

## **Is Low Cost Drip an Attractive Option for Small Farmers with Plenty of Water? Interviews with Farmers Growing Lettuce, Flowers and Coriander in Hue Vietnam**

**Paul Polak, March 2000**

On Mar 31 and April 1, 2000, I visited five small farmers who had installed low cost drip irrigation systems within an hour's drive from Hue. This in itself was a surprise to me. I had always considered that drip irrigation would only appeal to farmers that were short of water. But Vietnam has lots of water- in fact it is just recovering from a major flood. Why would farmers want to buy drip irrigation systems when they have no water shortage?



**Typical IDE Low Cost Drip Irrigation Installation in Vietnam**

### **Farmer 1. Quang Loi Village. 1 hour car ride from Hue**

We talked to an energetic middle aged woman who had one month's experience with a drip system covering 7 beds of lettuce which were just reaching the harvesting point. The drip system was centered on a blue steel 55 gallon drum about 2 meters above the field, which was fed with water from a shallow tubewell using a twenty dollar half horsepower Chinese electric motor attached to a garden hose. The garden hose ran water into the drum through a cloth filter, and the water flowed from the bottom of the drum through another filter to a one-inch plastic mainline. The mainline, in turn, irrigated 7 raised beds, each of which contained 6 rows of lettuce plants. Each row is about 10 meters long, and I counted 54 lettuce plants in each row, for a total of  $54 \times 6 = 324$  lettuce plants,  $\times 8$  beds = 2592 lettuce plants

The drip system she uses is the Nepal soft PVC system with holes as emitters and baffles over the holes, but she does no shifting. Each drip line provides water to two rows of lettuce.

She lives in a substantial stone house with a tile roof, and says that she does the work in growing and marketing the lettuce, which she calls "salad". She grows lettuce because it usually fetches a high price during the dry season

### **Farmer's Evaluation of Drip System Experience**

She says that the lettuce plants grow quicker with drip than with hand spray from a hose, which is what she used before the drip. The soil is always wet, and it is easy to water the plants. She fills the barrel once in the morning and once in the evening. But from what she tells us, what she means by filling the barrel is that she turns the electric motor on and lets it run for one to one and a half hours before she turns it off. Since she has plenty of water, how long she runs the hose does not seem to be critical to her.

### **System Uniformity**

To get some indication of uniformity, I counted the number of drops over a thirty-second period from an emitter at the beginning and end of three lateral lines. I raised the lateral line an inch off the ground by putting a small piece of bamboo under it so I could count the drops.

	First emitter Drops/minute	Last emitter Drops/minute
Lateral line 3	180	120
Lateral Line 6	210	180

The patterns suggest that uniformity may be less than expected. The drum seems to me to be pretty low, less than 2 meters. From here on, one of the IDE staff members began to test uniformity in the field. The main conclusion is that it is important for IDE R&D to carry out systematic uniformity tests in the field, which may be very different from uniformity under lab test conditions.

### **Drip System Economics**

1. The farmer says that with drip, the lettuce crop takes 25 days to mature instead of 30 days. This allows her to grow 6 crops during the dry season instead of 5 using a hand spray system.
2. The price now is only 100 Dong for a bunch, but she expects the price to go up to 500 Dong a bunch as lettuce gets more scarce
3. The price that is paid in the market has to do with how much lettuce there is in a bunch. Because one lettuce plant with drip has more leaves, a "bunch" of drip irrigated lettuce is made up of 2 or 3 plants, but it takes 4 or 5 plants of spray irrigated lettuce to make a bunch
4. The drip irrigated lettuce looks nicer, so it will sell quicker than other lettuce in the market, but she thinks the price will be the same, or at most just a little bit higher.
5. Total value of drip irrigated lettuce if there is a 500 dong per bunch price will be  $2500/2.5=1000 \times 500=500,000$  dong  $\times 6$  crops = 3million dong or about \$200 from a 100 square meter plot..

6. Total value of spray irrigated lettuce is  $2500/4.5=555 \times 500 = 278,000 \times 5 \text{ crops} = 1.4$  million dong or about \$100 from the same plot
7. The gross income from drip for 100 square meters of lettuce would under these conditions be about \$200 US, and from sprayed lettuce about half, or \$100.
8. Assuming less than ideal conditions for price, pests, etc., a realistic income might be \$100 from drip and 50 from non-drip methods like spray or irrigation by sprinkler can. In any case, using drip approximately doubles the income, and if she is successful she is likely to both increase plot size to 300 square meters and increase her income through crop diversification and improved inputs.
9. The head of the farmers union who came with us evaluated the drip system positively also. He said its advantages are that it doesn't destroy the plants, and saves labor. He thinks people will likely be interested in buying, but this depends on longer experience with the demonstration plots, and on their price.

