

www.attra.ncat.org**CURRENT TOPIC**

By Alice Beetz
NCAT Agriculture Specialist
June 2001

The commercially cultured bait earthworm species are not, generally speaking, the worm species found in your local garden soil. The two most frequently raised species are the manure worm, *Eisenia foetida*, and the red worm, *Lumbricus rubellus*, because they are prolific and adaptable to a wide range of growing environments. African nightcrawlers, *Eudrillus eugeniae*, are also farmed.

Common nightcrawlers, found in many areas of the United States, are not appropriate for commercial production because they are slow to grow and reproduce. However, it is possible to increase populations in the soil by adding organic matter, and then to collect them from their natural habitat.

Raising worms

Earthworm husbandry, as with any livestock, requires management to ensure adequate reproduction, growth, and health. I will provide a brief review of some basic requirements here, but please refer to the enclosed materials and to the listed resources for further details about particular species and production systems.

Containers for raising earthworms vary depending upon the size of the operation. They typically consist of a simple box made from a material that will resist rotting. In some cases, shallow worm boxes are stacked vertically in a frame resembling a chest of drawers. The bedding material should retain moisture and resist compaction. For this reason, soil is not recommended. A better choice is an animal manure/bedding mixture. Because the heat from an active compost pile can kill earthworms, the bedding material must be composted beyond the heating stage before the worms are introduced to it. The bedding should be kept crumbly moist, not soggy, with a temperature suitable for the species of worm being produced. Optimal temperatures range from 60 to 80 degrees Fahrenheit.

Earthworms are sensitive to fluctuations in acidity (pH). A pH between 6.8 and 7.2 is best for commercial earthworm production. Because most organic-matter bedding materials tend to become acidic upon decomposition, pH should be tested periodically and lime added when needed. Bedding should be kept loose for proper aeration and replaced when necessary.

Manures from animals fed high-roughage diets, such as cattle or horses, make excellent worm feed when added to the bedding. The fiber in the manure also forms a mat that reduces evaporation from the bedding material. Shredded cardboard, wood shavings, and other organic matter with a high cellulose content can be used as feed; but these low-nutrient feeds should be supplemented with a nitrogen source. After the food has been spread on the surface, the bed should be watered to maintain adequate moisture levels.

Marketing

The two major markets for earthworms are for fish bait and as earthworm breeding stock. In addition, there is an increasing opportunity to market worms to the waste management industry, which uses worms to process biodegradable garbage.

Earthworm wastes, or castings, are also sold as a soil amendment or potting medium. Worm castings are rich in both available plant nutrients and organic matter. Local gardening centers may be interested in using or selling this resource, especially if the product is consistent in quality and the supply is adequate. Attractive packaging can also enhance sales. Landscapers, who are more likely to use the material in bulk, provide another potential market. Another market is to vermicomposters who use worms to process organic waste into compost. ATTRA has another publication available on vermicomposting.

Economics

Enclosed are two publications that discuss the profitability of worm production. The Pennsylvania State University publication entitled *Earthworm Production* shows a return of \$196 over variable costs on a sale of worms from a 42-square-foot worm box at 4 pounds of worms per square foot of production area per year. The net return, including initial investment, was \$132 per year. These figures are based on a single production unit and are in 1994 dollars. Their worm boxes were made at ground level from framing lumber or cinder blocks.

According to the enclosed article on Weber's worm farm, sales reached approximately 60,000 worms per week during their 4-month peak season (April through July) in 1990. The farm required about 100 man hours of labor per week during this time period. They sold their African nightcrawlers at a price of \$1.50 for 2 dozen in 1990. They also sold bed-run African worms for \$12 per pound.

Worm information sources

If you have access to the Internet, there are many websites with information about worm farming. Many resources for the producer, including books, breeding stock, and equipment, can be located by visiting the sites listed at the end of this letter. Each is linked to other sites of interest. Under the website section below, I list just a sampling of appropriate websites. Web addresses frequently change, but a search of "worm farm" or "worm production" will locate many sites.

