



THE LAND

Presented By

Kraft

LOCAL CONTACT:

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Please leave message where you can
be reached.



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Kraft

Epcot Center
Walt Disney World



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Contact: **Mary Agnes Welsh**
312/998-2726

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FACT SHEET

PURPOSE: The Land, a six-acre pavilion at Walt Disney World's Epcot Center, presents beneficial uses of the environment for food production and showcases, in an involving and entertaining manner, the elements of a balanced diet.

SPONSOR: Kraft, Inc.
Glenview, Illinois

OPENING DATE: October 1, 1982

THE LAND HIGHLIGHTS:

"Listen To The Land" Boat Ride

Visitors take the "Listen to the Land" boat ride through a simulated seed germination; various inhospitable environments that people faced when they progressed from hunter to farmer; the history of U.S. farming over the last 100 years; and live, experimental growing systems presenting the latest technology.

Guided walks through the growing systems area are available for those who want to closely observe new agricultural technology.

Harvest Theater

In the 450-seat Harvest Theater, visitors can see "Symbiosis," an 18-minute motion picture presented on a 60-foot-wide screen, which explores the interdependence between humans and their environment. In scenes from over 20 countries, the film shows spectacular views of nature, focusing on how primitive and modern people have harvested the land.

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Kitchen Kabaret

This animated nutrition show features bigger-than-life Audio-Animatronics figures who tell the story of good nutrition in an imaginative and memorable way. Characters include Mistress of Ceremonies Bonnie Appetit, the Kitchen Krackpots, the Colander Combo and the comedy team of Hamm n' Eggz.

Farmers Market

This traditional Americana plaza for informal dining features eight food booths offering a variety of wholesome, nutritious meals and snacks.

The Good Turn Restaurant

In this 250-seat revolving, fine-dining experience, guests view some parts of the boat ride as they enjoy their meals.

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THE LAND: MAN'S INTERACTION WITH THE ENVIRONMENT

"Symbiotic relationships mean creative partnerships. The earth is to be seen neither as an ecosystem to be preserved unchanged nor as a quarry to be exploited for selfish and short-range economic reasons, but as a garden to be cultivated for the development of its own potentialities of the human adventure. The goal of this relationship is not the maintenance of the status quo, but the emergence of new phenomena and new values."

-- René Dubos
(1901-1982)

The Land, a pavilion presented by Kraft, shows visitors beneficial uses of the environment for food production, along with the grouping of foods that constitute a balanced diet. The Land covers six acres under roof and is part of the Future World area of Epcot Center at Walt Disney World in Florida.

The Land has four major areas: the "Listen to the Land" boat ride, the Farmers Market, the Harvest Theater and the Kitchen Kabaret animated stage show. The pavilion also has a 250-seat, revolving, fine-dining restaurant, called The Good

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Turn, where guests may look down on the boat-ride areas as they enjoy their meals. Visitors are free to choose the order in which they visit the four areas.

Listen to the Land

This multi-faceted boat ride takes visitors on a guided tour initially through a simulated underground probe into the micro-world of the seed: its germination and growth.

The journey continues through three ecosystems -- the rain forest, the desert and the prairie -- simulating these environments as man faced them when he progressed from hunter to farmer. This area shows that nature, left to itself, is harsh to deal with in many areas of the world. However, people -- through a partnership with nature -- have been able to tame the elements.

The boat then proceeds into a picturesque farm scene; a barn door opens to reveal the history of agriculture in the United States over the past 100 years, shown through quick-paced photography and Disney entertainment technology.

From there, the boat tour moves on to the experimental growing systems area -- giant greenhouses of advanced controlled-environment agriculture and aquaculture that display some

possible new ways to provide sufficient food for the increasing world population. These futuristic processes one day may enable people to grow crops commercially without soil or to economically transform the desert into a garden.

Visitors who are particularly interested in agriculture may take Tomorrow's Harvest Tour, a guided walk through the growing systems area to observe more closely the plants, technology and future advances expected in these areas.

Kraft worked with Disney and the Environmental Research Laboratory (ERL) at the University of Arizona in the development of this phase of the pavilion. A special facility was built in Tucson where Carl Hodges, director of ERL, and his staff grew and tested the plants and systems that are in place at The Land. Furthermore, an experimental greenhouse, adjacent to The Land pavilion, was completed in August 1981. Under the direction of Dr. Henry A. Robitaille, a select staff of scientists have been conducting extensive tests on plant growth and integrated pest management systems for application in the growing areas.

Farmers Market

Fragrances from an on-site bakery lure visitors to the Farmers Market, which is located in the center of the pavilion.

In this traditional Americana plaza for informal dining, there is a variety of wholesome, nutritious meals and snacks available for purchase at several food booths. Three gigantic, hot-air-type balloons showcasing the basic food groups are positioned above a fountain to provide a colorful focal point for the seating area.

Harvest Theater

To one side of the Farmers Market is the entrance to a 450-seat theater where Kraft presents an 18-minute film, "Symbiosis," on a 60-foot-wide screen. The motion picture focuses on how primitive and modern people have harvested the land, exploring the delicate balance between technological progress and environmental integrity. Specific scenes portray people's ingenuity in adapting the world to their needs: the Peruvian city of Machu Picchu, France's ancient aqueducts and the rice terraces of the Philippines.

In addition to depicting these past accomplishments, "Symbiosis" showcases current environmental recovery achievements, such as England's Thames River and Europe's Lake Constance, where three bordering countries joined in a successful reclamation effort.

Kitchen Kabaret

Another 250-seat theater in The Land features the Kitchen Kabaret. This show stars bigger-than-life Audio-Animatronic

figures -- Disney's sophisticated, electronically animated characters -- who tell the good nutrition story in a totally new, humorous and memorable way. Bonnie Appetit, mistress of ceremonies, has a unique supporting cast of foodstuffs, including the Kitchen Krackpots; The Milk Group, led by matinee idol Mr. Dairy Goods with Miss Cheese, Miss Yogurt and Miss Ice Cream; The Colander Combo; and the comedy team of Hamm n' Eggz.

Optimism For The Future

The Land helps to communicate how effective and imaginative use of natural resources can enable the world to meet its growing food needs. And Kraft believes sponsorship of The Land is part of its responsibility, as a leading worldwide food processor, to support this goal that will ensure good nutrition and food production for future generations.

The Land is in keeping with Kraft's long-standing commitment to provide good food and good food ideas. The pavilion was created to foster a spirit of hope based on sound accomplishment and to show that, while no one has all the answers, there are scientists who are taking a positive approach to the task of providing enough food in the years ahead. And, most importantly, they are making progress.



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KRAFT'S SPONSORSHIP OF THE LAND:

A PARTNERSHIP OF COMMITMENT

"The glory of the farmer is that in the division of labors, it is his part to create. All trade rests at last on his primitive activity. He stands close to Nature; he obtains from the earth the bread and the meat. The food which was not, he causes to be. The first farmer was the first man."

-- Ralph Waldo Emerson

The Land at Epcot Center, presented by Kraft, represents the company's faith in and commitment to a future in which people and businesses can flourish in a creative and confident environment. The pavilion's purpose, and the basis for Kraft's sponsorship, is to show how intelligent and constructive use of land for agriculture will enable humans to continue the centuries of progress that is this generation's heritage.

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Examples of the scientific research and technology now being applied to this important natural resource should help to dispel current doomsday prophecies that the availability of food will be limited in future decades. The Land was created to foster a spirit of hope based on sound accomplishment and to illustrate that, while no one has all the answers, there are scientists who are taking a positive approach to providing enough food in the years ahead; and, most importantly, they are making progress.

The goal is to tell both adults and children -- as imaginatively as possible -- about beneficial interaction with the environment and of how brutal and destructive nature can be, at times, when left to its own devices. Future concepts that may increase the cultivation of the food supply receive special emphasis.

Kraft's participation in The Land is a natural one. The chain of life, which produces agricultural raw materials that become part of the company's products, begins with the land, water and sun.

