters also can convert the newly diagnosed customer into a faithful regular customer.

The staff at Whole Foods Markets refers to food substitution products while conducting its "Heart's Delight" familiarization tours. Held three times a week in the Austin stores, the tours are designed to provide information about fats, fiber and cholesterol for customers with concerns or needs in these areas.

Alana Sugar, customer service and customer relations demonstration coordinator for Whole Foods, notes that allergy-free customers take the tour for general information, they often seek her assistance afterwards to request sensitivity-related help. The tours are conducted free for customers (who must sign up in advance). Those taking the tour are given food samples from "Heart Healthy" departments in the store, a copy of Wittenberg's book *Experiencing Quality* and a collection of coupons worth $20 in merchandise.

Retailers can also tie allergy-free food promotions into special monthly or seasonal promotions such as Natural Foods Month or National Soyfoods Month (both in April) whenever appropriate, suggests Leslie Harlow, Executive Administrator of the Soyfoods Association of America, in Bar Harbor, Maine.

An Estimation of Local Economic Potential

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Abstract

This paper briefly describes the general types of economic returns that may be available to dryland taro farmers. It borrows heavily from work done by Leung and Sato, "Cost and Return of Chinese Taro Production in the Hilo Area," in the proceedings of *Taking Taro into the 1990s: A Taro Conference*. It also provides spreadsheets that can be used to perform sensitivity analysis on price, production, and processing estimations.

Introduction

At this point in time it is rather difficult to assess the potential economic returns from growing or processing white-fleshed taros. However, we can give an example of how to estimate returns quickly with the attached spread sheets (Figures 1 and 2). For instance, let's say you get a conservative yield of 25,000 lb/acre (could go as high as 40,000), and $.15/lb over the total cost of production; a farmer can expect to receive about $3750/acre.

Now if you are in the processing end and you get an order for 100,000 lb of taro flour, you can look at Figure 3 and get an estimate of how much your farmer-contact will need to grow for you. If the conversion rate of fresh weight taro corms to flour is about 25 percent (1 lb taro equals 0.25 lb flour), you look for the 100,000 under the vertical column at 25 percent and then look left to 400,000 lb.

Some Past Research

In 1989 Leung and Sato estimated the cost and returns for Chinese taro growing in the Hilo area. While the circumstances may not be exactly the same in the case of white-fleshed taros, this paper is a good starting point for return estimation.

