

## **WormEzine**

News and information from Mary Appelhof  
... about vermicomposting, worms, and other critters that live in the soil.

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mary@wormwoman.com phone: 269-327-0108  
Web site [www.wormwoman.com](http://www.wormwoman.com)

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For the Small Print, scroll to end.

They laughed when I said worms eat my garbage,  
but I showed them how, and now thousands say the same thing ...

A WORD FROM MARY APPELHOF aka Worm Woman

Dear Worm Workers,

I've decided to start the New Year with a fresh slate and send this WormEzine out as the January issue. You know how it goes at the end of the year with all of the things that must be done before the ball finally drops at Times Square. We enjoyed a very pleasant celebration at our local New Year's Eve Fest at Bronson Park in Kalamazoo. This annual event offers some 24 arts and cultural performances, with each 30 or 45-minute performance repeated 2-3 times during the evening. We saw 4 events, including a Celtic group with harp, whistles, keyboard, and guitar; a Highland bagpipe performing group; storytelling, and an outstanding tap-dancing troupe. This non-alcoholic event is popular with all ages, including families with little kids. Some of the events we didn't get to see were an Elvis impersonation, big band, wind quartet, the Spoon Man, juggling, classical guitar, and Chinese acrobats. The grand finale is fireworks over the park. According to the radio 6500 came out this year.

The worms seems to be doing fine in my winterized Patio Bench Worm Bin. They don't work very fast because it still is cold, even with the insulation and supplemental heat. Temperature inside the bin was 50 degrees F (10 C); outside it was 25 F (4 C). I am able to continually add food waste, however, and it does get processed. I see a lot of enchytraeids (white worms.) I don't know if the cold temperature encourages their growth, or whether it is related to the pH, food source, or some other factor. I'm not concerned about having them in the bin ... after all, they're helping to process the food wastes, also! If I had tropical fish, I would have a feast of white worms for them!

My feature this month gives you a bit of an idea of the ZERI training I participated in. There's much to absorb and I can't do it justice in a short piece, but this should give you an idea.

Please write with your comments and ideas!

Sincerely,  
Mary Appelhof

“Changing the way the world thinks about garbage ...”

#### CONTENTS of this issue

1. Feature
2. Resources
3. Q & A
4. Coming events
5. Product highlights
6. About the Author
7. The Small Print

#### 1=====FEATURE=====

#### ZERI Establishes Presence in United States by Mary Appelhof

ZERI is an approach, a methodology, a practice. ZERI stands for Zero Emissions Research and Initiatives. Gunter Pauli founded the international non-governmental organization in 1994. Gunter Pauli is truly an international citizen. Author of several books, the most recent of which is *Upsizing*, he has worked in 120 countries, speaks seven languages, and has influenced millions of people through his creative and innovative approaches to solving problems of food, poverty, self-esteem, and resource depletion. On December 8, 2002, in Santa Fe, New Mexico, Pauli awarded certificates to the first 24 ZERI practitioners in the United States. I was among them, having completed a 120-hour training program, which took place over a six-month period. Assembling in Santa Fe for three four-day sessions, trainees came from New York, Paris, Colorado, Texas, California, and Michigan, in addition to local people from the Santa Fe region.

#### ZERI USES THE FIVE KINGDOMS OF NATURE

Based on a systems approach to evaluating problems and opportunities, ZERI projects look at people's needs, for example, for food, shelter, and self-esteem. The team then identifies assets often hidden from typical evaluation formats. Using the principles of nature that (1) no kingdom eats its own waste, and (2) that waste from one kingdom is

food for another, ZERI projects incorporate the five kingdoms, bacteria, fungi, algae, plants, and animals, into their schemes. An example, with successful pilots and an existing commercial venture, is a microbrewery, which uses fermented grain (plant). The problem is that only 8% of the grain becomes beer, 92% is spent grain, which is often landfilled. Or, perhaps fed to cows (animal). But the unbroken down fiber is not the best food source for them, so the bacteria in their stomachs produce more methane, which gets expelled as a greenhouse gas.

However, by growing shitake mushrooms (fungi) on the spent grain, additional value is added with a new profit center. The mushroom enzymes break down the fiber bonds so that the spent mushroom substrate then provides better food value for the cows. Manure from the cows processed through a biodigester (bacteria) produces harvestable methane, which can provide sufficient heat energy to sterilize the spent grain to use as mushroom substrate. The system can be carried further by processing water through oxidation ponds supporting algae growth, which can provide food for fish. And the water--nutrient-rich, but purified from pathogenic bacteria--can be used to fertilize gardens and fields to obtain higher quality crops without the use of synthetic fertilizers. With the possibility of profit centers from algae (for vitamins) and fish, fully integrated ZERI systems provide more jobs, more income, more self-esteem, and zero wastes.