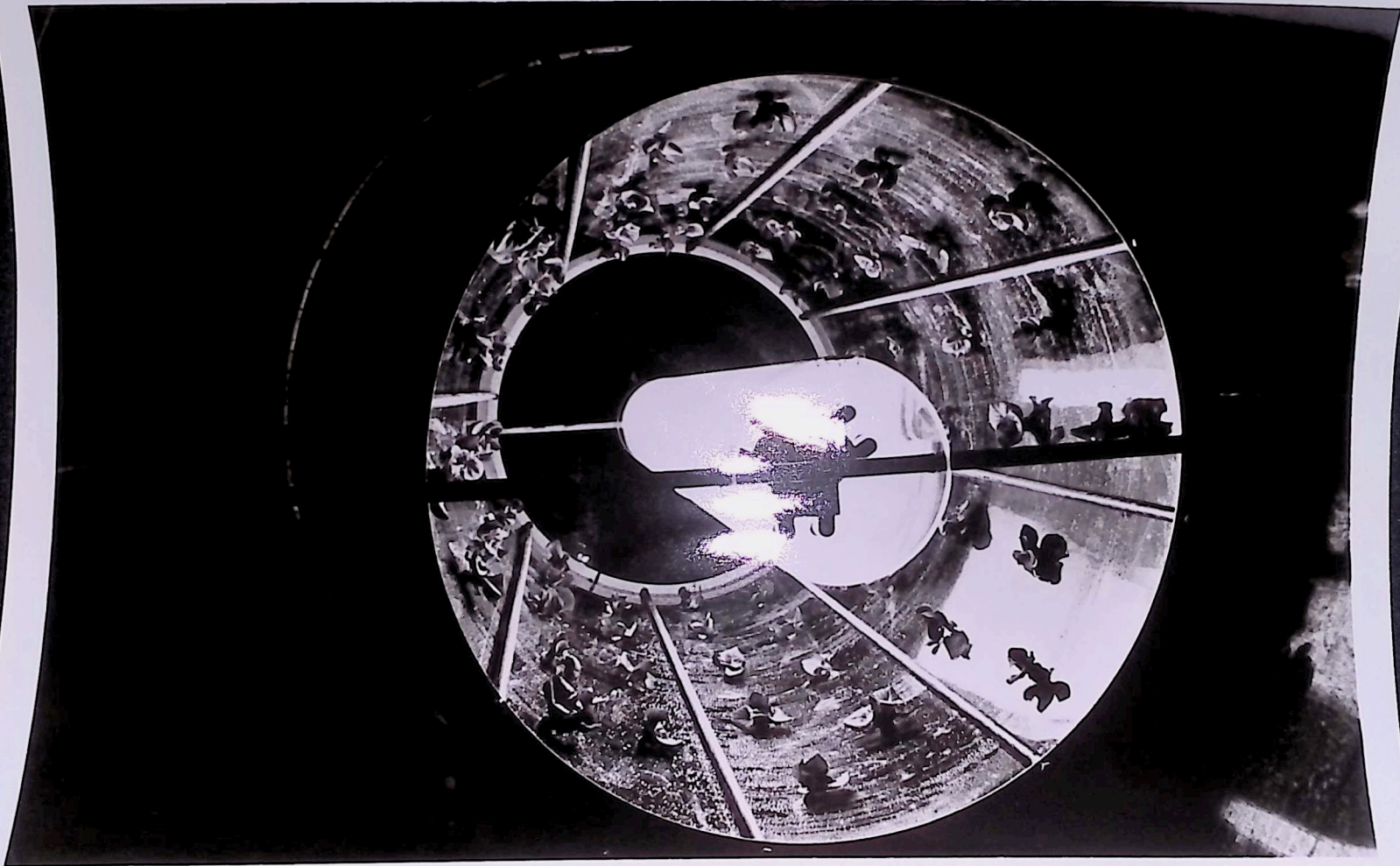
The Land dramatically presents these primal elements to convey a positive view of the enormous potential for expanded and improved food production that will be possible through high technology, improved techniques and intelligent land use, such as no-tillage farming and intercropping. Visitors see futuristic

processes that one day may enable crops to be grown commercially in a controlled environment without soil.

As in the rest of Epcot Center, The Land is a unique venture and deals with a dynamic subject. Its concepts will be revised continuously to reflect the latest developments for using the land to meet the world's diverse food needs.

By participating in this vast, new international showplace for the concepts of the future, Kraft is among the major U.S. companies whose pavilions at Epcot Center are expected to attract at least 10-million visitors each year.

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An eight-foot, revolving drum simulates extraterrestrial farming for a space colony. Lettuce and other plants are grown from the walls of a spinning drum with their roots flying out toward the simulated gravity and their leaves facing the light at the center of the drum. This growing technique is demonstrated at The Land, a pavilion presented by Kraft at Epcot Center.



To grow more food per volume of space, melons are planted in sand along the sides of a water raceway. While the melons mature, several crops of leafy vegetables are harvested as they grow through styrofoam boards floating on water, which has nutrients added to it. Meanwhile, aquatic animals may grow in the water. This new technique called a "polyculture system" is showcased at The Land, a pavilion presented by Kraft at Epcot Center.



A cast of whimsical Audio-Animatronic foodstuffs are stars of the Kitchen Kabaret, a musical revue on basic nutrition featured at The Land, a pavilion presented by Kraft at Epcot Center.





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DINING AT THE LAND: GOOD TIMES AND GOOD NUTRITION

Traditional American cuisine has undergone a revival in recent years, an offshoot of the public's heightened interest in good nutrition and sound dietary habits.

The key, however, is in balancing all of the options available today, from healthy snacks to meals eaten at or away from home.

For visitors to The Land, a six-acre pavilion presented by Kraft at Walt Disney World's Epcot Center, the balance will be easy to maintain.

Food service at The Land focuses on good nutrition through the Farmers Market, an Americana plaza for informal dining containing eight fast-food booths, and The Good Turn Restaurant, which provides a fine-dining experience highlighting traditional American fare.

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Farmers Market

In keeping with tradition, visitors to the Farmers Market are encouraged to sample a variety of wholesome, nutritious meals and snacks from the various booths. The seating area for 350 has an open-market atmosphere complete with umbrella-topped tables near a central fountain.

The foods offered at the Farmers Market range from basic items such as soups, salads and sandwiches, to an assortment of more unusual selections.

The Cheese Shoppe, for instance, provides a choice of three quiches, as well as fried cheese in pastry.

Various toppings are featured at the Potato Store, where spuds are served with sour cream or beef tenderloin in a Madeira wine sauce.

In addition, visitors to the Farmers Market can choose from ribs at the Barbecue booth; chicken gumbo and a pineapple boat at the Soup and Salad Bar; or a Country Sampler -- full of salami, turkey, bologna and cheese -- at the Sandwich Stand.

For smaller appetites, many of the booths provide a special menu. Children under 12 and their parents will be happy to know that two truly American favorites -- peanut butter and jelly on

raisin bread, and American cheese on white bread -- are available.

Everyone can enjoy the wide range of desserts at the Farmers Market. The on-site Bakery serves baked goods from Boston cream pie and cheesecake to hermit cookies with cinnamon and molasses. A selection of ice cream and yogurt is available at the Ice Cream Shop.

Peach, papaya, vegetable and orange juice, along with other beverages, are served at The Beverage House.

The Good Turn Restaurant

The revolving Good Turn Restaurant offers guests a fine-dining experience while they view some of The Land's other highlights.

The Good Turn is quite unlike any other restaurant as it revolves at varying speeds depending on the time of day. For instance, in the evening, the revolutions are somewhat slower, allowing diners to linger over their dinner. The restaurant always tries to accommodate its patrons with a complete revolution during a meal.

While the atmosphere at The Good Turn is unique, the menu is traditional. Basic foods -- such as prime rib, ham and salmon which are called "The Midwesterner," "The Iowan" and "The Alaskan"

respectively -- can be selected from a menu with subtitles such as "From the Mountains to the Prairies" and "From Sea to Shining Sea."

Children, through age 12, may make their selections from a separate menu, which includes ever-popular items such as The Cow-poke Hamburger and Frontier Fried Chicken.

Young or old, fast-food aficionados or formal restaurant connoisseurs, all visitors to The Land are sure to find their dining experience one of the most enjoyable aspects of a thoroughly entertaining and educational trip to Epcot Center.

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"SYMBIOSIS" -- PEOPLE'S PARTNERSHIP WITH THE LAND

Throughout time man has worked to tame nature's harsh elements and to develop a mutually beneficial relationship with the land. The film "Symbiosis" at The Land explores that relationship.