Pounds of Raw Taro Corms Produced

	Average Yield Per Acre (lbs)								
Acres	20,000	22,500	25,000	27,500	30,000	32,500	35,000	37,500	40,000
10	200,000	225,000	250,000	275,000	300,000	325,000	350,000	375,000	400,000
20	400,000	450,000	500,000	550,000	600,000	650,000	700,000	750,000	800,000
30	600,000	675,000	750,000	825,000	900,000	975,000	1,050,000	1,125,000	1,200,000
40	800,000	900,000	1,000,000	1,100,000	1,200,000	1,300,000	1,400,000	1,500,000	1,600,000
50	1,000,000	1,125,000	1,250,000	1,375,000	1,500,000	1,625,000	1,750,000	1,875,000	2,000,000
60	1,200,000	1,350,000	1,500,000	1,650,000	1,800,000	1,950,000	2,100,000	2,250,000	2,400,000
70	1,400,000	1,575,000	1,750,000	1,925,000	2,100,000	2,275,000	2,450,000	2,625,000	2,800,000
80	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000	3,200,000
90	1,800,000	2,025,000	2,250,000	2,475,000	2,700,000	2,925,000	3,150,000	3,375,000	3,600,000
100	2,000,000	2,250,000	2,500,000	2,750,000	3,000,000	3,250,000	3,500,000	3,750,000	4,000,000
110	2,200,000	2,475,000	2,750,000	3,025,000	3,300,000	3,575,000	3,850,000	4,125,000	4,400,000
120	2,400,000	2,700,000	3,000,000	3,300,000	3,600,000	3,900,000	4,200,000	4,500,000	4,800,000
130	2,600,000	2,925,000	3,250,000	3,575,000	3,900,000	4,225,000	4,550,000	4,875,000	5,200,000
140	2,800,000	3,150,000	3,500,000	3,850,000	4,200,000	4,550,000	4,900,000	5,250,000	5,600,000
150	3,000,000	3,375,000	3,750,000	4,125,000	4,500,000	4,875,000	5,250,000	5,625,000	6,000,000
160	3,200,000	3,600,000	4,000,000	4,400,000	4,800,000	5,200,000	5,600,000	6,000,000	6,400,000
170	3,400,000	3,825,000	4,250,000	4,675,000	5,100,000	5,525,000	5,950,000	6,375,000	6,800,000
180	3,600,000	4,050,000	4,500,000	4,950,000	5,400,000	5,850,000	6,300,000	6,750,000	7,200,000
190	3,800,000	4,275,000	4,750,000	5,225,000	5,700,000	6,175,000	6,650,000	7,125,000	7,600,000
200	4,000,000	4,500,000	5,000,000	5,500,000	6,000,000	6,500,000	7,000,000	7,500,000	8,000,000
210	4,200,000	4,725,000	5,250,000	5,775,000	6,300,000	6,825,000	7,350,000	7,875,000	8,400,000
220	4,400,000	4,950,000	5,500,000	6,050,000	6,600,000	7,150,000	7,700,000	8,250,000	8,800,000
230	4,600,000	5,175,000	5,750,000	6,325,000	6,900,000	7,475,000	8,050,000	8,625,000	9,200,000
240	4,800,000	5,400,000	6,000,000	6,600,000	7,200,000	7,800,000	8,400,000	9,000,000	9,600,000
250	5,000,000	5,625,000	6,250,000	6,875,000	7,500,000	8,125,000	8,750,000	9,375,000	10,000,000

Figure 1

Returns Per Acre of Production

		Average Yield Per Acre (lbs)								
		20,000	22,500	25,000	27,500	30,000	32,500	35,000	37,500	40,000
Return	$0.05	$1,000	$1,125	$1,250	$1,375	$1,500	$1,625	$1,750	$1,875	$2,000
per	0.06	1,200	1,350	1,500	1,650	1,800	1,950	2,100	2,250	2,400
pound	0.07	1,400	1,575	1,750	1,925	2,100	2,275	2,450	2,625	2,800
over	0.08	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
cost	0.09	1,800	2,025	2,250	2,475	2,700	2,925	3,150	3,375	3,600
of	0.10	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000
production	0.11	2,200	2,475	2,750	3,025	3,300	3,575	3,850	4,125	4,400
	0.12	2,400	2,700	3,000	3,300	3,600	3,900	4,200	4,500	4,800
	0.13	2,600	2,925	3,250	3,575	3,900	4,225	4,550	4,875	5,200
	0.14	2,800	3,150	3,500	3,850	4,200	4,550	4,900	5,250	5,600
	0.15	3,000	3,375	3,750	4,125	4,500	4,875	5,250	5,625	6,000
	0.16	3,200	3,600	4,000	4,400	4,800	5,200	5,600	6,000	6,400
	0.17	3,400	3,825	4,250	4,675	5,100	5,525	5,950	6,375	6,800
	0.18	3,600	4,050	4,500	4,950	5,400	5,850	6,300	6,750	7,200
	0.19	3,800	4,275	4,750	5,225	5,700	6,175	6,650	7,125	7,600
	0.20	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000
	0.21	4,200	4,725	5,250	5,775	6,300	6,825	7,350	7,875	8,400
	0.22	4,400	4,950	5,500	6,050	6,600	7,150	7,700	8,250	8,800
	0.23	4,600	5,175	5,750	6,325	6,900	7,475	8,050	8,625	9,200
	0.24	4,800	5,400	6,000	6,600	7,200	7,800	8,400	9,000	9,600
	0.25	5,000	5,625	6,250	6,875	7,500	8,125	8,750	9,375	10,000
	0.26	5,200	5,850	6,500	7,150	7,800	8,450	9,100	9,750	10,400
	0.27	5,400	6,075	6,750	7,425	8,100	8,775	9,450	10,125	10,800
	0.28	5,600	6,300	7,000	7,700	8,400	9,100	9,800	10,500	11,200
	0.29	5,800	6,525	7,250	7,975	8,700	9,425	10,150	10,875	11,600
	0.30	6,000	6,750	7,500	8,250	9,000	9,750	10,500	11,250	12,000

