EDN ECHO Development Notes

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Edited by Dawn Berkelaar and Tim Motis

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

Issue Highlights

NOTE: Link to extra material from the web version of *EDN* 109.

ECHO
17391 Durrance Rd
North Ft. Myers, FL 33917
USA
Phone: (239) 543-3246
Fax: (239) 543-5317
echo@echonet.org
www.echonet.org

Global Weather and Climate Information

By Richard James, Prescient Weather

Richard James is a meteorologist who has worked in both the academic and private sectors. He is currently employed with Prescient Weather, a new company that provides weather and climate information for risk analysis. Richard is a native of the UK but now resides in Athens, Georgia; he can be reached at richard.james@prescientweather.com

Many in ECHO's network have taken on the responsibility of establishing an agricultural development project in a country far from home and mostly unfamiliar. Often they and others involved in agricultural development wish for a better understanding of local weather and climate patterns so that agricultural planning can be successful. Location-specific climate information is valuable for coping with rainfall extremes, choosing which crops to work with, and determining the best time of year to prepare fields for planting.

In recent years, global weather and climate monitoring has grown in sophistication, and detailed, up-to-date weather information has become increasingly accessible via the internet. This article documents some online sources of weather and climate information and provides some guidance concerning the interpretation of available data. Section 1 discusses climatological data, Section 2 addresses real-time weather monitoring, and Section 3 explains how the status of the 'El Niño' effect can help anticipate future rainfall trends.

1. Climatological Data

Weather observations over periods of at least several decades provide an understanding of the long-term average, or 'climatology,' of weather for any given location. Since the 1970s, global observations have been greatly improved by satellite monitoring, so that climatological information is available even for remote locations. A good source for climatological data worldwide is the website of the International Research Institute for Climate and Society (IRI): http://iridl.ldeo.columbia.edu/maproom/.Regional/

The 'climatology' links provide access to high-resolution maps showing the average monthly temperature and average monthly precipitation for various regions of the globe. After selecting "climatology" for one of the regions, the "select a point" links allow the user to obtain data at any location over land on a grid of points with spacing of 0.5 degrees latitude and longitude [this distance for latitudes is about 35 miles (56 km); the distance of 0.5 degrees for longitude depends on the distance from the equator, since longitudinal lines get closer together the farther you are from the equator]. For the selected grid point, the website provides charts showing the distribution through the year of precipitation, temperature, frequency of rain, and frequency of frost. The "select a point" data can also be accessed from: http://iridl.ldeo.columbia.edu/maproom/.Global/.Climatologies/Select_a_Point/

When using a 'gridded' climatology map such as the one provided by IRI, it is important to bear in mind that each grid point represents an average over a substantial area of the earth's surface, and therefore local effects may not be represented properly. For example, differences in elevation or proximity to water bodies may greatly alter the climate at a specific location, but a coarse grid will not capture these effects. In such instances, historical

weather observations from the precise location are needed to accurately describe the local climate. Historical 'station' observations do exist for many of the more significant population centers globally. These records may sometimes be accessed via an online search, but unfortunately there is no comprehensive online source.

2. Real-time Monitoring

Meteorologists sometimes remark that "normal weather never occurs," meaning that weather is ever-changing and that weather observations rarely match the long-term climatological norm. Because significant departures of weather from 'normal' create important, and sometimes dramatic, effects on agriculture and society, up-to-date (real-time) monitoring is critical for understanding evolving global weather scenarios. To assist with interpretation, weather data from the recent past is often expressed in terms of both the weather that has occurred (temperature, precipitation, etc), and the weather 'anomaly,' which is the departure of these weather conditions from normal.

IRI provides a modest selection of maps of temperature and precipitation anomalies in the most recent 1 and 3 month periods, under the first URL listed on page 1.

A more comprehensive set of maps showing recent precipitation anomalies is provided by the Climate Prediction Center (CPC) of the U.S. National Weather Service: www.cpc.noaa.gov/products/fews/global/

After making the regional selection, click on the "rainfall estimates" link. Then you can choose monthly maps of precipitation, precipitation anomaly (i.e. departure from normal), and percent of normal precipitation. Note that these precipitation maps are obtained from geostationary satellites, which are located above the equator; consequently the data are only reliable between approximately 30°S and 30°N. Although the data are displayed up to 60 degrees of latitude, they should be regarded as unreliable between 30° and 60°.