The Land, presented by Kraft at Walt Disney World's Epcot Center in Florida, highlights positive associations between man and nature, and showcases a variety of food systems and future technologies. In addition to "Symbiosis" in the Harvest Theater, the six-acre pavilion also offers the "Listen to the Land" boat ride, the Kitchen Kabaret animated nutrition show, the Farmers Market for informal dining and The Good Turn restaurant.

"Symbiosis" features spectacular views of nature, focusing on how primitive and modern people have harvested the land. This 18-minute motion picture explores the delicate balance between technological progress and environmental integrity, while recognizing that these goals are not necessarily mutually exclusive.

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Disney presents the film on a 60-foot-wide screen in the 450-seat Harvest Theater.

A camera crew traveled to more than 20 countries to shoot appropriate footage for this presentation. Paul Gerber, a filmmaker with over 20 years experience, was the project's writer/producer/director.

"Our goal was to make a beautiful, majestic and positive film about humans and the environment," says Paul. "But, we also wanted to make visitors aware of their responsibility to protect the land, water and air."

In a tribute to nature, "Symbiosis" opens with panoramas of mountains, rivers, deserts and glaciers. The film then shows people and wildlife living in harmony with their environments, from a cast-net Tahitian fisherman to giraffes on the Masai plain in Africa to the migration of Alaskan caribou.

Specific scenes portray people's ingenuity in adapting their world to their needs: the Peruvian city of Machu Picchu, France's ancient aqueducts and the rice terraces of the Philippines. "We want to debunk the myth that only in recent times have people sought to modify the environment," explains Paul. "As the film's narrator points out, 'Nothing has changed, except the approach.'"

For centuries, humans have used irrigation, water removal systems, and land and water conservation to alter the world. "Symbiosis" reveals many methods in use today that are contemporary versions of ancient practices. Through irrigation, Egypt and Israel have transformed Middle Eastern deserts into gardens; and, at sophisticated hydraulic laboratories in Holland, people are developing a new Southern Delta Flood Control System. "This segment provides a sense of historical perspective; although people's need to modify their surroundings has not changed, the character and scale of their modifications have," Paul says.

"While we concentrate on grand success in the film, we also deal candidly with the fact that, too many times, modern technology has resulted in serious environmental problems," adds Paul. "The Nebraska Dust Bowl and the Mississippi River Valley -- two areas almost destroyed by poor farming techniques and industrial pollution -- appear in this sequence, with much of the footage drawn from old newsreels."

The film explores current environmental recovery efforts, such as England's Thames River and Europe's Lake Constance, where three bordering countries joined in a successful reclamation effort. From Germany's Black Forest to Sweden's pines and the firs of Oregon's Mount Hood, "Symbiosis" highlights technological applications in areas where the environment is especially important or fragile.

The Disney crew filmed the motion picture in 70mm Panavision with large-format cameras, also used for the feature movie "Lawrence of Arabia," because of the quality of the images.

"Symbiosis" is projected at 30 frames per second, 25 percent faster than most films. This produces a richer and brighter picture, with less flickering. The movie's audio portion matches its visual scope, as the Harvest Theater's 13 speakers and 13 sound tracks allow limitless flexibility in precisely pinpointing sounds -- from a cricket's chirp to the roar of a buzz saw. In comparison, even the best movie theaters offer no more than 6-track sound systems.

At the film's conclusion, a farmer stands in the midst of vast, fertile fields, in what was once the Dust Bowl. "These fields are an example of our ability to establish a truly creative partnership with our environment," Paul adds. "But, we can only achieve and maintain this symbiosis through constant use of our foresight, our imagination and, most importantly, our will."

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FUTURE FOOD TECHNOLOGY IS PART OF THE LAND

"We can grow the world's required food if all nations and people work together, sharing new ideas in the development of food systems for the future. It is our goal that The Land pavilion set the stage for this cooperation, plus stimulate and challenge the spectator to meet the needs of tomorrow's agriculture today."

-- Dr. Merle H. Jensen
Research Horticulturist
Environmental Research Laboratory

An opportunity to see examples of agricultural growing systems of the future is in store for visitors to The Land at Walt Disney World's Epcot Center in Florida.

These agricultural systems of food crops and species of aquatic animals were developed and designed by the Environmental Research Laboratory (ERL) at the University of Arizona at Tucson and are featured in gigantic greenhouses at The Land. WED Enterprises, the design and engineering unit of Walt Disney

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Productions, selected ERL to develop the exhibit after surveying researchers nationwide.

The combination of ERL's extensive involvement in exploring food production through improved plants and new growing techniques, and Disney's magical entertainment expertise produces a fascinating learning experience for visitors to The Land, presented by Kraft.

ERL -- A Pioneer

The 40-acre ERL site in Arizona consists of eight laboratory buildings where a professional staff of horticulturists; agricultural, chemical and mechanical engineers; physicists; and metallurgists conduct experiments with plants and aquatic animals, with the goal of increasing yields to meet growing world food requirements.

Experiments include growing plants under artificial gravitation that simulates growing conditions aboard spacecraft, and producing fin fish and aquatic animals that can thrive in controlled environments. Visitors can see these techniques at The Land.

Established in 1963, ERL has been a leader in the concept of controlled-environment agriculture (CEA) and is continually developing innovative techniques that help to meet the world's

need for expanding food production. The best-known ERL project has involved the design and construction of controlled-environment greenhouses for high-volume vegetable production in coastal and inland deserts. ERL has designed some of the largest CEA installations in the world, including those in Arizona, California, Abu Dhabi (United Arab Emirates), Mexico, Africa, Puerto Rico and French Oceania.

A Tour of Other Growing Systems at The Land

Each visit to the agricultural growing area at The Land begins with a look at general food crops from various sections of the world, as well as at some experimental plants and growing techniques.

In the tropical greenhouse, foods such as the winged bean, pineapple, banana and sugar cane are intercropped with both the mung bean and the pigeon pea. For example, intercropping sugar cane with a legume, such as peas or beans, allows the cane to use some of the "free" nitrogen derived from the air by bacteria and fungi that attach themselves to the legumes' roots.

This greenhouse features plants that are important Asian food crops, including rice -- a staple for one-third of the world's population -- eggplant, soybeans and the luffa gourd. Guests see these plants at various stages of growth.

Other plantings in the tropical area also show intercropping -- bush beans growing between rows of corn and pole beans climbing up cornstalks. Chinese and other varieties of cabbage are intercropped with corn; and kohlrabi, papaya and sweet potatoes grow in this area.

An additional presentation features an aquacell, which is an environment for raising fish and aquatic animals in high density for food production. Red light bathes this area, so scientists can collect information about this color's effect on the behavior and production of fish.

In the Creative Area, visitors see tomatoes, lettuce, spinach, cucumbers and strawberries growing on conveyor belts. While the plants move around the belts, they enter a "feeding area" where their roots are sprayed with nutrients. As the crops leave the feeding area, some of the nutrients drip into ponds below the conveyors to provide nourishment for water hyacinths.

Another technique shows plants as they might grow in space -- imbedded in a giant rotating drum, functioning similar to a centrifuge.

Many, New Techniques Displayed

The Land features plants with increased yield potential due to new agricultural techniques. One process is a hormonal growth

regulator which induces flowering in pineapples. In nature, it takes about three years for pineapples to flower; with the growth regulator, they can bloom in 18 months. This permits two crops to mature in the time it normally would take for one.

Use of the cubic space within the greenhouse is another technique. For example, lettuce grows on plastic-foam A-frames and tomatoes on space-saving trellises.

Meeting Expanding Food Needs

The Land features plants that are instrumental in feeding an ever-expanding world population. The winged bean, containing up to 37-percent protein, may become the soybean of the tropics. The tuberous roots of this crop have 10 times the amount of protein found in a potato. All parts of the winged bean are tasty and edible. The fleshy pods make a chewy, slightly sweet vegetable that resembles green beans. The leaves taste like spinach; and the flower, when cooked, is similar to a mushroom. The firm-fleshed roots, eaten like potatoes, have a delicious, nutty flavor.

While more efficient systems and plants will meet the food needs of tomorrow, the fact remains that over 99 percent of the water on earth is seawater or ice. ERL has launched an extensive program to develop plants that can be irrigated with pure



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THE KITCHEN KABARET -- GOOD NUTRITION STEALS THE SHOW

Off-Broadway takes on a new meaning for visitors to The Land, the largest pavilion at Walt Disney World's Epcot Center.

