

UPCOMING EVENTS

ECHO International Florida Conference
December 4-6, 2012

With great anticipation, plans are being made for the 19th Annual Agricultural Conference to be held in Fort Myers, Florida. We will welcome the following individuals as plenary speakers for the event

- **Dr. Hans-Martin Hirt**, ANAMED & **Tsimba Kandu**, ANAMED Canada presenting “*Artemisia annua* – A revolution in the history of tropical medicine”
- **Douglas Brown**, World Vision International
- **Bill Mebane**, Marine Biological Laboratory, to present on Fish Farming in Haiti
- **Stanley & Tami Brown**, “Orchards in Middle Earth: nonprofit and commercial orchard development in tandem”
- **Brad Ward**, Finca Loma de Luz, Honduras project review
- **Erwin Kinsey**, ECHO East Africa Regional Impact Center Director
- **Kay Witt**, Nutrition Assessment & Incorporating Moringa

Afternoon & evening presentations will include: Economics of Farming, Grafting, Water Harvesting, Foundations for Farming, Green Manure, Cover Crop Trial Results, Small Scale Nursery Techniques and more.

ECHO East Africa Symposium
Arusha, Tanzania
February 5-7, 2013

The program is taking shape for the East Africa Symposium. At present the following individuals will join us as presenters for the morning sessions:

- **Simon Lugando**, ACT, best practices/ lessons learned in conservation agriculture
- **Henry Njakoi**, Heifer, small livestock
- **Dr. Robyn Alders**, rural poultry
- **Dr. Lieve Lynen**, ECF presentation
- **Dennis Rensch/Lyne Ukio/Edith Banzi**, village cooperative banks
- **Kristin Davis** & colleagues, IFPRI, Farmer Field Schools.

For Afternoon Sessions:

- **Mike Peens**, vermiculture
- **Max Church/GSC**, ferrocement household grain stores
 - **Chrispin Mirambo**, MCC, fish farming
- **Edward Charles**, Kilimo Markets, warehouse receipt system
- **Harald Peeters**, AFRISEM, hybrid vegetable seeds from Africa
- **Karen Hampson**, Farm Radio Network, mass mobilization using radio.

Many more topics and speakers to come.

Additional information and registration for both events can be accessed through www.ECHOcommunity.org. Please plan to join us for one of these global training & networking opportunities.

Tropical Agricultural Development I: The Basics

January 7-11, April 15-19, May 20-24 or July 29 - August 2, 2013

ECHO Global Farm, Fort Myers, FL

Those interested in preparing for short- or long-term involvement in agricultural development internationally are encouraged to participate in this one-week course. Participants will gain an introduction to aspects of poverty and community development and an orientation to ECHO. They will also receive instruction on proven agricultural principles/practices and practical techniques, systems and technologies to meet agricultural and nutritional needs of small-scale, impoverished farmers. There will also be time for hands-on work on the farm, visits with staff, and study in the ECHO library. Registration for all 2013 TAD I classes opens October 15, 2012. For more information or to register, see the calendar of events at ECHOcommunity.org.

FROM OUR REGIONAL IMPACT CENTERS

ECHO Asia

The latest issue of *ECHO Asia Notes* (Issue 14, July 2012) contains the following articles:

- Vacuum Sealing vs. Refrigeration: Which is the most effective way to store seeds?
- The Crop Genetic Pump: A Possible Task for NGOs

Link to the issue from: www.echocommunity.org/?page=AsiaNotes

PLEASE NOTE: At ECHO we are always striving to be more effective. Do you have ideas that could help others, or have you experimented with an idea you read about in EDN? What did or did not work for you? Please let us know the results!

THIS ISSUE is copyrighted 2012. Selected material from *EDN* 1-100 is featured in the book *Agricultural Options for the Poor*, available from our bookstore (www.echobooks.org) at a cost of \$19.95 plus postage. Individual issues of *EDN* may be downloaded from our website (www.ECHOcommunity.org) as pdf documents in English (51-117), French (91-117) and Spanish (47-117). Recent issues (101-117) can be purchased as a group from our bookstore (www.echobooks.org). Earlier issues (1-51 in English) are compiled in the book, *Amaranth to Zai Holes*, also available on our website. ECHO is a non-profit, Christian organization that helps you help the poor to grow food.