An important caveat concerning 'percent of normal' precipitation maps is that many regions of the world experience dry seasons in which little or no rainfall occurs. In these months the 'percent of normal' is not well defined. In such instances, maps of 'percent of normal precipitation' may show apparently excessive dryness or wetness that is not truly meaningful. For this reason, precipitation anomaly maps should always be interpreted in light of the local climatology.

The CPC also supplies a more extensive series of precipitation monitoring maps for Africa and for South Asia:
www.cpc.noaa.gov/products/fews/AFR_CLIM/afr_clim_season.shtml
www.cpc.noaa.gov/products/fews/SASIA/climatology.shtml

Because these maps combine station observations with satellite data, they represent a higher quality of data than the satellite-only maps. At the bottom of the Africa page is a useful tool ("Time Series Plots") that provides up-to-date charts of recent precipitation observations from individual stations across Africa. These station observations may be compared with the maps to check consistency, or to obtain the 'ground truth' at selected locations.

3. Seasonal Forecasting

Although it is impossible to predict individual weather events beyond approximately 7 days into the future, it is sometimes possible to anticipate long-term weather trends that evolve slowly over periods of months or even years. Long-range or 'seasonal' forecasting depends on the fact that weather patterns are driven to some extent by patterns of temperature at the surface of the world's oceans. Phenomena such as El Niño, which consist of widespread changes in sea surface temperature, develop and persist over the course of months or years, and therefore provide useful predictability well beyond the range of conventional weather forecasts.

The 'El Niño – Southern Oscillation' (ENSO) is the most important ocean cycle for seasonal weather variability. It is defined by sea surface temperature anomalies [departures from normal temperatures] in the equatorial Pacific Ocean. Widespread ocean warming is observed in El Niño, but La Niña brings unusually cool sea surface temperatures. A figure in the online Supplement to this issue of *EDN* includes a historical analysis in the form of maps that show the effects of ENSO (in both the El Niño phase and the La Niña phase) on global precipitation in 3-month periods, for the years since 1948.

As a prediction tool, these maps indicate the percent likelihood that precipitation will be above normal for either ENSO phase. Some of the most notable effects of ENSO on global precipitation are:

- East Africa tends to be wetter than normal in El Niño between September and February; opposite for La Niña
- Northern South America tends to be drier than normal in El Niño in both northern Hemisphere winter and summer; opposite for La Niña
- El Niño tends to bring pronounced dryness in the vicinity of Indonesia at all times of the year, but especially from September to November; unusual wetness is more likely in La Niña

The current status of ENSO, and indications for the next few months, can be obtained from IRI at:
http://iri.columbia.edu/climate/ENSO/currentinfo/QuickLook.html

The online maps show the precipitation anomalies that are most likely to prevail if El Niño is presently occurring or is predicted to occur, or if the same is true of La Niña. Bear in mind, however, that these outcomes are not guaranteed to occur. In general, the stronger the El Niño or La Niña episode, the more likely the effects shown in the maps will emerge.

Further information about ENSO is available at:
http://iri.columbia.edu/climate/ENSO/globalimpact/index.html

Ocean cycles other than ENSO also impose significant long-term weather anomalies on certain regions across the globe, and some of these cycles persist for years or decades. The understanding and prediction of this naturally-occurring variability is an area of active scientific research, and it is likely that improved long-range forecast methods will eventually result.

Summary

Modern communications technology provides ready access to a wide variety of information concerning historical and recent weather conditions, along with limited tools for anticipating future weather trends.

Moringa Use in Mzenga, Tanzania

By Tim Tanner, AIM

Tim Tanner and his family lived on ECHO's campus for several months early in 2010, in a reciprocal relationship. Interns and staff could learn from the Tanners' experience, and the Tanners had access to ECHO's plant, appropriate technology and library resources. Tim shared the following about his experiences promoting use of moringa in Tanzania.

I was introduced to ECHO in December of 2005 through Bob and Ellen Hargrave who serve at ECHO. I had a great tour of the facilities, and took full advantage of the seed bank, library and bookstore resources on campus! I had never seen so many appropriate, practical resources and methods available in one place for addressing some of the basic hunger/ development issues among the people I serve in East Africa. I found ECHO's services quite applicable to my holistic ministry among the unreached Zaramo tribe along the coast of Tanzania in East Africa.