The Land, presented by Kraft, features the Kitchen Kabaret, a musical comedy revue starring a unique cast of show-stopping characters, who praise the basics of good nutrition through song and dance.

Inanimate objects such as food and utensils come to life, through the Disney magic of Audio-Animatronics, to perform an original seven-act revue. Headliners include Bonnie Appetit, the mistress of ceremonies; the Kitchen Krackpots, a condiment and utensil band; the Stars of the Milky Way -- Miss Yogurt, Miss Cheese and Miss Ice Cream; the Cereal Sisters; the Colander Combo; and the Hamm n' Eggz comedy team.

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As the curtain rises, the audience hears Bonnie Appetit singing "The Mealtime Blues":

Oh, the mealtime blues can get you,
Every time you dine.
But we all can beat that rap,
And end up feelin' fine.

The audience is then entertained by a succession of characters, beginning with the Kitchen Krackpots band that features animated containers of mayonnaise, mustard and barbecue sauce. These "seasoned performers" kick off their segment with a "spicy" number, "Chase Those Mealtime Blues Away." Next, a giant refrigerator door opens to reveal Mr. Dairy Goods and his three Stars of the Milky Way: Miss Cheese, singing a la Mae West; Miss Yogurt, with a "cultured" French accent; and Miss Ice Cream, who has a Pearl Bailey style of "cool." These characters sing the praises of the wide variety of delicious dairy foods.

With a quick change of scene, the audience meets the Cereal Sisters: Mairzy Oats, Rennie Rice and Connie Corn. In spirited Andrews Sisters' fashion, they belt out "Boogie Woogie Bak'ry Boy":

We'd like to sing about a friend who has really come
far.
He started out with some dough and then he rose to be a
star.
He's hot when he leads the bread and cereal group.
An oven-right trouper he can never be duped.
It's known that he's no clown,
Our Boogie Woogie Bak'ry Boy, the bread with the
sound.

Next, Hamm n' Eggz, the comedy stars of the show, relay the message that protein is available from a variety of sources, including meat, poultry, fish, cheese, beans and nuts. Hamm n' Eggz "beef up their act" with distinctly vaudeville-style humor:

There's plenty of good protein acts for me to work
with!
Oh yeah? Like who?
Cheese! Cheese is a great source of protein!
Oooooooo! I cheddar to think about it.
Beans! Now there's a good one.
Beans? Ahhh, nuts to you Hammy.
That's right ... nuts to me. Another
excellent source of protein.

Latin rhythms dominate the next revue, which features the Colander Combo and the Fiesta Fruits. Here, bananas, a tangerine, pineapple, apple and assorted vegetables sing, "there are no substitutes for we, veggie fruit fruit ... A balanced meal always wins with our vitamins A and C."

The Kabaret finale assembles all the animated characters, who remind the audience of the importance of a balanced diet that includes items taken from all the food groups.

With good humor and song, each food group is briefly highlighted, then all join in the finale:

Proper foods each time you dine,
Can keep you fit and feelin' fine.
Eating right's a healthy sign,
And feelin' good makes each day shine and shine!



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THE KITCHEN KABARET BLENDS

GOOD NUTRITION AND DISNEY MAGIC

"The basic food groups make a perfect team.
When balanced, they are held in high esteem."

-- Bonnie Appetit
Kitchen Kabaret Hostess
The Land, Epcot Center

Their names are Mairzy Oats, Rennie Rice and Connie Corn. Professionally, they are known as the Cereal Sisters; and their theme song is "Boogie Woogie Bak'ry Boy, the Toast of the Town." These characters and many more comprise the cast of performers in a sparkling variety show called Kitchen Kabaret, one of the entertainment highlights that enchant visitors at The Land.

The Land, presented by Kraft, is the largest pavilion -- six acres under roof -- at Walt Disney World's Epcot Center in Florida, which opened October 1.

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The Kitchen Kabaret, representative of Kraft's commitment to family entertainment, is a successful blend of Disney magic and education about the basic food groups and good nutrition.

The creative genius behind the animated exhibits at both Disney theme parks breathes life and talent into otherwise inanimate objects in the Kitchen Kabaret: a mayonnaise jar, a mustard squeeze bottle, cartons of milk and of yogurt, and a dish of ice cream, as well as broccoli, eggplant, bananas, and other fascinating foodstuffs. Previously, this magic has only been used to bring animals and human characters to life.

The process by which the cast of the Kitchen Kabaret is created is called Audio-Animatronics, a Disney creation. Three-dimensional scale models initially were developed from artists' sketches. Later, a mid-size clay mold of each head, called a maquette, was made to work out facial traits in detail. The maquette was then translated into a full-size model. Next, the mold was cast -- first in fiberglass and then in a soft vinyl -- and painted. The finished mold was fitted to the computerized machinery at MAPO, Disney's subsidiary for fabrication and animation.

MAPO craftsmen initiated each figure's motion and mood by installing and programming the gears and motors within the body cavities. For example, Bonnie Appetit, the Kabaret's hostess,

has 25 animation functions that give her the fluid, lyrical movements of a graceful lady. On the other hand, action of the Kitchen Krackpots, a self-contained Dixieland group, are jerky and frenzied like a wind-up honky-tonk band.

Another important aspect of the characters' development was the selection of appropriate voices. To accomplish this, Disney scriptwriters conducted extensive auditions. After recording the script, inflection in the voices helped dictate how MAPO programmed the head and facial movements.

At the same time the characters were taking shape, other artists were busily designing the set. The Kabaret comes to life in a 1940s-type kitchen that the show designers call "cartoon deco." This revue uses everything, including the kitchen sink, for its stage. Stars perform from a table, refrigerator, toaster, counter and stove.

Important to all attractions is the pre-show area, the place where Disney masters "get guests in the mood" for the entertainment. For the Kabaret, there is a '30s-'40s night street scene with silk-screen playbills to hype the variety acts, without giving away the plot or the surprise that the performers are actually foods themselves.

There is a method in this madness, and behind the zaniness of the Kitchen Kabaret lies a higher purpose. That goal is to present -- as entertainingly as possible -- sound nutrition information to the generations that make up the family: children, parents and grandparents. The nutritional concepts were developed with the advice and cooperation of the Kraft Nutrition Advisory Council, a group of independent experts who provide guidance and information on nutrition matters. The nutrition information is basic and presented in a way that will be remembered.

The Kitchen Kabaret is family entertainment with a generous helping of hints about structuring meals around all of the basic food groups. Both are part of the Kraft tradition.

In addition to the Kitchen Kabaret, The Land at Epcot Center features a "Listen to the Land" boat ride that carries guests through the history of American food production and into an area with live, experimental growing systems; the Harvest Theater, with a wide-screen motion picture showing phenomena of nature's power and examples of creative partnerships between man and nature in many parts of the world; and the Farmers Market with stalls offering a variety of appealing, nutritious foods to satisfy the visitors' appetites.

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THE LAND SHOWCASES ADVANCED AGRICULTURAL METHODS

An interview with Dr. Henry A. Robitaille, Director of the Developmental Agricultural Systems, The Land at Epcot Center.

- Q. Who was responsible for the design of The Land pavilion agricultural area?
- A. WED Enterprises is the branch of the Disney company that designed and built Epcot Center. In the case of The Land agricultural area, Disney looked primarily to the Environmental Research Laboratory (ERL) at the University of Arizona in Tucson for most of the initial ideas and design. There was also an advisory board of high-level agricultural experts from various governmental agencies and land-grant colleges. Since 1981, the growing systems area has been the responsibility of The Land agricultural staff, which has made a substantial contribution in planning and design.
- Q. How do people visit the agricultural growing areas at The Land?
- A. Most guests take a boat ride, called "Listen to the Land," which lasts 13 minutes and has the capacity for about 2,300 guests per hour. A limited number of them take a walk-through tour, hosted by a specialist at The Land, which gives these guests an opportunity to ask questions and see the agricultural show at close range.
- Q. What do you show in the agricultural areas?
- A. We grow present superstar crops -- corn, rice, bananas, sugar cane, tomatoes, lettuce and Tilapia fish -- which make a major contribution to nutrition on a worldwide basis. In addition, there are potential superstars like the winged bean, triticale, buffalo gourd, peach palm and Macrobrachium shrimp. We also show concepts like trickle irrigation, integrated pest management, intercropping and hydroponics.

