

Delivering nutrient rich foods is a major concern to those involved in the fight against hunger. Green leafy vegetables are recognized for their contribution of a diversity of nutrients, and are the focus of this edition.

Learn about promotion of green leafy vegetables and powders through *Sábado Verde* from one of network members in Honduras, Andrea Suarez. Get inspired by another change agent from the region, Elioena Arauz in Nicaragua. Discover what nutrients members of the mustard/cabbage family contribute to a healthy diet. Learn what Larry Yarger thinks of Lagos Spinach. Explore the latest resources posted in ECHOcommunity.org and find interesting events happening in the Latin American / Caribbean Region.

Enjoy this edition of *ECHO Latin America/ Caribbean Notes!*

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Green Leafy Vegetables and Powders for Improved Nutrition in Honduras

by Libby Arcia and Cecilia Gonzalez

At ECHO's [International Agriculture Conference](#) last November, Andrea Suarez, a Food Science student at [Universidad Nacional de Agricultura \(UNA, National Agriculture University\)](#) of Honduras, presented a workshop titled, "Fortifying local foods with leaf powder to combat child micro-nutrient deficiencies." This article shares about Andrea's experience and the importance of green leafy vegetables and powders for nutrition in Honduras.

Honduras, located in Central America, is a country rich in natural beauty, history and people. It has a population of more than 9 million, who primarily speak Spanish, and other Amerindian languages. It has borders with Guatemala, El Salvador, Nicaragua, the Caribbean Sea, and the Pacific Ocean. In the tropical rainforest



Figure 1. Andrea Suarez, Kathy Bryson and Cecilia Gonzalez (left to right) during the ECHO International conference workshop. Source: Andrea Suarez

near Guatemala, we find the Copan Ruins, which was an important city and center of art in the Mayan Civilization—like the Paris of today. Through their stone-carved hieroglyphics, we have learned much about the Mayan way of life. Their Bay Islands in the Caribbean Sea are part of the 1,000 km-long Mesoamerican Barrier Reef, a world-renowned diving destination (Google Maps 2018).

On the other hand, Honduras also faces challenges. According to World Bank data, more than sixty-six percent of the population lives in poverty, while in the rural areas one out of five live in extreme poverty (World Bank 2017). One-third of child deaths are due to malnutrition, primarily from increased severity of disease. Extreme weather, prolonged droughts, and hurricanes affect the food security of its most vulnerable people. One in four children suffer from chronic malnutrition. Nearly one third of preschool aged children and pregnant women are anemic due to iron deficiency and 14% of preschool aged children are deficient in vitamin A (World Bank 2015).

Gratefully, innovative solutions to food security and nutrition are evolving from young Honduran citizens. One of them is Andrea Suarez, a Food Science student at [Universidad Nacional de Agricultura \(UNA, National University of Agriculture\)](#). She wants to use her education to address malnutrition in her country. Andrea recently completed an internship with [Servants in Faith and Technology \(SIFAT\)](#), a training center for meeting basic human needs with

an extended training ministry through campus programs, international mission teams, seminars, and conferences (SIFAT 2018). She currently works with fellow students, members of the [Asociación Hondureña de Egresados de SIFAT-UNA \(AHESUNA, Honduran Association of SIFAT-UNA Alumni\)](#), which mission is to contribute to sustainable development through appropriate technology and empowerment to improve the quality of life of Honduran communities (AHESUNA 2018).

With the goal of reducing childhood malnutrition and mortality, these students go directly to the most vulnerable communities through a program they call *Sábado Verde* (Green Saturday). This public education event promotes the use

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Honoring God by empowering the undernourished with sustainable hunger solutions.

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of green leaf powders. Green leaf powders are derivatives of plants such as Moringa, Katuk, Chaya, and other green leafy vegetables, which are rich micronutrients, such as iron and vitamin A —which are deficient in the Honduran diet.

During *Sábado Verde*, participants learn to integrate green leaf powders into staple foods, such as tortillas. In addition to community education, the group succeeded in convincing the university to add green powders to some of the foods and drinks they serve in the cafeteria. The group is now working towards the goal of launching a business to sell food products fortified with green leaf powders, such as pastas and cookies, to influence diets across Honduras.

