ECHO® Development Notes

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Strategies to Help Prepare for and Respond to Disaster

by Dawn Berkelaar

What if you are working in a community when disaster strikes it? What steps toward recovery can you take in such a situation? And what actions can be taken beforehand to minimize the damage from a large-scale, catastrophic event such as Typhoon Haiyan, which devastated large portions of the Philippines in early November 2013?

According to the UN Office for the Coordination of Humanitarian Affairs, 13 million people were affected by Typhoon Haiyan and four million were displaced. The typhoon damaged the main rice crop in areas that were affected, and disrupted planting of the secondary rice crop (www.fao.org/news/story/en/item/206856/icode/).

The immediate need after such a disastrous event is for relief supplies, including food, water and shelter. In the case of Typhoon Haiyan, the FAO (Food and Agriculture Organization of the United Nations) also planned to provide farmers with rice, maize and vegetable seeds; tools; fertilizer and irrigation equipment.

After initial relief efforts, the process of rebuilding must begin, as relief shifts into development.

What factors should a local development worker be aware of when it comes to preparing for a disaster? And what interventions can be most helpful in the face of disaster? To gain some broadly-applicable insights, we contacted four people who have experience working with displaced and unsettled people, either after a natural disaster or post-conflict disasters:

R. Darrell Smith is the Executive Director of Global Environmental Relief.

Robin Denney worked in post-conflict situations in Liberia and South Sudan.

Laura Meitzner Yoder worked in Aceh, Indonesia, after the December 2004 tsunami, and in Timor-Leste in the years following independence.

Rhoda Beutler was involved in relief work after the 2010 earthquake in Haiti, though she was not physically in Haiti at the time of the earthquake. She also knows many people who were deeply involved in recovery efforts in Haiti.

We share their input below, along with information from presentations and papers.

Figure 1. *A home garden outside a shelter in Yida UN refugee camp, Unity State, South Sudan. Photo by Robin Denney.*

I. Preparing for the Possibility of Disaster

What can be done ahead of time to minimize damage from a natural phenomenon such as a tsunami, hurricane or typhoon?

Conservation agriculture to prevent erosion. Gaye Burpee with Catholic Relief Services shared this information in a webinar on Agricultural Extension and Climate Change: "In 1998, Central America was hit by a 200-year hurricane [Mitch] with 180 mile per hour winds, 50 inches of rain, and 22,000 deaths in Honduras where the hurricane centered. Economic losses [totaled] $7 billion, [$2 billion of that from agricultural losses.]… [A] third of farmers in Honduras had total crop losses and 10,000 hectares of topsoil were stripped.

"Afterwards, World Neighbors and a consortium of [other] agencies [analyzed] some of the impacts….They found…that on conservation agriculture plots,…depending on the country, there was 58 to 99 percent less damage on those plots than conventional plots, 28 to 38 percent more topsoil, 2 to 3 times less surface erosion.

"But in areas where there were gullies or landslides above those conservation agriculture plots, there was the same damage inflicted on conservation and conventional tillage plots. When I went into Nicaragua…about ten months afterwards, farmers said, 'We ignored you when you were training us in soil and water conservation because we thought it was a waste of our time.' [They] pointed to a slope where the plot that had been there had completely washed into the ravine. Then they pointed [to a plot that had conser-

Featured in this EDN

1 Strategies to Help Prepare for and Respond to Disaster

5 Echoes from our Network: Increasing Interest in Chaya

6 From ECHO's Seed Bank: Dual-Purpose Cowpea Varieties

7 Books, Websites and Other Resources

8 Upcoming Events

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vation agriculture and was still there and still had crops on it.] They said, 'We beg you to come back and teach us again because now we understand.'" (Simpson and Burpee, 2012).

Broadly speaking, conservation agriculture (CA) is an approach that uses sustainable, ecologically sound principles to reduce erosion and to maintain and improve soil fertility. CA practices include minimum soil disturbance, use of organic matter as mulch, and crop rotation. If you are practicing conservation agriculture, but someone higher on the same slope is not, it might be helpful to establish vetiver or other deep-rooted plants at the top and along contours, or to dig ditches at the top of the conservation agriculture piece of land. See the article on soil and water conservation in *ECHO East Africa Notes* (*EAN*) #2 for information about the ditch-digging technique. The document can be downloaded from www.echocommunity.org/?EastAfricaPubs

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When asked what can be done ahead of time to minimize damage from a disaster, Laura Meitzner Yoder commented, "Smallholder farmers trying to cope with and prevent natural disasters [in areas that are prone to them] incorporate many of the same principles that are commonly used to ensure food security in general, such as crop biodiversity." She added the following specific ideas for disaster zones:

I**nclude root/tuber crops among those promoted**. "Root and tuber crops are often still accessible if a storm topples maize or rice. There is good reason that many Pacific islands have root crops as their staple starches." [Ed: See http://cipotato.org/publications/annual_reports/1998/02 for information on how the International Potato Center intervened in Latin America and East Africa.]