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- Q. What is your primary objective or goal as agricultural director at The Land?
- A. Today, only about 5 percent of people in the United States are directly involved in agriculture. As a result, most of our population has little knowledge or understanding of food production. The Land is the one place where people come to see many of the important and potentially important world food crops, as well as many of the most exciting concepts and technologies in agriculture. It should help the public understand the basic importance of agriculture. We use the successful Disney style of education with a healthy serving of entertainment.
- Q. How are plants and fish selected for display?
- A. Obviously, we can't show everything at one time. Selection is based on present or potential importance, environmental and seasonal adaptability and, of course, overall design considerations. Potential importance of crops and technology is not an arbitrary decision, but is based on studies by the National Academy of Science, agricultural research centers worldwide and other reliable sources.
- Q. Why is all of the show in greenhouses?
- A. Greenhouses are primarily tools that enable us to maintain a consistent, exciting show of a wide variety of crops from around the world throughout the year. They also enable our guests to visit regardless of weather conditions.
- Q. Is this high-tech agriculture?
- A. Yes, from the standpoint that we are continually striving to show the most advanced concepts in agriculture, such as integrated pest management, trickle irrigation and computerization. We have on display some of the most exciting new crops in agriculture, including triticale, amaranth, Macrobrachium shrimp and winged bean. There are also some controlled methods of growing them, such as hydroponics, greenhouses and closed-system aquaculture.

Q. I thought The Land demonstrated controlled-environment agriculture?

A. "Controlled-environment agriculture" is a term used by the Environmental Research Laboratory (ERL) for its method of greenhouse crop production in sand culture. ERL has operated this type of growing system commercially in several locations, including Tucson and Abu Dhabi, and designed the same system for use at The Land. Technically, controlled-environment agriculture refers to crop production in a precisely defined set of conditions. Most of our show at The Land occurs in greenhouses that enable us to heat in the winter, cool through evaporative cooling in the summer and provide wind protection throughout the year. These controls are similar to many commercial greenhouses. The Creative Area at the end of the ride is an exception because we introduce refrigeration, an additional level of controlled environment. As a practical matter, it allows us to grow lettuce and tomatoes in the Florida climate year-round. The ultimate controlled environment would enable us to precisely control temperature, wind speed, quantity and quality of light, atmospheric composition and many other parameters.

Q. How effective is evaporative cooling?

A. Its effectiveness depends on the relative humidity. In a hot, dry climate such as the southwestern United States, evaporative cooling can provide up to 20 degrees of difference over the outside temperature. In humid Florida, temperatures are often only 3-4 degrees cooler in the greenhouses than outdoors. Fans are essential since greenhouses are tremendous solar collectors and can easily reach temperatures of 120-130 degrees Fahrenheit without good ventilation.

Q. Why isn't the greenhouse roof also made of hard acrylic plastic?

A. The material doesn't provide qualities we're looking for. Most new greenhouses have double-layered polyethylene roofs that provide excellent insulation and conserve energy. Further improvements can be made by filling the air layer with an insulation material like styrofoam beads or foam, which we plan to install soon at The Land.

Q. What is trickle irrigation and why do you use it?

A. Trickle comes closest to the ideal irrigation system because it places the correct amount of water at the plant's root zone. This concept is not new but will continue to grow in popularity as water conservation becomes more critical.

Q. You mentioned injecting nutrients into the irrigation water. Does this mean you dissolve fertilizer in the water?

A. We have a hydroponic system where all the essential elements, or nutrients, required by the plants and normally absorbed by the roots are provided in the water. Plants receive oxygen and carbon from the air; hydrogen from the water; and take up through their roots nitrogen, phosphorus, potassium, calcium, magnesium, manganese, sulfur, iron, boron, molybdenum, zinc, copper and chloride. We provide these latter elements in the irrigation water by mixing appropriate salts in the right proportions to obtain the proper concentration of each element.

Q. Is hydroponics an example of the new technology being shown at the Land?

A. Not really. There are commercial hydroponic operations that are currently producing crops without soil. Their only limitation is economic.

Q. Why do you grow plants in sand rather than soil?

A. We opt for the advantages of sand, which include good aeration, drainage, ease of cultivation and a good background for showcasing green plants. Many of you know how difficult it is to garden in clay soils. Clay and organic matter or humus are very important in the garden because they provide physical support, as well as hold the water and essential nutrients in the soil. In our controlled system, however, this is less of a factor since we supply all water and nutrients, as needed; and the sand provides the necessary support.

Q. What do you do in the Creative Area where plants are growing on conveyors, in spray boxes, in whirling drums, etc.?

A. The only difference in the Creative Area is that we substitute different supports for the sand. The nutrient solution is exactly the same. Hydroponics in the Creative Area, in addition to being exciting, can also teach the guests some basic principles of food production. Seeing whole plants growing in air dramatically illustrates the functions of soil. Guests also can learn much about the shape and size of root systems.

Q. Hydroponics bothers me. As a home gardener, I save grass clippings and leaves for mulch to get as much organic matter as possible into my soil. I've always heard that organic material is necessary for good yields and for production of more nutritious foods. Why do you grow plants without organic matter?

A. Organic matter is a very important part of the soil environment. It serves as the essential matrix for holding water and nutrients, and its breakdown provides many of the essential elements that plants require. Although it's hard to convince some people, the science of chemistry has progressed sufficiently so that we understand precisely the components of soil and plants, as well as the requirements for good nutrition. We are providing plants with exact quantities of nutrients they normally obtain from the soil. Chemical analysis proves that they are nutritionally identical to soil-grown plants.

Q. Although you must have insect and disease problems, you don't use chemicals at The Land, do you?

A. Without the use of chemicals, agriculture is possible, at least with some crops, in a home garden or on a labor-intensive small farm. However, it is not a realistic approach to large-scale agriculture or worldwide food production, particularly as the population increases and quality farmland decreases. At The Land, we proudly use an integrated pest management (IPM) system, which is a decision-making approach to agricultural production that considers a variety of techniques to maintain pest populations below damaging levels. I should add that IPM is incompatible with the public's poorly conceived goal of a pest-free environment. We use several controls: biological, such as releasing predatory mites; mechanical, such as vacuuming leaf miner and other small flying pests; physical, including steam sterilizing the sand; and cultural and genetic, such as selecting plant varieties that are disease or insect resistant whenever available, as well as necessary and appropriate use of chemicals.

In addition to carefully monitoring the plants, the heart of the IPM program is to design crop production systems which minimize pest and disease problems. Our major effort, involving a large part of our research and staffing, is in the area of IPM. We work continuously to improve our system and make it a model that others will want to emulate.

Q. How do you handle the plantings to ensure a continual show year-round?

A. Some plantings, like the bananas and coco yams, are perennials and require only routine maintenance. However, most crops must be replanted several times during a year. We display most crops in two stages of growth, as seedlings and as mature specimens. This gives our guests a clearer perspective of the growth process.

Q. Why is the aquacell red?

A. Several years ago, the Environmental Research Laboratory experimented with red covers over shrimp raceways as a technique for increasing production rates. The red cover at The Land is also an experimental modification, and we hope to collect information on the effect of red on behavior and production of other aquatic animals. This red filter also demonstrates that light quality is an additional environmental parameter that can be controlled.

Q. How were the specimens selected for the aquacell?

A. Again, the thrust is food production. Our goal is to display those species that are important in aquaculture from the standpoint of present and potential food production. There are certain species, however, that can't be grown in this type of aquaculture because of the intense crowding required to make this system economically viable.

Q. What's special about this aquacell? Isn't it typical aquaculture?

A. No. Most aquaculture today is conducted in outdoor ponds, with raceways accounting for only a small part of the industry. Most raceway culture that exists is much less sophisticated than the one at The Land and is limited to high-value species such as Penaeid shrimp. Other raceways generally operate as flow-through systems where water is brought in one end of the tank and discarded at the other. The system at The Land is experimental and, perhaps, futuristic because it is a closed, recirculating, water-conserving system. The aquatubes are certainly innovative and futuristic. They might be likened to modern poultry production where large numbers of animals are housed in individual, small compartments with controlled environment and feeding.

