

Drip Irrigation for Third World Kitchen Gardens

By Richard D. and William A. Chapin of Chapin Living Waters

Abstract: After drip irrigation for greenhouses was introduced in 1960, it spread rapidly to commercial field crops. In the nineteen seventies Richard Chapin introduced Bucket Kit drip irrigation. This concept has grown so that Chapin Living Waters Foundation is now partnering with more than 2,000 organizations in over 150 countries where millions are threatened with starvation. Bucket Kits make it possible for the poorest of the poor to grow vegetables when there is no rain. If a lady can get 10 gallons of water daily, she can grow enough vegetables in her kitchen garden for a small family. A 5-gallon bucket, mounted one meter above the soil, provides sufficient pressure. Container loads of bulk materials are sent to third world countries to be assembled into individual Bucket Kits. CLWF has held Workshops and Seminars in many countries to train trainers to teach others to use Bucket Kits.

Drought conditions worldwide result in millions of people going to bed hungry every night. Food becomes scarce and expensive when there is no rain, and poor people have no money to pay for food. Starvation then death is too often the result (Fig.1). Children and the elderly are most vulnerable. Women who have most of the kitchen gardens cannot grow vegetables without water.

Charitable and Governmental organizations have spent billions in sending Relief Food to help starving people in third world countries (Fig. 2). Not only does the food have to be purchased, but also there is an additional cost in getting it to the other side of the world (Fig. 3). Then the next drought creates the need all over again.

Can Drip Irrigation be Adapted for the World's Poor People?

When Drip Irrigation for greenhouse flowerpots (Fig.4) was introduced in 1960, it saved growers labor, water, and fertilizer. It also helped prevent disease and gave better control of the crop. Growers across the country soon began to install drip irrigation on their greenhouse benches.

With all of these advantages it seemed that drip irrigation would also be ideal for field grown row crops. In 1964, Mr. Norman Smith (Fig.5), County Agent on Long Island, used drip irrigation combined with plastic mulch for a crop of cantaloupes. Mr. Smith's great success with this field led to Mr. Bernarr J. Hall (Fig.6), San Diego County Farm Advisor, to run tests comparing drip irrigation with furrow irrigation on tomatoes. His published Paper showed a 26.8% increase for the drip irrigated rows.

With these success stories, drip irrigation soon spread to tomato (Fig.7), strawberry (Fig.8), and pepper (Fig.9), crops in California, Mexico, and southern Florida. Sugar cane and pineapple (Fig.10), growers in Hawaii were soon convinced that drip irrigation would save production costs and give them better control of their crops.

Early third world trials

In 1974, Catholic Relief (Fig.11), of Senegal asked for help to be able to grow vegetables during their dry season. A 50-gallon drum was mounted about 6 feet above the soil and connected to rows of drip line. The drum was filled with water as needed and produced a good crop of vegetables. However, this system would be far too expensive for families who have very little income.

Simple and Inexpensive Bucket Kit

Later in the 1970's, a simple and inexpensive Bucket Kit system (Fig.12) was developed. It was found that a 5 gallon bucket mounted one meter above the soil would provide enough pressure to drip irrigate 2 rows 50 feet (15 meters) long, or 4 rows 25 feet (7.5 meters) long or 6 rows 16.5 feet (5 meters) long, depending on the shape of the garden. The bucket needs to be filled once in the morning and once in the afternoon. When it is first set up, the bucket should be filled 2 or 3 times to make wet spots at each outlet. Then a plant is transplanted into each wet spot. In this way, every drop of water goes directly to a plant with no waste of water.

Often the water used for Bucket Kits is rather dirty. To overcome this a 3 stage-filtering system is used:

1. A heavy cloth is tied over the top of the Bucket, and the water is poured through the cloth.
2. The water goes through a screen filter as it leaves the bucket.
3. There is an internal filter segment extending the full length of the drip tape. All the water has to pass through this filter before it reaches an outlet. This filter segment has 10,000 tiny openings for each 100 feet of drip tape.

NOTE- The drip tape is always placed on the ground with the outlets up. This allows any foreign particles to fall to the bottom of the tape so they can be flushed out the end of the Tape.

If there is a hot dry wind and the crop is well developed, it might be necessary occasionally to fill the bucket a third time daily. The object is to grow a good crop with as little water use as possible. This is especially important when water is carried for a considerable distance.

