

# ST. LOUIS *Women* ON THE MOVE

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**LUCY MARSHALL  
IS GOING FOR  
THE GREEN**

**VIRGINIA KYLE  
CAMPBELL**

**CONTINUING  
EDUCATION**

**SUCCESS IS  
MAKING  
A DIFFERENCE**

**12 TIPS TO BE  
MORE PRODUCTIVE**



# A Natural Passion A Biochemist Strives to Help the World's Waterways

by Alicia McColl

Lowering the chemical load on the environment with natural products is Dr. Lucy Marshall's passion. Going up against large chemical companies can be a sticky situation, but Marshall and her team are making their mark globally with their natural adjuvants.

About 10 years ago, Marshall developed and patented a microsp sponge system called Biocar® that can be used in agricultural and environmental treatments to reduce spraying frequency and volume of chemical or biological applications. Biocar® materials are derived from grain and oil seed materials that come from Mid-Western States.

Marshall is president and CEO of Trans America Product Technology, Inc. or TAPT ([www.taptinc.com](http://www.taptinc.com)), a technical consulting firm, and she is acting president of Biosorb, Inc. ([www.Biosorb-Inc.com](http://www.Biosorb-Inc.com)), a manufacturing company that provides natural-based products for aquatic, environmental, agricultural and horticultural industries.

The first company, TAPT, which Marshall established in 1994, is based in St. Charles County and developed the proprietary delivery technology. Once the patents were issued, a second company, Biosorb Inc., was established in 1998 with four other investors to manufacture products using the natural matrix for delivery of chemical and biological treatments. Along the way, students and chemists were hired to develop the products.

Marshall credits her parents for her love of the environment and her drive of being a risk-taker. As a child, she grew up in the Everglades. Her

parents left Cuba in 1960 when dictator Fidel Castro began removing children from their homes to be indoctrinated in the Communist Regime. Lands and homes were being confiscated by the government and people who were opposed to the agrarian reforms were being executed.

"Cuba was in turmoil, and today, it is a ruined country," said Marshall.

Marshall's parents always stressed education. Her father was an agronomist and her mother went to law school. The family quote was "What's in your head, no one can take away." And so, the family of four with \$100 in their pockets, began all over again in the sugar cane business in South Florida.

Her father was a great role model in environmental concerns. When developing farmland in the Glades, he would always be concerned that there were enough lagoons and wildlife areas intact for endangered species like the whooping cranes, Florida panthers, and bears. Food production and wildlife coincided in the farmland around Lake Okeechobee.

With scholarships, Marshall received an undergraduate degree from Rollins College in Winter Park, Florida, and a Ph.D. in Biochemistry from Rice University in Houston, Texas, while attending as a Robert A. Welch Foundation Scholar. While she was working as an NIH Postdoctoral Fel-



*Dr. Marshall with Mr. Thad Holmes of Alabama Department of Wildlife and Fresh Water Fisheries, DNR, in the Mobile Bay*

low at the University of Texas, Houston, she was selected by NASA as an astronaut candidate finalist for the Mission Specialist Program.

In 1983, Marshall was working for Bell Laboratories, Murray Hill in New Jersey, when Monsanto was looking for scientists to set up its first drug delivery laboratories. Marshall came to the St. Louis headquarters and worked on a collaborative program with California Institute of Technology and the Medical Imaging Group at Washington University Medical School in St. Louis.

When Monsanto bought G.D. Searle, Marshall could not move to Skokie, Illinois, where the pharmaceutical headquarter was located.

"My children were young and my husband was working in St. Louis," said Marshall. In 1988, she was transferred to the Monsanto Agricultural Company where she began working on low-toxicity formulations for homeowners, golf and turf markets. It was a natural fit for Marshall because of her pharmaceutical background.



In 1993, during a round of downsizings, Marshall took the opportunity to start her formulation consulting business TAPT.

"I had learned many valuable lessons from customers while working in the turf and golf markets," said Marshall. "People wanted to make sure that the materials applied on lawns would not hurt their dogs or their children who were bringing them into the home. Customers wanted non-toxic, natural products that could do the job and not adversely affect them, their pets and their environment.