One of the many things I learned about that day at ECHO was the incredible benefit of the moringa tree (*Moringa oleifera*). I had seen this tree in Tanzania before, but was ignorant of its uses. At the book store I bought the book *Moringa, The Miracle Tree* to follow up on what I learned that day at ECHO. ECHO also provided me with some Technical Notes about moringa. Armed with this information, I was excited to get back to Tanzania and share what I learned with the Zaramo, working with them to introduce this tree more broadly so that the leaves could be used as a dietary supplement to combat the prevalent malnutrition issues in the area.

Once back in Tanzania, I looked for *Moringa oleifera* and found it growing randomly in our local village. I confirmed that it was not widely known or used by the Zaramo and only prescribed by witch doctors on a limited basis for medicinal purposes. Common knowledge of moringa's benefits for daily use was lacking.

First, I took some of the seed pods from local trees and planted the seeds during the short rainy season (late November to early January) in my back yard. I watered my saplings with gray water through the short dry season (late January to March). This was the only time I watered my moringa trees. By the end of March the heavy rains had started and I learned that I had planted the trees too close together. I moved every other tree to my front yard. Most of the transplants survived. By June, when the rains were over, I was harvesting leaves and the trees were starting to flower. By September and October I was harvesting seeds from my own trees. Some of the trees were 15 feet tall already and they were not yet a year old. Soon word spread throughout Zaramo territory that I was growing moringa, and one day an old man showed up with a burlap sack full of moringa seed ready to plant! I have never been short of seed to plant!

Next, I went about harvesting fresh, green leaves from my trees to make into an edible powder to be used as a daily nutritional supplement. At first I tried shade drying the leaves on a large tray in the attic of our house. I found that for my own use, I could grind them into powder in my little coffee grinder plugged into my solar system. This worked fine for my family, but obviously was not reproducible on a large scale. Eventually I taught my neighbor lady how to collect the green leaves and dry them in the shade of the mango trees. Next, using her large mortar and pestle, she would pound them into a fine powder. She would sift the powder through a locally acquired screen to collect only the fine powder, and then re-pound the rest until she was only left with stems that she would toss out. The technique is a very simple, natural, and reproducible way for Zaramo to have moringa powder for their daily use. I would buy the powder from her at 1000 shillings a kilogram. That is about US 80 cents for 2.2 pounds (1 kg) of powder.

The next task was to introduce the use of the powder more broadly into the village as a dietary and medicinal supplement. We already were involved in a medical ministry with a local YWAM doctor who comes to our village for two-day medical clinics once a month. As we encountered people with complications due to malnutrition, we encouraged them to use moringa leaf powder by giving them a jar of moringa powder to start with. As these people saw and felt the benefits of daily use of moringa in their diet, they became the best advertisement of its use. They enthusiastically told others about the use of moringa leaf and how to produce it themselves.

I also learned that Asian Indian people cook and eat the nutritious seed pod while it is still young, so I experimented with a few simple recipes. As I learned how simple it was to use and how good it could taste, I started sharing cooked moringa seed pods with some Zaramo friends. These friends began cooking it at home as well and now the word is spreading. I am hoping to convince more people to use moringa seed pods for food. [See the issue Supplement for a few ideas of how to cook and eat the seed pods.] The beautiful thing about moringa seed pods, for the Zaramo, is that they are ready to harvest from early July to early November. This is the driest part of the dry season, when the least amount of

green vegetables is available to eat. God is so good to provide the nutritious moringa pod for food during the hardest time to get food.

Another book I purchased in the ECHO book store on my visit was titled *Hand Dug Wells*. I noticed during my recent stay at ECHO that this wonderful book is still available. From this book I was able to learn about methods of digging hand dug wells, and to find a suitable option for my location and for the culture within which I work. I have taught people here how to dig and maintain their own cement ringed hand dug wells. There are four of these wells now in our village and, Lord willing, more on the way soon.

The hand dug wells relate to something else I learned from ECHO about moringa, which is that the seed kernel is an excellent settling agent for clarifying water. The seed kernel consists of positively charged proteins. Dust, dirt and most microorganisms [including harmful bacteria] are negatively charged. The dust and other impurities in the water are attracted to the seed particles and settle to the bottom. I simply taught the people to use one seed kernel in about 1.5 or 2 liters of water (depending on how dirty the water looked). I taught the people to peel the dried seeds they were going to use, pound them using their mortar and pestle, add the powder to the bucket of water, and stir. They were to wait about 10 minutes and then stir again. Finally, after waiting about 3 hrs, all the solid particles settled to the bottom and the clean water could be carefully poured out.

