

WormEzine Vol. 2 No. 9

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

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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 a.k.a. Worm Woman

Dear Worm Workers,

I've returned from my West Coast tour, dealt with the most urgent emails, and gotten my thank-you notes written. I can now bring you up-to-date a bit on what's happening in my world as it relates to worms. Next month I'll be more specific in the West Coast Fall Tour Trip Report that started out in Portland, Oregon, then moved on down the Oregon and California coasts, ending up in Long Beach. We'll keep George Chan's photos on the website for now, then next time I'll post some of my favorite photos from my trip.

I was gone nearly a month, the longest time I've ever been away from home. It was also the least planned ahead of time; I usually know exactly where I'm staying, have car rental reservations, and know whether I'm flying or driving, etc. So this was an adventure that permitted—and required—me to go with the flow more than usual. It was absolutely delightful, however, and I thoroughly enjoyed myself. I got to visit and work with old friends, and I met new and interesting friends. We taught each other, shared stories, posed for photos, and laughed ... a lot! I felt loved, honored, and respected. I met dozens, if not hundreds, of people who have been doing worm composting for years. I came away with the certain knowledge that if I stopped working tomorrow, the worm work would continue. There are SO many worm workers out there developing programs, writing brochures, creating mascots, constructing models, and giving presentations. Some people help trouble-shoot problems with worm bins, others teach master gardeners who will then teach others, many go into classrooms of all levels. I feel privileged to have met so many of you.

The feature this month continues with Part II of George Chan's Integrated Farming Systems paper so that you learn a bit more about his system. I also wrote about a lodge with worm bins that you

have to hike 5 miles in to stay at. Some worm workers have interesting worm projects to view on the web, so I'll direct you to those. Whatever your taste ... enjoy!

Until next month ...

Mary Appelhof

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

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1=====FEATURE=====

Integrated Farming System
George Chan
Environmental Management Consultant
ZERI

PART II

For PDF file of Part I, go to <http://www.wormwoman.com>

For photos, go to:

http://www.wormwoman.com/acatalog/ezine-sept-chan/ezine_chan_01.html

ROLE AND EFFECT OF VARIOUS COMPONENTS OF Integrated Farming System (IFS)

LIVESTOCK –Whether it is for production of milk, egg or meat, small and big livestock require properly balanced feeding every day, and cannot continue to rely on rejected grains and their sweepings, cheap offals and residues from abattoirs and packing plants, and food remains from restaurants. It is worth emphasizing that, besides being comfortably housed and kept clean and dry, they must have those well-balanced rations in order to produce quality food products.

They also produce daily wastes, which are valuable renewable resources and will make various farming activities locally sustainable, even without any external inputs such as fossil fuel, chemical fertilizer and artificial feed. Worldwide, the latter have been relied upon to increase yield and even quality but at greater financial risks for those who have the means, but most of them just cannot afford them and remain poor farmers while the integrated farmers become rich by providing their own means of production on their farms.

However, feed can still be a serious problem in both quantity and quality. Most feeds can be locally produced from crops, crop and processing residues, with or without further processing for preservation or enhancement, but more nourishing ones such as earthworms, silkworms, fungi, insects and other organisms should also be constantly encouraged, some of them even producing high-value goods such as silk and mushrooms.

DIGESTER—It is the most significant addition to farming during the past century, especially with livestock, which is mandatory for integrated farming systems. It can be as simple as a couple of concentric plastic bags of 5m³ capacity or 200-liter drums for a small farm, or a complex reinforced concrete or steel structure with upflow anaerobic sludge blanket (UASB) for maximum efficiency for a big farm or industrial enterprise.

It gives the best primary treatment to the livestock or organic wastes through isolation, settling, digestion, liquefaction and solid-liquid separation, with the latter process enhanced with an additional but optional sedimentation tank for a reduction in biochemical oxygen demand (BOD), which is a measure of the organic content in the waste, of 60% or more. Once the substrate is well conditioned biologically, with the methanogenic bacteria, which are naturally present in the intestines of humans and warm-blooded animals, taking over inside the digester, it is a continuous process. As the fresh wastes enter the digester, the bacteria “feed” on the organic content and transform the resulting unstable ammonia (NH₃) and nitrite (NO₂) into stable nitrate (NO₃), which is a nutrient readily usable as fertilizer. It only requires some stirring and clearing of floating matter at the inlet pipe by means of a plunger, with no addition of energy or chemicals.

