UNIVERSITY OF FLORIDA
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Using Home Water Pumps to Irrigate Small Acreage and Increase Farm Income[1]

Dalton S. Harrison[2]

Most rural, north Florida, small farmers' homes already have their own home water systems. These are usually 1/3, 1/2, 3/4, 1 and 1-1/2 HP submersible, centrifugal or jet pumps. Pressures operated by these pumps are generally 20 psi (on) to 40 psi (off). Water output ranges from 8 gallons per minute (8 GPM) to 30 gallons per minute (30 GPM).

These are well suited for irrigating vegetables or specialty crop" acreage from 1/4 to 2.0 acres with drip irrigation without interrupting the home water needs required. They can help (by irrigation) to produce cash crops for roadside markets, as fresh fruit or vegetables, ranging in net profit from $1,500 to $6,000 per acre on an annual basis for increasing total farm income, with little increase in energy costs. These increases in energy may be as little as $51 to $102 per year for each farm utilizing a 1-1/2 HP pump and irrigating 120 days/year, yet increasing the small farmers' cash income.

This is accomplished by simply installing a portable "trickle (drip) irrigation system" (either Bi-Wall or Twin-Wall tubing) which is portable, on double-row beds, and may be utilized for some 5 to 7 years for as low as $165 to $300 initial cost, dependent upon the acreage (for 1/4 to 2 acre specialty crops).

There is no required purchase of a well, pump or power unit (electric motor) since these items are already a part of the farm family homestead and will not be an initial capital outlay for the farmer. The only initial capital cost is for the trickle (drip) irrigation tubing and its accessories such as pressure regulator, and filter and drip lines on connecting Tees, as shown in tables 1 and 2.

Water sources from one spigot range from 5 to 8 GPM; whereas a required water supply of 20-30 GPM may require that the Tee be placed between the check valve and the pressure tank with a Tee, gate valve, filter and pressure regulator to insure an adequate continuous supply without interrupting home water use.

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2. Dalton S. Harrison, Professor Emeritus and Former Energy Extension Specialist, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611.

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Table 1. Examples of equipment needed for a drip irrigation system, including parts and number of each, and retail cost estimates for a 1/4-acre garden.

No. Required	Material	Est. Costs
1 each	Hardie Hose Filter, 3/4" Connection (or equal substitute)	$11.49
1 each	3/4" MPT x 3/4" MPT Close Nipple	.35
1 each	Senninger Pressure Regulator, (or equal substitute) 10 psi (810 GPM)	6.95
1 each	1 " Barb x 3/4" MPT Connector	.40
168 ft.	1 " Oval or Regular P. E. Tubing	23.75
19 each	Lay Flat or Regular P.E. Adaptors	9.50
1 each	Hose End Cap, 1"	1.32
3,040 ft.	Hardie Drip Strip (15-12 x 72) (or equal substitute)	91.20
19 each	Hardie Drain Valves (FDV9200) (or equal substitute)	19.00
Approximate Total Cost		$163.96
Discounts may be 10-20%, or even more.		

Table 2. Pump HP, GPM required, (est) acres covered for Drip Irrigation plots, applying 1/4-inch irrigation in 5 hrs and 10 hrs operating time, and estimated costs as shown in Tables 1-2 and Figures 1-2.

Pump HP	GPM (Est.)	No. Acres Irrigated/3 hrs.	No. Acres Irrigated/6 hrs.
1/4	5.6-7.6	1/4 acre	1/2 acre
1/2	7.6-11.2	1/2 acre	1.0 acre
3/4	11.2-16.8	3/4 acre	1.5 acres
1	22.4-25	1 acre	2.0 acres
1 1/2	25-30	1 acre	2.0 acres

ENERGY USE ON IRRIGATED FARMS

On many irrigated farms, water delivery to the plant root zone via irrigation requires more energy than all other farm operations combined (Smerdon, 1977; Battey, et al., 1975). In Florida, citrus production consumes one third of all energy consumed for irrigation (Stanley, 1980).

It is estimated that for field and row crop production irrigation systems in Florida, energy consumed by irrigation may be as much as one-fourth to one-third of all energy consumed for all production costs; therefore, energy consumption for irrigation is a major cost to consider. Yet, because of unpredictable rainfall and sandy soils, irrigation pumping for optimum crop production is considered a necessity for many crops, especially vegetable crops.