Several books on worms, and on raising them as a business, are listed below. Shields Publications (1) offers many low-cost books on worm production, including the *Earthworm Buyer's Guide*, which is updated every two years. They will send a brochure if requested.

Peter Bogdanov's book *Commercial Vermiculture: how to build a thriving business in redworms* provides a comprehensive guide to getting started in the worm business. The book includes a checklist of necessary beginning steps, necessary tools, and materials to get the business underway. It covers the entire production process in a step-by-step manner. Other salable products resulting from worm production are also discussed. Two more recent resources from

the same publishing company are: *In Their Own Words: Interviews With Vermiculture Experts*, edited by Peter Bogdanov, and *Developing A Successful Business Around Earthworms*, a CD-ROM set including the speech Bogdanov delivered at the Vermillennium meeting in September, 2000, plus 30 pages of text and data. These resources are available from the publisher and at their website (2).

Worm Digest is a quarterly newspaper about raising worms and worm composting (vermicomposting). The goal of *Worm Digest* is to provide information and resources on the use of worms for organic waste conversion and soil enrichment. *Worm Digest* is also available on the web. The website contains many resources including books and videos. Subscriptions to the paper version of *Worm Digest* are \$12 per year or \$22 for two years (3).

References:

- 1) Shields Publishing Co.
Box 669
Eagle River, WI 54521
(715) 479-4810
(715) 479-3905 Fax
<http://www.wormbooks.com>
- 2) VermiCo
P.O. Box 1134
Merlin, OR 97532
(541) 476-9626
(541) 476-4555 Fax
<http://www.vermico.com>
- 3) Worm Digest
P.O. Box 544, Eugene, OR 97440-0544,
(541) 485-0456.
Email: mail@wormdigest.org
<http://wormdigest.org>

Enclosures:

Anon. 1994. Earthworm Production. Agricultural Alternatives. Penn State Cooperative Extension Service. 4 p.

Janetos, John. 1992. Raising nightcrawlers in your basement for fun and profit. Countryside. November-December. p. 40-44.

Leary, D. 1990. Weber's worm farm: A wiggly business in the Ozarks. Missouri Farm. September-October. p. 18-21.

Enclosures: continued

Martin, J.P., J.H. Black, and R.M. Hawthorne. 1977. Earthworm Biology and Production. University of California Cooperative Extension Service, Berkeley, California. 10 p.

Mason, William T. Jr. and John F. Dequine. 1991. Culture of West-African nightcrawler and brandling worm. Aquaculture Magazine. July-August. p. 39-45.

Rule, Gwen. 1996. Live bait vending venture based on convenience. Northwest Arkansas Business Times. July 28. p. E1, E3.

Worm Books:

Nancarrow, Loren and Janet H. Taylor. 1998. The Worm Book. Tenspeed Press. 160 p.
Available for \$10.95 through your local bookstore.

Appelhof, Mary. 1997. Worms Eat My Garbage, Second Edition. Flower Press, Kalamazoo, MI. 162 p.
Available for \$12.95 from your local bookstore.

Gaddie, Ronald E. and Donald E. Douglas. 1976. Earthworms for Ecology and Profit, 192 p.
Available for \$14.95 through your local bookstore.

Dembroff, Glenn. Date Unknown. Exploring Profits in Worm Farming
Available for \$7 + \$1 shipping from:
<http://www.happydranch.com/books/epiwf.php3>

Shields, Earl B. 1999. Raising Earthworms for Profit. Shields Publications
A limited number of copies available for \$10 from:
<http://Amazon.com>

Morgan, Charlie. 1978. Earthworm Selling and Shipping Guide.
A few copies available for \$7 from:
<http://Amazon.com>

Myers, Ruth. 1969. The ABC's of the Earthworm Business. Out of print.
A few copies available for \$8 from
<http://Amazon.com>

Web sites:

<http://www.wormdigest.org/links/webworm3.html>
Worm Digest, a master website containing links to dozens of worm websites on production, bins, books, vermicomposting, back issues of Worm Digest Newsletter, and worm growers already in the business.

<http://www.magicworms.com/catalog.htm>

Sells worms, worm farming equipment, books and has much on-line information on getting starting on worm farming and vermicomposting.