ECHO® Development Notes

Edited by Dawn Berkelaar and Tim Motis

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# Why Many African Farmers Choose Not to Engage in Development

*by Joel R. Matthews*

*Eds: Joel Matthews wrote to us in response to the article in EDN 121 about farmers and risk aversion. He shared, "Dick Tinsley highlighted an important cause of the failure of poor peasant farmers to adopt a labor intensive technology, and I believe he is correct in his assessment. I have been working on the same problem from the other end of the labor spectrum. My research has shown that many peasant farmers choose not to participate in labor saving techniques as well, but this phenomenon demands another explanation." The article below explains Joel's findings, based on his past development work (along with Tony Rinaudo) at the Maradi Integrated Development Project, and his current PhD research among the Hausa of Niger.*

There is no doubt in my mind that West African farmers want development if that means, among other things, more productive farming. Of course they would rather harvest seven than three sacks of sorghum per hectare. If that is so, why do so many choose not to engage in development projects that are designed to increase productivity? Dick Tinsley offered an explanation in his article "Rethinking a Basic Assumption in Agricultural Development," in *EDN* 121. His argument makes sense when the innovations require more labor than what farmers are already doing, because many subsistence farmers have run out of food by planting time and are short of the calories needed to implement labor-intensive innovations. But what explains the decision not to participate in an innovation that promises higher productivity but requires *less labor* than what farmers are already doing?

***Figure 1.*** *Harvesting poles from the living fence at the Soura MIDP experimental farm, 1999. Photo by Joel Matthews.*

## Case study of a technique rejected by farmers

I lived on a ten-acre experimental farm situated just outside of a village in Niger, West Africa, where I worked with a small team of Hausa farmers testing solutions to common problems of low productivity. All of our innovations needed to have very low or no cost, and were based on what farmers were already doing, such as grafted *Ziziphus*, locally constructed bee hives, and live fencing. I have no doubt that many of these techniques, along with others developed by my colleagues at the Maradi Integrated Development Program (MIDP), were technically successful and culturally appropriate. Yet few farmers ever adopted the techniques. The one exception is the widespread adoption of natural regeneration (especially in non-project villages), as described by Tony Rinaudo in recent *EDN* issues.

Let me offer one example of an innovation that was rejected: the live fence. This is an important innovation because it solves several serious environmental and productivity problems with very little effort and no cost. Hausa farmers in the region have always battled to keep unwanted 'visitors' out of their dry-season gardens. These visitors range from stray cows to thieves in the night. The traditional solution is to cut branches from nearby thorn trees and bury these branches in shallow, closely-spaced holes on the garden boundary. Dry-season gardens are then planted in the low-lying heavy clay once the flood water has receded and the heavy soil is workable.

A fence made of thorn branches is mediocre at best; not an effective barrier for thieves who can simply push the branches over with a large stick. These temporary fences, constantly needing renewal due to termite damage, are ineffective, cause deforestation, and offer very little return for investment. Furthermore, due to the ineffectiveness of this barrier, farmers must spend cold nights in their gardens, or hire guards (an expense they can ill afford) to intercept thieves. One solution my team worked on for several years is live fencing. A live fence replaces dead thorn branches with living ones, is permanent, and provides additional benefits such as wood production and animal fodder.

### Featured in this EDN



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In order to move from dead to live thorn fences, the traditional practice of building fences from cut branches has to be modified. First, thorn seedlings must be obtained before they can be planted. Since many farmers will not spend disposable income for thorn seedlings, they must plant their own. Seeds can be collected from local thorn trees and scattered in an upland sandy plot. This step requires very little time or effort and should be done in the rainy season, several months before the seedlings will be needed for transplanting, to eliminate the need for watering. Seedlings of thorn trees then must be transplanted along the boundary of the garden, about a month before the lowland clay is workable for garden planting, and when it is still moist enough to allow the seedlings to establish without any watering or care. This way no watering is ever required from start to finish.

We experimented with several varieties of local thorn trees and shrubs, and we found several combinations that provided an impenetrable fence within two or three years. The first three years some dead thorn branches must be placed along the fence line until the live fence is mature, but by the end of the third year a permanent and impenetrable fence has been established. Additionally, after the third year the fence can be harvested for animal fodder (always in short supply), edible fruit, nuts and leaves, firewood, thorns for sale (to others that continue with the dead thorn fence technique), and wood poles for construction or for sale. In terms of return for inputs, the process is not energy- or time-intensive, does not require any cash outlay, and by the third year only requires wood harvesting to keep the fence trim and dense. Choosing the correct thorn species and keeping the fence trimmed minimizes competition between the fence row and nearby crops, and the advantages far outweigh the disadvantages, both in terms of usable products from the fence, and of savings that result from no theft or animal damage.