ECHO® *Development Notes*

Edited by Dawn Berkelaar and Tim Motis

October 2012 | Issue 117

Developing Low-Cost Assistive Technologies for Persons with Disabilities

by Nathaniel Kamban and Ray Norman

Introduction

Inclusive development has become increasingly a priority for development organizations. This focus on inclusive development has led organizations to address the particular needs of persons with disabilities in specific development sectors. One area of growing attention is in inclusive water, sanitation and hygiene (WASH) programming. Since 2007, World Vision and the Conrad N. Hilton Foundation have partnered with the Collaboratory, an applied research and project-based learning center at Messiah College, to fund the Africa WASH and Disabilities Study (AWDS). The AWDS seeks to improve the access to and use of WASH facilities by persons with disabilities in communities targeted by World Vision and the West Africa Water Initiative (WAWI) in the countries of Mali, Niger and Ghana. One of the primary ways in which the AWDS seeks to address the needs of persons with disabilities is through the development of simple, low-cost, assistive WASH technologies.

As part of the AWDS, assistive technologies will be designed in each of the three target countries. The process is already underway in Mali. The technologies which have been designed thus far are based upon the needs and preferences of persons with disabilities in World Vision target communities in rural Mali. A survey and focus groups were conducted in the target communities to identify the priorities of persons with disabilities in regards to WASH. Feedback from the surveys and focus groups revealed that persons with disabilities faced significant constraints in the following three areas:

- Access and use of hand-pumps
- Transport and domestic use of water
- Access and use of latrines

Two of the technology sets designed by persons with disabilities to facilitate access and use of latrines are presented in this paper: latrine chairs and a latrine hole

locating system for persons with visual impairments. These technologies were developed and fabricated in a developing world context using only locally-available materials and construction techniques. It is hoped that these technologies may be useful to others working with persons with disabilities throughout the developing world.

Sanitation and Latrine Constraints

Results from the survey and focus groups brought to light the numerous difficulties faced by persons with disabilities in relation to sanitation and latrine use. In the targeted communities in Mali, more than 60 percent of rural households reported they do not have a latrine. Many persons who lack a latrine urinate in the drainage of the “bathing” area of the household, and most people go outside their homes to defecate (usually to the “bush” or adjacent crop fields). The lack of latrines in most households causes unique challenges for persons with disabilities. Those with mobility limitations are often faced with the need to regularly traverse significant distances. Many persons with disabilities choose to wait until after nightfall to relieve themselves, as they are not required to travel as far to find a place of concealment. However, this practice carries with it the risk of encountering poisonous snakes or scorpions, or incurring other types of bodily harm.

Thirty-five percent of the survey respondents reported the presence of a traditional latrine, with about five percent having some form of improved latrine. Among persons with disabilities who have access to a latrine, 85 percent indicated that they have to touch the latrine floor while accessing the latrine or to stabilize themselves. Only 14 percent of the respondents indicated using an assistive device to help them use the latrine.

Perhaps the most challenging issues related to latrine use are squatting and

cleaning. Persons with lower-body limitations often have difficulty in one or more of the following actions: a) lowering themselves to a squatting position; b) maintaining a squatting position without the support of their hands; c) cleaning themselves after defecation; and d) raising themselves to a standing position when finished.

Latrine Chairs

In order to minimize the numerous challenges noted in regards to latrine use, technologies designed to provide adequate seating and assist with personal cleaning were developed and tested. The main

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ECHO is a global Christian organization that equips people with agricultural resources and skills to reduce hunger and improve the lives of the poor.

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technologies developed were clay terra cotta latrine seats and metal and wooden latrine chairs.

Clay Terra Cotta Latrine Seats

Clay terra cotta latrine seats can provide a low-cost solution for persons with disabilities who lack sufficient lower-body strength to squat (see Figure 1). Many moderate-sized villages and towns in the target region have skilled, traditional potters who produce terra cotta containers for water transport and storage. AWDS representatives worked with a local potter to develop and test several prototypes for use with both traditional latrines and the sanplat (sanitation platform) system. These seats can be produced for the affordable price of approximately 400-1,500 cfa (West African franc) (.80¢ - \$3.00 USD) each.



Figure 1. Clay terra cotta latrine seat in use on a sanplat latrine.