To highlight innovative uses of green leafy vegetables, ECHO hosted its own *Sábado Verde* at its International Agricultural Conference in Florida. Andrea led an afternoon workshop called, “*Fortifying local foods with leaf powder to combat child micro-nutrient deficiencies.*” The workshop included a step-by-step demonstration on how to dry Moringa, Katuk, Chaya, and other nutritious green leaves. Andrea prepared smoothies made of orange juice, fresh fruits, and Moringa powder. Tasting this concoction convinced workshop participants that children would readily accept this tasty drink.

Andrea’s leadership of this workshop and participation in the conference was an important stepping-stone in pursuit of her calling to improve the health and nutrition of Honduran children. She commented, “*Participating in ECHO’s International Conference, at such a young age and almost concluding my student career, has been of great importance. It is an emotional achievement and an inspiration to the professional calling I wish to pursue. I value the attention received from all of ECHOcommunity and I appreciate the space which allowed me to be filled with knowledge and to grow as a person and as a citizen of my country where I will put into practice all I learned.*”

We, at ECHO, are privileged to partner and learn from people like Andrea, leaders and change agents of the communities we want to impact. We are also pleased to share about what individuals, communities, and organizations are doing to promote nutrition in practical ways, such as *Sábado Verde*, something inexpensive and easy to replicate.

Please see our resources section for helpful information on green leafy vegetables, including:

- [ECHO Technical Note #12](#) by Dr. Martin Price reviewing various uses of Moringa leaf and powder.
- [Leaf for Life](#) resources, such as *21st*

Century Greens: Leaf Vegetables and Sustainable Agriculture are available at Leaf for Life’s website, including resources in English and Spanish. The Leaf for Life Handbook is available at the [ECHO Book Store](#).

- *Edible Leaves of the Tropics* by Martin, F.W.; , Ruberte, R.M. and Meitzner, L.S.; available at the [ECHO Book Store](#).

References

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MEMBER HIGHLIGHT

Elioena Arauz, Artists for Soup, Nicaragua

Edited by Libby Arcia

Elioena Arauz is a certified Bio-intensive Garden instructor who grew up in the Matagalpa region of Nicaragua. Matagalpa is the fourth largest city in Nicaragua and one of the most commercially active. Matagalpa produces and exports beef, cheese, fruits and vegetables (Wikipedia, 2018). She grew up in this agricultural environment learning agricultural methods and skills that she continues to cultivate to this day.

Elioena works with [Artists for Soup](#), a non-profit organization dedicated to reducing hunger, malnutrition, and poverty through empowering women and secondary school students. In this work, she is able to share her knowledge, and influence the life of low-resourced women. These women

then lead community initiatives aimed at building the local economy and improving food security in a sustainable way. Artists for Soup focuses on training and development of young, single mothers who are empowered to grow from managing their home and school gardens to become strong community leaders (Artists For Soup, 2018).

Elioena leads three school gardens and four home garden projects. She has watched women transition from passive to active community and family leaders, overcoming the traditional belief that women belong only in the home. The lessons learned, including punctuality, discipline and shared responsibilities, allow women to work as a team to meet production goals. The acquisition of new knowledge gives women the independence and confidence needed to become instructors and role models.



Figure 2. Elioena visiting her farm
Source: Cecilia Gonzalez

Elioena is a change agent working to replace traditional growing techniques with

safer organic and bio-intensive methods. Through this work, she leads women toward personal growth and contributes to improve the nutrition of families and communities.

References

Artists For Soup. (2018). Artists For Soup. Retrieved February 16, 2018, from <https://www.artistsforsoup.org/>

Wikipedia. (2018). Matagalpa, Nicaragua. Retrieved February 16, 2018, from https://en.wikipedia.org/wiki/Matagalpa,_Nicaragua

ECHOES FROM OUR NETWORK

ECHO's Technical Response Unit (TRU) answers your technical questions. Below, ECHO Intern Gretchen Rops, responds to a question regarding pigs.



Figure 3. Deep Litter Pig System at ECHO Global Demonstration Farm. *Source: ECHO Staff*

Q. I recently attended your February Tropical Agriculture Development (TAD) training. I am back in the Amazon Basin working with unreach tribes. I need to understand pig farming especially your impressive pig composting system.

A. In his book *Natural Farming*, Arnat Tancho, presents the deep litter pig raising system used at ECHO. This consists of a built up pen, about three to four feet, with front-end removable cement slabs. This concept works with a sturdy pen with room for organic matter buildup (does not need to be 3 feet).