Once our fence was functioning well and we were sure that we had chosen some of the best species, we were ready to promote the innovation to local farmers. Of course the local farmers already knew about the live fence. They saw it established over the several years that we experimented with it; indeed they walked past it every day. Furthermore, as I sat and talked with local farmers, conversation would often drift into a discussion of some of our innovations, including the fence. Farmers often commented that no thief could get though our fence, but they never asked for our help in establishing one for themselves. This seemed odd, knowing that their fences were time consuming and ineffective, but necessary. It was also quite a disappointment as I watched the men deforest the area chopping thorn trees to build ephemeral rickety fences year after year.

At this point someone may offer familiar advice: “You should never try to promote innovations unless they are asked for.” That is a good general principle, but not always practical. Sometimes village mothers need to be taught about infant nutrition and disease even before they ask. And the natural regeneration that is so successful in our area was developed without asking the farmers whether they needed to restore trees on their farms—but is widely practiced by many of those same farmers today.

Why did the farmers decide not to adopt the thorn fence? At this point the perceptive reader will protest that he/she does not know enough yet about the context. Did I harbor secret racism? Was I incorrigible? Did the Hausa neighbors secretly despise me? Were we using a tree reserved only for sacred purposes? These issues can never be completely eliminated as possible factors, but the team that I worked with was made of local Hausa farmers, and they thought that people would adopt the fence idea. And if perfect harmony was required between adopters and possessors of new technologies, no innovations would have ever been adopted by Africans. But clearly this is not the case. When the issues already discussed above have been eliminated as factors, my research (which is still ongoing) suggests other reasons. One factor in particular, that stands out among many that are emerging, is **irresponsible giving**.

Irresponsible giving is closely related to a phenomenon that is very familiar to development thinkers and practitioners alike: aid dependency. In fact, I believe that one of the major factors that inhibit peasant farmers from adopting important innovations is dependency fostered by irresponsible giving. How and why does this happen? A dependency syndrome is created when people realize that they don’t need to solve their problems because wealthy foreigners regularly come to their village to offer gifts. These gifts can come from development facilitators, missionaries, or tourists. Of course giving itself is an important Christian principle, but uninformed and excessive giving does more harm than good. In fact, visiting Americans are probably the worst culprits, especially visitors from American churches that come armed with money to help the poor. Part of the problem is that giving makes the giver feel good, and the glowing report returned to the donor churches only increases the tendency to give irresponsibly. Finally, the giver does not realize that the gift will foster dependency, or that dependency is very destructive to constructive and sustainable problem solving.

What is the solution? Continue to give to the destitute, such as widows and orphans, but even then give in a way that does not foster dependency (this is not easy). In the development context, restrict giving to the giving of your time. Spend a lot of time with people: eat with them, buy their mangoes, attend their weddings, and visit them when they are sick. And advise the visiting Americans how and when to give. Do not let them give with indiscretion.

## Further Reading Suggestions (by Editors)

*When Helping Hurts* by Corbett and Fikkert

*When Charity Destroys Dignity* by Glenn Schwartz

*Western Christians in Global Mission* by Paul Borthwick

*African Friends and Money Matters* by David Maranz

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# Russian Comfrey for Fertilizer, Feed and More

*by Dawn Berkelaar*

Comfrey is a unique perennial plant that requires minimal maintenance after planting and that can give high, sustained yields of nutrient-rich leaves for use as fertilizer, animal feed and more.

**Julie van Zevern**, a member of ECHO's network, worked with an herbal clinic in Zimbabwe that uses comfrey in a medicinal manner (more on that later in the article). Julie also mentioned that comfrey is used as a fertilizer in Zimbabwe by Foundations for Farming (FFF). I (Dawn) contacted FFF and asked for more information about their use of comfrey.

**Hazel Edwards** from the FFF office in Harare responded. "We were first introduced to [the use of comfrey as a fertilizer] by a local farmer, Rory Maloney, a fairly large market gardener who supplies fresh produce for the Harare vegetable market. He said it improved the health and disease resistance of his crops."

***Figure 2.*** *Comfrey regrowth after harvesting leaves. Photo by Bill Cotton.*

Hazel commented that comfrey is high in potassium (K) and other micronutrients, and "seems to improve fruiting and disease resistance."

She notes that it is most effective when "applied to solanaceous [e.g. tomato and potato] and leguminous plants, as they are potassium responsive. [It can] be applied every two weeks as a drench or foliar spray. [We] haven't done the scientific study on this with controls, etc., to quantify the response."