Trees are important! "Many coconut palms withstood the massive December 2004 Indian Ocean tsunami unharmed, providing emergency (coconut) water supplies and calorie-rich food immediately after the disaster.

"Tree crops of any kind, including palms and fruits, may provide alternate food sources in the near term when annual crops are destroyed. Many people are also able to survive a flood or storm by clinging to a tree."

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Rhoda Beutler also had ideas for actions that can be taken within a community, which can increase resilience in the case of a disaster.

Work to build trust and local capacity in your community. "The stronger the bonds are and the more that people in the community are confident in their God-given abilities and talents, the more they will be able to act to help others in the wake of an emergency."

Get to know your local authorities. "If possible, work in advance with local authorities, to talk about the risks that threaten the community and how you might collaborate in case of a disaster."

Think about ways to reduce the risk in advance. "Some ways to reduce the risk could include community motivation to move away from vulnerable spaces (ravines, seacoasts, exposed hillsides); community acceptance of norms (e.g. construction standards); making known evacuation or shelter plans; or having regular meetings of community members who are thinking of the well-being of the people in the area."

Collect supplies. "To the extent that is possible, collect supplies in advance and have tools, materials, and any food or medical supplies easily accessible. "

II. After a Disaster: Helping with Relief Efforts

Oftentimes, people already working in a country are uniquely poised to help with relief efforts in the case of a disaster. Based on experiences after the 2010 earthquake in Haiti, Rhoda Beutler shared a number of general ways that people working in-country might be able to step in and help with relief efforts after a disaster:

Rescue, evacuation, and burial. "Knowledge of the terrain can help people locate victims and survivors quickly and coordinate with family members."

Provide emergency medical care. "Existing clinic facilities or supplies on hand can be quickly mobilized to help with the emergency needs."

Assist with communications and transportation. "During a disaster, working vehicles, internet, or radio connections are invaluable."

Help to direct relief organizations as they seek to provide water, food, sanitation, and temporary shelter. "A few years ago, Bruce Robinson spoke at the ECHO conference about one of the roles of a long-term missionary [or development worker] as 'pointing the big guns.' While they may not have the resources to accomplish all that a bigger organization or expert can do, the long-term worker can direct the efforts toward greater effectiveness. This can be tricky, because the [bigger relief] organizations may be flooded with both bad and good ideas and they may trust their own internal experts more than a person on the ground, but relationships can be built with time and patience. Long-term workers should be aware of the SPHERE handbook (www.spherehandbook.org/), which sets out minimum standards for humanitarian action. If an established local organization wants to administer any emergency grants, they will need to follow these guidelines.

"In Haiti after the earthquake, there was a veritable flood of help; many disasters are less-publicized and there would be fewer resources to direct."

Carry out a community needs assessment. "A long-term worker who already understands the geography, local dynamics, and vulnerabilities of an area is several steps ahead of someone who has just come into the region. In Bohoc, Haiti, members of a local community committee, church members and young leaders volunteered to do a needs assessment, traveling to each household and recording who was there and what the needs were."

Engage the community in the distribution of aid. "A long-term worker who is part of the networks of trust in a community can help empower volunteers from the area to help with effective aid delivery. This can multiply the impact of any effort you are undertaking."

Keep cash on hand. "When infrastructure, banking systems, and electronic payment structures are damaged, the amount of cash an organization has on hand becomes critical, both to daily operation and survival and to aid efforts."

Think long-term. "While acting to provide relief, think about the long-term impact of your actions."

III. Beyond Relief

Relief and development are two distinct and different things. A relief effort is a

response to a disaster, which focuses on meeting people's basic needs quickly and efficiently. A development program works toward lasting change that is not dependent on outside input. Relief efforts that continue for too long can hinder development. For example, after the Haiti earthquake, free food was widely available, for quite a long time. As a result, farmers' capacity to sell produce and make a profit was hindered. Relief is necessary after a disaster, but must then pivot to development (preferably sooner rather than later). For more details on the distinction between relief and development, consider reading Steve Corbett and Brian Fikkert's book titled *When Helping Hurts: How to Alleviate Poverty without Hurting the Poor…and Yourself*.