- Q. What do you do with your fish?
- A. Our fish are raised as food fish and, when harvested, will be used in the restaurants at Walt Disney World.
- Q. What happens to the crops harvested in the pavilion?
- A. Wherever possible, the food is served in the restaurant. However, we really don't produce significant quantities of most crops; and, since our most important objective is to show these food crops to our visitors, the fruits and vegetables often stay on the plants past their optimal harvest stage. After we pick them, we make colorful displays with the harvested crop, which is another important part of the show's learning experience.
- Q. Is this the farm of the future?
- A. No, I don't think anyone associated with agriculture would suggest that. In fact, our food in the future will be essentially the same food we have today and, for the most part, will be produced in fields, much the same as today. Greenhouses are for specialized applications to supplement present food supplies. The controlled environment is the only way we can show so many food crops year-round in Florida or any other place. We are trying to project an optimism for the future by showing that, with people's creativity, there can be new alternatives to familiar food production methods. Halophytes, plants nurtured with seawater, are good examples.
- Q. Why did you leave a career in academia to head the agricultural program at The Land?
- A. The Land is the most important vehicle for agriculture in this century. We communicate the excitement of new crops, ideas and technologies to millions of people from every walk of life. Because of the international prestige of Disney and Kraft, The Land will do more for agriculture around the world than a myriad of government programs.

Q. Tell me about your staff at The Land?

A. The senior staff includes an agricultural engineer, agronomist, aquaculturist, entomologist and a plant pathologist -- each with a master's degree and experience in his or her discipline. They are products of a nationwide recruiting effort. In addition, all of the gardeners have college degrees in the particular agricultural effort to which they are assigned. I'm tremendously proud of my staff for the great job they're doing in presenting the show. Since plants and fish are living organisms, they are in continuous dynamic equilibrium with their surroundings including climate, pests, nutrients, etc., making it a continuously challenging job just to present the show.

Q. What do you have here behind the scenes?

A. There is much more to The Land agricultural areas than is immediately visible. We plan to feature new crops, ideas and technologies in agriculture that have been sufficiently developed. We are doing the research and development here required to incorporate them into a show in an entertaining and educational manner. We have a backup greenhouse for propagation, research and testing; a laboratory to support the show, primarily diagnostic plant pathology and entomology; five small greenhouses which support our integrated pest management program; a fish quarantine and experimentation facility; a first-rate pesticide storage and handling room; and other supportive facilities.

Q. Will The Land become involved in training agricultural students?

A. We have a program for some of the top U.S. agricultural students who will have an opportunity to work a semester with us at The Land. There will be a formal study/work program, and the participants will give the Tomorrow's Harvest tour for guests. We also hope to have academicians taking research sabbaticals here, which will provide a constant flow of new ideas for our staff.

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Epcot Center
Walt Disney World

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BIOGRAPHICAL SKETCH

HENRY A. ROBITAILLE, Ph.D.
Director, Developmental Agricultural Systems
The Land, Epcot Center
Walt Disney World, Florida

"You ask first graders where their food comes from, and they say the supermarket. I think The Land will change that."

-- Dr. Henry A. Robitaille

Dr. Henry A. Robitaille is responsible for the planning, design and day-to-day maintenance of the experimental growing systems area of The Land at Epcot Center, as well as the activities of the laboratory and the 10,000-square-foot greenhouses adjacent to the pavilion. In this capacity, Dr. Robitaille supervises and trains a staff of 30 to 40 professionals.

Dr. Robitaille acquired his B.S. degree in ornamental horticulture and landscape architecture from the University of Maryland in 1966. He earned both his M.S. and Ph.D. in

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horticulture and plant physiology from Michigan State University in 1967 and 1970, respectively.

He has authored over 20 scientific publications, has experience with all horticultural crops, and spent two years working outside the United States in international agriculture.

From 1972 to 1981, Dr. Robitaille taught and conducted research at Purdue University in West Lafayette, Indiana.

His most recent research projects include development of a new peach growing system for cold climates and a study of the chemistry of potato proteins, in an effort to improve the vegetable's nutritional value.

Dr. Robitaille co-authored a paper, which received the top presentation award at the 1979 national meeting of the American Society for Horticultural Science, the Dale W. McMillan Award (Purdue) for excellence in agricultural communication, and the top collegiate publication award for 1979 from the International Plant Propagators Society.

He is a member of the American Society of Plant Physiologists, the Scandinavian Society of Plant Physiologists, Sociedad Latinamerica de Fisiologia Vegital, the American Society for Horticultural Science, Society of Sigma Xi, the International

Robitaille Biography ... Page 3

Plant Propagators Society and Pi Alpha Xi (honorary).

Dr. Robitaille also is listed in American Men of Science and
Who's Who in Technology Today.

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SCIENTISTS OUTWITTING PESTS AT THE LAND

A tiny predatory mite, barely visible to the naked eye, is successfully guarding valuable food crops at The Land pavilion. The mites serve as a biological control against plant-feeding pests, which reduce crop yields by consuming leaf tissue.

Successful biological control is part of an integrated pest management (IPM) program under development at The Land, presented by Kraft at Walt Disney World's Epcot Center in Florida. The program is based on the selection and use of compatible combinations of distinct control methods: cultural, mechanical, physical, biological and chemical. One goal of IPM here is to reduce the use of chemical pesticides.

IPM originally emerged as a response to the limitations of total reliance on pesticides. The need became apparent when insects acquired resistance to commonly used insecticides. More frequent applications of higher dosages only resulted in

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increased resistance. To add to the problem, use of broad-spectrum chemicals -- those which destroy most varieties of pests -- indiscriminately eliminated beneficial insects, as well. This, in turn, caused major outbreaks of pests which had previously been kept in check by their natural enemies. As these problems multiplied, it became clear that more than one control method was necessary to maintain pest populations at tolerable levels.

"Much of the research here concentrates on integrated pest management," says Dr. Henry A. Robitaille, director of agricultural systems at The Land. "Growing conditions in Florida offer plenty of challenges, because insects and plant pathogens thrive in this hot, humid climate. We hope our pest management system will emerge as a model that will encourage others to use this approach elsewhere in agricultural production."

"Prevention, of course, is the best medicine," says Andrew Schuerger, The Land's plant pathologist. "When combined with sound plant culture, it is our first line of defense. The most effective prevention is the selection of disease-resistant plant varieties, whenever possible. The cucumbers and cantaloupes growing in the pavilion are varieties chosen specifically for their resistance to powdery mildew, which can destroy crops in a matter of days."

As part of the cultural controls, the staff follows strict sanitary procedures to minimize disease introduction to the growing areas. All persons entering the greenhouses must first put on sterile overshoes to avoid tracking in soil-borne pathogens. Gardeners are alerted to "hot spots," or concentrations of insect and disease pests, so they will not be spread to other areas via skin, clothing or tools. Similarly, selective pruning and thinning of infected areas, as well as the careful destruction of crop refuse, are ways of limiting the spread of pests by cultural methods.

"A common public misconception is that control should always result in total elimination of pests," notes Fred Petitt, staff entomologist. "In contrast, the philosophy of IPM is based on management of pest populations. In agriculture, we must learn to tolerate the presence of these organisms. At the same time, we must keep their numbers at levels that do not reduce the crop's yield or marketability."

Careful monitoring of pest density is an essential requirement of IPM. Scientists examine plants at The Land daily to determine the kinds and numbers of insects and pathogens that are present. A variety of detection methods is used. Yellow

objects, for instance, attract many flying insects. Some can be monitored by the use of sticky yellow cards, suspended in the greenhouses like old-fashioned flycatchers.

With other monitoring activities, scientists can actually predict the likely occurrence of crop damage. This is done through observation of temperature and humidity, awareness of vulnerability in various growth stages, understanding the life cycles and population dynamics of pests, as well as of beneficial organisms. "Early detection of problems, if possible even before they develop, gives us time to react," Petitt says.

Mechanical control methods include the actual vacuuming of flying insects. "Some pests, which prefer certain crops for feeding or laying their eggs, become concentrated on the leaves," he explains. "By ruffling them, gardeners equipped with an electric backpack and a 10-inch air duct can suck up the surface insects in flight. However, this method is used only in conjunction with other controls."

In addition, barriers are used to prevent large insects from entering a greenhouse. Inside, sticky foam tape, applied to the trunks of papaya trees, prevents pests from crawling up to feed on the leaves.

Steam sterilization of the soil is a physical control effective in the elimination of plant pathogens and certain insects during developmental stages. "We schedule routine sterilization of the entire planting area at least once each year," Schuerger says. "Of course, we will use this control in localized areas whenever specific problems emerge."

