By Ann Adams & Liz Bresniger, partners in Green Heron Tools, LLC, and Green Heron Farms and PASA members

"If you want something done, do it yourself." The idea that that well-worn expression might apply to us and the design of agricultural tools and equipment would have struck us as crazy just a few years ago.

At that time, we were at least 10 years into growing for market — organically raising heirloom vegetables and herbs for Ann’s son’s farm-to-table restaurant (The Farmhouse in Emmaus) and for two farmers’ markets. We’d had diverse careers (in journalism, nursing, public health, higher education) and were still working as consultants to nonprofit organizations, something we’d done for years. Our consulting work was busy into May but tended to dry up during the summer, which worked out well for us and Green Heron Farms. We absolutely loved the growing, and wished only for a little more flat land, a few more hands for weeding and harvesting (or a little more money to hire them), and two slightly more flexible backs.

Oh yeah — and a few good tools.

Sometimes, what you don’t know can actually end up helping you. In our case, we had no idea that despite the significant increase in the number of women farmers in the U.S. (and the already huge number of women gardeners, some of whom use small-farm-scale equipment), no one had tried to produce tools & equipment that were right for women. So we started looking, and all we found was a few tools that showed how little conventional companies understood about women farmers and growers. The tools were small, often flimsy-looking hand tools — some pink, some with flowers. Aaugh!

Fast forward to early 2010. We’ve traded our consulting business for a tools business, Green Heron Tools, LLC, and switched from writing grants for nonprofits to writing grants for ourselves. Thanks to a USDA Small Business Innovation Research (SBIR) grant, we are well on the way toward introducing what we believe to be the first agricultural tool in the U.S. designed specifically for women. Doing it ourselves (which actually means doing it with the help of wonderful people and organizations all over the country, including PASA and the PA Women’s Agricultural Network) hasn’t proven so crazy, after all.

**Why tools for women?**

Tools and equipment function best — and are safest and easiest to operate — when they fit the user. We knew that from our years in public health, and the exhaustive literature search we did for our SBIR grant confirmed it. We also knew — as does everyone — that women’s and men’s bodies are significantly different. That does NOT mean that one gender is “better” — just different. The ways we’re different range from the obvious (shorter stature, smaller grip sizes for women) to the less obvious and perhaps even more important (women having 40–75% less upper-body strength, 5–30% less lower-body strength, a lower center of gravity, and greater flexibility than men).

Our research also confirmed that virtually all tools and equipment currently on the market had been designed for men — or, at best, for some "average" user whose size, weight, strength etc. were heavily influenced by the average man’s. That means that as long as women have been farming, we’ve been using tools and equipment that in most cases are not optimal for us.

We’ve made them work, anyway. But at what cost?

**Implications of using the wrong tools**

It’s impossible to quantify the health and safety effects of women farmers’ long-time use of tools & equipment that don’t really fit us. That’s largely because very little research has been done on the health and safety of women farmers. (The Northeast Center for Agricultural and Occupational Health has an objective of addressing “populations known or suspected to be facing increased risk, including women, for whom there is limited injury/illness data”.)

We’ve been able to learn more about the quality-of-life and safety implications anecdotally, however, through stories women have told us. Funded by our SBIR grant, we conducted focus groups with women farmers in Pennsylvania, Vermont, Iowa and Oregon, and also interviewed women throughout the U.S. Coupled with more than 200 responses to an online survey we posted from 2008–2009, these data open a window into women’s experiences. Here are a few of the common themes we’ve heard, from women in some 36 states:

- The 3-point hitch for connecting implements to tractors is difficult for many women farmers to manage. Some women called it “terrible,” saying that changing implements could take an hour and that some implements were impossible for women to hook up alone. That meant losing valuable time while waiting for help, or delegating large-equipment work to men (husbands or male partners if available, hired hands or helpful neighbors if not).

- Pull-cords on motors are too long for most women to comfortably start. Our public health “hats” fell off our heads when we heard about the dangerous lengths to which some women will go (literally and figuratively) to start small engines. The best/worst story involved propping a chainsaw in the Y of a tree in order to get enough distance to pull the cord to start the chainsaw.

- Many women find mechanized equipment like rototillers difficult to maneuver. Handles tend to be too high and too widely spaced. Specific descriptions of rototillers included “pure hell” to start; “too loud, too heavy, too every-
thing;" and causing so much vibration that "I can be numb from my elbow down."

- Even simple equipment and supplies can be tough on women. One dairy farmer told us that 5-gallon buckets are too heavy to comfortably and safely carry when full. The same goes for 50-pound bags of chicken feed, compost etc. Yet women carry them anyway.

- Long-handled tools tend to be too long and too heavy for most women, with some women directly attributing back pain to their use.

Despite the relatively young age of most of the women in the three Oregon and Vermont focus groups, participants cited histories of disabilities and injuries, including sore backs / back injuries, arthritis and torn tendons. Whether or not these conditions were directly related to tools or equipment, at least some are likely to make farming — including tool and equipment use — more difficult in the future.

The fix: Tools designed for women

SBIR funding enabled us to team up with engineers from Penn State University to use the best available data and science to design tools and equipment that would "fit" women, thereby making the work of farming a little safer, easier, more efficient and more comfortable. We focused first on a digging spade / shovel and a long-handled weeding tool, or hoe — two of the top priorities identified by women farmers and market growers responding to our survey. (More below on women farmers' top priority — a rototiller — and on the 3-point hitch).

Our design "dream team" includes agricultural engineer Aaron Yoder; industrial engineer Andy Freivalds, who’s a certified ergonomist (ergonomics focusing on the safety and efficiency of people's interactions with tools and their environments); Jesun Hwang, a doctoral candidate in industrial engineering; Joonho Chang, another industrial engineering student; and Angie Hissong, an occupational therapist.