A handout from FFF gives this advice about making comfrey tea:

> With its high levels of potash, comfrey tea can be used as an excellent fertilizer for tomato, pepper, cucumber and potato plants. The smell while it is 'cooking' is strong. Pick a handful of leaves. Place them in a container with enough water to cover the leaves (1-2 kg comfrey leaves in a 20 L bucket). Cover and let this [sit] for four weeks in cool weather or two weeks in hot weather. Then squeeze the leaves to extract as much juice as possible. Strain and use at a rate of one liter comfrey juice to 20 liters of water. Use as a foliar feed and soil drench around the plants. Put the solid wastes into the compost pile. Dried…comfrey leaves have the following percentages of NPK: 0.75%, 0.25%, 0.20%. Fertilizing potatoes with comfrey will provide the crop with an excellent source of potassium and trace elements. Comfrey leaves contain two or three times more potassium than farmyard manure.

The plants used at the FFF office are from a local farmer. Hazel commented that it is fairly common there and not difficult to find.

**Bill Cotton**, an ECHO volunteer who lives in the Cotswolds in England, shared information about the use there of comfrey as a plant fertilizer. He uses comfrey to make a fertilizer 'tea'; lays leaves on the ground; and uses the leaves for making compost. He shared, "The important things to note are:

- Comfrey is very vigorous and can be harvested up to four times each year. It will grow well on the poorest soils and in well-lit as well as shady areas.
- Note that in England, comfrey is the basis of much organic gardening and was initiated by Henry Doubleday who is the originator of 'no dig' gardening using 12 x 4 foot plots that you can walk around rather than on, thus avoiding compaction.
- Concentrated comfrey leaf liquid can be produced in a bucket or similar container (see Figure 3). Add leaves to the container, but do not add water at this point, since the leaves will make their own [black] liquid concentrate. Prior to use, dilute the concentrate with water [using a five to one ratio of water to comfrey extract ]. It is an inexpensive way to produce fertilizer.
- Note that comfrey leaves have a long reputation as a healer of cuts, rashes and other skin ailments."

Bill, an avid gardener and a former teacher of Rural Science, suggested that I contact the organization "Garden Organic" (originally the Henry Doubleday Research Association). They pointed me to a recently reprinted book by Lawrence Hills called *Comfrey: Past, Present and Future*.

The rest of this article includes relevant abstracted information from Hills' book.

## History and cultivar development

The primary comfrey cultivars available today are the result of Hills' research at Bocking in Essex, England, which led to the development of strains of Russian comfrey (*Symphytum uplandicum*, referred to as *S. peregrinum* in Hills' book) designated as varieties Bocking 1 through Bocking 21. Russian comfrey is the result of a cross between *S. asperrimum* (aka prickly comfrey) and *S. peregrinum* (aka common comfrey). During Hills' years of experimentation, comfrey was grown in many different countries around the globe.

Hills observed that Bocking 14 was the most common clone in South Africa. It was highest in potash, resistant to comfrey rust, and highest in allantoin (the main active ingredient for medicinal purposes). Bocking 14 is also the variety recommended for garden cultivation and feeding to pigs and poultry (if leaves are first harvested and wilted).

[An internet search will show frequent mention of Bocking 14, as well as Bocking 4. The two cultivars are similar; however, Bocking 4 is said to have a deeper root system, with greater drought tolerance, than Bocking 14. Bocking 4 is reportedly best for fertilizer use, while Bocking 14 is best for animal fodder.]

## Growth and yield

Russian comfrey can grow up to 6 feet, 8 inches in height when allowed to flower [if you are growing for the leaves, flowering is not desirable]. The flowers start out blue and then change to magenta. It is perennial, typically cut six to eight times per year, with a leaf biomass yield of 40 to 100 tons/acre/year (fresh weight). In temperate areas, leaves start growing early in the spring. In the tropics, leaves can generally be harvested year-round.

## Environmental requirements

Comfrey adapts to a wide range of soils but grows best in moist, fertile and well-drained soil. Though not influenced heavily by pH, growth is best with a soil pH of 6.0 to 7.0. With its deep roots, comfrey is quite tolerant of dry, sandy soils, as long as those soils are supplied with sufficient nutrients. It is both cold and heat tolerant, so multiple leaf harvests per year are possible in most parts of the world. It grows best with full sun but tolerates partial shade.