In fact, as more wastes are added, the digester also produces an abundant and inexhaustible supply of biogas, a mixture of 2/3 combustible methane and 1/3 carbon dioxide, that is a convenient source of free and renewable energy for domestic, farming and industrial uses. Big farms, meat and fish packing plants, distilleries, and various agro-industries are now self-sufficient in energy, besides having big volumes of nutrient-rich effluent for fertilization of fish ponds, and “fertigation” (fertilization and irrigation) of many kinds of crops, as described more fully below.

OXIDATION – This oxidation process facilitates further treatment in low-cost shallow basins by aerobic (in presence of oxygen dissolved from the atmosphere or produced by natural algae through photosynthesis) means for another 30% of BOD reduction. So the effluent is almost fully treated when it is ready for discharge into the fish pond. In the tropical, but less in the subtropical, regions the high-protein chlorella algae grow prolifically, while supplying the free oxygen for treatment, and are used as additional feed for chickens, ducks and geese.

FISH POND – Any residual organic matter from the livestock waste will be instantly oxidized by some of the dissolved oxygen in the fish pond, with hardly any adverse effect on the big fish population. Moreover, the nutrients are readily available for enhancing the prolific growth of different kinds of natural plankton as feeds for polyculture of 5-6 kinds of compatible fish. No artificial feed is necessary, except locally grown grass for any herbivorous fish.

As already mentioned, the fish produce their own wastes that are naturally treated in the big pond to give the second cycle of nutrients, which are then used by crops growing in the pond water and on the dykes. Such a highly productive bonus is not available in any other farming system.

Where some fermented rice or other grain, used for alcohol production, or silkworms and their wastes used in sericulture, are available they are added to the ponds as a third cycle of nutrients, resulting in high fish and crop productivity, provided that the water quality is not affected. More research and development are required to find more innovative systems of fish, shellfish and crop cultures to use up these nutrients, because any unused parts are potential pollutants. There is also a possibility to precipitate them and sell them as dry fertilizers.

Special diffusion pipes are now being tried with compressed air from biogas-operated pumps to aerate the bottom part of the pond to increase plankton and fish yields. A deeper pond than 3 meters of water is also being tried for the same objectives

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2=====NOTABLE BITS=====

HIKING, HOT SHOWERS, CLEAN SHEETS, WORM BINS, AND THE CHATAHOOCHEE NATIONAL FOREST

How would you like to visit an elegant lodge in the middle of a state park within a national forest close to a 700-foot waterfall with pristine and natural beauty? Here's an adventure that will give you vivid memories of the Blue Ridge Mountains for years to come. Hike the five miles in to the lodge and you will find family-style dinner awaiting, an evening program where you can learn about over a hundred wildflower species, how worms turn food discards and paper into fertilizer for the organic garden, or how the solar panels pre-heat the shower water. Located in the Chattahoochee National Forest in northern Georgia, the Len Foote Hike Inn within the Amicalola Falls State Park provides a unique opportunity for those who would like a night or two without a car outside their window, and no radios, TVs, cell phones or video games ringing in their ears.

I learned about Hike-Inn from a woman from Idaho who called and ordered worms after spending a night there, She couldn't say enough positive things about Heather McKee who is education director and head worm wrangler at the Inn. I called Heather and learned that the Inn has a staff of 10 who cook dinner and breakfast and serve as many as 40 guests a day who hike the trail near the Southern Terminus of the Appalachian Trail.

WORM BINS MAKE THE ZERO WASTE POLICY WORK

The Inn has 4 large worm bins about 2.5 ft (80 cm) wide and from 6-10 ft (2-3 m) long in the basement. The bottoms are solid (not flow-through), and raised 18-24 inches (45-60 cm) off the floor for easier working height. Sides are about 12 inches (30 cm), but the bedding depth is never up to the top. Staff shred all the waste office paper on site, plus post-it notes, phone messages, and non-glossy junk mail for bedding. They started with about 10 pounds (4 kg) redworms (*Eisenia fetida*), but the worms have now populated all of the bins, and enough are left over for an occasional sale of excess worms. Each cook has a bucket of pre-processing food waste that becomes worm food. About 10-15 lbs (4-7 kg) food discards go into the bins per day. Meat and dairy stays out to avoid possible odors. Prior to dinner, guests are told about the Zero Waste Policy and asked to be members of the "Clean plate club." Guests can take as much food as they want, but not more than they can eat.