Figure 2

Figure 3

Amount of Finished Product

Raw lbs	Conversions 10%	15%	20%	25%	30%	35%	40%
200,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000
300,000	30,000	45,000	60,000	75,000	90,000	105,000	120,000
400,000	40,000	60,000	80,000	100,000	120,000	140,000	160,000
500,000	50,000	75,000	100,000	125,000	150,000	175,000	200,000
600,000	60,000	90,000	120,000	150,000	180,000	210,000	240,000
700,000	70,000	105,000	140,000	175,000	210,000	245,000	280,000
800,000	80,000	120,000	160,000	200,000	240,000	280,000	320,000
900,000	90,000	135,000	180,000	225,000	270,000	315,000	360,000
1,000,000	100,000	150,000	200,000	250,000	300,000	350,000	400,000
1,100,000	110,000	165,000	220,000	275,000	330,000	385,000	440,000
1,200,000	120,000	180,000	240,000	300,000	360,000	420,000	480,000
1,300,000	130,000	195,000	260,000	325,000	390,000	455,000	520,000
1,400,000	140,000	210,000	280,000	350,000	420,000	490,000	560,000
1,500,000	150,000	225,000	300,000	375,000	450,000	525,000	600,000
1,600,000	160,000	240,000	320,000	400,000	480,000	560,000	640,000
1,700,000	170,000	255,000	340,000	425,000	510,000	595,000	680,000
1,800,000	180,000	270,000	360,000	450,000	540,000	630,000	720,000
1,900,000	190,000	285,000	380,000	475,000	570,000	665,000	760,000
2,000,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000
2,100,000	210,000	315,000	420,000	525,000	630,000	735,000	840,000
2,200,000	220,000	330,000	440,000	550,000	660,000	770,000	880,000
2,300,000	230,000	345,000	460,000	575,000	690,000	805,000	920,000
2,400,000	240,000	360,000	480,000	600,000	720,000	840,000	960,000
2,500,000	250,000	375,000	500,000	625,000	750,000	875,000	1,000,000
2,600,000	260,000	390,000	520,000	650,000	780,000	910,000	1,040,000
2,700,000	270,000	405,000	540,000	675,000	810,000	945,000	1,080,000
2,800,000	280,000	420,000	560,000	700,000	840,000	980,000	1,120,000
2,900,000	290,000	435,000	580,000	725,000	870,000	1,015,000	1,160,000
3,000,000	300,000	450,000	600,000	750,000	900,000	1,050,000	1,200,000

Note: Conversion of fresh weight taro corms to flour is about .25.

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Cost and Return of Chinese Taro Production in the Hilo Area

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Abstract

This study provides an update of the cost and return of Chinese taro production in the Hilo area. Return to management is estimated to be $5,575 per acre per crop. Total fixed costs and variable costs are $1,573 and $4,602 respectively. Estimated breakeven price is 20.6 cents (per lb of taro corm) to cover total costs. For a newly established operation which has to purchase hulis, return to management is reduced by the cost of hulis of $1,245 to $4,219, and breakeven price to cover total costs is estimated to be 25.1 cents. Using an optimal fertilization schedule as derived from a recent experiment, return to management can be increased by $2,500 per acre per crop and breakeven price to cover total costs is estimated to be 19.2 cents.

