

WormEzine Volume 2-8

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 aka Worm Woman

Dear Worm Workers,

Hammock time is over and we're into the busy fall season here at Flowerfield. Schools are busy ordering worms for setting up classroom worm bins, and some of our wholesale customers are ordering books like crazy. All of that is very good news.

Fall is absolutely the best time to order worms for classrooms because the weather is so cooperative. Not much chance of the worms' getting overheated or frozen en route. The classrooms also benefit from fall orders because the students get an entire school year's benefit from seeing how the worms turn shredded paper or other bedding and food waste into dark, rich material full of microorganisms to support plant growth for spring projects.

I travel to Santa Fe tomorrow for a reunion of ZERI practitioners from the first and second group. We'll meet the third group and get an entire day with Paolo Lugari, the brilliant engineer and social activist who developed such innovative devices as solar heating systems that could sterilize water for a hospital in Columbia, planting systems that could transform 11,000 hectares of savannah into a lush tropical forest with over 260 species in about a decade. So I'm looking forward to an exciting, stimulating time connecting again with Gunter Pauli and George Chan and Lynda Taylor and Robert Haspell who are doing so much good work with ZERI projects and training in New Mexico.

Now, let me introduce Professor George C. Chan, who has given me permission to share with you his paper, Integrated Farming Systems.

I met George last year at Picuris Pueblo, nearly 7000 feet high in the mountains about 30 miles south of Taos, New Mexico. Now retired, George was born and worked in the tiny island state of Mauritius, having graduated as a civil engineer from the Imperial College of London. He spent five years in China learning about and working with their extensive fish farming systems. He is totally committed to designing systems that will bring to people in poverty lives that have good, nutritious food, diversity in their work, and freedom from the economic stress that reliance on fossil fuels for fertilizer, heat, and energy require. George hopes to help the people of Picuris solve their problem of a sewage lagoon near-to-capacity above the Rio Pueblo by incorporating each element in his integrated farming system. This project will be a model that can be emulated all over the world, giving hope and meaning to millions who deserve the dignity that satisfying, productive lives can give. And it will be beautifully sustainable.

George Chan's systems run human wastes and animal manure through a biodigester that produces biogas (methane) for energy. The effluent moves through shallow basins, then oxidation basis where millions of microorganisms and plankton put oxygen back into the water. Six to eight species of fish live in deep ponds, feeding off the plankton and the grasses around the edges of the ponds. The fish more fully incorporate the nutrients in the system and provide a protein food source. Mushrooms and earthworms grow on sludge substrates, producing higher quality feeds, mushrooms for the people, earthworms for livestock and fish. The nutrient-rich water is used to irrigate adjacent lands for higher quality crops. Eventually the system becomes so efficient at producing crops and products with few external inputs that not having enough wastes becomes a limiting factor. Instead of being concerned about wastes polluting the land, George says, "I want your waste." Let him tell you about Integrated Farming Systems in his own words.

Until next month. . .

Mary Appelhof

Changing the way the world thinks about garbage

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Integrated Farming System

George Chan
Environmental Management Consultant
ZERI

Abstract

Looking back at the precarious and even risky situation in the farming activities worldwide, we see the poor farmers working hard to feed themselves and trying to make a living from their land with some livestock and crops. The livestock manure fertilizes the crops and the crop residues feed the livestock. In order to produce more and improve the quality, they need costly inputs such as chemical fertilizers and artificial feeds which make their farming activities uneconomic. If they also have to remove the pollution they create, they will not be able to afford it. Those who added fish to the livestock-crop system have made a very big step forward, not only increasing the fertilizer from the fish wastes, but also enhanced their income from the bigger and quicker yield of fish and their relatively high market prices. The deeper pond resulted in high fish productivity, with increased wastes and fertilizer value, but the pond can still be subject to pollution if it receives too many wastes that deplete the limited dissolved oxygen. By treating the livestock wastes anaerobically in digesters, with additional production of biogas energy and aerobically in shallow basins, their amount can be increased ten-fold in the system, increasing the fertilizer and feed in the pond accordingly, but without using any of the dissolved oxygen. Without such abundant, low-cost but much better inputs to improve the farming methods, we cannot expect high-quality produce and better yields. Provided that all the extra nutrients and feeds are utilized to improve productivity, the benefits can only increase to make the farmers much more prosperous. The energy can also help the farmers to process their produce for preservation and added value, reducing spoilage as well as increasing the overall benefits. This is what the Integrated Farming System is all about.