With this in mind, what are some concerns to be aware of after a disaster? What steps should be taken as soon as possible to help people begin to rebuild?

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Watch for Salt Contamination. We asked R. Darrell Smith for input regarding agricultural interventions that would be particularly relevant to the Philippines, that might also be more broadly applicable. Darrell commented, "I haven't seen specific information about the extent of flooding from the storm surge in the Philippines, but working in Indonesia after the 2004 tsunami allowed me to take a number of soil readings to look for salt contamination. I did not find a correlation between distance from the shoreline and amount of salt buildup, but I did find significant salt levels in some areas. I also had no pre-tsunami readings, so can't account for bad agricultural practices beforehand that might have led to high salt levels (e.g., improper irrigation).

"The levels were high enough in some places that rice varieties commonly grown would not have been able to cope. On the other hand, because the amount of rainfall is high, one would expect the salt levels to decrease over time due to flushing (possibly several years depending on the salt concentration). Another approach would be to use varieties with greater salt tolerance, if available. I'd recommend that agriculture workers look at soil salt levels in the affected area to see if a bad rice crop might be in their future."

Rick Burnette, ECHO Agricultural Director and former Director of ECHO Asia, commented, "Darrell's observations are similar to what was reported in the Irrawaddy Delta of Burma following Cyclone Nargis."

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Laura Meitzner Yoder had several ideas for coping after a disaster:

Replant. Especially trees! "Do not delay replanting trees, as they are important in providing food and are also very important for shade, community gathering places, and beauty in areas where tree cover has been destroyed. After the 2004 tsunami, people quickly re-established sitting areas with benches under any fast-growing trees available in the newly barren landscape—especially the strawberry tree [*Muntingia calabura*] in the early months." [Sample quantities of seed for strawberry tree are available from ECHO; we also share seed for other fast-growing trees such as papaya (*Carica papaya*) and moringa (*Moringa oleifera*). Read about strawberry tree on page 8 of *EDN* 80, linked here: http://tinyurl.com/echo-edn-strawberry-tree]

Look locally for food supplies. "In localized disasters, food may be readily available nearby the badly affected areas. It is worth exploring whether efforts to restore washed-out bridges and other infrastructure may be helpful in bringing local food sources to areas with emergency needs."

Address infrastructure related to agriculture. "Helping people organize to clear out any irrigation ditches can help farmers restart their agriculture as soon as possible."

Be alert for unexpected benefits. "Sometimes, storms or floods bring additional nutrients to fields, leading to exceptional harvests in the season after the disaster."

Document responses and experiences. "If you work with local students, involve your classes in gathering information about farmers' experiences and agricultural responses to the disaster. Help them write this up and seek ways to disseminate it locally so people can learn from each other's experiences, and also learn ideas for the future."

Equip local churches to help. "Wheaton College's new Humanitarian Disaster Institute (HDI; http://www.wheaton.edu/HDI) aims to equip churches to respond to disasters in their regions. The HDI web site is full of useful resources."

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Robin Denney, who has worked in post-conflict situations, has suggestions concerning where, after initial relief efforts, to begin rebuilding following a disaster. In both natural and post-conflict disasters, communities end up dealing with major upheaval, trauma and possibly displacement.

Land access. "Access to land is a big issue. People are often displaced internally, within their own country. Internally Displaced People (IDPs) in South Sudan often traveled very far from their home before settling. They sometimes settled in camps, but often they were welcomed into a community and settled interspersed between neighbor's homes. I saw this throughout Western Equatoria State in South Sudan, perhaps most pronouncedly in Maridi town, where 10,000 IDPs were dispersed between the homes of local hosts. In most rural villages, people would have about an acre of land around their home, and then plots of land for farming further away. Because the newcomers were dispersed throughout the community, they got to know their neighbors, and the latter could share resources and information unique to the location, e.g. about the microclimate, local pests, etc. Had the newcomers settled on the outskirts, the village residents would likely have lost some cropland, and the displaced people would be without the support of the people in that community. They would be more like outsiders, with a greater sense of desperation and dependency. When they were a little more dispersed, they felt more hosted by a community."