Biological control is the use of selected predators, parasites and pathogens to reduce pest populations. It is one form of control that may occur naturally, without intervention by gardeners. For instance, certain beneficial organisms reduce pest populations of their own accord, simply by eating them.

The scientists stress that, when an active role is taken in establishing a biological control, the amount of money and effort invested depends largely on the value of the crop to be protected. For example, they release predatory mites to safeguard high-value crops. These mites are widely used in greenhouses in Europe and are recognized as an important control method in the tree-fruit industry. Another example is the application of Bacillus thuringiensis, an insect bacterium, to plant foliage at The Land. Small caterpillars will die after eating leaves coated with this bacteria.

More knowledge, scientists believe, is required to successfully employ biological means than other types of pest control. When using biological methods exclusively, crops may sustain damage before natural enemies can curb the pests. Also, when predators eliminate their staple food source in one area, they must move on to other pest infestations or die from starvation.

Chemical control is also an important part of IPM at The Land. It can be used effectively to achieve short-term reduction of pests. However, unlike biological methods, chemicals alone do not provide a long-term or permanent decrease in pest density.

"We apply pesticides only when strictly necessary and then only after thoroughly evaluating their effects on both crops and beneficial organisms," says Petitt. "Chemical and biological controls, when used together, can be more effective than either method alone."

There is seldom only one pest present on a crop, so scientists must constantly review their options without upsetting the ecology. In a single crop of sweet potatoes, a leaf-eating mite may be stopped by predators; but, while the valuable predators are still present, aphids or other pests may appear. To decrease the number of aphids, scientists must carefully

choose a technique that does not upset the balance between predator and prey. Their options include choosing another biological control such as ladybird beetles, applying a chemical pesticide that kills only aphids or using one to which the predators are resistant.

"With IPM, all the controls available to us are important options. The actual system used in any given situation must be selected to provide optimum results at the lowest cost in pesticides and energy," Petitt say.

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BIOGRAPHICAL SKETCHES -- SENIOR AGRICULTURAL STAFF

THE LAND

EPCOT CENTER

PETER C. COOK
Technical Specialist, Aquaculture

Peter Cook is responsible for all aspects of aquaculture at The Land, which include animal selection, rearing, treatment, harvesting and systems maintenance.

Cook received his B.S. and M.S. degrees in biology from the University of Arizona, with major emphasis in ichthyology and marine ecology. He spent two years in Honduras for Red Lobster Inns of America as the marine biologist developing a prawn larva culture technique, and four years as research associate for the Environmental Research Laboratory (ERL) in Tucson, Arizona.

His experience with ERL included three months in Ecuador studying the shrimp farming industry, two years in Mexico working on the Coca-Cola/F. J. Prince experimental shrimp aquaculture

- more -

project, and two years at ERL's Tucson laboratory with responsibility for research on the aquaculture portion of The Land.

LEXIE HERMAN MCKENTLY
Technical Specialist, Agronomy

As staff agronomist, Lexie McKently supervises the propagation and plant nutrition programs, as well as research on new food plant species and varieties for future inclusion in The Land.

McKently received her B.S. degree in horticulture from Pennsylvania State University, and her M.S. degree in agronomy from the University of Florida. She conducted an on-site study of agriculture in South America through the University of Delaware, and studied supervision and management through the Orange County Florida Vocational Education Program. In addition, McKently worked in horticultural therapy with handicapped persons in New Jersey and in many capacities at the Pennsylvania State University research greenhouses. In 1978, she joined the Walt Disney World organization in landscape horticulture and was promoted to The Land staff in 1981, following completion of her M.S. degree.

ELDON RAY MULLER
Technical Specialist, Agricultural Engineering

Eldon Muller's responsibilities at The Land include supervision of operations in the mechanically complex aeroponics greenhouse (Creative Area). Muller is also researching and will

implement future growing-area sets for The Land, which will demonstrate important new concepts and technologies in agriculture.

He received his B.S. and M.S. degrees in agricultural engineering from the University of Idaho, with specialization in machine design and computer science. His experience has been primarily with construction and testing of experimental agricultural systems. Muller has worked with various computer systems, controlled circuitry and remote sensing.

FREDERICK L. PETITT
Technical Specialist, Entomology

Fred Petitt supervises the tropical areas of The Land and is responsible for development, implementation and continual improvement of The Land's integrated pest management (IPM) program.

Petitt received his B.A. degree in biology and environmental studies from Thiel College, where he was class valedictorian and recipient of the Thomas Memorial Award in Sciences. He received his M.S. degree in entomology from Pennsylvania State University and earned the Asa Fitch Memorial Masters Student Award from the Entomological Society of America.

His entomology experience has included management of IPM programs, and research of crop/insect interactions and

development of economic injury levels with greenhouse and field study. Petitt's work at Penn State and Michigan State has given him firsthand experience with some of the most advanced IPM programs in the country.

Petitt joined The Land staff in August 1981, after completing one year toward his Ph.D. in entomology at Michigan State University.

ANDREW C. SCHUERGER
Technical Specialist, Plant Pathology

Andy Schuerger supervises the desert greenhouse areas of The Land. He is responsible for disease control and sanitation programs, as well as having a major role in design, implementation and continual improvement of The Land's IPM program.

Schuerger received his B.S. degree in plant pathology and entomology, and his M.S. degree in plant pathology from the University of Arizona. His specialization areas included nematology, mycology, electron microscopy and other technical laboratory methods. He has experience in electron microscopy, primarily with nematodes; field research with Dow Chemical Co. testing insecticides; and integrated pest management, working with a pheromone to trap pink bollworms (male moth) in cotton.

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BIOGRAPHICAL SKETCH

CARL N. HODGES
Director, Environmental Research Laboratory
University of Arizona

"Any activity where you display the future must constantly change because the future quickly catches up with you."

-- Carl N. Hodges

Carl N. Hodges, director of the Environmental Research Laboratory (ERL) in Tucson, Arizona, is coordinator of the biological displays at The Land pavilion in Epcot Center.

ERL is responsible for the developmental work of the experimental growing sections at The Land, particularly the task of ensuring their scientific validity. Over the years, as the project evolves, Hodges and ERL will continue to work with and monitor agricultural research from many sources so that new systems and plant types can be exhibited.

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Hodges was born in New Braunfels, Texas, on March 19, 1937. He earned his B.S. degree in mathematics at the University of Arizona in 1959.

While a graduate student in meteorology, Hodges developed theoretical ways of harnessing the sun to desalt seawater. Based on his models, a pilot desalting plant was established at Puerto Penasco, Sonora, Mexico, in 1963. A result of these experiments in Mexico is the system, devised by Hodges and his colleagues, that uses desalted water to irrigate vegetables in controlled-environment greenhouses.

He was named supervisor of the Solar Energy Laboratory, a unit of the University of Arizona's Institute of Atmospheric Physics, in 1963. The Solar Energy Laboratory's name was changed in 1967 to the Environmental Research Laboratory.

Among other achievements, Hodges and his colleagues have developed controlled-environment aquaculture for crustaceans, which has led to commercial application of the technology in Hawaii.

Commercial applications of controlled-environment agriculture facilities have been established under the direction of ERL in Mexico; Abu Dhabi (United Arab Emirates); Tucson and Yuma, Arizona.

Hodges has published technical papers in the areas of controlled-environment agriculture and aquaculture, solar energy and energy conservation. He is a Fellow of the American Association for the Advancement of Science and the Arizona-Nevada Academy of Science. In addition, he was appointed by the Governor to the Arizona Solar Energy Commission, and is a member and past secretary-treasurer of the International Solar Energy Society. Hodges is also a member of the World Mariculture Society. He was appointed to the Technology Assessment Advisory Council of the U.S. Congress, and the Advisory Committee on Technology Innovation of the National Academy of Sciences.

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BIOGRAPHICAL SKETCH

MERLE H. JENSEN, Ph.D.
Research Horticulturist
Environmental Research Laboratory

Team Leader, Developmental Agricultural Systems
The Land, Epcot Center
Walt Disney World, Florida

Professor, Department of Plant Science
University of Arizona

"Today, most of the world's food supply comes from 150 species of plants -- and about 85 percent of our food comes from just 30 species. To protect ourselves, we must learn to diversify our food sources."