INTRODUCTION

The Integrated Farming System (IFS) has revolutionized Conventional Farming of Livestock, Aquaculture, Horticulture, Agro-Industry and Allied activities in some countries, especially in tropical and subtropical regions that are not arid. Farming all over the world is not very performing unless relatively big inputs are added to sustain yields and very often compromise the economic viability as well as the ecological sustainability. Evidently, the situation can worsen if high duties are paid on imported materials and energy, and the polluter-payer policy is also applied, as it should well be.

The IFS can remove all these constraints by not only solving most of the existing economic and even ecological problems, but also provide the needed means of production such as fuel, fertilizer and feed, besides increasing productivity many-fold. It can turn all those existing disastrous farming systems, especially in the poorest countries, into economically viable and ecologically balanced systems that will not only alleviate poverty, but can even eradicate this source completely.

INTEGRATION

The ancient combination of Livestock and Crop activities had helped farmers in the past, almost all over the world, to use the manure as fertilizer for crops, and the crop residues as feed for livestock. However, most of the manure usually lost up to half its nitrogen content before it became nitrate and was readily available as fertilizer to plants. The quantity also became inadequate as the population increased, so chemical fertilizers and artificial feeds had to be purchased, eroding the small profits of the small farmers.

The more recent integration of Fish with the Livestock and Crop has helped to improve both the fertilizer and feed supplies, plus the high market value of fish as feed and/or food increasing the incomes substantially. Technically, this important addition of a second cycle of nutrients from fish wastes has benefited the enhanced integration process, and has improved the livelihoods of many small farmers considerably. This has now been documented by M. Prein of ICLARM Malaysia in "Integration of Aquaculture into Crop-Animal Systems in Asia."

It should be noted that the first of the two cycles of nutrients from the livestock is used to fertilize the growth of various natural plankton in the pond as fish feeds. Yield of fish was increased up to three-to four-fold with polyculture of many kinds of compatible fish feeding at different trophic levels, as practiced in China, Thailand, Vietnam, India and Bangladesh. The fish, after consuming the plankton, produce their own wastes that are converted naturally into the second cycle of nutrients, which is then used to fertilize various crops on both the water surface with floats, as practiced in parts of China, and on the surrounding dykes.

However, even if this has been a big step forward, it still required some external input to increase farm productivity and produce processing in agro-industry. So it has remained inadequate to lift the small farmers out of poverty, because of the continuously rising costs of the inputs, such as chemical fertilizer, artificial feed and fossil fuel, which had adverse effects on yield and quality, produce processing, and farming economics. Further innovations as well as increased productivity are necessary to push the integrated farming system almost to perfection. This is what the ZERI (Zero Emission Research Initiative) Integrated Biomass System (IBS) has been trying to do, as documented by Gunter Pauli in "Upsizing."

DIGESTION AND OXIDATION

The most significant innovation is the introduction of the DIGESTER AND BASIN in the waste treatment processes of the integrated farming system. One big problem with livestock waste, which contains very unstable organic matter, is that it decomposes fast and consumes oxygen. So for any specific pond, the quantity of livestock wastes that can be added is limited, as any excess will deplete the oxygen and affect the fish population adversely, even resulting in fish kills.

We should also seriously question the erratic proposals, presently being made by local as well as foreign experts in Mauritius, while ignoring past failures worldwide and wasting scarce funding to repeat the same mistakes, such as:

- spreading the livestock wastes on land to let them rot away and hope that the small amount of residual nutrients left after losses of volatile ammonia and nitrite, if they are not washed away by rain or irrigation water, can improve the soil fertility,

- composting the livestock wastes with household garbage to get a low-quality fertilizer, again because of the ammonia and nitrite losses, instead of digesting the livestock wastes into higher-quality fertilizer, and using the garbage to produce high-protein feeds such as earthworms and having their castings and garbage residues as better soil conditioner; and

- treating the livestock wastes ineffectively as well as inefficiently in outdated septic tanks for not much financial or other benefits, while the badly treated effluent is just as dangerous as the waste itself.