The technology development process revealed that persons with disabilities had varying preferences for seat height based upon their individual impairment(s) and the size and type of latrine hole. However, site tests revealed that the standard height for these should remain within the 15-20 cm range. Circular seats for traditional latrines should have a diameter of about 25 cm, but this can vary depending on the size and shape of the traditional latrine. Terra cotta seats for the sanplat should be fabricated by simply following the dimensions of the latrine opening. The top rim should also have wide and well-rounded edges to provide greater comfort to the user.

There was a largely favorable response from persons with disabilities assigned these seats for testing over a period of six months. In addition to no longer having to sit directly on the latrine hole, the low-cost and ease of local fabrication was particularly appealing. The seats are weather resistant and can be left in the latrines year round.

Despite the benefits of the clay seats, field testing revealed several minor challenges. The seats are heavy and must be placed and removed with each use so that other family members can use the latrine. In some cases, another family member assisted in placing and removing the clay seat. Additionally, while personal cleaning is made somewhat easier and more hygienic than when seated directly on the hole, some individuals still struggled with this as it is still difficult to reach one's buttocks with a cupped handful of water. The seats can be brittle and must be handled with some care to avoid breakage if dropped. In terms of comfort, some persons cited mild discomfort due to the hard nature of fired clay.

Metal Latrine Chairs

In order to provide an assistive device that was both more portable and more conducive to washing, AWDS representatives worked with local metalworkers and volunteers to design and test metal latrine chairs (see Figure 2). Several prototypes were developed and tested over a period of 18 months, with both male and female volunteers.

Field testing of the metal latrine chairs revealed numerous technical specifications that increase the chair's overall functionality and comfort. For instance, the optimal height of the latrine chair should normally be about 20 cm. This height is based on user preferences and the need to keep the chair seat relatively close to the latrine opening to avoid possible soiling of the latrine surface. If there is an object the seat must fit over, or if the individual needs a higher position due to a physical limitation, then the seat can be positioned higher. Additionally, the specifications of the latrine seat can vary based upon user preferences. However, field testing revealed that the appropriate seat width should range from 15-25 cm, with most persons usually preferring a width of 20-25 cm. The length of the seat portion of the chair should be about 30 cm.

It should also be noted that the metal chair designs are open at one end. This opening is necessary to facilitate hand access for cleaning and rinsing after defecation. The seat opening does not need to be larger than the maximum width of the seat. Early chair prototypes were built with circular (or enclosed) seating and did not include these openings. User feedback quickly indicated that this design impeded effective hand access and cleaning, and the future designs were adapted accordingly.



Figure 2. Prototype of the metal latrine chair.

Field tests also revealed that the total chair width should normally not exceed 50 cm, as greater width can make access difficult when passing through the entranceways of many latrines. The depth of most chairs (i.e., the distance from the front to the back of the chair) will need to be slightly more than the length of the seat portion of the chair. Typical depths may range from 35-45 cm. By limiting the width of the chair, persons with disabilities can more easily transport the chair between their homes and the latrine. In addition to the dimensions of the chair, consideration must also be given to stability. Low-placed braces between chair legs can serve to enhance seat stability and prevent chair legs from sinking in the soil surface.

low can reduce leaf production by causing the plants to go to seed earlier than they normally would under optimal conditions (known as bolting). According to Knott's Handbook for Vegetable Growers (Lorenz and Maynard), the optimal temperature range for many brassicas is 60-65°F (16-18°C) with minimum and maximum temperatures of 45°F (7°C) and 75°F (24°C), respectively. Considering that temperatures in most parts of the sub-tropics and tropics would exceed 24°C, even during the coolest months, we were encouraged that none of these varieties bolted with highs of 25-29°C during their first month in the field. If the climate in your area is too warm for these or similar crops, alternatives may be available (e.g. Malabar spinach [*Basella alba* or *B. rubra*]).

Based on the information in Table 1, as well as other observations, here are some comments regarding each variety:

Thai Mustard Green leaves began to lose their sweetness and tender texture approximately 64 days after seeding, after which time the plants became spindly and woody.

Japanese Giant Red provided the second-largest amount of total biomass among varieties. The plants peaked around 64 days, after which they gained little in biomass and lost some of the leaves' pleasant flavor.

Big Stem Mustard produced increasingly large stems, which proved to be very palatable. This variety started out small, and had low survival rate due to transplant shock, resulting in the second smallest harvest of the experiment. However, the remaining individual plants produced very well.

Toscana Kale grew slowly into a strong plant. It provided the third-smallest harvest of total biomass, due at least in part to the fact that we harvested the leaves instead of whole heads, which meant that the heavy stems were excluded in our measurements.