A community agricultural spokesperson. "Yida UN refugee camp, in Unity State, South Sudan, hosts refugees from the conflict in Sudan. Agricultural support wasn't initially given, so the people organized themselves for agriculture. They elected an agricultural development person who was the most experienced with various techniques, and asked him to be the representative of the camp in terms of agriculture. He would talk about the needs with aid workers that came to the camp. He also trained people in the camp and set up a demonstration of farming techniques next to his shelter. The people also chose an informal camp leadership of elders that was not officially sanctioned by the UN camp directors, but was their own organizational system. The community thus had a voice to represent itself, resulting in better communication between the refugees, the UN, and other agencies working in the camp. The group of elders was able to encourage people to farm on the outskirts of the camp

Figure 2: Yida's elected agriculturalist, Suki, with his demonstration plot. *The blue tarp of his shelter/home is visible behind. Photo by Robin Denney.*

where there was better land, to try to grow more staple crops."

Plant fast-impact crops. "After a disaster, you need fast-impact, nutritious crops, and training in how to use crops with which people may not be very familiar. Vegetables, especially greens, are good, quick-growing crops to promote, because in that period of hunger people are used to collecting leaves and plants from the forest, when the more preferred staple crops have run out. I think that when people are displaced, they are more willing to do things differently and try new crops, because they understand that the microclimate is different than the place where they are from. Training could focus on producing and using fast-growing vegetable varieties that fit the microclimate and that grow quickly and can fill out the rest of the meal."

Chaya is a good fast-impact crop to promote. Robin commented, "I really tried to promote chaya in South Sudan. It is easy to plant, grows quickly, is easy to maintain, and can feed you throughout the year. There is no worry about saving seeds and replanting. I found that practically, in terms of dinner and our schedule, chaya was so easy that we would eat it at least once a week. Every time I would harvest some for dinner, I would plant the sticks around my house, and pretty soon my house was surrounded by chaya. There was no way I could eat it all. People would ask, "What is that you are planting?" and I would tell them it is edible. It was fast to cook, and filling." [Note: particularly where people are used to eating cassava leaves, chaya seems to often be readily accepted.]

Above-ground gardening. "If you can grow things close to your house, you can easily pick and add them to your meal. Above-ground gardening can be done using the packing materials that relief supplies come in." [These packing materials are already often repurposed creatively. For example, Robin mentioned that cans from cooking oil regularly turn into pots, toy cars, and roofs. For more information about above-ground gardening, see ECHO's Technical Note: http://tinyurl.com/echo-rooftop-urban-gardening].

Local seeds. "I asked people in Yida what crops they were using and what their needs were. Their biggest concern was not having the seeds that grew in that microclimate. The refugee camp was only 20 km from where they had fled, but the microclimate was significantly different and their seeds weren't working in the way they thought they ought to. They had a list of different varieties that they had heard of and wanted to try."

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Encourage local seed systems. CIAT, the International Center for Tropical Agriculture, partners with a number of relief and development agencies to facilitate a program called 'Seed Systems Under Stress.' On the website, they comment, "Humanitarian relief practitioners, although skilled in quickly delivering short-term food aid, often do not understand the technical complexities of the agricultural context. Even though seed aid began in the early 1990s, the long-term effectiveness of such activities remains disappointing. Both food and seed aid are still being delivered to many countries year after year.

"Because they base their diagnoses on food assessments, relief practitioners are typically ignorant of, or misunderstand, stress situations as they apply to agriculture. For example, they commonly assume farmer seed systems to have collapsed or to have been inadequate in the first place. Yet field results show that seed systems are usually resilient. For example, in Rwanda, even after its genocidal war, local seed markets continued functioning, and crop diversity profiles remained stable.

"Even research institutions tend to view disasters as opportunities to expose farmers to 'improved' varieties of current crops or to alternative crops. However, evidence shows that system resilience, not only productivity, is key to recovery and sustaining household food security after disasters. Multiple strategies—which strengthen local systems and introduce innovation—are often required." For specifics about strategies promoted by the Seed Systems Under Stress Program, see http://ciat.cgiar.org/seed-systems-under-stress

In situations where local seed varieties were lost or destroyed after a disaster, seeds from several of the CGIAR centers have been used to help rebuild agricultural systems (www.cgiar.org/consortium-news/seed-banks-great-and-small/).

Can You Help Us?

We know that this article only scratches the surface when it comes to preparing for and responding to disaster. If you have additional thoughts to share, we would love to hear from you! Contact us at echo@echonet.org.

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Increasing Interest in Chaya

Recently we read correspondence from **Penny Rambacher**, R.D., a registered dietician working with Miracles in Action in Guatemala. About eight years ago, ECHO's then-CEO, Dr. Martin Price, suggested to Penny that re-introducing Chaya could be an important way to address malnutrition within the country. She has since gathered a great deal of information about chaya, and heads a network of people (that she calls 'Chaya Chums') who also promote chaya. Penny shared the following.