Digestion of the livestock waste under closed ANAEROBIC conditions, is followed by oxidation in open shallow basins with natural algae providing the free oxygen through photosynthesis, before letting the treated waste effluent flow into the fish pond. This can convert almost 100% of the organics into inorganics, which will not consume any oxygen to deprive the fish of this important life-sustaining item. So, theoretically, it is possible to increase the quantity of waste ten-fold into the pond without any risk of pollution. Moreover, the big daily increase in readily usable nutrients can be beneficial to the system, provided that they are totally utilized in both fish and crop cultures, or they can

create problems of eutrophication in bodies of water, including the fish ponds themselves, which are then counterproductive.

To be continued

Part II of George Chan's Integrated Farming Systems will discuss the Role and Effect of Various Components of IFS.

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A. DIARY OF A COMPOST HOTLINE OPERATOR: EDIBLE ESSAYS ON CITY FARMING. Spring Gillard. 208 Pages 5.5 x 8.5" Gardening & Horticulture / Environmental Studies Pb New Society Publishers. ISBN 0-86571-492-4

What do you do with Doggy-Doo? Can I put corks in my compost bin? Do worms have lungs? Why is my compost full of thousands of tiny white flies?

Vital questions such as these are the lot of a Compost Hotline Operator, as Spring Gillard knows only too well. That really is her job description, and she fields calls like this all day long. She also meets a cast of characters curiously crazed by the garden bug. Like Ellen who wears worm earrings and belts out the "Compost Rap" to unsuspecting participants in her vermicomposting class. Or Laurel, worm bin mural artist, Wet Coast Wes the Scarecrow, Scissor-happy Sally, and Mike their fearless leader, prone to tai-chi fits.

The Diary of a Compost Hotline Operator began in 1996 as a series of entries on the web site of City Farmer, Vancouver's non-profit urban agriculture group that has been thriving for 25 years. It is packed with barely credible real-life tales from the trenches of the urban horticulture avant-garde, dealing with all manner of gardening lore -- such as:

- * the essentials of composting
- * alternatives to pesticides
- * organic landscapes
- * garden tours and compost teas
- * green buildings and drug-free lawns
- * rainwater harvesting, and even
- * urban ag in New York and Cuba.

It is also a mine of useful resources -- perfect reading for garden fanatics, gift-givers, ag-academics and environmentalists, and all who like to laugh while they learn.

Spring Gillard abandoned a successful advertising career 12 years ago, and stumbled into City Farmer's garden in Vancouver. She never left. Her diary entries have been published widely, and -- as editor of the Compost Hotline News -- she does widespread research into urban agriculture worldwide. An avid storyteller, she believes in the power of humour to convey serious messages.

Some of the pre-publication comments:
Mary Appelhof, author of "Worms Eat My Garbage"

From Mike the flailing tai chi fanatic to Wes the head gardener who gets blamed for everything that goes wrong because he has gone on yet another holiday,

Spring Gillard entertains as she informs. She left me not only with laughter, but with hope that things will turn out OK as long as there is green in our cities.

Carol Lee Flinders, author of "At the Root of This Longing and Rebalancing the World"

So how much fun can it be to get up to speed on compost piles, worms, water conservation and cob houses from an urban gardener's perspective? And on the other hand, how much can you learn about anything when you keep breaking up in giggles every third paragraph? A lot, it turns out - an awful lot. And the proof is Spring Gillard's absolutely delightful Diary.

Dan Jason, author of "The Whole Organic Food Book"

Spring Gillard's 'edible essays' are edible indeed - very inspirational, informative and full of spicy humor. Such writing is so needed these days to counter the unsustainable globalization and monoculturing of our planet.

If you order before Sept. 20 you can receive a 20% pre-publication discount. New Society Publishers requires a check or credit card number to hold your order. If requesting a discount, mention that you learned about it from Mary Appelhof's WormEzine.

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B. HEALTHY FOODS FROM HEALTHY SOILS: A HANDS-ON RESOURCE FOR TEACHERS. Elizabeth Patten and Kathy Lyons. Illustrated by Helen Stevens. Paperback, \$19.95. ISBN 0-88448-242-1, 8 1/2 x 11, 192 pages, illustrated. Education/Science, Grades K-6 Tilbury House Publishers.