There is so much more available at ECHO, and I know I have only hit the tip of the iceberg. I am grateful for several months of reflection, sharing and learning at ECHO in early 2010. I hope to expand my moringa project and introduce the Farming God's Way [now also called Foundations for Farming] program among the Zaramo upon my return to Tanzania. In the months and years ahead, I look forward to updating you on how these other projects—gleaned from ECHO—are being used by God to bring hope and transform lives among the Zaramo of Tanzania, East Africa!

Can You Help Us? Request for Feedback about FMNR

Tony Rinaudo working with World Vision Australia wrote, "Following my various talks and articles for ECHO, I've often wondered if anybody from the network actually implemented FMNR in other parts of the world. Today I received an email from Rick Burnette who said that it played a role in his [agroforestry efforts] in Northern Thailand." Tony asked us to include a note in *EDN* asking for feedback from our network about FMNR.

FMNR (Farmer Managed Natural Regeneration) is a reforestation method in which the shoots that sprout from living tree stumps (Tony referred to them as "the underground forest") are selectively pruned, resulting in rapid regrowth of trees. In Niger, extensive tree cover now exists on land that was formerly barren (except for the multi-stemmed stumps of plant growth that turned out to be growing from roots of trees cut down long ago). The FMNR technique is simple, cheap and effective, with huge potential to positively impact communities.

Information about FMNR can be found in *EDN* 58-4 and 90-3, as well as in a Technical Note recently posted to ECHO's website (www.echonet.org). A CD about FMNR is available from ECHO's bookstore: http://fpgwj.ltwck.servertrust.com/ProductDetails.asp?ProductCode=1546

FMNR was also listed as a "proven success in agricultural development" by the International Food Policy Research Institute (IFPRI; see www.ifpri.org/book-5826/millionsfed/cases/innovation). A short video clip describing FMNR and its impact is now available on YouTube: www.youtube.com/watch?v=E9DpptI4QGY

Please let us know if you have any experience with FMNR. In particular, it would be helpful to know:

- Have you used FMNR or a similar technique? If so, where?
- How widely has it been adopted?
- What has been the impact (on environment, economics, society, food security)?

ECHOES FROM OUR NETWORK

Human Urine as a Fertilizer

Dr. Dwayne Ogzewalla is a Professor Emeritus in Pharmacy at the University of Cincinnati, and an agriculture specialist in Costa Rica and Nicaragua. He wrote to us after reading the article about human urine as a fertilizer in *EDN* 108.

"I have used human urine in my garden for the last 25 years. I am collecting it now to use in the next few days. I appreciate your article and find only a few things about which to comment.

"As a male, I find it simple and convenient to use 'urinals.' I keep several in my bedroom so that I do not need to go to the bathroom in the night. As mine are tightly capped there is no odor and I can carry them to the garden where I fertilize appropriate plants. I [make my own urinals] using one liter (quart) plastic jars left over from my purchase of medicine. The empty containers are my urinals. I have six of these so I can store urine for several days and have a gallon or more to use on my garden/orchard at one time. These urinals are easy to wash; I

sterilize them every few weeks using household bleach. Gallon plastic jugs are readily available but not easy to use.

"I am aware that a federal agency had gone on record of approving the use of urine in gardens but NOT for application to edible vegetable parts that touch the ground. I would never apply urine to the soil around beets, carrots, radishes, onions, lettuce, etc. I use it as a side dressing around sweet corn; berries on trellises or plants with fruit that does not touch the soil; trees, shrubs, and vines.

"Fresh urine usually has a distinct but not offensive odor. Leaving it for a few hours or days leads to build-up of large numbers of microorganisms. These organisms will give the urine an offensive odor that is above and beyond the odor from the nitrogenous materials. Stale urine almost always has an offensive odor. This pronounced 'urine' odor may be noticed if too much or too frequent applications are made in the garden. To avoid a build-up of stale urine odor, I use it sparingly and rotate areas of application.

"Urine without treatment is NEVER COMPLETELY SAFE. A certain number of apparently healthy individuals have urinary tract infections and can and do produce unsafe and unhealthy urine. The statement must always be that untreated urine is USUALLY SAFE; it is never COMPLETELY SAFE."