Gailan was slower to mature, and stem material composed most of its biomass.

Vitamin Green surpassed all other varieties in terms of total biomass production, (approximately 40% more biomass than the next largest variety, Japanese Giant Red).

Komatsuna produced remarkably uniform and full heads, and was one of the top producers of biomass.

Hon Tsai Tai was another large producer, with highest biomass production at 78 days after seeding.

Mizuna matured early, but peaked in size midway through the trial. Mizuna was harvested by individual leaves and was a low to medium producer.

Large Leaf Tong Ho produced the least amount of total biomass over its lifespan.

Flowering and seeding: At the time the trial was terminated, five of the ten varieties had flowered, and Hon Tsai Tai, Gailan and Thai Mustard had already begun to set seed. The fact that they flowered, and some even began to set seed, indicates that it may be possible to multiply and save seeds of one or more of these varieties. We have no way of knowing the extent to which the January 3 frost contributed to flowering in these varieties, but at least some of the plants of Hon Tsai Tai, Large Leaf Tong Ho, Gailan and Thai Mustard had begun flowering by December 22, before the frost occurred. Big Stem Mustard began flowering January 19. (Tim Motis observed that an October planting of mustard greens in Haiti, where frost was not a factor, grew well and set seed).

Taste: Large Leaf Tong Ho was a strong favorite among our pool of participants. It was generally agreed that the Tong Ho had a "celery-like" flavor, possibly accounting for its popularity in the taste test. Toscana Kale also scored high (data not shown) in the taste test, which could potentially be due to its more common consumption among our target group. Big Stem Mustard was the highest ranking among the mustard-flavored greens in the trial, and received the fourth highest overall rating. Thai Mustard and Mizuna both received low rating, consisting more of stem than leaf tissue.

We recognize the preferences of the participants in this taste test may not translate to the preferences of other populations in other regions of the world, particularly those with a diet that commonly includes more mustard greens.

Seeds available

We encourage you to conduct your own annual greens trial and let us know your results. Development workers may request a trial packet of the following five varieties:

Vitamin Green: produced the most leafy biomass in our trial

Summerfest Komatsuna: another high-yielding variety, maintaining very marketable leaves even when the leaves of other varieties were being chewed up by insects

Large Leaf Tong Ho: best liked in terms of taste; had flowered by the end of the trial

Gailan (Chinese Kale): one of several that produced seeds in our trial; stems and flower buds are tender and can be cooked like broccoli

Thai Mustard Green (already offered through ECHO's Seed Bank): though mustards are more bitter-tasting than other greens, the bitter taste is not necessarily a negative depending on local preferences; also, mustards tend to be more heat tolerant than some of the other oriental greens.

See www.ECHOcommunity.org for information on requesting seeds and registering with ECHO as a development worker. We would love to hear how these varieties perform under your conditions. Also, please let us know if you have experience with other varieties that you would recommend as additional ECHO seed bank offerings.

| Table 2. Weather data from seeding (19 Oct) to the frost event (Jan 3) that occurred just before final harvest (Jan 5). Temperature and humidity values are biweekly averages. | | | | | |
|--|------------------|-----|-----------------------|-----|---------------|
| Time period | Temperature (°C) | | Relative humidity (%) | | Rainfall (mm) |
| | High | Low | High | Low | |
| Weeks 1-2 (Oct 19-Nov 1) | 28 | 17 | 98 | 66 | --* |
| Weeks 3-4 (Nov 2-Nov 15) | 27 | 14 | 99 | 56 | --* |
| Weeks 5-6 (Nov 16-Nov 29) | 29 | 17 | 99 | 59 | 3.6 |
| Weeks 7-8 (Nov 30-Dec 13) | 25 | 13 | 98 | 60 | 3.8 |
| Weeks 9-10 (Dec 14-Jan 3) | 24 | 14 | 75 | 53 | 37.1 |
| Total rainfall | | | | | 44.45 |
| *No value given because seedlings were in the greenhouse until November 17. | | | | | |

FROM ECHO’S SEED BANK

Annual Leafy Greens Variety Trial

by Amy VanNocker and Vanessa Reed, former ECHO interns

Introduction

Annual leafy greens grow quickly, are typically more tolerant of shade than fruit-bearing vegetables (e.g., tomato and pepper), and do not require a lot of space. They can be grown in small gardens or containers near people’s homes, and are easily incorporated into many traditional dishes for added nutrition. Last year, we evaluated ten varieties (Table 1) of annual leafy greens for their potential to produce large amounts of leafy biomass quickly, grow well in the sub-tropics, and resist bolting (premature flowering and seeding) while still producing seed. Heat tolerance was important to us, so most of the varieties we grew are of Asian origin. In conducting this trial, we became familiar with promising varieties that were new to our seed bank. Based on the results and information summarized below, ECHO staff added four varieties of seed to our seed bank collection, trial packets of which are now available to our international network.