A popular option for the evening program is a tour of the worm bins. Other aspects of this facility that have low environmental impact are odor-free composting toilets (fans move lots of air to keep the system aerobic), solar panels, and a rainwater catchment system to provide water for the organic garden that is fertilized by vermicompost from the worm bins. Woodstoves keep the commons areas warm during cold weather, and propane is used for additional heat and cooking.

I haven't been to Hike Inn, but it sounds like fun. Guess I'd better start getting in shape for the 5-mile hike! Find out more at: <http://www.hike-inn.com/default.asp>

3=====RESOURCES=====

A. FREE BOOKS ONLINE. Steve Solomon offers an amazing resource through his website at: <http://www.soilandhealth.org/soilandhealthlibrary>

"This is a free public library offering a tightly focused collection of books about holistic agriculture, holistic health, self-sufficient living, and personal development. Most of the titles in this library are out of print. Some can be quite hard to find; many of these books are old enough to be public domain materials.

The titles on this website are here because one person, Steve Solomon, intensely believes that when grasped as an inter-related whole these books can constitute a self-guided course of study or curriculum that connects agricultural methods to the consequent health of animals and humans, shows how to prevent and heal disease and increase longevity. There are also smaller collections about homestead-based lifestyles and about why globalized society is resistant to changing its food and health systems."

At last, I have a source for books by Sir Albert Howard, the George Sheffield Oliver book, "Friend Earthworm," and Lady Balfour's classics. Take some time to take a look. You will find gold in the soil at this site.

B.PHOTO STORY OF WORM CAFÉ EXPERIMENT by Amy Weishuhn

Derek and I are doing a fun science project involving worms. We used a 1 quart canning jar and filled it with layers of bedding and food. Then we counted out 30 *Eisenia fetida* and added them to the jar. Everything was weighed each step of the way. We are going to let the worms work for 12 weeks, which will be Feb. 6, 2004, then empty the contents and count how many worms and cocoons there are. Each Friday I will weigh the jar and take a picture of it which will be posted on my Worm Cafe Experiment photo album at the link below. It will be interesting to see if the weight

changes and to watch how the worms change the levels in the jar. Each level is labeled and marked so we can easily see the changes as time goes by. If you'd like to watch the jar as the weeks go by, check the photo album each Friday for the updates.

<http://community.webshots.com/album/100040649jLZTRm>

B. WORM DIGEST FEATURES EARTHWORMS AS TEACHERS. The popular quarterly newspaper, Worm Digest, has put together an outstanding issue on using worms to teach all ranges of students. Lisa McCurdy describes her extensive project with 6th graders studying population biology starting with 30 worms in 2-liter plastic bottles. Kelly Cox's 7th graders in Oklahoma started with worms from classroom worm bins to set up large bins that have now processed over 8800 pounds of food waste over 4 years! They do gardening, teach nutrition, botany, scientific method, and recycling with their worm program. This issue of Worm Digest gives the best web sites for teaching about worms, has a trouble-shooting guide, lists grant opportunities, and describes new products such as the Worm Drive Musical. If you haven't yet accessed the Worm Digest Forum, you are missing an opportunity to participate in lots of discussion about all aspects of worm raising, maintaining worm bins, creatures in the bin, and what's going on in the worm business. Subscribe to the newspaper by sending a check for \$14 to Worm Digest, Box 544, Eugene, OR 97440-0544, Canada and Mexico require US\$16, and other countries US \$20. To access the website, go to <http://www.wormdigest.org> The Worm Forum is at <http://www.wormdigest.org/forum/index.cgi>

4=====WORMS IN THE NEWS=====

A. NEW YORK PRESS NOV. 18, 2003. Jeremy Smerd describes Joan Lynch teaching "wormshops" at the Brooklyn Botanic Garden that teach teachers how to create worm composting farms in their classrooms. <http://www.nypress.com/16/47/nyc/nyc1.cfm>

B. FORT WORTH STAR TELEGRAM NOV. 16, 2003 Worm composting farm demonstrated and described by Charlie Shiner at recent worm composting workshop. <http://www.dfw.com/mld/startelegram/news/local/states/texas/arlington/7276302.htm>

C. LONG BEACH PRESS-TELEGRAM, CA. OCT. 31, 2003. Former biology teacher and author of two books on worm composting gives workshops.