"In the beginning, TAPT was making all sorts of formulations: nutraceutical, pre-clinical pharmaceutical, veterinary, horticultural, cosmetic, etc. It was when a Canadian customer from Toronto decided to come to St. Louis to visit us that TAPT became involved with EDC, a St. Charles County business incubator. We needed a seminar room. When I arrived at their facility, the EDC asked me what I did and I explained that I was a biochemist making private formulations. The EDC said that they had an available laboratory that had had an explosion and if I could clean it up, they would rent it to me. And that's how we got started," she said.

"As TAPT grew in business contracts, we hired chemists and students to help us make products. From 1994-1998, we had experimented with several formulation inerts that had very absorptive, cost-effective properties. The patents were filed and were issued by 1999. During this time, the United States Army Corps of Engineers has heard about our proprietary absorptive matrix called Biocar®, and TAPT received federal funding from the Corps to work on a natural bioherbicide. TAPT worked on the natural aquatic bioherbicide until the chemical politics got involved. Apparently, there was a chemical company that did not want the natural bioherbicide to be made and the project was

discontinued."

Developing and promoting natural products that lower the chemical load on the environment can be a double-edge sword, said Marshall. She said when Biosorb started selling TopFilm™, two large agrochemical distributors wanted to carry the new microsphere-based natural adjuvant because of customer demand. About 1-1/2 years into sales with these chemical giants, said Marshall, Biosorb heard from one of these distributors who said that TopFilm™ was working "too well." Apparently because growers and applicators could extend their application times and reduce their spray frequency, the big distributors were not selling the volumes of their standard pesticidal chemicals. TopFilm™ was lowering the chemical use in the environment. Word came from their headquarters to substitute their old standard surfactant (soap) based adjuvant every time a customer ordered TopFilm™. When a customer in Florida called Biosorb to complain that TopFilm™ was being substituted, Marshall confronted the distributor,

who verified that they had gotten orders from headquarters.

Today, Biosorb's products are primarily being sold by smaller distributors in the Southern States and in Southwestern States, as well as, in Puerto Rico, Mexico, Central America, South America, Europe and the Philippines. In these warm areas, humidity and rainfall tend to wash off herbicide, algacide, fungicide, and insecticide applications. By using Biosorb's products, applicators and growers reduce pesticide usage, manual labor and chemical dilution into waterways.

In aquatic applications, Biocar® technology is used in TopFilm™ to coat underwater plants such as hydrilla - a dense vegetation that is a problem in waterways - allowing pesticide applications to stick under water without diluting throughout the lake. TopFilm™ is also used on emergent aquatic weeds, which are sprayed from airboats using a watergun. "Since the airboat turns around right on top of the application, you need to make the herbicide stick or else it washes



*Dr. Marshall with distributor with Miami-Dade County distributor, Mr. Bill Hunt, at the annual Tropical Plant International Expo (TPIE) visiting one of their customers, Excelsa Garden.*



off." Some of Biosorb's customers are water districts, public works, government agencies, private golf course communities, and theme parks (such as Butterfly World in Fort Lauderdale). "The benefit of using natural non-toxic materials is that it does not hurt butterflies or hummingbirds at Butterfly World."

Just recently, on Biosorb's 10th anniversary, TopFilm™ received acceptance by the United Kingdom regulatory authorities. The director of England's aquatic society is very impressed with the results. "I think it is a fantastic product; we got 100% control of 'Potamogeton natans' compared with 65% when using the herbicide alone" said Dr. Jonathan Newman, Head, Aquatic Plant Management Group, Wallingford, England.

Water quality issues are coming to the forefront. In November 2007, the Texas Nursery and Landscape Association published an article entitled "Water Management - Beyond Conservation" in TNLA Green Magazine which states that the "EPA estimates that nonpoint source pollution accounts for 65 percent of pollution in rivers, and 76 percent in lakes in the United States" Therefore, reducing foliar run-off is important to the health of our waterways.