Introduction

This publication serves as an update to the Farm Management Report No. 17 entitled "Cost and Return of Dry Land Taro Production in Hawaii: 1984" (Marutani, 1984). In addition, the economics of applying the optimal fertilization schedule as derived from a recent experiment will be analyzed.

Because of the assumptions and sources of information used in this study, the data in this publication should be viewed as representative of what a farmer would anticipate for a well-managed Chinese taro enterprise. The data does not represent any particular grower nor does it represent the average. Therefore, many factors may alter the cost and return figures reported here when compared to a particular individual's operation. The primary purpose of this publication is to identify the type of production practices and management program considered to be typical of a well-managed Chinese taro enterprise.

Sources of Information

Data was collected from three growers in the Hilo area. These growers were considered to be representative of having well-managed Chinese taro enterprises. The data was collected with the aid of the "Vegetable-Crop Budget Template" (Cox et al., 1988). The growers were asked to fill in a blank budget template with our assistance. The data were then processed and checked by the respective growers for accuracy. We then used these data as the baseline in generating what we believe would be the typical or representative well-managed Chinese taro enterprise.

Assumptions

The following assumptions were made in developing the enterprise budget:

1. This typical farm has ten acres in production with five acres devoted to Chinese taro.
2. Growing period per crop is nine months and the land is plowed only once a year.
3. Total yield per acre per crop consists of 25,000 pounds of grade A and 5,000 pounds of off-grade taro.
4. The grower receives 40 cents per pound for grade A taro and 35 cents for off-grade taro.
5. The wage rates are $8.00 and $4.50 per hour for skilled and unskilled labor respectively.
6. Land is rented at $400.00 per acre per year.

7. Prices for gasoline and diesel fuel are $1.55 and $1.50 per gallon respectively.

8. Interest on operating loans is 12 percent.

9. This typical farm has a 2000 sq. ft. structure valued at $2000.

10. Machinery and equipment are valued at cost which would be incurred if replaced.

11. Farm overhead cost is charged at 1 cent per pound of production.

Budget Analysis (based on per acre per crop)

Case 1: Typical Operation

Table 1 shows the machinery and labor requirements by operation while Table 2 shows the material requirements by operation. Table 3 lists all the machinery and equipment necessary for a typical taro enterprise along with the derivations of their per hour fixed and variable costs. Fixed costs include depreciation, interest on investment, taxes and insurance. Variable costs include repairs, fuel and lubrication.

Table 4 shows the gross receipts. Table 5 outlines the variable expenses by operation. Table 6 summarizes the cost and return of the typical taro enterprise. Total costs is estimated to be $6,175 per acre per crop with 25 percent being fixed expenses. With a gross receipt of $11,750, net return to management is estimated to be $5,575. Table 7 shows the breakeven prices and yields necessary to cover variable costs and total costs. A grower would have to cover its total costs in the long-run in order to remain profitable. However, in the short-run, the grower would continue to operate as long as its variable costs is covered. In order to cover total costs, a production of 15,765 pounds per acre is needed at 40 cents per pound while a 20.6 cents per pound price is sufficient to cover the total costs with a production of 30,000 pounds per acre.

It should be noted that this study shows a much higher return to management as compared to the 1984 study, $5,575 vs $1,389, primarily due to the increase in both per acre yield and price per pound received by the growers.

Case 2: Newly Established Operation (with purchasing cost of hulis)

For newly established operation, the grower has to purchase hulis which are assumed to cost 10 cents per piece. Hulis were spaced one foot apart within rows and 3.5 feet apart between rows with a population of 12,446 plants per acre. In other word, an additional cost of $1,244.60 would have to be incurred per acre. This would result in a lower return to management as compared to the typical case, $4,219 vs. $5,575, and a higher breakeven price to cover total costs, 25.1 cents vs 20.6 cents. (see Table 7)