Methods

This variety trial was conducted on the ECHO Global Farm in southwest Florida (17391 Durrance Road, North Fort Myers,

FL 33917). It consisted of three raised box beds, 60 feet in length. Each bed was divided into ten plots, with each variety randomly assigned to one of the plots within each bed. A plot consisted of three rows of seven plants (giving 21 plants per plot).

The raised beds were weeded on November 10. NPK fertilizer (6% nitrogen-2% phosphorus-6% potassium) was broadcast-applied the next day at a rate of 2 lbs per 100 square feet. Seeds of all ten varieties were sown (double-seeded) in fifty-cell flats in the propagation greenhouse on October 19, and were transplanted out to the field on November 17. No other fertilization was given, and no pesticide or fungicide was applied. The plants were watered with drip irrigation approximately two times a week, for two to three hours each time.

Greens were harvested on December 15, December 22, and January 5. (We stopped harvesting on January 5 due to a frost event on January 3 that killed or damaged most of the greens beyond marketability.) Greens were harvested using a small serrated knife, and placed with stems in a bucket of water until we were able to weigh them (weighing happened no more than ten minutes after harvest). We harvested leaves from Toscano Kale, Hon Tsai Tai, and Purple Mizuna, while other more bunched (as opposed to loose-leaved) varieties were harvested as entire heads. They were weighed on a digital scale to

a precision of 0.1 grams. The number of plants and cumulative weight of the greens were recorded for each replication of each variety.

After the final leaf harvest, we continued to monitor flowering and seeding of the plants. An informal (non-blinded) taste test of steamed leaves was conducted on January 6. Participants included 13 ECHO staff and interns who identified their favorite varieties and recorded general impressions.

We terminated the trial in the field at 114 days after seeding. Yield data were analyzed with statistical software (SPSS).

Results and discussion

Growth and production: Leaf biomass (weight) at each harvest period varied with crop variety, as shown in Table 1. Because of the frost event on January 3, we were not able to measure the full yield potential of these varieties; however, the data do give an indication of yield potential over a time period (78 days after seeding) that spans the typical time to maturity for these crops.

Table 2 shows the weather conditions under which the plants were grown. Brassicas generally prefer cooler temperatures than warm-season crops such as okra or eggplant, so it is advisable to time the planting of these crops to avoid the hottest months. Temperatures that are too high or

The handles on each side of the latrine seat are used primarily for proper placement of the seat and for lowering and raising oneself from the seat. The height of the side handles will therefore depend on the strength and preferences of the user. For most users, the handles should extend approximately twice the height of the seat (usually 40-45 cm). However, some persons with disabilities and elderly persons can benefit from higher side handles which will allow them to use the chair as a walking aid. When used in this manner, the individual can leave their assistive device (tricycle, crutches, etc.) outside the latrine and enter without becoming soiled from the latrine or bathing area floor. Chair handles that will be used to assist with walking should be about 65-70 cm in height.

The metal chairs can be fabricated by local metalworkers, and they are comfortable, portable, strong and degrade little when exposed to water and sun. However, their primary disadvantage is their cost, which generally ranges from 8,000-10,000 cfa (\$16.00-\$18.00 USD), depending on the type of design and the amount of metal and welding involved. Without some form of assistance, this cost is prohibitive for most persons with disabilities in rural communities of Mali.

Wooden Latrine Chairs

The AWDS also examined lower-cost wooden latrine chair options. Various models were developed, tested and improved over a two-year period. The same guidelines mentioned for metal chairs also generally apply to the development of the wooden version. However, these chairs can be produced by local artisans for a much lower price of approximately 1,000-2,500 cfa (\$2.00-\$5.00 USD). A standard model which can be used by the majority of persons with disabilities with lower-body limitations was developed (see Figure 3). Field tests revealed the ideal dimensions of the chair as follows: width approximately 51 cm, length approximately 42 cm and height approximately 40 cm. Refer to Figure 4 for the recommended dimensions for the wooden latrine chair seat.