Another benefit of natural non-toxic products like TopFilm™ is that it does not burn delicate foliage. When temperatures in South Florida's major nurseries top 100 degrees, growers have to water plants three times per day. That much irrigation can wash off fertilizers and other treatments that are used in crop production. Marshall explained that growers in South Florida have discovered that if they use TopFilm™ as a "sticker," they can reduce chemical applications from once every

Giant Cane (*Arundo donax*) Control in the Rio Grande, Texas  
Reported by North Star Helicopters (September 18, 2006)

**BEFORE**

Imazapyr Herbicide  
With  
TopFilm™ 16 oz/Acre



**AFTER**

95-100% Control of Giant Cane  
(*Arundo donax*)  
6 Weeks After Treatment



ten days to once every 30 days. This can be a tremendous cost savings in labor, chemicals and fuel.

Another growing industry is the organic food production area. In the organic markets, "The organic producers are sometimes getting four times the price for organically grown produce like avocados, mangos, bananas and berries," said Marshall.

Biosorb's natural products fit into this niche market. In the production of herbs, Eduardo Guerrero, vice president of Shenandoah Growers Inc. in Homestead, Florida, stated, "TopFilm™ has reduced our chemical bill and improved the quality of our herbs."

Biosorb's product line made with natural grain materials is out-performing the current petroleum oil based adjuvants and surfactant lines. In a side-by-side study published by Texas Department of Transportation, glyphosate treatments with TopFilm™ out-performed the standard glyphosate treatments with the petroleum-based crop oil adjuvants (Texas DOT Annual Report 2004). The treatments with TopFilm™ gave 90 days of weed control due

**TopFilm™**  
Sticker for Rainfastness  
A Revolutionary New Development  
in Adjuvant Sticker Technology for  
Enhanced and Prolonged Rainfastness

- Patented Biocar formulation microcrystalline sponge technology
- Improved crop safety (non oil formulation prevents leaf damage)
- Use with fungicides, insecticides and herbicides
- Significantly increases efficacy of all treatments
- Prevents wash-off even under irrigation
- Dry in 10 minutes

[www.topfilm-uk.com](http://www.topfilm-uk.com)

Advertisement running in the European publication, 'Horticultural Week,' sponsored by the distributor in the United Kingdom.



to rainfastness (meaning the herbicide did not wash-off); whereas the treatments with the standard surfactant, lost weed control within the first 30 days.

Biosorb still faces competition from petroleum oil-based products from larger agricultural distributors but the name is beginning to be recognized in the U.S. and in international markets. Biosorb started with two distributors in 2002 and has grown to 25 distributors in 2008; and now, with the international registrations, more distributors are coming on board.

Marshall encourages women to persevere and follow their dreams. Education and developing a product that outperforms is key. Also, she said "When you get investors, make sure they are people who will work with you until the end, a true commitment. Finally, get connected with your trade organizations and with respected research groups.

"I have been very lucky to work with great trade organizations, academic institutions and research societies," said Marshall.

Biosorb is looking forward to expanding their line of natural bioherbicides, biofungicides, bioinsecticides and others and continuing to form business relationships around the world.

Marshall lives with her husband, Monte, who is also a Ph.D. chemist and works with regulatory agencies. They live in St. Charles, Missouri. The couple have two children attending the University of Missouri—Columbia: one who is studying biology/chemistry and the other who is studying business. Both children have a passion for the environment and enjoy traveling internationally with their parents.

"In today's world, we have to make our children aware of the needs of our international neighbors. I really enjoy introducing my children to scientists and environmentalists. Now, that they are college age, it is easy to take them to trade shows and international meetings. For example, I made my son work with me in our booth at the National Aquatic Plant Management Society in Nashville, Tennessee last

July. That is how we met our British distributors and how we exchanged ideas for controlling invasive aquatic weeds and reducing chemical pollutants in our waterways."



*Biosorb's HydraClear® technology makes a bioherbicide stick to underwater weeds in hydrilla tanks.*

**Algaecide Treatments with TopFilm™**  
Whitmoor Country Club  
Lake at 17 North Course

Date Applied 04-08-05 (3 Hours After Application)



10 Days After Treatment (04-18-05)



Lake Size: 1 acre with 5-8 ft average depth  
Use Rates: 2.5 gal Cleargate Algaecide with 8 oz TopFilm™  
Reference: David Priest, Superintendent, Whitmoor Country Club

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