## Propagation and management

Russian comfrey is usually propagated from root cuttings, crown divisions or transplants. Root cuttings are the cheapest option for starting a new planting. Use roots that are 1½ to 6 inches long and ¼ to ¾ inches in diameter (Teynor *et al*., 1997, www.hort.purdue.edu/newcrop/afcm/comfrey.html). Lay the cuttings flat and cover with 2 inches of soil. Added manure or mulch is helpful. Hills' book suggests transplanting root cuttings in holes filled with aged manure. Space the plants on a 3 foot X 3 foot grid (see Hill's book and www.coescomfrey.com/grow.html for additional information).

Because comfrey is propagated by root cuttings, it is possible to take cuttings from consistently high yielders *where records have been kept* (records are very important!). A comfrey plant can live as long as an orchard, so be careful in selecting where to locate it. Here are some helpful tips:

- Roots can grow at least four feet deep. If a hard pan is present, break it up so that the roots can grow deep.
- Plant comfrey close to where it will be fed to animals (as cut-and-carry). This will also make it easier to haul manure back to the plants.
- Do not plant comfrey under trees; the latter will block the sun and their roots will take nutrients and moisture.

Hills commented about comfrey, "It is only a crop when it is kept clean, cut and manured." We will look at each piece of advice in turn:

**Keep it clean**. As with most crops, keeping comfrey plants weeded is a good management practice. Mulch can help to keep weeds down.

**Keep it cut**. Regular cutting of comfrey leaves generally results in higher annual yields. Since most animals will not graze comfrey, but will eat the leaves once they are wilted, it is a good option to 'cut and carry.' Hills shared insights from many farmers who have grown comfrey. He concluded that cutting more often resulted in better yields, and in better opinions of the plant. One article stressed that plants should not be allowed to become hard and woody. Leaves can typically be cut six to eight times per year.

**Keep it manured/fed**. Comfrey requires little maintenance, but because of its fast growth and inability to fix its own nitrogen, it benefits greatly from fertility inputs with rapid release of nitrogen. Nitrogen from compost will not be available quickly enough. High nitrogen manures (e.g. poultry, pig, cattle, etc.) work well.

## Potential Problems / Disadvantages

An awareness of potential problems and disadvantages with comfrey (listed below) is important before deciding whether or not to introduce the plant. In many cases, comfrey compensates for the disadvantages in other ways (also listed below).

**Potential for weediness.** Although Russian comfrey rarely sets seed, it can be difficult to remove once it is established on a plot of ground. Trying to dig it out will only worsen the problem, because every piece of severed root will begin to grow into a new plant! One option for getting rid of it is to let pigs in to the area. Another (on a garden scale) is to use ammonium sulphamate. A third option (one that I read about online) is to build a hot compost pile directly on top of the comfrey plant that you wish to remove.

**Initially expensive to plant.** Early on, inflated claims were made for comfrey, in order to compensate for the cost of root cuttings and to make sales. The high price often meant that only small plots were established, and they were often neglected. However, once planted, comfrey can provide leaves for more than 20 years.

**High nitrogen requirement**. Unlike leguminous plants, comfrey does not fix nitrogen. However, if grown as feed for animals, the animals' manure can be used to provide much-needed nitrogen back to the comfrey plants. If grown purely for animal fodder, the decision to plant comfrey versus legumes would depend largely on the time it takes for comfrey to become established and the leaf yield of comfrey versus legumes.

**Uncertain potential for silage**. It is difficult to make silage with comfrey alone. A better option is to add comfrey to other plants when making silage (with comfrey as up to 25% of the weight).

**Drying comfrey is difficult and time-consuming**. Leaves need to be harvested before stems are too thick, and shouldn't be dried above 180 degrees F, to prevent proteins from coagulating and allantoin from being lost.

**Pyrethrum eelworm**. Despite comfrey's good growth in Kenya, Hills wrote that it was "not a country of comfrey growers." Having formerly grown pyrethrum, a nematode called pyrethrum eelworm (*Pratylenchus destructor*) was built up in the soil and could kill comfrey. Kenya still produces pyrethrum, so the threat likely still exists there.

**Termites** don't normally eat living roots, but Hills commented that they will eat comfrey roots if they dry out during a long drought.

**Rust** can be a problem where wild comfrey is also found. However, the Bocking 14 variety seems relatively resistant to rust.

## Analysis of Comfrey

The best nutritional value of comfrey is found in the leaves. Analysis of a Bocking 14 comfrey plant, cut in autumn, showed it to contain 2.77% calcium; 0.75% phosphoric acid; 7.09% potash; and 0.144% iron. Analysis of dried comfrey leaves showed them to be a rich source of protein, including the amino acids tryptophan and methionine. Comfrey seems to provide all the nutrients that pigs need, including vitamin B12, which normally must be obtained from animal products. Four pounds of fresh comfrey per day supplies enough B12 for a pig. Experience has indicated that the comfrey can also provide necessary B12 for chickens, cows and sheep. Hills commented, "For pigs and poultry, comfrey is cheaper than fishmeal or B12 injections."