"Healthy Foods from Healthy Soils" is just what we need now! Never before has it been so critical that young kids learn healthy eating habits and an appreciation for eating local, in-season, balanced diets. As we struggle to help our kids get connected to the earth and the food they eat in a world where most kids think vegetables grow on Aisle 8, this book is a great tool. Patten and Lyons make learning about food fun!" Anna Blythe Lappe, Co-author, "Hope's Edge: The Next Diet for a Small Planet."

“Healthy Foods from Healthy Soils” invites you and your students to discover where food comes from, how our bodies use food, and what happens to food waste. You’ll participate in the ecological cycle of food production on compost formation/recycling back to the soil, while helping children understand how their food choices affect not only their own health, but farmers, the environment, and your local community.

Elizabeth and Kathy use simple concepts and fun activities to show children the big picture—how quality soil is the basis of nutritious foods, and how eating a variety of wholesome foods leads to healthy bodies. Their program enhances existing curricula through methods that include writing, art, scientific investigation, music, and puppetry. Suggested resources encourage you to adapt the program to your needs, small scale or large. For instance, the activity “What If All I Ate Were Potato Chips?” encourages children to investigate the nutritional value of foods, while a seed-sprouting experiment “teaches through the taste buds.”

School gardens such as an Appetizer Garden or the legendary Three Sisters, or a series of classroom worm-composting activities help students discover the role nutrients play in healthy plant production. Handy extension activities demonstrate ways in healthy plant production. Handy extension activities demonstrate ways that students can help effect change in their own lives and communities. Background information, suggested readily available materials, and clear instructions give you enough guidance to integrate these activities into your classroom right away.

Description from Tilbury House

This dynamic, comprehensive book is bursting out of its seams with content, with rich and exciting activities, and with linkages across the curriculum. As does other educational curricular guides, “Healthy Foods from Healthy Soils” bases much of its worm composting activities on our book, “Worms Eat Our Garbage: Classroom Activities for a Better Environment.” It is gratifying to see these second-generation materials being produced, realizing that our work has helped educators across the country see the value of vermicomposting and worms in meeting diverse educational objectives. I recommend it highly.

Mary Appelhof

Order from:

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

Hi Mary,

I have started vermicomposting after a friend lent me your book, (I just ordered one for me). My question is I tried the paper and I didn't like it, so I put composted cow manure in the container with straw on top and everyone seems to be doing OK. I live close to Carl Sanburgs house and his wife was very into raising goats. I went up today and got some goat manure which was mixed with sawdust. Would that be good to put in with the worms?

Thanks, Karen

Dear Karen,

I acknowledge that starting a worm bin with just paper is not necessarily the kindest thing for the worms. After all, they eat the bacteria and protozoa and fungi and maybe nematodes that decompose the garbage that you bury in the bedding. Getting the system started with a medium that is already biologically active would be much kinder to the worms.

Some people put some vermicompost in their food container so inoculate it with lots of the organisms. I think that's a good idea. The material begins to pre-compost in the bucket so that by the time they feed it to the worms it's already full of worm food in the form they want to eat it.

I would think that goat manure would make good bedding. I'm not sure how the sawdust would affect it, so I would start with small amounts and make sure that the worms take to it before going overboard. Raw sawdust may not be good, composted sawdust should work. Try it and adjust accordingly. Then let me know how it works.

Good luck.

Mary Appelhof

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

A. AUGUST 13, TARBORO, NORTH CAROLINA. RAISING WORMS AND PRODUCING CASTINGS FOR PROFIT workshop. Rhonda Sherman, who has done excellent work teaching people about vermicomposting through her website, through her many excellent presentations, and working with prisons in setting up mid-scale vermicomposting systems, is offering a one-day session from 9:00-5:00. She says that a lot of people have been inquiring about how to start a worm farm or make an existing one more profitable The workshop will give an overview of the industry, markets for worms and castings, considerations for a business plan, setting up an operation, bedding materials and feedstocks, harvesting worms and castings, benefits of castings in soil and plant production, and marketing opportunities. The workshop includes a tour of

a working worm farm for castings production that processes hog manure. Her outstanding line-up of speakers with years of experience in the vermicomposting industry will be Dr. Scott Subler, Tom Christenberry, Brian Rosa, and, of course, Rhonda. For details and registration info, go to <http://www.bae.ncsu.edu/workshops> and click on the workshop title. If you have questions about the workshop content, please contact Rhonda.