Training in use of Bucket Kits

Experience has shown that it is much better to demonstrate the set up and use of Bucket Kits when they are distributed, rather than just giving the ladies a package for her to



Fig. 1 Drought Conditions



Fig. 2 Truck of Relief Food



Fig. 3 Distribution

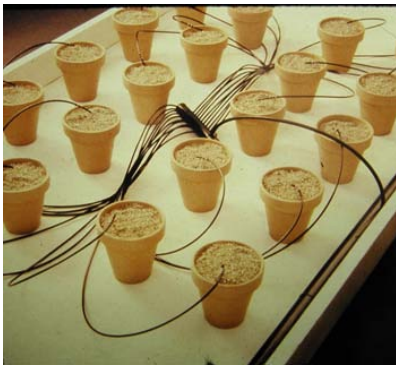


Fig. 4 Drip for Flower Pots



Fig. 5 Norman Smith

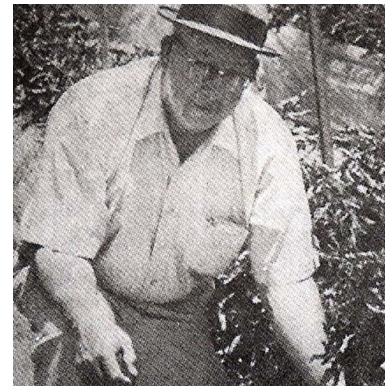


Fig. 6 Bernarr J. Hall



Fig. 7 Tomato Field



Fig. 8 Strawberries



Fig. 9 Peppers



Fig. 10 Pineapples in Hawaii



Fig. 11 Catholic Relief

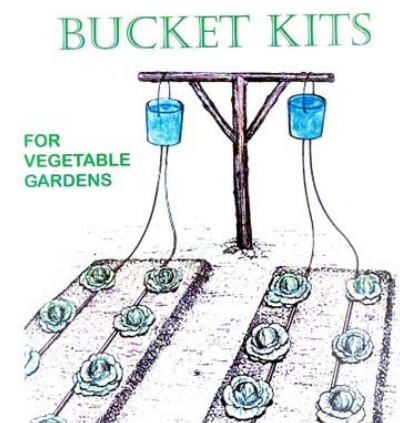


Fig. 12 Bucket Kits



Fig. 13 Seminar

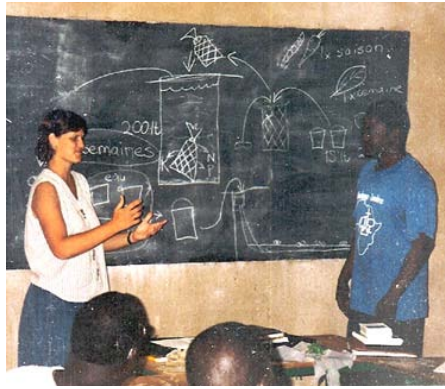


Fig. 14 Classroom



Fig. 15 Preparing Soil



Fig. 16 Placing Drip lines



Fig. 17 Filling Bucket



Fig. 18 Transplanting



Fig. 19 Super Bucket Kit



Fig. 20 1/4 Acre Kit



Fig. 21 Test Garden



Fig. 22 3 Bucket Kits



Fig. 23 Large Field



Fig. 24 Bucket Kits

figure out. Also, it is better to charge at least a nominal fee for the kits rather than donating them outright because the recipients will take better care of them.

Often 2 day workshops or several day Seminars (Fig.13) are held to train trainers in third world countries. The organizations, which distribute the Bucket Kits, often want 10 to 30 of their key people to attend these Seminars. Usually the mornings are in a classroom setting (Fig.14) with the afternoons spent in hands-on work preparing the soil, (Fig.15), making the stand for the bucket, placing and connecting the drip lines, (Fig.16), filling the bucket, (Fig.17), and transplanting into each wet spot, (Fig.18).

Larger size Kits requested

Schools, orphanages, and community gardens have requested larger Drip Irrigation Kits. One request was for a Super Bucket Kit, (Fig.19), which could irrigate 10 rows 10 meters long. This Kit uses a 35 gallon plastic garbage container mounted one meter above the soil, and is filled once daily.

If water under pressure is available, the ¼ Acre Kit (Fig.20) can be used. This kit irrigates a total of 2,000 feet of row.

Feeding 86,000 Orphans daily!

An organization in Malawi has used 10,000 Bucket Kits. Later, they built a food factory and at the latest report, they were providing a nutritious Vita meal to 86,000 orphans daily.

Charitable Organizations Need Effective Use of Donor Funds

A heavy 15 mil Drip Tape is used to give long life. 2006 is the 11th year that the same Bucket Kit has been used in our test garden (Fig.21). In 2005, this same Bucket Kit produced nearly 700 lbs of tomatoes. Bulk Bucket Kits can be delivered to most countries for \$8.00-\$10.00 each in container lots. If they are only used for 5 years, this brings the cost to about \$2.00 per year.

What organization can purchase hundreds of pounds of vegetables and deliver them to the other side of the world for \$2.00? (Fig. 22-24).

No One Company or Organization Can Supply the Whole World!

Chapin Living Waters is pleased to know that similar kits are being produced by manufacturers in several countries. It is our hope to encourage many more manufacturers and organizations to take up the call of starving people and get this type of simple drip irrigation into their hands!

**Presented at The Irrigation Association
The 27th Annual International Show
On November 7, 2006
San Antonio, TX USA**