At ECHO, sawdust is the primary bedding material; however, any available similar mater will work. We feed our pigs cut and carry forages of which the un-eaten material becomes part of the bedding/ organic matter. Start out with a thick layer of organic material; add a thin layer of sawdust (1-2 inches) when the bedding gets too wet. Every other week spray microorganisms to speed up composting and reduce smell. We use an indigenous microorganism (IMO) mixture made at the farm. Composting occurs when there is sufficient organic matter to mix with the manure.

Consider your soil type. In our Florida location, our pig compost has a high pH level, which is not the case in Southeast Asia, where the system was developed, and the soils are very acidic.

In regards to feed, pigs can handle a wide variety of food sources. The *Natural Farming* book contains pig feed suggestions/ recipes. On the farm, we feed mostly leafy forages with a small amount of purchased commercial feed, along with food scraps, rotting fruit, etc. when it is available. Aim to provide adequate protein.

Visit ECHOcommunity.org for additional resources related to Natural Farming techniques that employ the positive effect of microorganisms:

- [Farm-Generated Feed: Hog feed Production](#)
- [Raising Pigs on Moringa Leaves – ECHO Development Notes #51](#)
- The English *Natural Farming* edition is 340 pages and includes color photos and educational graphics as well as tables that summarizes information. To order visit [ECHO Bookstore](#).
- [See more resources on the Deep Litter System](#)

ECHO RESOURCE HIGHLIGHT

ECHO's Green Leafy Vegetables Resources

by Libby Arcia-Hird

- **Brassicas**, the mustard/cabbage family of dark green leafy vegetables (DGLV) deliver important vitamins, trace minerals, and are rich in fiber. To learn more go to [ECHO Development Notes #87](#). [ECHO's Seed Bank](#) offers a number of these brassicas, which do well in warmer climates.
- **Amaranthaceae, *Celosia argentea* var. *argentea*** commonly known as "**Lagos Spinach**" is a vigorous, broadleaf annual belonging to the Amaranth family (*Amaranthaceae*). In [ECHO Technical](#)



Figure 4. Lagos Spinach. *Source: ECHO Staff*

Note #56 author Larry Yarger informs us about this plant. ECHO's Seed Bank carries a mix of both the green and red varieties of Lagos Spinach.

- [Perennial Greens for year round nutrition](#). This article reviews ECHO's collection of perennial species that boast edible parts, especially leaves. Discover the plants, their use as powders, and their impact on health.
- [ECHO Development Notes No. 62](#) offers *A Second Look at Green Leafy Vegetables as a Source of Vitamins and Minerals*, based on information from ECHO's book, ***Edible Leaves of the Tropics*** 3rd edition available at the [ECHO Book Store](#).
- In [ECHO Technical Note #12](#), Dr. Martin Price reviews various uses of moringa leaf and powder, as well as the nutrient content of these in various settings and programs.

Other Resources:

- [A Spanish language recipe book](#). The Food and Nutrition Technical Assistance (FANTA) Project created a Spanish-language recipe book and guide that promotes nutritious, accessible, and affordable foods to improve the diets of pregnant and lactating women and young children in Guatemala's Western Highlands.
- **Practical Information from *Leaf for Life***. Leaf for Life helps people improve their health by showing ways to better use of vegetables, especially leaf crops. In ***21st Century Greens Leaf Vegetables and Sustainable Agriculture*** and in the ***Leaf for Life Handbook***, David Kennedy reflects his vast experience gained from his work around the world. Leaf for Life resources, such as *21st Century Greens: Leaf Vegetables and Sustainable Agriculture* are available

at [Leaf for Life's website](#), including resources in [English](#) and [Spanish](#). The ***Leaf for Life Handbook*** is available at the [ECHO Book Store](#).

- People interested in tropical gardening or botany will find ***Edible Leaves of the Tropics*** by Franklin W. Martin, Ruth M. Ruberte and Laura S. Meitzner, is an indispensable guide to several hundred species of plants and edible leaves. This book describes familiar and exotic plants with edible leaves, discussing their origin, growth habit, cultivation guidelines, nutritional value, preparation, multiple uses, and cautions. ***Edible Leaves of the Tropics*** is available at the [ECHO Book Store](#).
- [Green Leaf Powders in Review](#). A study of *Moringa oleifera Lam.* leaves confirmed the presence of all the essential nutrients, minerals and vitamins to be of good nutritive value. The plant leaf

powders can be considered probable sources of food supplementation in the future, after further investigation of the anti-nutritive factors present in them and their enzymatic and molecular effect on human health.