Dr. Ogzewalla commented on the commonly misused statement (also included in the *EDN* article) that urine is sterile. "One statement in the ECHO article is erroneous: '…urine is sterile when it exits a person's body.' The statement would be accurate if it was '…urine is usually safe when it exits…' Sterile means no microorganisms. Safe means no disease organisms. In laboratories, urine samples taken into sterile containers may have low bacterial count but are not sterile. Urine is exposed to microorganisms as it exits the urethra. To keep the count low one may take a urine sample "mid-stream"—but urine is never sterile.

"I will continue to use urine as fertilizer. I will use it safely and effectively."

Dr. Ogzewalla subsequently wrote about a simple trial he undertook after reading the urine article. He commented, "I wanted to demonstrate that sterilized urine would not turn into foul smelling material. I did a tiny study putting freshly produced (nonsterile) urine into 3 sets of bottles. I divided them into 3 groups: (1) urine was left alone as the control; (2) urine was sterilized with heat; and (3) urine was sterilized with bleach.

"The nonsterile control became cloudy in three days with a few bubbles (gas production) and was foul smelling over the next two weeks. Neither of the [bottles containing sterile urine] produced foul smelling urine even after two weeks.

"This agrees with chemistry and experience. I now share the information that foul smelling old urine is due to bacterial growth not to a change in the nitrogen chemistry. Urine as fertilizer need not be accompanied with foul odor if it is used before extensive bacterial growth."

Ken Sylvain in northern Thailand also wrote to us about the use of urine as a fertilizer. He attached photos of bananas that had been fertilized with urine (see *EDN* 109 Supplement). Though that was two years ago, and he did not record details, he shared what information he remembered. "As I remember, I basically used one 1.5L bottle of urine (from a collection of at least 3 days) in a 10L watering can—dilution factor of about 6.5. (I had read something about a factor of 10, and decided to go a little heavy.) I watered 'well,' deeply (I believed), basically once a week. Harvest was about a month before the end of our rainy season. I don't recall when I started the urine regime, but certainly it was for most of the lifetime of that particular [banana] 'tree.'

"The result in this head of bananas was impressive in size, in our experience—but although excited by it, we also didn't much *like* it, since the bananas were just too big!"

Ken commented that they also used urine as a fertilizer in a patch of amaranth. "This was watering from a watering can, followed by plain water to rinse the leaves and plot surface each time—no problem!" [Though the Sylvains experienced no problems, this is not necessarily recommended. It would be difficult to apply the urine in such a way that leaves would be completely avoided. While the risk of disease may be small, it still does exist!]

Sister Alegría of Amigas del Señor Methodist Monastery in Honduras wrote to us after reading the urine article. "What a delight to read the article on human urine as a fertilizer in the July issue. It gave us a lot of useful information (like the content of phosphate and potassium) and helped us see that we are on the right track, even though we didn't invent the idea ourselves.

"We have used urine for four years, starting with the [patch of soil to which urine from the dry compost toilet is diverted], which soon supported a thriving chaya plant.

"Nothing anywhere else on our land thrived. About a year later, we had access to a soil test kit, which explained a lot. Our soil pH was uniformly 4.5 except in the urine bed where it was 6.0. The nitrogen was also higher in the urine bed. We began emptying our nica (night time urine pot) near plants to fertilize and to buffer the acidity.

"We started out diluting the urine and carefully [avoiding] the foliage. We quickly stopped diluting it because carrying the weight was prohibitive. We live in the humid tropics—lots of rain falls and dilutes the urine for us.

"We have about a two month dry season. During that time we expand the number of plants [to which we apply] the urine [we collect], so as not to build up an inappropriate concentration in one place. We don't know if this precaution is necessary.

"We use fresh urine, full strength. As a consequence, we do not have to deal with ammonia smell. Fresh urine does not have the ammonia smell. It starts smelling like ammonia from sitting around. If it is used fresh, it still smells like it does right when you pee.

"We are not at risk of Schistosomiasis here. . . .If one of the 'donors' is suspected to have a urinary tract infection, her (or his) urine will be contaminated until the person has completed appropriate antibiotic treatment. Thus, using fresh urine is fine as long as the gardener knows the health status of all of the persons sharing urine. (I say this as a physician, not as a gardener.)" [Ed: This assumes that a person with a problem would be aware of it and/or undergoing the treatment.]

"We began putting urine directly on the foliage of plants in an attempt to dissuade leaf-eating lizards. It didn't work. They ignored the urine and chomped away.