Case 3: Optimal Fertilization

Based on a recent fertilization experiment (Sato et al., 1989), the optimal fertilization schedule was estimated to be 460 lbs N (1000 lbs Urea), 600 lbs K (1185 lbs Muriate of Potash) and 3,000 lbs. TSP per acre. Using this schedule, yield was estimated to be 40,000 lbs per acre, an increase of 10,000 lbs. This yield increase generates an additional $4,000 in gross receipt along with an increase of $583 in fertilizer cost and $792 in harvesting cost. Obviously, the increase in revenue outweighs the increase in costs. This contributes to an increase in return to management of approximately $2,500 ($8,076 vs. $5,575). Also, breakeven price to cover total costs is lowered to 19.2 cents as compared to 20.6 cents for the typical case. (see Table 7)

References

Cox, L.J., Nakamoto, S.T., Marutani, H.K., and Leung, P.S. 1988. *A User's Manual for the Vegetable-Crop Budget Template,* Research Extension Series 091, Hawaii Institute of Tropical Agriculture and Human Resources.

Marutani, H.K. 1984. *Cost and Return of Dry Land Taro Production in Hawaii: 1984,* Farm Management Report No. 17, Hawaii Institute of Tropical Agriculture and Human Resources.

Sato, D., Silva, J., Leung, P.S., Santos, G., and Kuniyoshi, J. 1989. *Nitrogen and Potassium Fertilization for Dryland Taro,* A GACC Taro Fertility Progress Report No. 1, Hawaii Institute of Tropical Agriculture and Human Resources.

Table 1.--Machinery and Labor Requirements by Operation

Operation	Machinery & Equipment	hours	Labor (hours) Skilled	Unskilled
1. Seedling Preparation				
Prepare Hulis				48.0
2. Land Preparation				
Rake	Rake	16.0	16.0	
Mow	Mower, 5ft.	3.0	3.0	
Plow	Plows, 18-inch	4.0	4.0	
Rotovate	Rotovator	2.0	2.0	
Cut row	Furrow Digger	2.0	2.0	
All activities	Tractor	27.0	27.0	
3. Liming				
Liming	Tractor	4.0	4.0	
	Lime Spreader	4.0		
	Tractor, front loader	4.0	4.0	
4. Planting				
Planting Hulis	Iseki	13.4	13.4	16.0
5. Maintenance of Growing Crop				
Weeding	Iseki	13.4	13.4	22.0
Fertilizing	Fertilizer applicator	4.0		4.0
6. Harvesting				
Harvest	Flatbed Truck	5.0		360.0
Wash and Trim				60.0
Bag				30.0
Hauling	Flatbed Truck	15.0		15.0

Table 2.--Material Requirement by Operation

Operation	Material	Quantity	Unit Price
1. Seedling Preparation			
	Baskets	20	$ 1.20
3. Liming			
	Lime	2 tons	20.00
5. Maintenance			
	16-16-16	10 @ 80lb bags	16.95
6. Harvesting			
	Bags	600 bags	0.25
	Water	54,000 gals	0.001
	Racks	60	2.00