Figure 3. The standard-sized wooden latrine seat developed by the AWDS.

Discomfort caused by the thin gauge metal wire used to bind the chair together can be easily overcome if grooves are first cut in the wood before binding takes place. When the seat is attached to the chair frame, the wire binding can then be embedded in the pre-cut grooves to provide a smoother seat surface. The cut ends of the wood sections which will come in contact with the individual when seated should also be rounded to create smoother and more comfortable edges.

In addition to being low-cost, the wooden model is lightweight, easily portable and weather resistant. The wooden chairs should last for several years without needing replacement. However, repeated use and long-term exposure to rain and sun can reduce the strength of wire binding over time. Tightening or replacement of the wire binding may need to be done every two to three years if the chair is typically stored outside in the open latrine area.

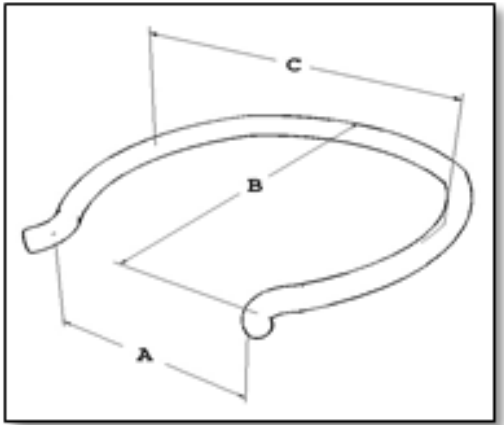


Figure 4. Recommended dimensions for the chair seat. A = 18 cm, B = 30 cm, C = 25 cm.

Special Challenges for Persons with Visual Impairments

For persons with visual impairments, traversing the courtyard and the latrine structure can be difficult, much as it is for persons with other forms of disability. Most challenging for persons with visual impairments, however, is locating the latrine hole and positioning oneself accurately over the hole in a squatting position. In both Mali and Niger, it was noted that most persons with significant visual impairments simply use their unprotected hands to locate the hole.

Latrine Hole Locating System

A simple, low-cost method for assisting persons with visual impairments was tested in Mali. This involves the use of string weighted with stones (see Figure 5). A string is suspended across the walls adjacent to the sanplat using stones attached to both ends. A second string is attached at the center of the cross string, directly above the latrine hole. This vertical string is then weighted at its low end with another stone and is lowered into the latrine hole some 40-50 cm below the surface of the sanplat. This vertical string is permanently fixed in this position and should not be removed (as the lower end will be soiled) except for repair.

The person with visual impairments can locate this string and the general location of the latrine hole with an outstretched hand. When descending to a squatting position he can then keep one hand on the string for accurate body positioning over the hole. As he squats, the string under tension will give way to the side while he remains in the squatting position. This system was tested for 12 months and was found to be easily mastered by adults with visual impairments. One concern was that other household members would remove the string or that curious children in the household would play with it or otherwise disturb the weighted string system. However, after one year of testing in a household that included a father with visual impairments with a spouse and several young children (to whom

Table 1. Fresh weight of leaves or heads for ten different leafy green crop varieties. Data were averaged over three replications.

| Crop | | Weight (g/plot) of leaves harvested at varying times (days) after seeding | | | |
|--|----------------------|---|---------|---------|--------|
| Latin name | Variety name | 57 days | 64 days | 78 days | Total |
| <i>Brassica juncea</i> | Thai Mustard Green | 425 | 1987 | 565 | 2976 |
| <i>Brassica juncea</i> | Japanese Giant Red | 441 | 995 | 2337 | 3773 |
| <i>Brassica juncea</i> var. <i>tumida</i> | Big Stem Mustard | 71 | 203 | 930 | 1205 |
| <i>Brassica oleracea</i> | Toscano Kale | – | 186 | 1698 | 1884 |
| <i>Brassica oleracea</i> var. <i>alboglabra</i> | Gailan | – | 345 | 1811 | 2156 |
| <i>Brassica oleracea</i> var. <i>narinosa</i> | Vitamin Green | 1240 | 1203 | 3786 | 6228 |
| <i>Brassica oleracea</i> var. <i>perviridis</i> | Summerfest Komatsuna | 734 | 1260 | 1576 | 3570 |
| <i>Brassica oleracea</i> var. <i>rosularis</i> | Hon Tsai Tai | 492 | 522 | 2453 | 3468 |
| <i>Brassica oleracea</i> subsp. <i>Nipposinica</i> | Purple Mizuna | 636 | 713 | 876 | 2225 |
| <i>Chrysanthemum coronarium</i> | Large Leaf Tong Ho | – | 352 | 668 | 1020 |
| P value ^z | | <0.001 | <0.001 | <0.001 | <0.001 |
| LSD value ^y | | 416 | 460 | 811 | 889 |