-- Dr. Merle H. Jensen

Dr. Merle H. Jensen is responsible for the design and development of the prototype growing systems at the Environmental Research Laboratory (ERL) in Tucson, Arizona; and he advises and helps coordinate those systems at The Land in Epcot Center.

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Born December 11, 1938, in Olympia, Washington, Dr. Jensen earned his B.S. degree in crops production from California Polytechnic State University in 1963; his M.S. in vegetable crops from Cornell University in 1965; and his Ph.D. in horticulture from Rutgers University in 1968.

Since graduating from Rutgers, Dr. Jensen has been associated with ERL, where he has been involved in research and development. Other projects, under his direction, include the use of plastics for agricultural purposes, primarily the use of air-filled polyethylene layers as greenhouse covers; soilless cultural systems for greenhouse vegetable production, such as sand and drip- or trickle-irrigation systems; and energy alternatives and conservation for controlled-environment agriculture. Results of these projects are incorporated into the growing systems at The Land.

In addition, Dr. Jensen has traveled worldwide to help develop agricultural projects and to advise governments of other countries on their agricultural research and development programs.

He is a member of the American Society of Horticultural Science, the International Society for Horticultural Science, the Society of Sigma Xi and the Comite International des Plastiques

en Agriculture. He is president of the National Agricultural
Plastics Association.

Dr. Jensen has published numerous scientific papers and
authored articles for many technical, trade and consumer publica-
tions. He has participated in and edited the proceedings of
national and international agricultural symposia.

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EPCOT Center is inspired by Walt Disney's vision of a community where people of the world explore challenges and share new ideas for tomorrow.

We, in the Disney organization, hope you enjoyed your visit to *The Land*, presented by Kraft. If you would like additional information about agriculture, the environment or personal nutrition, a letter or phone call to one of the organizations listed here may help you find the answers you're looking for. In addition to responding to your questions, many of these organizations have brochures, periodicals, referral services, audiovisual materials and exhibits.

For other organizations working in the fields of agriculture, nutrition, and the environment, contact your local library or the National Referral Center, Library of Congress, Ten First Street, S.W., Washington, D. C. 20540, (202) 287-5670.

AMERICAN FARM BUREAU FEDERATION
225 West Touhy Avenue
Park Ridge, IL 60068
(312) 339-5850

Represents farmers and ranchers on educational, legislative and economic matters. Interests include agriculture, land and energy use, food production, and natural resources.

AMERICAN GEOLOGICAL INSTITUTE
One Skyline Place
5205 Leesburg Pike
Falls Church, VA 22041
(703) 379-2480

Promotes educational and research aspects of the geosciences, including geology, geochemistry, and geophysics.

AMERICAN HORTICULTURAL SOCIETY
Post Office Box 0105
Mount Vernon, VA 22121
(703) 768-5700

Educational organization that encourages amateur and professional involvement in horticulture. Primary interest is the development and growth of ornamental plants, including flowers, shrubs, and trees.



CONSERVATION FOUNDATION
1717 Massachusetts Avenue, N.W., Suite 300
Washington, D.C. 20036

Research and communications organization dedicated to improving the quality of the environment and promoting the wise use of the earth's resources. Conducts research on land use, coastal and water resources, energy, and environmental matters.

**COUNCIL FOR AGRICULTURAL SCIENCE
AND TECHNOLOGY**
250 Memorial Union
Iowa State University
Ames, IA 50011

Conducts research on matters concerning food and agriculture science, including pest management, soil erosion control, farming techniques, and the preservation of agricultural lands.

FOREST SERVICE
U.S. Department of Agriculture
Publications Staff Office
Post Office Box 2417
Washington, D.C. 20013
(202) 447-3760

Federal agency responsible for managing the land, water and wildlife resources of our national forest system. Conducts the world's largest forestry research program.

4-H EXTENSION SERVICE
U.S. Department of Agriculture
Room 5035 South
Washington, D.C. 20250
(202) 447-5853

Federal program to promote youth awareness and education in the areas of agriculture and farming, animal care, home economics and family living.

INSTITUTE FOR ENVIRONMENTAL STUDIES
University of Wisconsin-Madison
Publications and Information Office
120 WARF Building
610 Walnut Street
Madison, WI 53706
(608) 263-3185

Research institute working on environmental matters through its programs in biotic systems, climatology, environmental remote sensing, geographic analysis, and marine studies.

KRAFT, INC.
Consumer Service Department
Kraft Court
Glenview, IL 60025

Produces and distributes a variety of packaged food items, including salad dressings, packaged dinners, frozen desserts, dairy products, and refined edible oil. Provides helpful information regarding food and human nutrition.

NATIONAL WILDLIFE FEDERATION
1412 16th Street, N.W.
Washington, D.C. 20036
(202) 797-6800

Conservation and education organization which encourages prudent management of our natural resources. Promotes conservation education and works in the areas of fish, wildlife, water, and public land management.

OFFICE OF GOVERNMENT AND PUBLIC AFFAIRS
Special Programs Center
U.S. Department of Agriculture, Room 536-A
Washington, D.C. 20250

Federal agency responsible for food and agriculture. Interests include farm and commodity policies; food production, storage, transport, and marketing; gardening; plants; food cooperatives; and the use of pesticides.

RESOURCES FOR THE FUTURE
1755 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Dedicated to research and public education on conservation, environmental quality, the use of natural and renewable resources, and energy policies.

U.S. DEPARTMENT OF AGRICULTURE
Food and Nutrition Information Center
Room 304, NLA Building
Beltsville, MD 20705
(301) 344-3719

Clearinghouse for information on food and human nutrition, with emphasis on nutrition research, food technology, and food service management.

U.S. DEPARTMENT OF AGRICULTURE
National Agricultural Library
Beltsville, MD 20705
(301) 344-3755

Center for worldwide agricultural information, including farming, botany, entomology, forestry, and soil sciences. Maintains extensive agricultural library.

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Public Affairs
401 M Street, S.W.
Washington, D.C. 20460

Federal agency responsible for protecting the public from environmental hazards and problems associated with pollutants. Areas of jurisdiction include air and water quality, hazardous wastes, noise, radiation, pesticides, and toxic substances.

U.S. GEOLOGICAL SURVEY
Public Inquiries Office
503 National Center
Reston, VA 22092
(703) 860-6167

Federal agency responsible for earth science research and information in the fields of geology, geography, water resources, mining, minerals, oil and gas development, mapping, remote sensing and Landsat imagery.

U.S. NATIONAL OCEANIC & ATMOSPHERIC
ADMINISTRATION
Office of Public Affairs
11400 Rockville Pike, Room 108
Rockville, MD 20852
(301) 443-8243

Government agency responsible for climatic monitoring of the air and seas, mapping of oceans and land, and weather forecasting and research conducted through the National Weather Service.

U.S. WATER CONSERVATION LAB
4331 East Broadway
Phoenix, AZ 85040
(602) 261-4356

Government-affiliated research lab working to enhance water conservation through irrigation and water-recycling systems, and the more efficient use of water in agriculture.

For more information on agriculture and farming in your state, contact the Cooperative Extension Service of your state land grant university.

PLACES TO VISIT

BELTSVILLE AGRICULTURAL RESEARCH CENTER
Visitors Center
Building 186, BARC East
Beltsville, Maryland 20705
Visitor information: (301) 344-2483

One of the world's largest agricultural research facilities, this U.S. Department of Agriculture site is devoted to the improvement of world food supplies and the environment. Located 15 miles northeast of Washington D.C.

ENVIRONMENTAL RESEARCH LABORATORY
Tucson International Airport
Tucson, Arizona 85706
Visitor information: (602) 626-2931

Futuristic growing techniques utilizing controlled environment agriculture for high volume vegetable production in arid regions. Principal advisor on "Listen to the Land" boat cruise at EPCOT Center.

MITCHELL PARK CONSERVATORY
524 S. Layton Boulevard
Milwaukee, Wisconsin 53215
Visitor information: (414) 278-4383

Three, seven-story glass domes house tropical, desert, and temperate environments in this 60-acre botanic garden. Located in downtown Milwaukee.

NEW ALCHEMY INSTITUTE
237 Hatchville Road
East Falmouth, Massachusetts 02536
Visitor information: (617) 563-2655

Ecological approaches to food production, shelter and energy are explored in self-contained "bioshelters." Located 80 miles south of Boston.

For help planning your trip, please call Walt Disney Travel Company at (305) 828-3255.

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