"About one and a half years after beginning use of the dry compost toilet, we noticed the urine smell wafting near the outdoor kitchen. We didn't like that, so after we emptied the night time pot on plants first thing in the morning, we began moving the pot into the toilet to pee into during the day and then took that urine to use as fertilizer for other plants. In this way, we doubled the urine available to put on other plants and reduced dramatically the amount of urine passively entering [the garden area nearest the compost toilet]. This resolved the urine odor. If we had it to do over, we would construct a more extensive [garden area for urine diversion] further from the kitchen.

"We have put full strength, fresh urine directly on coconuts, banana family, guava, moringa, chaya, katuk, suriname cherry, citrus, cashew, papaya, cranberry hibiscus, Malabar spinach, tomatillos, sweet potatoes and pineapples with no negative results and good evidence that they like it.

"When we are ready to plant something new that will receive urine as part of its care, we consider distance from our outdoor living areas and prevailing breeze direction. We learned this the hard way, of course. We don't like the smell of fresh urine."

BOOKS, WEBSITES AND OTHER RESOURCES

An Agricultural Testament Available Online

Several times while researching for an article, I [DRB] read references to *An Agricultural Testament* by Sir Albert Howard. Howard was an English botanist who spent time in India as an agricultural advisor. He has been called the father of the modern organic farming movement, and his *Agricultural Testament* is viewed as a classic. The book is out of print, so I was not able to locate it despite searching on several occasions.

However, I learned just recently that the text of *An Agricultural Testament* can be read online from this website:

www.journeytoforever.org/farm_library/howardAT/ATtoc.html#contents

More by Howard is available from the same site by following this link:

www.journeytoforever.org/farm_library/howard.html

FROM ECHO'S SEED BANK

Reducing Moisture Content of Seeds Prior to Storage

By Tim Motis

Over the years, ECHO has investigated some simple methods for reducing moisture content of seeds in preparation for storage. Drying seeds in preparation for storage and maintaining dry conditions in storage both help prevent the growth and harmful effects of mold on seed viability. Recently, Rick Burnette (Director of the ECHO Asia Regional Office) and Abram Bicksler (International Sustainable Development Studies Institute) have been experimenting in the seasonally high-humidity environment of Chiang Mai, Thailand. Results are shared in a Technical Note compiled by Dr. Tim Motis (called *Seed Saving Tips and Technologies*) and are excerpted here.

Before seeds go into storage, they should be dried—either in the sun or with any other technique or device that will circulate heated or reduced-humidity air in/around the seeds to be dried. Regardless of the method, monitor temperatures to avoid subjecting the seeds to excessive heat. Maximum safe temperatures vary depending on the crop; at ECHO, we

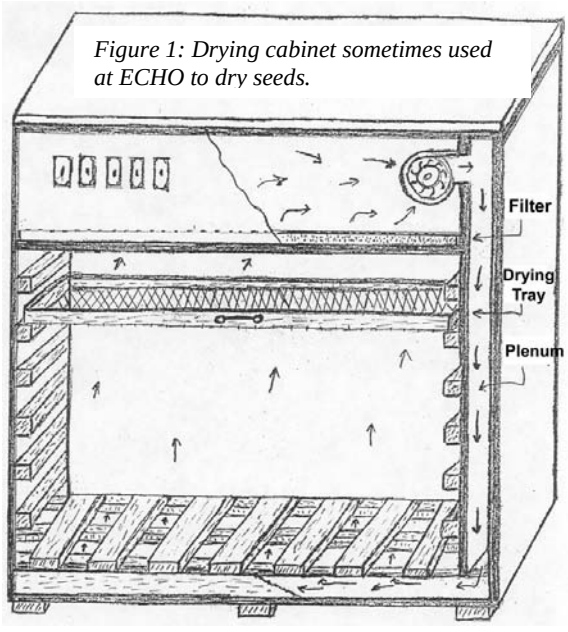

Figure 1: Drying cabinet sometimes used at ECHO to dry seeds.

keep the temperature in our seed dryer at or below 100°F (38°C), which is safe for most seeds.

For optimum long-term seed storage, seed moisture content should be reduced to 3 to 8% (IBPGR Handbook 1985; www2.bioversityinternational.org/publications/Web_version/188/). Although 3 to 8% seed moisture may be difficult to attain in the tropics, it gives an optimum for which to strive. An easy way to determine seed moisture content, without having to destroy any seeds in the process, is to use existing tables to predict seed moisture content based on percent relative humidity (see Chapter 3 of the IBPGR Handbook mentioned above).