"Chaya, sometimes referred to as the 'Mayan Spinach Tree,' has caught on so well that there have been articles in the main newspapers in Guatemala, and cuttings are in high demand. We have four 'chaya farms' sourcing cuttings now, and I still can't get enough to meet the demand. We have held classes and cooking workshops for NGOs, government social programs, women's groups, and anyone who will listen. Our PowerPoint presentation will be posted on our website, later in 2014."

Figure 3. *Miracles in Action's truck filled with 4,000 chaya cuttings, used to start a farm in Guatemala. Photo credit: Penny Rambacher.*

We encourage you to check out the Miracles in Action website (www.MiraclesInAction.org). There you can view two chaya videos. According to Penny, "One is about general nutrition with an emphasis on chaya and super foods (in Spanish with English subtitles). In that video we also promote chia seeds, called 'chan' by the indigenous population [see *EDN* 110 for more about chia]). The other chaya video is about how to make fortified tortillas by adding chaya to the masa dough—'Tortillas Verde' or green tortillas." Both videos are online, at http://vimeo.com/75339569 and http://vimeo.com/79052427.

Penny shared that she and colleagues have developed recipes with chaya for rural Mayan kitchens. She added, "Our next work will be to create healthy snacks using super foods to be made by mothers and sold as a business outside schools. The kids buy a ton of junk food at recess, and we want the moms to sell alternative, healthy snacks and drinks. Our chaya recipe book is available on our website under 'documents.' It is currently only available in Spanish. This site also has our chaya informational brochure in Spanish and in English." http://miraclesinaction.org/photos-links/links/

Dr. Price originally told Penny to learn everything she could about chaya. She commented, "Learning about chaya was the hardest part, because there is not a lot known or published on the internet. Much of what I found is in Spanish published by the Food Science and Agriculture Departments under Dr. Bressani and Dr. Cifuentes at the University del Valle in Guatemala. I set up a Google Docs site with the research we found; it can be accessed from this link: https://docs.google.com/folderview?id=0B0bN65vHw237VTdTbEVjejhOSjA"

Penny warned (as ECHO also does) that chaya should not be eaten raw, due to the cyanide in the plant cells. "University del Valle research answered our question concerning how long one must cook chaya to make it safe for eating. [They recommended] 15 minutes, and slightly less if the chaya is chopped before cooking." It is also safe to drink the cooking water, which contains vitamins and minerals. Despite the warning to cook chaya, Penny commented that people regularly consume raw chaya that has been pureed with lemon or lime, in a blended drink. She has never heard of anyone experiencing acute symptoms of cyanide poisoning after drinking it. [Little is known about what chronic effects might result, if the blending and acid have not removed sufficient cyanide.] In Cancun, Mexico, 'Jugo de Chaya' (chaya juice) is popular at juice stands. The added vitamin C from the lemon would improve the absorption of iron from the chaya (which has double the iron, calcium and protein and over three times the amount of vitamin C compared to spinach). Penny added, "I have read several research articles stating that chaya can help diabetics lower their blood sugar. However, none of the articles recommends how much chaya needs to be consumed, in what form, when, or how often.

"From the University del Valle's research we learned that there are four best-known varieties of chaya. Chichicaste is the wild variety with thorns, and is best used as security fencing, or destroyed. Picuda chaya leaves have more points, and when fully grown, the plant looks more like a tree with a trunk, rather than a bush. Rodunda (round) chaya is popular in the Yucatan of Mexico; it produces fewer leaves, but they are generally large and round. The variety we promote in Guatemala is Estrella (star) chaya with leaves that look a bit like maple leaves, but larger. We selected Estrella chaya after analyzing the nutrition research. This variety is slightly higher in protein and other nutrients, and has more leaf mass than other varieties. Estrella chaya is the variety grown at ECHO."

Penny shared a final comment. "I have read over and over how extremely resistant chaya is to disease and pests, and that has not been my experience with chaya in Florida or Guatemala. It tends to recover from disease, but it is not 'extremely resistant' as the literature states. The leaves will curl and sometimes yellow and fall off during the dry season when the weather is cooler, but it always comes back, and continues to produce healthy, nutritious green leaves year after year. It grows best at the coast where it is hot and humid, but we have it growing up to 5,000 feet in the Highlands; it's just not as prolific."

Figure 4. *Pedro Rodriguez, a chaya and nutrition promoter, does four-hour workshops with a PowerPoint presentation followed by hands-on cooking and tasting of chaya. Here he is sharing two favorite dishes—chaya tortillas, and nachos with chaya. Photo credit: Penny Rambacher.*

Interest in chaya is also growing in Asia. Rick Burnette, head of the ECHO Agriculture Department, shared, "I heard more about chaya's spread in SE Asia [recently]. **Melanie Edwards**, a development worker in Myanmar, picked up chaya cuttings from ECHO in 2009 to introduce there. The production and interest in chaya there is thriving."