^zWithin each column, at least two means are statistically different because the corresponding P value is ≤ 0.05.

^yA least significant difference (LSD) value was calculated for each column. Any two means within a column are statistically significant if the difference between them exceeds the corresponding LSD value.

the string's purpose had been explained), not a single incidence of disturbance was reported. To reduce the frequency of repair, the string material should ideally be resistant to deterioration from wetting and from ultra-violet rays from the sun. For testing, a low-cost, UV resistant cord was used.

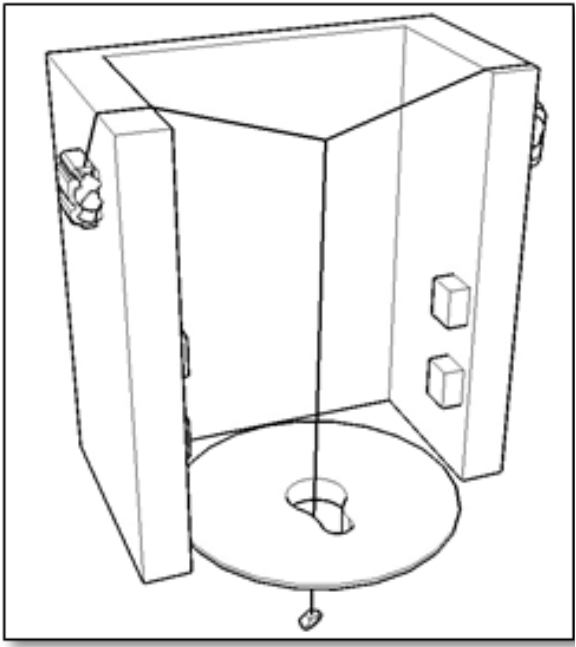


Figure 5. The latrine hole locating system developed by the AWDS.

Conclusion

In rural West Africa, significant challenges impede the access to and use of WASH facilities by persons with disabilities. In order to confront these challenges, the AWDS designed and tested low-cost assistive technologies in target communities in Mali. The AWDS spent several years working with persons with disabilities to design and test assistive technology prototypes. The two technology sets presented in this paper represent the ideal technical guidelines as made clear by persons with disabilities in the target communities. It is hoped that the specifications presented in this paper will be used to assist others working with persons with disabilities in the developing world.

More Information

For more information please refer to the full report on the AWDS work in Mali available on the website below. Specifications for additional assistive WASH technologies are included in this document.

www.messiah.edu/collaboratory/media_press/documents/hiltonreport_reducedsize.pdf

For more information about the AWDS, please feel free to contact Nathaniel Kamban at nkamban@messiah.edu

ECHOcommunity.org – The First Year

At the Southeast Asia Conference in October 2011, ECHO launched the new ECHOcommunity.org website and internet portal for our network members. Since it has been up and running for a year, we decided to update our readers about how this site is being used. As of September 30th, 17,136 individuals or organizations have visited the site. They have viewed 234,596 pages, with an average of 6.90 pages per visit, and spent an average of 7 1/2 minutes per visit. These visitors represent over 169 different countries, and over 60 different languages. We now have over 3543 active members, with 1262 of them having joined ECHO since the website was launched in October 2011.

Our goal is for ECHOcommunity.org to be much more than just a repository of information; we want it to be a networking tool. The following features have become very popular in the ECHOcommunity.