## Comfrey for Animal Feed

[Note: The following information on feeding comfrey to livestock comes from Hills' book, initially published in 1976. However, more recent research has identified potential risks of feeding with comfrey, particularly with large amounts. Caution is advised related to using comfrey as animal feed.]

Animals seem to prefer comfrey when it has first been allowed to wilt, especially initially.

In a report from a Saskatchewan (Canada) farm, cows did not at first appear to like fresh forage, but ate it when it was slightly wilted. Later they would willingly eat fresh forage.

**Pigs**. Hills wrote that pigs generally like comfrey, right from the start, and that up to 30 percent of pig meal can be replaced with cut comfrey. One option is to cut and carry the leaves to tethered pigs.

Young comfrey leaves, without any coarse stems, can be fed to a sow with many piglets. According to Hills, “Stronger piglets will start eating comfrey very early, which gives a chance to the weaklings [to nurse].”

**Chickens**. Comfrey is well-suited as a feed for chickens. Chickens’ digestive systems are not equipped to handle much fiber (fiber should be kept to between 5 and 8 percent of the diet). Comfrey is low in fiber and high in protein and minerals, especially when cut regularly. It has a protein to fiber ratio of about three to two. If the high-yielding Bocking 14 strain of comfrey is planted, 30 plants spaced at 3 feet by 3 feet (for example, six plants by five plants) will yield enough comfrey to feed 12 birds their entire allotment of green plant matter.

Comfrey can be an inexpensive source of vitamin A. Second-year hens fed half a ratio of comfrey laid large eggs with deep yellow yolks. The flesh of chickens that have been fed comfrey also ends up being more yellow, perhaps because of increased vitamin A content.

Chopping comfrey with a chaff cutter is especially recommended for birds less than eight weeks old. Another method for feeding comfrey to chickens is to hang it on a string and let birds jump for it (so it doesn’t get trampled on).

**Cattle**. Comfrey is palatable to cattle, and has also helped to correct loose stools. Sometimes, comfrey is most available when there is also ample grass, making it less important as a feed source (this is true in Britain). However, Hills wrote that in Japan, where grass was less available, comfrey made economic sense. In Kenya, comfrey was especially valuable for cattle during the dry season. A bullock can eat about 37.5 kg of comfrey per day.

**Goats**. Goats need fiber and protein. They can be fed comfrey for protein and minerals, but must also be given plenty of roughage.

## Comfrey as Garden Compost

In ordinary garden plant material, the carbon to nitrogen ratio (C to N) is about 80 to 1, and with composting, the ratio goes down to about 10 to 1. Before composting, comfrey already has a C to N ratio of 14 to 1.

Comfrey is a good general fertilizer and an excellent source of potash. It can be mixed with other ingredients to make good compost. Hills wrote that “A comfrey bed is in effect a method of exchanging crude nitrogen for a balanced organic fertilizer.” It can be manured with straight chicken manure, or with a 2 to 1 mix of water and urine, referred to by Hills as Household Liquid Activator or HLA (and described by him as “the best and cheapest of compost heap activators,” and a source of potash and nitrogen).

***Figure 3.*** *Making comfrey tea. Photo by Bill Cotton.*

Alternatively, comfrey can be used as a kind of ‘instant compost.’ “Four wheelbarrows of cut and wilted comfrey will produce three wheelbarrows of instant compost with no need to build or turn a compost pile.” Apply it as a surface mulch, or incorporate it into the soil, depending on the crop. Do note that it will not leave much humus/organic matter in the soil. Comfrey as instant compost can be quite effective. Hills wrote that 1 ½ pounds of wilted comfrey applied per foot of row doubled the yield of potatoes compared to those grown with no manure, and gave higher yields than with a similar amount (by weight) of manure or compost.

Another form of comfrey fertilizer is manure tea (see the beginning of this article for a method that FFF uses).

## Medicinal Use of Comfrey

The genus name *Symphytum* comes from Greek, and means ”to make grow together”—a reference to the way comfrey is used to promote healing of wounds. Another reference is the common name for comfrey: ‘knitbone.’ A molecule called allantoin is the active ingredient in comfrey that makes it medically useful. Allantoin is highest in comfrey stems up until a comfrey plant flowers.