Ken Huong in Thailand wrote to ask a question about chaya. He read online (in the Wikipedia article about chaya/*Cnidoscolus aconitifolius*) that "Cooking in aluminum cookware can result in a toxic reaction, causing diarrhea." No further information was given, to explain what kind of toxic reaction might occur. Ken commented, "We now have people coming to us for cuttings, and guess what? Here people cook in aluminum! [It is] cheaper than stainless steel….How can we possibly tell people they shouldn't cook chaya in aluminum?"

Ken asked what we at ECHO knew about reasons to avoid cooking chaya in aluminum pots. Boonsong Thansritong, Agriculture Operations Manager for the ECHO Asia Impact Center, commented that he has cooked chaya in aluminium several times, but never experienced diarrhea from it. Here in Florida, we could not find any explanation for the recommendation.

I asked Penny Rambacher if she had heard the recommendation against cooking chaya in aluminum pots. She did not recall reading about it, but added, "I can tell you from experience that we once accidentally cooked chaya in an aluminum pot during one of our chaya/nutrition workshops, and everyone got diarrhea. That is enough to make me believe it is probably not a good idea."

FROM ECHO'S SEEDBANK

Cowpea: Spotlight on Multi-Purpose Varieties

by Tim Motis

Cowpea (*Vigna unguiculata*) is a versatile legume grown for human consumption as well as for soil improvement and animal fodder. It is the second most-planted grain legume in Africa (National Research Council, 2006). Though cultivated throughout the tropics, and thus familiar to smallholder farmers, there are almost certainly varieties that farmers in a given area are not aware of that could improve the resilience and productivity of their fields.

Background and benefits

Most cowpea types cultivated by small-scale farmers in the tropics have been either early-maturing varieties grown as a pulse (dry beans) or late-maturing varieties grown mostly for their vines that are cut and used for animal fodder. Some Nigerian farmers have increased their annual income by 25% through the sale of cowpea fodder during the peak of the dry season (Dugie et al., 2009), when livestock have little to graze. Recent years have seen a research emphasis—by the International Institute of Tropical Agriculture (IITA), for example—on dual-purpose varieties with increased production of both grain and vegetative biomass.

Dual-purpose varieties typically have a more spreading or semi-erect growth habit than the erect, bush-type varieties selected for mechanical harvest. As mentioned above, the increased biomass is useful for animal fodder. The extensive vine growth of a good creeping-type variety can also play a key role as a green manure, as long as at least some of the biomass is left in the field. Keeping soils covered is especially important in the tropics, where soils are subjected to intense heat from the sun.

ECHO research in South Africa has demonstrated the beneficial impact of a long-vined cowpea variety on soil fertility. By 6 months after seeding, with no fertility inputs and <700 mm rainfall on a soil with 87% sand, a low-growing cowpea variety (IT98D-1399) from AVRDC/ICRISAT-Niger produced 3.4 t/ha of dry, above-ground biomass when planted at a 50 X 50 cm spacing. That amount of biomass contained 90 kg/ha of nitrogen. When vines were left on the soil surface, soil nitrate concentration—six months after seeding cowpea—increased from 7-8 parts per million (ppm) in bare ground and weedy-fallow plots to 14 ppm with cowpea.

Where cowpea grows best

A warm season (25-35 °C) crop, cowpea is adapted to a wide range of soil and moisture conditions. For maximum biomass production (or forage and/or soil cover), rainfall amounts of 750-1100 mm are optimal (*Tropical Forages*); 500 mm or less is sufficient for early-maturing varieties (Dugie et al., 2009). Although tolerant of poor, sandy soils, cowpea grows best in well-drained sandy loam to clay loam soils with a pH of 6 to 7. It does not tolerate frost or overly wet (waterlogged, poorly drained) soil.

How to obtain cowpea seeds

Look for cowpea varieties in the country in which you are working. Other institutions may already be working with one or more improved IITA varieties (website: www.iita.org). Also, be on the lookout for local varieties with multi-purpose traits.

Figure 5. *Long vines of a single cowpea plant grown on ECHO research plots in South Africa.*

Alternatively, seeds are available from ECHO's Florida-based seed bank, which recently acquired the following cowpea varieties:

Samoeng: Short creeping vine; inter-cropped with upland rice; plump pod, black seed.