B. SEPTEMBER 21. KALAMAZOO, MICHIGAN. COMMUNITY HARVEST FEST. Organized by MOFFA, an organization of Michigan Organic Farmers, this event celebrating local food will have a farmers' market, oxen demonstrations, hayrides, workshops, exhibitors (I'll be there presenting on Compost Teas!), educational displays, children's events, and more. It will be held at the new location for Tillers International where I gave a worm workshop last spring. Free admission, but there will be a \$5 charge for parking.

C. OCTOBER 4-6. CORVALLIS, OREGON. SOIL BIOLOGY AND SOIL CHEMISTRY WORKSHOP WITH DR. ELAINE INGHAM.
<http://www.soilfoodweb.com>

D. OCTOBER 10, 11. PORTLAND, OREGON. BEST MANAGEMENT PRACTICES IN VERMICOMPOSTING. Produced by Pete Bogdanov of Vermico.com, this 2-day seminar is the most comprehensive offering available for someone who wants to become a better grower and marketer of worms, worm castings, and services in the vermiculture industry. On a large scale, vermiculture cannot be isolated from management. On a large-scale, vermiculture cannot be isolated from the regulatory environment. Without knowledge of sound business practices, one will not be able to stay in the worm business very long. Pete's Best Practices in Vermicomposting Seminar is a must for anyone wanting to become a viable player in the industry. This is an opportunity to hear the latest from top leaders in the field, to network, and to sense the pulse of what is happening in vermiculture today. I'll be there presenting! Let's meet up! <http://www.vermico.com>

E. OCTOBER 20-21. CORVALLIS, OREGON. HANDS-ON COMPOSTING WORKSHOP WITH DR. ELAINE INGHAM. Followed by Hands-On Compost Tea October 21-22. <http://www.soilfoodweb.com>

F. OCTOBER 20-NOVEMBER 1. MARY APPELHOF TOUR IN CALIFORNIA. We are still finalizing dates and venues for Mary Appelhof to give presentations to teachers, compost educators, the general public, and to kids in California. She will definitely be in San Jose and Long Beach. Other venues are possible and being arranged. Call 269-327-0108 to find out what the possibilities might be for her to appear in your location.

G. March 17-20, 2004. 2ND INTERNATIONAL SCIENTIFIC PRACTICAL CONFERENCE "EARTHWORMS AND SOIL'S FERTILITY. The conference will be held at the Taneev Concert Hall in Vladimir, Russia. Application forms for participation in the conference, hotel numbers reservation and report texts are to be sent to: The Organizational Committee of the Conference, Studenaya Gora

street, 36-a, Vladimir, Russia, 600001, Titov Igor. Phone number: (0922) 32-10-42; Fax: (0922) 32-17-88; E-mail: ic_pic@port33.ru. For more detailed information concerning the conference visit our site: <http://www.mnkpik.com>. The number of participants is limited (400 places).

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

A. EARTHWORM VISUAL TRANSPARENCIES

Many of you are setting up worm bins in classrooms and your students are getting excited about seeing how their food wastes disappear. Add to their understanding of the creatures that are doing the work by getting a set of earthworm transparencies that show different parts of a worm. It's easier talking about these simple, yet complicated creatures if you have a common terminology.

These transparencies of earthworm anatomy and reproduction provide clear, labeled diagrams of earthworm features such as segments, setae, clitellum, mouth, hearts. This set of overheads is based upon the nightcrawler, "Lumbricus terrestris." Included are:

- I. External Features
- II. Anatomy of an Earthworm
- III. Anterior Internal Organs
- IV. Cross-section, Setae, and Nephridiopores
- V. Earthworm Mating and Cocoon Formation;
- VI. What part is this?

The last transparency, "What part is this?" is unlabeled for use as a review, or a quiz. Classroom teachers, recycling coordinators who give worm workshops, and those in the worm industry who do presentations in their communities can all benefit from having these excellent visual aids among their tools for communication.

Artists: Paul Bourgeois and Mary Frances Fenton

Level: Adult

We'll offer a \$10 discount from the customary \$30 price until November 1. Order from the website. Mention the discount in the comment line so that your account can be credited accordingly. Or give Nancy a call at 269-327-0108

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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.

7===== THE Small PRINT=====

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