Hills listed recipes for comfrey leaf tea and for poultices, but warned against making an ointment that would “sit around,” due to the risk of infection. [Caution: In more recent years, research has resulted in concerns–pertaining especially to internal use–regarding adverse effects on the liver of pyrrolizidine alkaloids in comfrey. Some of the literature says that the harmful effects are only caused by consuming comfrey in large amounts; however, ECHO is not able to make recommendations as to the medical use of comfrey.]

## Obtaining Comfrey

ECHO does not supply comfrey. Import of comfrey can be tricky, because root cuttings can be destroyed by fumigation and other precautionary treatments.

Because of a short historical period of widespread interest in comfrey, it may already be available in your country. If you are in Zimbabwe, contact Foundations for Farming to inquire about root cuttings.

## Conclusion

Russian comfrey has high potential for the small farm, provided that it is kept clean, cut and fed. Once established, it can be a long-term source of feed for animals and fertilizer for the garden. Ultimately, yield is what determines the benefit of comfrey versus other options. Legumes are less demanding of nitrogen than comfrey; however comfrey could be a good option if it produces higher leaf yields. Comfrey also can supply a wide variety of other important nutrients. We hope this article helps you decide whether or not to look for the plant in your area.

Let us know of your experience if you grow comfrey in a warm climate.

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## Cowpea: Living Mulch under Maize

*by Melissa Miller and Tim Motis*

*EDN 122 highlighted multi-purpose cowpea varieties with spreading vines that cover the soil. Below is an ECHO research update from South Africa relating our experience so far with a spreading cowpea variety intercropped with maize grown in a Foundations for Farming (FFF) system.*

"Living carpet" and "green manure/cover crop"---these are terms used to describe the practice of maintaining a plant-based mulch to protect and enhance the soil. But why bother to intercrop maize with a legume if the maize plants will shade the ground soon enough? First, plant growth is influenced by soil temperature. Maize, for example, has optimal root growth between 23-25°C (Brady and Weil, 2008). Soil temperatures above 26°C restrict root and shoot growth of maize seedlings (Walker, 1969). In the warm tropics, therefore, the cooling effect of an early-season "living carpet" would be beneficial to maize. Secondly, leaf litter from the legume crop decomposes over time, resulting in an organic mulch layer that conserves soil moisture (Lal, 1995) and enhances nutrient retention and microbial life. Legume rotations are now being widely promoted throughout Africa in attempt to reverse the rapid decline of biological activity and soil organic matter (Sileshi, 2008). Lastly, cowpea grown with maize helps suppress weeds and provides the farmer with a food source (dry beans) before maize harvest.

In an ongoing FFF trial, rows of a creeping cowpea variety (IT98D-1399) were alternated with rows of maize. The FFF-style planting stations (basins 15 cm deep) were dug 60 cm apart within rows, with 50 cm between the rows. [NOTE: recommended FFF spacing calls for 75 cm between rows of planting stations; for purposes of this trial, we reduced the between-row spacing to 50 cm so that, with alternating maize/cowpea rows, there would only be 1 m instead of 1.5 m between rows of maize.] Cattle manure was placed in the planting stations (500 ml of manure/station) at the end of August, during the winter dry season. Maize and cowpea were planted on 22 November 2013, as soon as there was enough rain. The maize planting stations received a micro-dosed (5 grams per station) side-dressing of NPK (12% nitrogen; 9% phosphorus; 12% potassium) fertilizer on 15 Jan 2014.

By the 6th week after seeding the maize, the cowpea canopy was 50 cm wide, corresponding to 50% soil coverage. Two weeks later, cowpea had completely covered the soil with the canopy width ranging from 97 to 111 cm. At 10 weeks after seeding maize, the cowpea canopy showed a noticeable cooling effect on the soil; soil temperature (at 7 cm depth) decreased from 35°C with maize alone to 30°C with maize/cowpea. By maize tasseling stage (nearly 12 weeks after planting), the cowpea vines had begun to produce harvestable pods (Figure 4).

***Figure 4.*** *Maize at tasseling stage with a cowpea understory. Photo by Tim Motis,*

Some concerns to keep in mind when deciding whether or not to incorporate a green manure into your cropping system include moisture competition, nutrient competition, and potential yield reduction. Our results to date indicate no competitive effect of cowpea with maize. Maize plant height did not vary between plots planted with and without cowpea. Yield results have yet to be collected, so it will be interesting to see how the cowpea understory affects the maize yields. These results hold promising potential for incorporating cowpea into a FFF maize field.