When drying beans, a rule of thumb to test for adequate dryness is that when you bite down on a seed, no bite mark should be visible on the seed surface. If you notice bean or pea seeds splitting while drying, try drying them at a lower temperature.

ECHO sometimes uses a drying cabinet (shown in Figure 1) to dry seeds. Cabinet dimensions may be varied to suit the material that is available to you. The cabinet consists of two chambers. The upper chamber contains four sixty-watt incandescent light bulbs to furnish heat, and a radial or squirrel cage fan to produce air movement throughout the cabinet. The lower chamber is built to accommodate drying trays with wire mesh bottoms or bins or canisters with perforated sides that can be stacked.

The two chambers are separated by a filter made of fiberglass or any other material that prevents dust from being recirculated. The fan moves the heated air from the upper chamber into a plenum which encompasses one entire side of the cabinet. This plenum is approximately 2 inches (5 cm) wide. The air moves downward and under the plenum wall. It moves under and upwards through a latticed floor, then upwards through the drying trays or containers, and finally through the filter into the upper chamber to be reheated and recirculated.

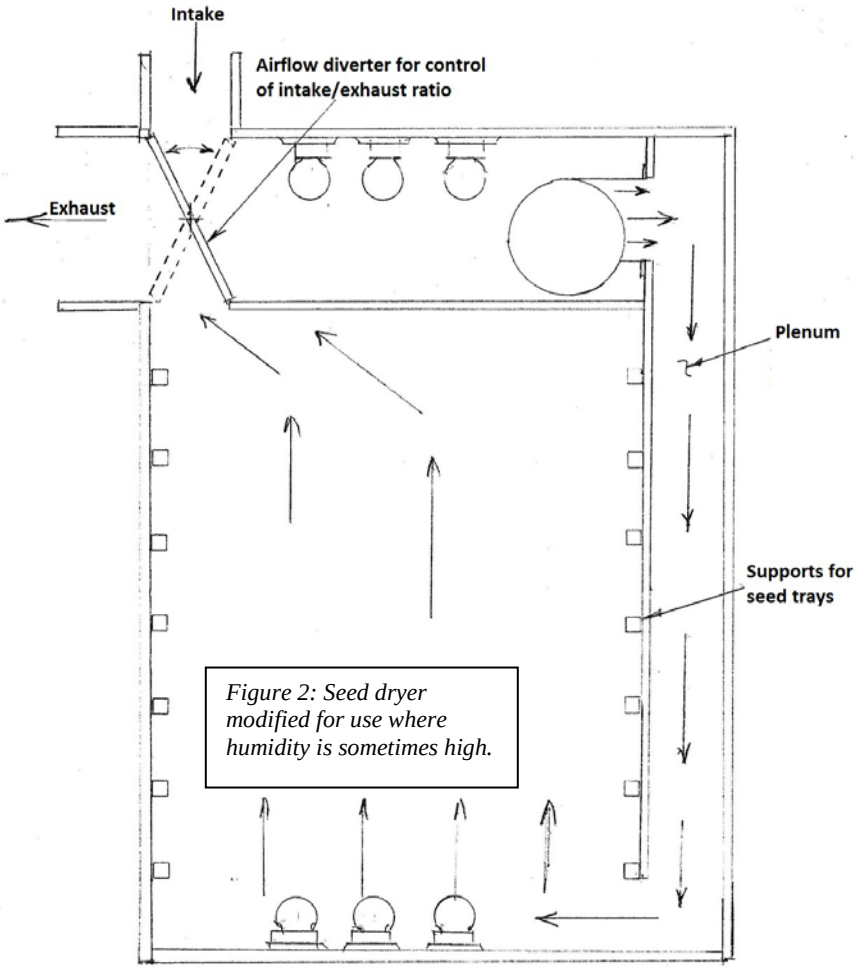

Figure 2: Seed dryer modified for use where humidity is sometimes high.

Each light bulb contributes heat to the chamber, and each bulb has a separate switch so that you can control the amount of heat produced. The fan is controlled by a separate switch. Do not make the top cover or doors overly tight. Air leakage (escape) is necessary for circulation, which helps control the humidity.

Using a modified design recommended by Joe Holley (Figure 2), Abram Bicksler, Rick Burnette and Scott Breaden found that the performance of a seed drying cabinet operating where humidity is high could be improved by including intake and exhaust ports and an additional lower bank of lights as shown in Figure 2. The additional lights help to better distribute heat throughout the cabinet.