In brief, the process to design the digging spade / shovel has included:

- Researching the latest anthropometric data on women — data on heights, grip sizes, arm lengths etc. — and calculating tool dimensions for small, medium and large sizes based on these data.
- Applying principles from ergonomics to ensure comfort and safety.
- Building five prototypes.
- Testing the prototypes in the field (thanks to volunteers from PA WAgN!) and in the lab to determine optimal angle and handle based on physiological measures such as oxygen intake and heart rate, as well as on user preference.
- Testing the force necessary to get various blades into the ground to identify optimum blade type, using equipment Aaron conceived and adapted.

We’re close to our final design, at which point we’ll make more prototypes and get them out to women farmers to test. We hope to have the spade on the market in about a year. As to the hoe, we’ll be testing it in the spring and, depending on the results, making it available sometime in 2012.

We are also in the process of applying for another SBIR grant which would allow us to research and design a tiller (or something to do the work of a tiller) tough enough to dig up sod but significantly safer and easier to use.

Identifying good tools, now

The design and commercialization process for new tools is obviously a lengthy one, especially when you’re committed to producing something that’s truly high quality, as we are.

Because women need better tools now, we’ve launched an e-commerce website at www.greenherontools.com, where we offer a limited selection of tools, equipment and apparel — most recommended to us by women and all tested by women farmers, market growers, landscapers or gardeners before we
April

April 18
Earth Day at Sonnewald Natural Foods, Spring Grove, PA (York Co.) Visit www.sonnewald.org, 4796 Lehman Road, Spring Grove, PA 17362-7703, 717-225-3825.

April 21
Food for Profit
Information for Starting Small Scale Food Businesses
9-4pm, Penn State Corporate Learning Center, Bethlehem, PA
Visit www.extension.psu.edu/start-farming, or contact Tianna DuPont, 610-746-1970.

April 22
Future Harvest-CASA & PASA Field Day - Pasture Based Dairy: Restorative Grazing Strategies, Long Delight Farm, Washington Co., MD.
Register at www.pasafarming.org or call 814-349-9856.

April 30-May 2
May Day Faire Festival at Spoutwood Farm located in Glen Rock, PA (York Co.) Visit www.fairefestival.net for details.

May

May 1
Wine & Jazz Festival at Longwood Gardens, 12pm-5:30pm. Visit www.longwoodgardens.org for details.

May 4-5
Sheep Shearing School
5-9pm, Delaware Valley College, Doylestown
Visit www.extension.psu.edu/start-farming, or contact Mike Fournier, 215-345-3283.

May 5, 12, 19
Exploring the Small Farm Dream
6-9pm, Heritage Restaurant, Franconia
Contact John Berry, 610-391-9840 or Andrew Frankenfield, 610-489-4315

May 10-16
Hameau Farm Studio's Artist Retreat
Day options available. Visit www.s nicholasart.com/workshops/index, or contact Susan Nicholas Gephart, 814-360-2116, snicholasart@aol.com

May 13 — PASA FIELD DAY
Bugs, Wind & Solar: IPM in High Tunnels and a Hybrid Renewable Energy System, Quiet Creek Herb Farm and School of Country Living, Brookville, Jefferson County
10am-3pm
$15 PASA members, $25 all others; lunch will be provided. Register at www.pasafarming.org or call 814-349-9856.

May 15 — PASA FIELD DAY
Edibles from Your Woods: The Wild, Wild World of Ramps and Mushrooms, Shaver’s Creek Environmental Center
Petersburg, Huntingdon County
10am-3:30pm
$15 PASA members, $25 all others; lunch will be provided. Register at www.pasafarming.org or call 814-349-9856.

May 19 — PASA FIELD DAY
Getting Grants for Farming: Meet Your Goals Using Federal or State Funding, Paradise Gardens and Farm LLC, Jefferson County

May 21
PASA’s Summer FARM START located at the Milestone Inn, Harrisburg, PA (Dauphin Co.). Visit www.pasafarming.org/summerstart for complete details.

May 22
Mayse’s Farm Fest 2010, visit www.maysiesfarmfest.org

May 23
PASA Summer FARM START at Eden Hall Farm in Richland Twp., (Allegheny County) PA. Visit www.pasafarming.org/summerstart for details.

June

June 2-5
Native Plants in the Landscape Conference, Millersville University.
To register online, go to www.millersvillenativeplants.org, or contact: 717-871-2189, npilc@yahoo.com

SAVE THE DATE!
20th Annual Farming for the Future Conference
February 3-5, 2011
Penn Stater Conference Center
State College, PA
More details will be available at www.pasafarming.org

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decided to carry them. Although none of the tools was designed specifically for women, they share characteristics such as adjustability (Valley Oak wheel hoe) and smaller dimensions (ARS pruners and hoof trimmers), developed for Asian markets in which people tend to be of smaller stature) that make them work well for women. We’re also offering the DeltaHook Rapid Hitch, which allows farmers of both genders to safely connect and disconnect implements without leaving the seat of their tractor. We’ll continue to add products as we identify and test them.

We’re also committed to making our website a valuable resource for women farmers, with lots of useful resources, education and hopefully inspiration. Please visit us, and let us know what you think.

As to Green Heron Farms, it’s amazing the difference a few good tools can make!

Food Sustainability
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grammed for. We are encouraged by the behavioral and developmental changes we see. The same outcomes will happen with people, eating sustainably produced foods.

The book is only partially written. Let’s continue compiling the sustainable information for the afterword. For those of you who already know your farmer and get close to your food will be ahead in this real life game of “what do I eat today?”