Green manure cover crops can be incorporated into your growing system in many ways. Another technique we are trying in South Africa is to combine cowpea with a longer-duration legume (*Lablab purpureus*) to extend the time over which the soil is covered. Other legumes to try include velvet bean (*Mucuna pruriens*), jackbean (*Canavalia ensiformis*), horsegram (*Macrotyloma uniflorum*), pigeon pea (*Cajanus cajan*), and tephrosia (*Tephrosia vogelii* or *T. candida*). Perhaps cowpea or another legume could be integrated into small-scale cropping systems in your area, enhancing the health of farmers' soils and increasing their crop production. Small-plot experimentation is suggested to make sure that the legume plants do not compete strongly with the main crop.

ECHO's seed bank offers seeds of a variety of legumes, as well as spreading-type cowpea varieties ('Samoeng' from Asia and 'Mavuno' from Tanzania; see *EDN* 122 for short descriptions) and a more bushy variety from ILCA (International Livestock Center for Africa). Visit www.ECHOcommunity.org for information on how to order trial packets of seeds. Our bookstore (www.ECHObooks.org) also carries *Restoring the Soil*, a book authored by Roland Bunch with a wealth of information on green/manure cover cropping systems.

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## Replant with Groundcover after a Disaster

**Axel Bosselman** wrote from North Queensland in relation to the article on disaster preparedness in *EDN* 122.

"Don't ignore groundcover! [It] is even more important than replanting trees; for groundcover is 'its own salvation.' It resists erosion and compaction; it mitigates extremes of temperature on both root systems and above-ground vegetation; [and] it helps establish and protect upper-storey vegetation. If you like, consider trees as connecting their canopies to groundcover down below."

## Community-Based Food Security

**Grant Geist**, working with the Peace Corps in Mozambique, wrote the following: "In regards to *EDN* 121, hungry farmers (or in my case, students) is an obstacle when trying to improve farming methods. I think that first establishing moringa and some of the other under-used plants found in ECHO's seed banks in the community is an excellent way to start increasing energy reserves, but has anyone created or written methods describing how to increase the energy reserves of a community?

If you know of resources that address the question of increasing community energy reserves, we would love to hear from you.

ECHO staff member **Bob Hargrave** found an IRIN article from 24 February 2014 that shared information about a recent reduction in child hunger in Rwanda. Over a period of five years (2005 to 2010), stunting prevalence among Rwandan children under the age of five fell from 52 percent to 44 percent. The reduction in stunting is largely the result of community-based nutrition programs, based on locally-grown food.

In the article, Fidele Ngabo, director of Maternal Child Health, commented, "Each village comes up with community-based approaches to tackle malnutrition and food insecurity that don't cost money—we are at the centre to provide support and play a monitoring role," she said.

The IRIN article shared, "Examples [of community-based approaches] include the setting up of a communal grain reserve to which each household contributes at least 20 percent of their harvest during a good season, with the stored grain being used during the lean season; or the expansion of kitchen gardens with shared information on the vegetables to be grown."

The article added, "Suggestions and proposed solutions are debated in working groups comprising aid agencies, researchers, academics and government officials." Importantly, the nutrition research and resulting actions came from within the country, rather than from a program with initiatives driven by foreign donors. African researchers, who understand their country`s contexts, set the agenda.

http://www.irinnews.org/report/99696/call-for-shake-up-in-africa-nutrition-research

## Risk Aversion and Diversification

Harry van den Burg works with Umlimi Lokhonile Seeds, Mbovane Marketing, in Mbabane, Swaziland. He wrote in response to the article on risk aversion that appeared in *EDN* 121, about "…the extent to which risk aversion may have been and even is overestimated, at the expense of hunger and exhaustion, as a leading limiting factor on agricultural productivity.

"Whereas I certainly think that the argument has merit…I do not think that risk aversion should be relegated to insignificance as yet. While it is certainly true that small farmers in developing countries do take risks, all the time, that does not mean that they like it, and that they will not try to minimise them whenever they can, as most of us will do. I would like to share with you a very instructive example from Swaziland.

"When analysing the smallholder agricultural system for bottlenecks to be addressed, an agricultural research team from Penn State University in the early- to mid-1980s observed that two important factors were limiting maize production: late planting and labour for weed control. There was a clear relationship between area planted per homestead and available weeding labour, even in locations where land availability as such was not a problem. And even in years with early onset of the rains, planting was not done significantly earlier. The reason was that early planted crops would have to be weeded earlier, before the time when homestead members would come home from school and town employment for the Christmas holidays (in the southern hemisphere, the main long mid-summer holidays). Tillage or draught power was less of an issue, as many homesteads had oxen, and there was (and is) a subsidized government tractor ploughing service. And to avoid the queues at peak planting time, it would even be beneficial to make use of that early.