SPECIALTY CROPS

For specialty crops such as "pick-your-own" vegetable crops and orchard crops, irrigation pumping is considered one of the essential tools of production and should be considered in the planning stages for growing these crops. For example, the combined farm practices in the production of tomatoes (through retailing) requires about 0.13 kwh of energy to produce one pound of tomatoes (Fluck and Baird, 1979). For strawberries and watermelons, the total

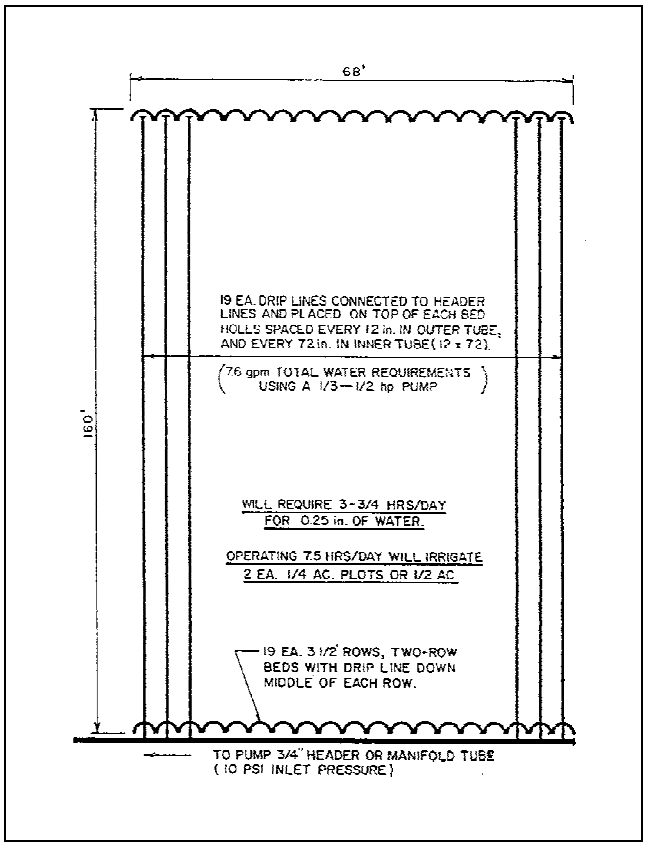

Figure 1. Schematic layout for 1/4 acre garden or fruits, utilizing a drip irriation system.

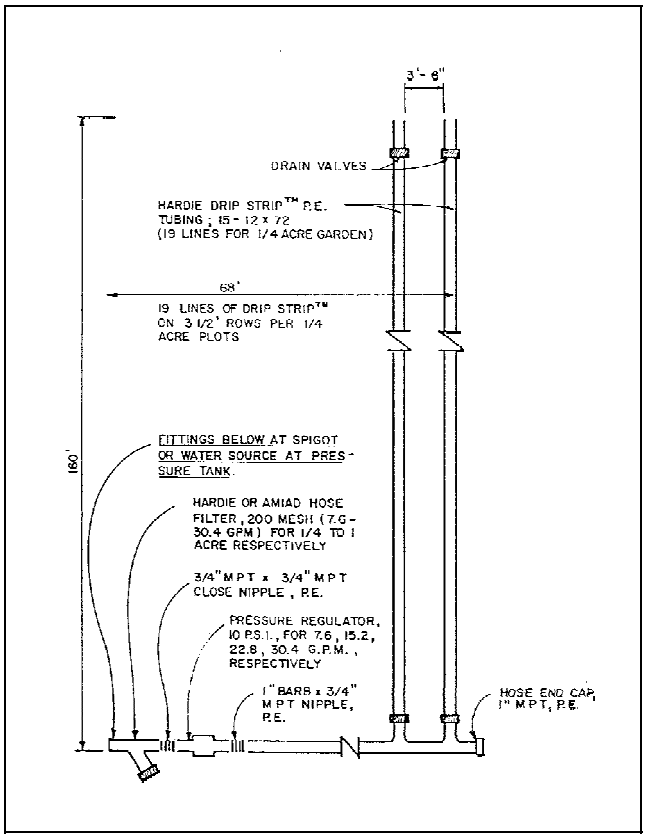

Figure 2. Example of a header or manifold at end of field supplying 1/4 acre plot, for 1/3 hp home water pump for irrigation.

energy required is 0.08 and 0.38 kwh per pound of fruit, respectively. Irrigation energy required is only a part of the above figures but may be as high as one-third to one-half the kwh required for production only.

Strawberries

An example of producing high cash crops on small acreage is the production of strawberries, reported in the Florida Grower and Rancher magazine in its February 1988 issue for the Plant City, Florida, area for the 1985-86 season. There, producers (most of them small farmers) harvested 7.9 million flats on 4,900 acres, for an average yield of 1,612 flats (12 pints/flat) per acre, with a gross cash value of $5.08/flat, and a cash gross value per acre of $8,188.96. If we assume production costs $4,000 per acre, then 1/2-acre of strawberries could net a small farmer $2,000-$4,000 on a "pick-your-own" operation and a grower could conceivably earn as high as$6,000-$7,000 per acre. Of course, situated near a town or

community of demand would enter into a decision to grow strawberries, but especially crops such as grapes, blueberries, melons and fruits certainly suggest a "high cash option" crop for small farmers, in utilizing their home irrigation systems for more cash flow, rather than "cheap" field crops.