Table 3.--Machinery and Equipment Cost Calculations

Table 3.--Machinery and Equipment Cost Calculations

Name	Horse-power	Market Value	Annual Use (hours)	Use Life (years)	Salvage Value	Fuel Type*	Average Value	Depreci-ation (s.l.)	Interest	Taxes & Insurance	Annual Fixed Cost	Fixed Cos hour	Repairs	Fuel	Lubri-cation	Annual Variable Cost	Variable Cost/ hour	Total Cost/ hour
TRACTORS																		
Tractor	50.00	20000	300	24	1000	Diesel	10500	791.67	1260.00	157.50	2209.17	7.36	833.33	990.00	148.50	1971.83	6.57	13.94
Tractor, front loader	30.00	12000	40	24	600	Diesel	6300	475.00	756.00	94.50	1325.50	33.14	500.00	79.20	11.88	591.08	14.78	47.91
OTHER MACHINERY W/ ENGINES																		
Truck, flatbed, 3/4 - 1 ton	200.00	16000	300	10	800	Diesel	8400	1520.00	1008.00	126.00	2654.00	8.85	1600.00	1800.00	270.00	3670.00	12.23	21.08
Iseki (Hand-drawn Tractor)	6.50	4500	270	10	225	Gasoline	2363	427.50	283.50	35.44	746.44	2.76	450.00	54.41	8.16	512.57	1.90	4.66
ATTACHMENTS																		
Rotovator		4000	20	15	200		2100	253.33	252.00	31.50	536.83	26.84	266.67	0.00	0.00	266.67	13.33	40.18
Lime spreader		3000	40	36	150		1575	79.17	189.00	23.63	291.79	7.29	50.00	0.00	0.00	50.00	1.25	8.54
Rake		2000	160	36	100		1050	53.20	126.00	15.75	194.95	1.22	56.00	0.00	0.00	56.00	0.35	1.57
Plows, 18-inch		750	40	25	38		394	28.50	47.25	5.91	81.66	2.04	36.00	0.00	0.00	36.00	0.90	2.94
Mower, 5ft		2000	30	15	100		1050	126.67	126.00	15.75	268.42	8.95	133.33	0.00	0.00	133.33	4.44	13.39
OTHER EQUIPMENT																		
Furrow Digger		2000	20	25	100		1050	76.00	126.00	15.75	217.75	10.89	80.00	0.00	0.00	80.00	4.00	14.89
Backpack Fertilizer Applicator		225	40	5	11		118	42.75	14.18	1.77	58.70	1.47	45.00	0.00	0.00	45.00	1.13	2.59

Table 4.–Gross Receipts (based on per acre per crop)

Item	Quantity	Unit	$/unit	Value
Grade A	25,000	lb.	0.40	$10,000
Off-Grade	5,000	lb.	0.35	1,750
TOTAL	30,000	lb.	0.39	11,750

Table 5.--Variable Expenses (based on per acre per crop)

Operation	Machinery & Equip.	Labor	Material	Sub-Total
1. Seedling Preparation	$ 0	$ 216	$ 24	$ 240
2. Land Preparation	235	216	0	451
3. Liming	90	64	40	194
4. Planting	25	179	0	205
5. Maintenance	30	269	170	469
6. Harvesting	245	2,093	326	2,663
Total Variable Costs :	625	3,037	560	4,222

Table 6.--Summary Budget (based on per acre per crop)

Item	Value or Cost	% of Total Cost
1. Gross Receipts	$11,750	
2. Variable Costs :		
Labor	3,037	49.2
Machinery & Equipments	625	10.1
Materials	560	9.1
Interests on operating expenses	380	6.2
Total Variable Costs	4,602	74.5
3. Income Over Variable Costs	7,148	
4. Fixed Costs:		
Machinery & Equipments	777	12.6
Building	72	1.2
Land	424	6.9
Farm Overheads	300	4.9
Total Fixed Costs	1,573	25.5
5. Total Costs	6,175	100.0
6. Return to management	5,575	
7. Return to labor & management	8,612	
8. Return to machinery & management	6,352	
9. Return to land & management	5,999	

Table 7.--Breakeven Analysis

	Breakeven Yield (lbs/acre)	Breakeven Price ($/lb)
1. To cover total costs:	15,765	$0.21
2. To cover variable costs:	11,749	$0.15

Table 8.--Case Comparison

	Case 1	Case 2	Case 3
Return to Management ($/acre)	$5,575	$4,219	$8,076
To cover total costs:			
Breakeven yield (lbs/acre)	15,765	19,228	19,490
Breakeven price ($/lb)	$0.21	$0.25	$0.19
To cover variable costs:			
Breakeven yield (lbs/acre)	11,749	15,212	15,495
Breakeven price ($/lb)	$0.15	$0.20	$0.15

Note: Case 1 - Typical operation
Case 2 - Newly established operation
Case 3 - Optimal fertilization

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