### **Farmer 2**

Just a couple of hundred meters down the village lane we interviewed a middle aged man with a yellow baseball cap, who was irrigating a 100 square meter plot with a drum kit using Nepal soft PVC system. We asked him about his farm, and he said he farms a total of about 4000 square meters (one acre), including the 750 square meters around his house, where he has installed the drip system. He has 2000 square meters of lowland rice in another location and 1500 square meters in a second location, where he grows chili and groundnuts. His major profession is as a farmer, but he sometimes fabricates concrete blocks to sell and add to his income. He has 4 children, two of whom are married and live in another place. He has three people in his primary household now.

### **Farmer's Evaluation of Drip System**

We asked him about the good things and bad things about the drip system from his experience.

#### **Good Things**

- 1) It kept the land where the plants were wet.
- 2) The plants grow faster
- 3) It saves labor- before, he irrigated using two watering cans and a shoulder bar, which took 20 minutes for each irrigation. Now he only turns on the switch. (He got his electric motor just recently)
- 4) There is less plant damage from disease. (Root exposure is one problem he experienced using watering cans)

#### **Bad Things**

He said he couldn't think of any negative things at this point.

### **Farmer 3**

The woman who runs the third farm we saw has a beautiful setting around her house, with flowers, hibiscus plants, and walkways. Her family has 1500 square meters in garden around her home, 5000 square meters in rice, and 1000 square meters in a third plot where they grow peanuts and sweet potatoes. She has just installed an electric pump at her house, but before she irrigated with sprinkler cans two times a day. She says it took 20 minutes to irrigate 100 square meters by watering can two times a day. She has an open well next to the house, and uses the camouflage pad of a GI helmet used as a water scoop.

She grows mostly lettuce, but also has one bed of mustard greens and one bed of Coriander. She grows during the dry season from April to September.

### **Evaluation of Drip System**

She says that lettuce grows faster and the plants are thicker with drip than with bucket. She estimates the growing cycle will be 15 days, instead of 20 days.

### **Observation of Watering Can Method**

Since she has lots of experience with the watering can method, and two watering cans were sitting by the open well, I asked her if she would be willing to demonstrate how she normally waters with watering cans. She was a very good sport about this odd request, and agreed to give us a demonstration.

I timed her with the stopwatch, and she used two watering cans, one with 10 liters and one with five liters, to water 70 mustard seed plants in 32 seconds. She used a quick circular motion, so each plant got a quick sprinkle of water two or three times, but the average total exposure to water for each plant amounted to about half a second. My impression is that this probably produces a relatively shallow but wide oval wetting pattern, even though the soil in this area is very sandy.

This likely means that there is little difference between watering can and drip irrigation methods when the plants are small and have very shallow roots. But I would expect an exponential difference favoring drip irrigation over the watering can method as the plants get older. This is because with drip the water is applied slowly for at least 20 minutes, producing a deep wetting pattern and a deeper, fuller root system, which would facilitate early maturing, more and fuller lettuce leaves, with the difference increasing as the plants get older. In Hue, this difference is exaggerated further. Because of the abundant supply of water, farmers turn on the electric pump for an hour or an hour and a half twice a day, which provides much more water and a much deeper wetting pattern than the plant needs. There is just as much water available for the sprinkler can, but the limiting factor is the labor required to distribute it.

In the future, when we find ways to deliver fertilizer through the drip system, for instance through manure tea, this overwatering will become a significant disadvantage, because it will waste fertilizer and leach it into the groundwater, causing environmental problems.

## **Phu Duong Area** (20 minutes from Hue on the River)

Farmers in this area used the drip system last year, and this is the beginning of their second season of their experience with it. The three farmers we visited are all a stone's throw from the river, and are close to the Hue market. After the first year's experience, each of these farmers has expanded their drip systems from 100 square meters to 300 square meters. Possibly because of the proximity to Hue, these farmers are also described by IDE Vietnam staff as being more professional market gardeners.

### **Farmer 4 Phu Duong Village**

This experienced farmer is growing several crops in his 300 square meter drip irrigated plot.