By virtue of a diverter that can shift, the modified design allows for control over how much air is being recirculated in the cabinet vs. how much is exhausted outside the cabinet. With the diverter shifted all the way to the left (i.e. wide open), all of the air entering the cabinet can be exhausted. With the diverter shifted all the way to the right, all the air is recirculated within the cabinet instead of being exhausted to the outside. Based on current heat and humidity conditions where the dryer is located, the diverter can be adjusted to allow the necessary amount of heated air to recirculate inside the cabinet to facilitate drying. Exhausting all of the air outside the dryer helps control humidity, but the light bulbs will not heat the air as much as they would with most of the air recirculating inside the cabinet. If your dryer is placed in an air-conditioned room, where ambient humidity is low to begin with, you can rotate the diverter more to the right to

increase temperatures and reduce drying time. Should the dryer be located in a non-climate controlled location, under excessively hot conditions, high temperatures inside the cabinet can be moderated by opening the diverter more to the left. Lights can also be turned off and on to better maintain constant temperatures.

The modified cabinet described here is often used to dry seeds, but the ECHO Asia seed bank staff has also successfully used it to dry moringa leaves under very humid conditions.

The previously mentioned Seed Saving Technical Note also includes information about the use of desiccants, a good option for maintaining low seed moisture content when placing seeds in long-term storage containers.

Also see *EDN* 86, which contains an article by Dr. Edward Berkelaar about using sealed and buried PVC tubes (or buckets) to store dried seeds.

Thai Lablab Bean

Rick Burnette sent seeds to ECHO of a local variety of lablab, which we are calling 'Chiang Dao.' This variety is harvested dry and used in Thailand to make a roasted snack. 'Chiang Dao' is an excellent green manure cover crop; in Thailand it is often planted two months before the end of the rainy season, with seeds ready to harvest six months later.

Promoting well-known varieties of lablab such as Rongai and Highworth (and well-known varieties of other crops) can result in the displacement of valuable local varieties. Hence, we encourage you to evaluate any local varieties of lablab in your project areas. If you would also like to try 'Chiang Dao,' we have a limited supply (pending future grow out) for requests for complimentary packets (one per request). ECHO network members may also contact Rick Burnette (rburnette@echonet.org) in Thailand to request a complementary seed packet.

UPCOMING EVENTS

17th Annual ECHO Agricultural Conference

Fort Myers, Florida
December 7 to 9, 2010

Keynote speakers selected to date for this year's agricultural conference are the following:

Dr. Norman Uphoff from Cornell will speak on SRI (System of Rice Intensification) with an emphasis on agroecology/organic farming. **Eric Toumieux** has worked extensively with World Vision in Senegal and will present a talk on drip irrigation. Dr. **Ray Norman** will present a talk on appropriate technologies. Dr. **Jim Goering** will present a talk titled, "The State of Food and Agriculture, 2009-10: Signs of Hope; Reasons for Concern." **Cory and Kris Thede** will give an update on recovery efforts in Haiti in light of the recent earthquake there; principles will be applicable to disaster response in other parts of the world as well. **Dr. Diane Ragone** will present information on breadfruit. **Bruce French** will speak on the importance of edible, indigenous food plants.

If you are a registered delegate and are willing to speak, we are still accepting speaking proposals for 25-minute evening PowerPoint talks and 60-minute afternoon workshops.

We hope you are able to join us!

In Memoriam

Cheryl Beckett, an ECHO intern in 2001 and ECHO Seed Bank Assistant Manager in 2005, died in Afghanistan on Friday, August 6th, 2010. She and nine other aid workers were returning from a medical and community health clinic in the mountains of Northern Afghanistan when they were attacked by gunmen. Cheryl had been working with women in Afghanistan for the previous five years in the areas of nutritional garden projects and mother and child health.

Cheryl wrote about the challenges of life in Afghanistan but always with her perspective focused on the needs of the people she served and the personal growth she experienced through those challenges. Cheryl's life, as well as her radiant smile and sweet spirit, will be deeply missed by her friends and family. Sadly, the people of Afghanistan have also been denied the gift of her knowledge, experience and passion to improve their lives. Hers was a life not wasted but certainly cut short by this senseless and tragic act.

ECHO staff shared in a private memorial to Cheryl on Monday, August 9, 2010.

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!