D. MELROSE FREE PRESS, MA. NOV. 6, 2003. Workshop will cover the basics of composting and offers worm composting for apartment dwellers. http://www.townonline.com/melrose/arts_lifestyle/arts_lifestyle/mfp_calmfstringt11062003.htm

E.REGISTER-PAJARONIAN, CA. NOV. 7, 2003. Free classes offered by Santa Cruz County on backyard and worm composting, with training in presentation techniques. <http://www.zwire.com/news/newsstory.cfm?newsid=10481586&title=%3CP%3EComposting%20training%20program>

F.LETSRECYCLE.COM, UK. NOV 13, 2003. Pre-composted kitchen and green waste screened, then added to worm beds. Other compost blended with worm casts to make general purpose potting soil. <http://www.letsrecycle.com/materials/composting/news.jsp?story=2794>

5=====COMING EVENT=====

A. MARCH 17-20, VLADIMIR, RUSSIA. "EARTHWORMS AND SOIL'S FERTILITY." Sponsored by the Interregional Scientific Practical Corporation "PIK" Ltd., Russian Academy of Agriculture, Vladimir Scientific Institute of Investigations in Agriculture, Vladimir State Pedagogical University and Vladimir State University, and Vladimir Region Administration and Department of Agriculture. This will be the 2nd International Scientific Practical Conference.

The scientific programme of the conference includes plenary, sectional and stand reports on the following problems:

- biology and selection of destructors (microorganisms and earthworms) of organic wastes and environmental pollution;
- methods of composting and vermicomposting of organic wastes;
- industrial technologies of composting and vermicomposting of organic wastes;
- production of ecologically pure organic fertilizers;
- production and application of humic substances in agriculture;
- increase of soil's fertility and production of ecologically pure agricultural crop yields;
- restoration of polluted soils with microorganisms and earthworms;
- biotechnologies of food additives and bioactive substances production.

6. ===== SUCCESS STORY VIA EMAIL =====

Hi Mary,

It's been awhile (September) since I wrote you. I appreciate you writing me with all the helpful information. I'm writing you now to let you know I forged ahead with the mini grant and I named it Red Wigglers World. I found out yesterday that I had received it! I am very excited, but a little disappointed. I wanted to do this for 3 grade levels, so I went for the whole \$400.00 grant. I only received \$250.00 of it. Therefore we probably will do only one grade level (K). We receive our money in January. I'll be taking a lot of pictures and will send you some. Thank you for all the good advice, it gave me the boost I needed to move ahead with this when some of the staff laughed at what I wanted to do. Wait until we get all that good compost, they will want their own worm bin and want me to help them.

Thanks,
Renee

7. =====PRODUCT HIGHLIGHTS=====

A.NELSON BIRD BATH HEATER. Described in the "Winterizing my Worm Bin" WormEzine that can be found at <http://www.wormwoman.com/acatalog/wormezine.html>

Those of you who would prefer to keep your worm bin outside during cold temperatures can do so by insulating the bed well and adding a source of supplementary heat. This Bird Bath Heater must be immersed in water to work ... a safety feature. By drilling a hole in the lid of a bucket, then filling the bucket with water, you can place the heater in the bucket, plug it into an electric outlet, and give the worms a reasonably good chance at making it through the winter. A thermostat turns the heater on at 40 degrees (4 C). Worms congregate in the vicinity of the water jug and will remain active, but slow all winter. You can continue burying food waste in the bin, even with snow and below-freezing temperatures. Exterior insulation is critical for this system to work!

INCLUDES FREE BUCKET

Polyethylene coated aluminum sheath --- Immersion-type electric heater --- Rated 200 watts @ 120 volts --- Energy efficient with minimal operation costs --- Thermostat maintains water at 40°-50° F. --- Heavy-duty electrical cord with grounded plug --- FOUR-YEAR Manufacturer Guarantee

Order here: [http://www.wormwoman.com/acatalog/Nelson Bird Bath Heater.html](http://www.wormwoman.com/acatalog/Nelson_Bird_Bath_Heater.html)

For additional worm bin insulation information please visit 'Winterizing a Worm Bin' section at www.wormwoman.com in the WormEzine archives.

8=====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.

9===== THE Small PRINT=====

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