Training Videos:

- [Solar Drying of Kale Leaves](#). Solar drying allows farmers to reduce losses and sell leafy vegetables out of the main harvest season. Available in English and French.
- [Chaya a Solution from Nature against Malnutrition](#). This short Spanish language video exposes the beauty and wealth of Guatemala as a Megadiverse country, and presents Chaya as an ancient superfood to combat malnutrition today.

TECHNICAL NOTE SPOTLIGHT

Linking Smallholder Farmers to Markets

Summary by Libby Arcia

Brian Flanagan worked with MEAS (Modernizing Extension and Advisory Services), a USAID-funded project. He is currently the Director of Agriculture Training/Intern Manager at ECHO. Brian worked in Haiti for seven years after completing an ECHO internship in 2003. He has been involved in various community development projects throughout Haiti and other countries.

Introduction

This ECHO Technical Note, drawn from the MEAS / USAID [Brief #4](#) and [Discussion Paper #4](#) (*Linking Smallholder Farmers to Markets and the Implications for Extension and Advisory Services*), provides an overview of markets, factors to consider when developing projects that link smallholders to trade options, and common approaches to strengthening smallholders' access to markets.

The expansion of domestic and export markets, along with increased production of high value horticultural products in emerging economies are creating opportunities

for smallholder farmers to prosper from, and participate in the market. The goal is to create long-term market linkages for smallholders. Thus, intervention design must take into account the circumstances of the farmer and community dynamics. Projects should focus on linkages that improve food and nutritional security as well as income. To accomplish this, project planners must consider a number of issues before deciding on an approach.

Please [see the whole article at ECHOcommunity](#). It is available in English, Spanish and French. Here is an additional resource on the topic, "[Farmer Cooperatives](#)" from [EDN Issue #127](#).

UPCOMING EVENTS

ECHO Latin America/Caribbean Team is organizing and/or participating in the following two events:

[Grafting Training Exchange and Network Development](#)

Various locations in Guatemala. Feb 20-27, 2018

Organized by [Frutas del Mundo Farm](#) in Guatemala and [ECHO Latin America/Caribbean Regional Impact Team](#), this Training Exchange will allow Frutas del

Mundo and ECHO staff to teach and learn from each other grafting techniques for tropical fruit trees, and hold a practical training for nursery workers and grafters from farms in three sites in Guatemala. This event is an opportunity to exchange information, contacts, and experiences in areas relevant to Guatemalan farming families and the linkages between agriculture, nutrition and health. Event organizers will also have the opportunity to visit with practitioners, particularly working with homegardens, from [Seeds of the Future](#) and the [Mayan Health Alliance/Wuqu'](#)

[Kawoq](#), as well as the [National Agriculture School](#) (ENCA, Escuela Nacional Central de Agricultura).

[Chaya in Guatemala: Participatory consultation on needs, challenges and opportunities.](#)

Universidad del Valle Guatemala, Guatemala City, Guatemala. March 13, 2018

The purpose of this conference and consultation is to share the results of a

value chain and marketing study recently undertaken in Guatemala on chaya (*Cnidoscolus aconitifolius*). The event will be also an opportunity for cross learning among key institutions working on chaya in Guatemala, Mexico and the US. An open debate involving civil society, public sector and national and international organizations, will review the needs, challenges and opportunities for upgrading the value chain of this highly nutritious vegetable in Guatemala. The meeting is jointly organized by [Bioversity International](#) and [Universidad del Valle de Guatemala](#), in cooperation with the [International Fund](#)

[for Agricultural Development](#) (IFAD), the [European Union](#) (EU) and the [CGIAR Research Programmes on Climate Change, Agriculture and Food Security](#) (CCAFS) and [Agriculture for Nutrition and Health](#) (A4NH).

Conference presentations will be shared on ECHOcommunity shortly after the event.

Other Events:

ECHO Global Farm, Fort Myers, Florida, USA,

<https://www.echocommunity.org/events/>

Mexican Hydroponic Association A.C.,

<http://hidroponia.org.mx/>

Las Cañadas,” Veracruz, Mexico

<http://www.bosquedeniebla.com.mx>

Lasting Harvest International Demonstration Farm, Panama

lastingharvest@gmail.com

We are happy to publish your events. Please send us details to lac@echonet.org

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PLEASE NOTE: At ECHO we are always striving to be more effective. Do you have ideas that could help others, or have you experimented with an idea you read about in *LACN*? What did or did not work for you? Please let us know the results!