Tomatoes

Researchers with USDA, ARS, at Fresno, California, reported yields of 50 tons/acre of ripe tomatoes irrigated by underground drip irrigation on 1/2-acre plots in 1987. This is equivalent to 100 tons for a 1 - acre plot, since each research plot consisted of only 1/2-acre. On above-the-ground drip tubing the yield was 60 tons/acre.

In the accompanying pages are (1) designs of systems, ranging from 1 to 2 acres (Figures 1, 2, 3) and (2) materials and estimated costs which may be purchased at local farm supply stores or irrigation supply retail outlets (Tables 1-2). Operating schedules and regimes for the irrigation systems and

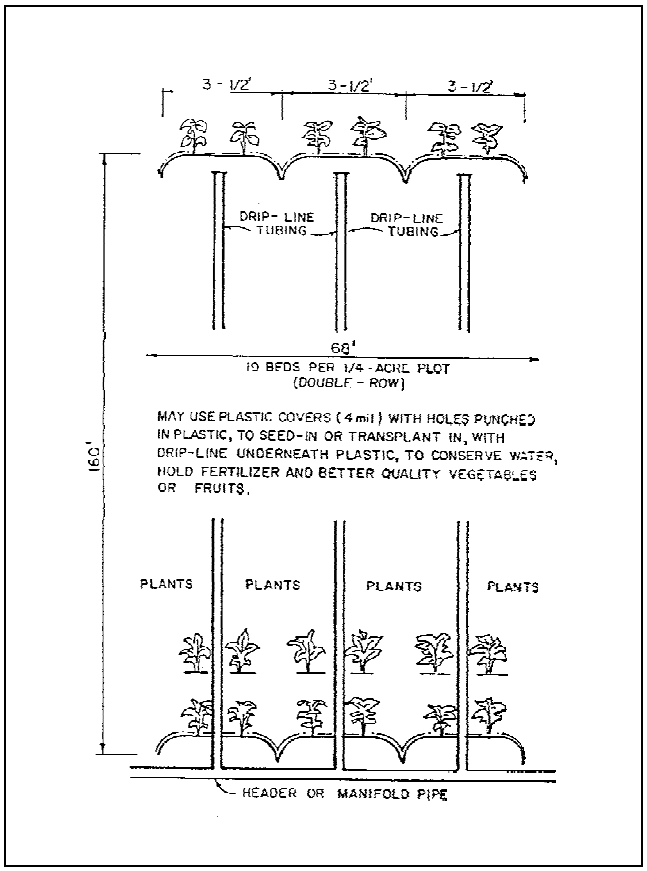

Figure 3. Layout of beds with drop tubing and 2 rows of plants on each 3-1/2 ft bed, for 1/4 acre plot, and optional plastic covers.

an estimation of energy costs for the irrigation systems, depending on kwh rates for the local area, are included in the sample plans.

In addition, the same portable drip system can be utilized to produce 2 to 3 crops per year and drastically increase the farmer's cash income, and at the same time complement his home consumption of fresh fruit and vegetables for direct use and freezer use for winter periods.

These practices are noted throughout the U.S. and small farmers can benefit tremendously by utilizing this regime to increase income and thus reduce the cash and energy necessary to purchase fresh vegetables and fruits at a local retail grocery store.

This irrigation process can help small farmers to increase sales of fresh fruits and vegetables, thereby supplementing their incomes and increasing their small income for other necessities of life.

ATTACHING TO PUMPS OR SPIGOTS

1. Small 1/3 to 1/2 HP Pump at House: When utilizing only a 1/4-acre plot, the 3/4-inch manifold (Fig. 2) must have enough hose (manifold, 3/4-inch) to hook up to a spigot at the house, so long as the extension is not more than 100 feet in length.

2. Small 3/4 to 1 HP Pump at House: Place a galvanized Tee at the pump, between the check valve and the pressure tank and a gate valve (1 inch) on the outlet side, then run a 1 -inch P.E. line to each of the 3/4-inch manifolds serving a 1/4-acre to 1/2-acre plot.

3. Small 1 to 1-1/2 HP Pump at House: Use the same procedure as 2 above, except use 1-1/2 inch mainline feeder hose, to each of the 1/4-acre plots, plus filter and pressure regulator (since most drip lines are designed to operate at about 10 psi).

SUMMARY

Plans and procedures are presented to aid the small farmer in producing "high cash" value vegetable or specialty crops to increase their farm income significantly with little investment necessary

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