"In order to address this problem, the team looked at the possible introduction of herbicides. While liquid application was unsuitable for reasons of costs, application technology, health dangers and dosage, the use of granular herbicides looked promising. Suitable products, rates and application technologies (simple dosage measuring) were established on-station, and on-farm farmer-managed trials carried out. In the evaluation, it appeared that farmers were very interested. Yields were not that much higher compared with hand weeding, but labour requirements were cut dramatically. They were very interested in purchasing the product. And then, the big question: now that weeding is going to cost you far less time, are you going to plant more maize, or plant earlier? Eh, no, was the answer. I think I will take up making handicrafts, or brewing beer for sale, or trade in second hand clothing. In general, people wanted to use the freed-up time for non-agricultural income earning alternatives! When asked why, most answers pointed in the direction of "not putting all eggs in one basket," and of spreading risks.

"There can remain no doubt that rain-fed agriculture is risky. And if one only has limited means (whether monetary or in kind, such as labour), to put them all into agriculture may result in no harvest AND no money to buy maize meal. A small subsistence farmer ignores this reality at his/her own peril!"

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## UPCOMING EVENTS

### Tropical Agricultural Development: The Basics (TAD I)

*June 2-6, 2014, July 28- August 1, 2014*
*ECHO Global Farm, Fort Myers, FL*

An introduction to aspects of poverty and community development.

### Health, Agriculture, Culture and Community Course

*September 29 to October 3, 2014*
*ECHO Global Farm, Fort Myers, FL*

For Christian health, agriculture, and community development professionals who work with rural and urban communities (internationally or in the US) with below-standard health and nutrition conditions.

*Note: The TAD and HACC classes are conducted in ENGLISH ONLY. Anyone needing a visa in order to attend any of our courses must have their visa in place at least 30 days prior to the start of the class.*

*See www.ECHOcommunity .com for course descriptions and to register.*

### 21st Annual ECHO International Agriculture Conference

*November 18-20, 2014 (Note change in date from previous years)*
*Fort Myers, Florida*

Speakers at this event will share practical solutions to agricultural challenges, personal experiences and strategies for improving the lives of millions who daily face the threat of starvation. The event offers an open exchange of information, connecting the people and ideas that can make a real and sustainable difference.

For those who are able to stay an extra day after the conference, consider attending a post-conference workshop on Friday, November 21. (An additional fee applies.) Topics this year will include:

- **Food Forests and Perennial Cropping Systems** (Eric Toensmeier)
- **Intercultural Team Leadership, Leadership Transition, and Strategy and Meditation Work** (Sarah Lanier)
- **Production of biomass char for drinking water treatment and biochar** (Josh Kearns)

If you would like to give a workshop or evening talk, please submit a speaker interest form when you register online. See ECHOcommunity.org for more information.

### Tropical Agricultural Development II: Underutilized Tropical Crops (TAD II)

*August 11-15, 2014*
*ECHO Global Farm, Fort Myers, FL*

An in-depth look at various edible under utilized tropical crops.

## FROM OUR REGIONAL IMPACT CENTERS

### ECHO East Africa

In *East Africa Notes*, Issue 3 (January 2014):

- Linking Small Scale Farmers to Markets (Charles Bonaventure and Jimmy Ebong)

### ECHO Asia

In *Asia Notes*, Issue 20 (March 2014):

- Farm-Generated Fish Feed (Keith Mikkelson)
- Producing the Biocontrol Fungi *Trichoderma* and *Beauveria* (Brock Mashburn, Niemeet Chompoothong, and Abram Bicksler)

ECHO Asia continues to post new Asia-appropriate resources on echocommunity.org, for free download.

**Request for Partner Seed Evaluators**. ECHO Asia is looking for dedicated observers to receive and plant seeds from our seed bank and to provide detailed information about growing conditions, planting times, growth of the plants, etc. We would like to compile this data and share it with others, to help them determine which seeds are best for a particular area and set of climatic conditions. To express interest, please e-mail us at echoasia@echonet.org.

### New: ECHO West Africa!

ECHO's newest Regional Impact Center, in Ouagadougou, Burkina Faso, officially opened on Thursday, March 13. Robert Sanou directs the West Africa center.

Contact information is as follows:

E-mail: westafrica@echonet.org or rsanou@echonet.org; Address: 15 BP 104; Ouagadougou 15; Burkina Faso; Telephone: (226) 50 43 09 45

Also, the dates for a 2014 ECHO West Africa Symposium have been set. Plan to join us **September 22-26, 2014**. Monitor ECHOcommunity.org to obtain more information on speakers and how to register in the coming weeks and months.

**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!**