- 1) Lettuce
- 2) Mustard leaf
- 3) Coriander- he said this is hard to grow in the dry season- it needs shade- but he will try it
- 4) Vietnamese Leafy plant (unable to obtain translation)

### **Positive Experiences with Drip**

- 1) It protects our health. People in this area believe that steam rising from the ground as a result of the combination of water placed on plants by watering can and heat causes arthritis and other health problems, and this negative health impact is removed by using drip, which does not create steam.
- 2) Saves labor
- 3) Saves water- this is the only farmer of the six who has a water limitation. Before using drip, he did not have enough water- now he has enough
- 4) Easy to operate

### **Disadvantages**

- 1) there has been some plugging, but he can fix it
- 2) there has been some variation in quality of drip lines

### **Economics**

He estimates that he earns 400,000 dong per 100 square meters per crop, times 6 crops, =2.4 million dong total, times 3 because he grows 300 square meters = 7.5 million dong (over \$500 US)

He estimates that the income with watering cans is 200,000 dong per 100 square meters, but since the crop takes 5 days longer, it produces only 5 crops, for a total of one million dong. (\$71 US) This would total 210 US for 300 square meters, but he was short of water, so how much he made without drip depends on how much he could irrigate. This is a sizable difference.

### **The Fruit Tree Option**

I counted 27 banana trees on the boundary of his property, plus five palm trees in front along the street, and four other fruit trees the names of which we couldn't translate. The

farmer says that that he grew fruit trees to sell their crop, rather than to eat, and he estimated annual income from the trees as follows:

10,000 dong per banana tree per year, x 27 (Plus some value for leaves as animal feed)	= 270,000 dong
5 coconut trees x 60,000 dong	=300,000 dong
4 other young fruit trees will produce 4x200, 000	=800,000 dong
Total current earnings from fruit trees US)	1.4 million dong (100

We estimated that adding a drip line for his fruit trees could add \$100 per year more in income, but he said this was not possible, because he didn't have the water.

However, all the other farmers we visited had plenty of water, and they all had fruit trees. This indicates that we need to test an extra drip line in several demo sites to irrigate fruit trees, and learn about its impact on crop yield and income.

### **Farmer 5 Phu Duong Village**

We finally found a farmer who was growing flowers for sale! We had been asking the other farmers about the possibility of growing flowers, but they were unenthusiastic, - the farmers in Quang Luo said that there was not much market, and so on. But here was a farmer who had been growing a form of aster for two and a half months, and had just planted two beds with the plan to sell them on Buddha's birthday. These flowers are popular on Buddha's birthday, which is May 17, and there is a good market for them at that time. He estimates that he would make a net profit of 200,000 dong on two furrows of flowers, after a two and a half-month growing period. This is a wholesale price- if he sells them retail, he would get 300,000 dong.

He tells us that there are two markets for flowers- Buddha's birthday, and to decorate houses. There are good profits in roses, which are in strong demand.



**Farmer at Phu Dong Village Growing Flowers, Lettuce, and Coriander with IDE Low Cost Drip System**

He also grows a furrow of coriander, and says that flowers bring a higher price, but coriander prices are likely to be higher than flowers in a few months. It is apparent that there is no way of predicting for sure what the relative price will be of lettuce, coriander, and mustard greens over time during the dry season. If our experience in Bangladesh is any teacher, these farmers are likely to be more successful with diversified cropping, and planning crop maturation with their best information on optimal price periods.

### **Advantages**

- 1) shortens crop cycle by 5-10 days
- 2) saves labor- the farmer says that using sprinkler cans is a lot of work, and sometimes he was lazy, so he missed an irrigation or two, but with drip and an electric pump, he just flips a switch, so he doesn't miss any irrigations.
- 3) Easy to use- now his wife and children can do drip irrigation, and he can go to the rice field

### **Disadvantages**

No complaints

### **Summary and Conclusions**

- 1. If the initial experience of small farmers using low cost drip systems to irrigate horticultural crops in the Hue region of Vietnam holds up, there may be a much larger global market for low drip than we originally projected. This larger market would embrace small farmers in areas with adequate water supply, like the gangetic basin, where farmers are interested in increasing the yield, productivity, and income from horticultural crops by using drip.**
- 2. Adding a simple drip line to irrigate homestead fruit trees is likely to increase small farmer income by another hundred dollars a year. We need to start testing this concept right away.**
- 3. It is important for IDE to routinely measure drip system uniformity in the field as well as in the lab**
- 4. We need to start running tests of using manure tea and liquid fertilizer applied through the low cost drip system**
- 5. If farmers diversify crops to increase income as they gain experience, like they did with the Treadle Pump over time in Bangladesh, we need to work with farmers to figure out how to help speed up this learning process.**

**Paul Polak. 4/28/2000**