- **ECHO Courses and Conferences are posted on the Event Calendar.** Registrations for the ECHO Courses are accepted through this site and links are provided for registrations for ECHO Conferences.
- **The site can be translated into 54 different languages.** This is however a machine translation, and is therefore not a perfect translation. Some technical and information documents have been professionally translated into different languages and are available for download from the site.
- **Documents are searchable and available for free download,** including ECHO Technical Notes, *ECHO Development Notes*, *ECHO Asia Notes*, and many others. The new *Ag Options for the Poor* book is the exception, but it is linked to our ECHO Bookstore and can be purchased from there.
- **Groups are available.** Join groups organized by geographical area, popular plants or agriculture techniques. The groups include forums and blogs where you can browse information submitted by others, or start a new thread with a question for others to respond to.
- **Information regarding our research projects** is posted on the site; you also have the opportunity to contribute information about your projects.
- **Seed information.** Detailed plant and seed information is available to assist you in determining what you should plant, and how. We encourage you to submit your seed trial report to the ECHO Seed Bank through the form on this site. This will enable us to better understand which crops grow best under various conditions.
- **Request Trial Seed packets** from our online store (this feature is for Active Development Workers only)
- **EDN Articles Forum.** Let us know what you would like to see discussed in upcoming issues of EDN, and submit potential articles.
- **Contact Us.** The “contact us” link allows you to send a request for information directly to the Technical Response Unit.
- **Links.** We have updated our subject-oriented list of links to outside sources of information. This list includes many of the links referred to in the *Ag Options for the Poor* book.
- **Career Center.** Active development workers are able to post and view development-related job opportunities.

Features we hope to have available soon:

- **Asia Seed Bank** information and online ordering process may actually be available by the time you receive this publication.
- **Online registration** for all ECHO Conferences, Symposiums, and Networking Forums through this site.

We understand that you have a right to your privacy. On ECHOcommunity.org, you have the ability to determine what you want the rest of the network to see regarding your personal information.

Books Websites and Other Resources

Hesperian Health Guides

Hesperian health guides are available in over 80 languages; digital resources are available in 26 languages.

Visit <http://hesperian.org/books-and-resources/> to find links for the following books. Most are available as a free pdf download, can be read online, or can be purchased as a paper copy. We include below information from the Hesperian website about selected books.

The website also gives an opportunity for individuals to create their own health materials (e.g., training brochures) using an online tool that is currently in the testing stage. Text and images are freely available from the Hesperian site.



Where There Is No Doctor

“The most widely-used health care manual for health workers, educators, and others involved in primary health care delivery and health promotion programs around the world. Our current edition contains updated information on malaria, HIV, and more.”

Advance Chapters from the new Where There Is No Doctor

“Topics include care for newborns, breastfeeding, and nutrition. These are the first chapters completed of an all new, 21st-century edition of our hallmark publication.”

Where Women Have No Doctor

“An essential resource for any woman or health worker who wants to improve her health and the health of her community, and for anyone to learn about problems that affect women differently from men. Topics include reproductive health, concerns of girls and older women, violence, mental health, and more.”

Helping Health Workers Learn

“An indispensable resource for health educators, this book shows – with hundreds of methods, aids and learning strategies – how to make health education engaging and effective, and how to

With ECHOcommunity.org, you can tell us what types of e-mail notifications you would like to receive. We can advise you of activity in a group that you belong to, when events are posted to the site, and many other situations. However, we realize that, especially in cases of limited internet access, you may not want to receive lots of extra e-mail messages. You are able to control what notifications you will receive.

encourage community involvement through participatory education.”

Disabled Village Children

“This manual contains a wealth of clear and detailed information along with easy-to-implement strategies for all who are concerned about the well-being of children with disabilities, especially those living in communities with limited resources.”

A Community Guide to Environmental Health

“This guide contains information, activities, stories, and instructions for simple technologies that help health promoters, environmental activists, and community leaders take charge of their environmental health.” Some of the chapters are also available separately, as short booklets (*Pesticides are Poison*; *Sanitation and Cleanliness*; *Water for Life*)

A Health Handbook for Women with Disabilities

“Developed with the participation of women with disabilities in 42 countries, this guide helps women to overcome the barriers of social stigma and inadequate care to improve their general health, self-esteem, and independence as active members of their communities.”

HIV, Health and Your Community

“A thorough, easy-to-understand guide for health workers confronting the HIV pandemic in their communities, it covers topics from biology of the virus to epidemiology to the mechanics of designing prevention programs, using language that is accessible to those with little medical training.”

Other titles include: *A Book for Midwives*, *Helping Children Who are Deaf*, *Helping Children Who are Blind*, *Where There is No Dentist*, and Advance Chapters from *A Worker's Guide to Health and Safety*.