#### ZERI PROJECTS OFTEN INCLUDE EARTHWORMS

Does it surprise you that several ZERI projects utilize earthworms as a part of the integrated system? The spent mushroom substrate is protein-rich from the mycelium still present. This can be used to feed worms, yielding another high-protein nutrient, which can be fed to fish or chickens. A unique use of earthworms in some ZERI projects is to produce enzymes that are being used for cleaning agents. A hope for one of the New Mexico projects is to use earthworms grown on slaughterhouse wastes to produce enzymes to separate lanolin from wool at lower temperatures than the current washing process requires. It's too early to share details yet, but can you imagine my NOT wanting to be involved?

#### EARTHWORMS HAVE LONG HISTORY IN CHINA

Gunter Pauli wrote the article, "*Earthworms, Mushrooms and Zero Waste in China*" which appeared in *BioCycle* February 1999. In it he says that the typical farmer in Wuxi, Hubei Province, has on average of 100 square meters reserved for earthworm farming. From this small area the farmer is able to produce some 500 kg per year (1100 lbs), which he sells to a local pharmaceutical company that uses the worms as a source of enzymes. Pauli reported that the Wuxi region produces 3000 tons of earthworms per month and may be one of the largest earthworm production centers in the world.

One of the papers presented at the Vermillennium was on the use of earthworms as pharmaceuticals in China, given by Dr. Sun Zhensun, professor of earthworm science in the College of Resources and Environmental Sciences, China Agricultural University, Beijing. He said that earthworms have been used in traditional Chinese medicine for 2300

years for numerous and diverse treatments of arthritis, itching, burns, carbuncles and inflammation. They have been used as anesthetics and to lower fevers. More recently, earthworm enzymes have been used to dissolve blood clots, and oral preparations are used to prevent cardiovascular disease in Hong Kong, Japan, Korea, and China. Dr. Zhensun is in the process of founding a new organization, the International Institute of Earthworms in China.

We Americans are often perceived as very Americentric . . . we come across as thinking we have all the answers. The reality is that the ultimate answers to solving our environmental problems, our societal problems will come from everyone from all nations and cultures pulling together, learning lessons from the past, moving forward in ways that make sense for everyone, not just a favored or powerful few.

As we learn about the Five Kingdoms, we begin better to understand the consequences of loss of our species diversity. When we learn about the replenishment of oxygen by plants and algae carrying out photosynthesis, we impart more meaning to the loss of the forests, which regenerate the air that we breathe. When we learn that it's the bacteria that learned how to free up oxygen first, and they'll probably learn how to perform many more healing reactions first, we may not be quite so ready to disinfect everything before we touch it. Who would have thought that the mycelium of fungi could make wood fibers palatable and nutritional for cows? Or that some fungi can enhance our immune system?

## VISION FOR THE FUTURE

My hope is that the work and vision of Gunter Pauli will draw people more fully into lives that have meaning because their basic needs are met in ways that harm neither the environment nor their fellow beings. Their spirits will be able to soar with joy as they develop and share their culture with others who also have their basic needs met. They will do this by working with nature in the way nature intended--any waste they produce will become food for another kingdom, which is what happens when our food wastes become food for bacteria, fungi, and protozoa, which themselves become food for worms, which produce nutrients for plants, and food for animals . . . the cycle is unending.

## 2=====RESOURCES=====

A. ZERI on the web at: <http://www.zeri.org/> to find the most detailed articles about various ZERI projects, select NEWS, then toggle through the NEWSLETTERS from 1998 and 1999.

B. BIOCYCLE article, "*Earthworms, Mushrooms, and Zero Waste in China*," by Gunter Pauli. Abstract and article are available on-line by clicking here <http://www.jgpress/> Go to the archives, search on earthworms, China

C. *VERMILLENNIUM ABSTRACTS* available from Flowerfield Enterprises.

The Vermilennium, a major international conference on vermiculture and vermicomposting, brought together over 125 scientists and worm industry leaders from 19 countries to report on their most recent work and projects. The 128 abstracts from 8 scientific sessions provide an overview of earthworm projects and relevant research in vermiculture species, methods, applications, microbiological relationships, greenhouse and field applications, and economics. Find out who is doing what and where they can be contacted. Dr. Sun Zhenjun has four abstracts, "*Novel Vermiculture Bed Design and its Corresponding Vermiculture Management in Batches*," "*Pharmaceutical Value and Use of Earthworms*," "*Nutritional Value of Earthworms and Cast in Feeding Trials for Broiler Chickens*," and "*Influence of Earthworms and Casts on the Heavy-Metal Content of Tilapia (*Oreochromis niloticus*)*."