Mavuno: Creeping cowpea reported by Joel Wildasin (former ECHO intern and staff member) as a best local variety from Magu, Tanzania. 'Mavuno' means 'harvest' in Swahili. Large cream-colored seeds, large leaves and long, big pods.

In reference to the 'Samoeng' variety from Thailand, Rick Burnette, who now heads up the ECHO Agriculture Department in

Florida, had this to say about creeping cowpea varieties:

"In the uplands of Southeast Asia, creeping cowpea varieties are typically grown in association with the main crop of upland rice, along with other secondary crops such as cucurbits. All of these are established at the same time at the beginning of the rainy season. In such situations, creeping cowpea germinates and becomes established while the rice crop is still small, while there is more exposure to sunlight. However, such types of cowpea can tolerate much less sunlight when other crops, especially upland rice, grow taller. As creeping cowpea does not climb, the other crops in the stand are not in danger of being overcome by the viney, prostrate legume. As a result, creeping cowpea increases crop diversity in upland rice fields, offering green pods as a vegetable in the middle of the rainy season. The legume also fixes nitrogen and provides a degree of weed control in the understory of the rice crop."

Both of these new varieties have grown well on ECHO's sandy soils at our demonstration farm in Florida. Those registered with ECHO Community as agriculture development workers may request a complimentary trial packet of one or several of the cowpea varieties from the ECHO Florida seed bank. Visit ECHOcommunity.org for information on how to register. We encourage you to grow these alongside your local varieties and compare the growth and production of the plants.

Cultivation hints

Clear the ground of weeds before planting. Planting should be timed to allow enough time during the rainy season for the crop to mature. Plant three seeds per planting station, thinning to two plants per station at two weeks after planting (Dugie et al., 2009). Use a wider spacing for prostrate varieties than for bush-type varieties. For spreading varieties, plants should be established 75 cm apart between rows and 25-50 cm apart within rows. Depending on the variety, dry beans will be ready for harvest at 90 days (early-yielding varieties) to 210-240 days (varieties that typically flower later in the season when day length shortens) after seeding (*Tropical Forages*). See references below for more detailed information.

References and Further Reading

Tropical Forages fact sheet: www.tropicalforages.info/key/Forages/Media/Html/Vigna_unguiculata.htm

CGIAR fact sheet (with information on the economic impact of grain/fodder cowpea): www.cgiar.org/our-research/crop-factsheets/cowpea/

Dugje, I.Y., L.O. Omoigui, F Ekeleme, A.Y. Kamara, and H. Ajeigbe. 2009. *Farmers' Guide to Cowpea Production in West Africa*. IITA, Ibadan, Nigeria. 20 pages. www.icrisat.org/tropicallegumesII/pdfs/Cowpea.pdf

National Research Council. *Lost Crops of Africa: Volume II: Vegetables*. Washington, DC: The National Academies Press, 2006.

BOOKS, WEBSITES AND OTHER RESOURCES

Several new documents, described below, have been published by ECHO and are available on ECHOcommunity.org. Choose "Publications" on the main menu, then select "Technical Notes." These are listed as the newest publications.

The Transformation of Sadore Village

By Dov Pasternak

A remarkable example of community initiative, Sadore Village in Niger overcame a history of hunger and subsistence, and "surpassed the threshold of poverty." Led by two local women, the community underwent dramatic social and economic change over a period of ten years. A small fruit nursery and an agricultural education program for children were triggers for transformation. This document identifies specific reasons for the transformation, highlighting the effects of empowering women in the community.

Nutrient Content of *M. oleifera* Leaves

By Kathryn Witt, PhD, LD, RDN

A review of current literature and data on the nutrient content of both fresh and dry *M. oleifera* leaves, this document is for those who work closely with moringa in feeding programs, production and marketing, or research. Five different tables summarize the results of this literature review and draw attention to gaps, inconsistencies, and uniformity in current research (emphasis on sources within the last twenty years). While *M. oleifera* is widely recognized as a nutrient source, nutrient analyses vary widely; this document will help the reader understand some of this variance.

Where There is No Farm Advisor

By Robin Denney

For anyone working where resources are few, and questions are many, the strength of this document lies in the breadth of topics covered. Included are: basics of plant biology and animal science; community development principles; common tropical agricultural and livestock-related problems with potential solutions; and an extensive resources section. The format is simple, straightforward, and thorough, making this document very user-friendly. Written with the smallholder farmer in mind, the author consistently connects scientific explanations with direct application, continually answering the question, "What can farmers learn from this?" For each technique or method, cautions and benefits are discussed, leaving the reader to decide what is appropriate for specific situations.