[http://www.wormwoman.com/acatalog/Wormwoman\\_catalog\\_Vermilennium\\_10.html](http://www.wormwoman.com/acatalog/Wormwoman_catalog_Vermilennium_10.html)

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3=====Q & A=====

The following question, along with my reply, was posted to the Worm Digest Forum <http://www.wormdigest.org/forum/index.cgi> regarding the photo story: Winterizing a Wormbin.

Hello Mary, I found your instructions very useful but am wondering how the air gets in the bin with all the Styrofoam around it.

owlhollow

Dear Owlhollow,

Valid question. Fact is, Styrofoam doesn't breathe, even though it seems that it would. You have to have some room for air to get into the system. I cut the floating lid smaller than the surface of the bedding, so some air gets around the edges. Worms and the other microorganisms in the system don't metabolize very fast at colder temperatures, so they don't use as much oxygen, and don't produce as much carbon dioxide. When things heat up a bit, they will metabolize faster, require more oxygen, and go hunting for where it is.

It's a trade-off. The bigger the air holes you provide, the more you will lose heat, and the more likely things will freeze.

Reminds me of Jay's (was it Jay?) description of harvesting by placing a plastic bag around a bin for awhile and letting the worms seek a breath of fresh air, thus removing themselves from the bedding and giving you masses of clean-sort worms.

One time I experimented by using a Styrofoam rose cone as a worm bin. Placed a Thermax (foil-covered polystyrene sheet) on top, and placed it outside. When I opened it up I found all the worms nosed up around the edges, gasping (!) for air. That's when I found out that Styrofoam doesn't breathe . . . the worms told me in no uncertain terms.

Ask them the right questions, and they'll give you an answer!

Thanks for contributing to the discussion.  
Mary Appelhof

4=====COMING EVENTS=====

A. January 16, 2003. Mary Appelhof will be interviewed by Lauri Sturdivant on West Marin Community Radio, Point Reyes Station, California. Interview is scheduled for 5:30 pm PST and will beam from this 180-watt station to local residents at KWMR-FM, 89.3 Bolinas, and 90.5 Pt. Reyes. They say it only covers a small portion of the region, but it's the only radio out there, and the locals appreciate having something of their own. She'll be talking about *WORMS*, of course! And you'll probably hear her read a bit from *Compost, By Gosh!* as well.

B. JUNE, 2002- A third, three-module USA ZERI Training is scheduled for mid-year. The second training session filled, and applications have already been accepted for the third. Sessions will be in Santa Fe, New Mexico. Contact Lynda Taylor for more info: <mailto:lyndataylor@cybermesa.com>

5=====PRODUCT HIGHLIGHTS=====

A. *COMPOST, BY GOSH!* by Michelle Portman is here and just BEAUTIFUL! This is Flower Press' first book printed in full color, first hardback, and our first book written specifically for children. We are very pleased with how it looks and feels. Shipping now from our website at: [http://www.wormwoman.com/acatalog/Compost\\_By\\_Gosh\\_.html](http://www.wormwoman.com/acatalog/Compost_By_Gosh_.html) Order your copy (copies) and reference that you are a WormEzine subscriber to get a \$2.00 discount AND a free wormy surprise with each book ordered. (Discount price applies to books sold at retail price not books sold with standard volume discounts)

B. Are you worms tired of the cold and gray of northern climate winters? Remember that we have **Nelson® Bird Bath Heaters**, which can be used as a worm bin heater for 'winterizing' wormbins. Each heater comes with its own bucket to get you started. Click here to order your heater and bucket  
[http://www.wormwoman.com/acatalog/Nelson\\_Bird\\_Bath\\_Heater.html](http://www.wormwoman.com/acatalog/Nelson_Bird_Bath_Heater.html)

Or click here to read about how Worm Woman provides her worms with a snuggly, warm bin for the winter [http://www.wormwoman.com/acatalog/winterize\\_01.html](http://www.wormwoman.com/acatalog/winterize_01.html)

Mention the WormEzine and get **FREE** shipping on the birdbath heater and bucket combo!

6=====ABOUT THE AUTHOR=====

Mary Appelhof is founder and president of Flowerfield Enterprises, which develops and markets educational materials on vermicomposting. Its publishing imprint is Flower Press, publisher of the how-to book *Worms Eat My Garbage*, the classroom activity book and curriculum guide, *Worms Eat Our Garbage: Classroom Activities for a Better Environment*, *The Worm Cafe*: Mid-scale vermicomposting of lunchroom wastes, and

*Diabetes at 14:* Choosing tighter control for an active life, which is not about vermicomposting, but is an invaluable asset for anyone affected by diabetes.

*Compost, By Gosh!* is Flower Press' newest publishing endeavor with author and illustrator Michelle Portman. If you are new to the WormEzine list you may not be aware of the opportunity that you have to "Instill in children the belief that they can change the world, and make it **FUN!**" Share *Compost, By Gosh!* with a young person in your life today.

7===== THE SMALL PRINT=====

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