Small-Scale Silage Production: A Resource for Smallholder Farmers

By Brian Campbell

Subsistence dairy farmers struggling to obtain quality feed during dry or cold seasons might find a solution in small-scale silage production. For the beginner silage-maker, this document asserts that "with few to no exceptions, any fodder can successfully be ensiled, from wetland vegetation to yard clippings." While corn, hay and sorghum are heavily featured in this discussion, the principles described are applicable to a wide range of crops. Topics covered include crops for silage; use of additives; evaluating and feeding silage; determining dry matter; harvesting; and different storage and production methods (pit, bag, receptacle, etc.). Written with the small-holder farmer in mind, systems and suggestions are kept low-tech with practical instructions.

UPCOMING EVENTS

Training Opportunity

The Asian Rural Institute (ARI) offers a nine-month residential training program in sustainable agriculture, community organizing and servant leadership. This training is for rural leaders living and working in Asia, Africa, the Pacific and Latin America. Grassroots leaders who are part of a local organization serving the marginalized in their community are encouraged to apply. Because this training is meant for those individuals and organizations on the grassroots level, ARI finds funding for tuition, room, board, housing and travel. ARI is Christian in inspiration, and since 1973 has trained over 1200 leaders of all faiths from over 55 countries. For more information email: recruitment@ari-edu.org or mail to: ARI, Recruitment, 442-1 Tsukinokizawa, Nasushiobara, Tochigi-ken, Japan 329-2703.

About the Asian Rural Institute

ARI is a training ground for grassroots rural leaders. Located in Northern Japan, each year we conduct a Rural Leaders Training Program which focuses on three areas of rural development – leadership, sustainable agriculture through integrated organic farming, and participatory community building. We invite rural community leaders to take part in this program, who have the passion and commitment to work for the betterment of their own communities. After completing our nine months of training it is expected that each program participant will return to their respective villages and communities to bring their new learning and adapt it to their own local context. Therefore this training is not intended only for an individual, but for a whole community. In this way we promote meaningful and lasting development "from within."

Founded by Rev. Toshihiro Takami in 1973, ARI's program is community-based, with participants coming from countries primarily in Asia, Africa, and the Pacific (though we now consider applicants from anywhere in the world). We strongly promote the training of women leaders, as their voice and participation are essential in creating any strong community. ARI is a Christian-based institution, but our training has always been open to people of all religions; each year's class often includes Buddhists, Christians, Muslims, and Hindus. From this culturally, religiously, and linguistically diverse group we build a cohesive learning community centered around the healthy production of food.

Most of the training is practically oriented. We call this "learning by doing," and it means that participants get out in the fields and in the livestock areas to work and learn through the experience of daily labor. We employ techniques which are appropriate to the contexts of rural communities, such as making bokashi (quick organic compost), charcoal, fermented plant juice, and more. We do make use of small machinery, however we do not promote large scale mechanized farming. Moreover, we emphasize the use of resources that are available locally, and challenge our participants to search for and discover the resources available in their own places, rather than rely on purchased imports. The common language of ARI is English, or it might be more accurate to say "broken English." Anyone considering applying to the program need not have English fluency, but will need at least limited communication ability.

ECHO East Africa Symposium: Best Practices In Pastoralist Areas

March 4-6, 2014
Garden Hotel, Machakos, Kenya

This three-day training and networking event will be a valuable time of learning, sharing information, and networking for those working and serving with pastoralists in the East Africa region. Please plan to attend and encourage others who might benefit to join us as well.

More information can be found at: www.echocommunity.org/events/event_details.asp?id=384404

Tropical Agricultural Development I: The Basics

April 7-11, 2014
ECHO Global Farm, North Fort Myers, FL

Those preparing for short- or long-term involvement in agricultural development internationally are encouraged to participate in this one-week course. 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 to meet agricultural and nutritional needs of small-scale, impoverished farmers. Course content is presented from a biblical perspective.

More information can be found at: www.echocommunity.org/events/event_details.asp?id=352538

Health, Agriculture, Culture, & Community Course

April 28 to May 2, 2014
ECHO Global Farm, North Fort Myers, FL

This workshop is designed for Christian health, agriculture, and community development professionals who work with rural and urban communities, internationally or in the U.S., whose health and nutrition conditions are below standard. The workshop will enable Christian health and community development personnel to help people improve their own health, agriculture, and nutrition through the understanding and application of scientific, biblical, and culturally appropriate principles, and by making behavior changes necessary for transformational development.

More information can be found at: www.echocommunity.org/?page=HACC

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!