LOW-COST DRIP IRRIGATION TECHNOLOGY FOR POVERTY ALLEVIATION

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Abstract

World grain production has now tripled due to Green Revolution, yet approximately one out of five in the developing world remains chronically hungry. It happened because of development of expensive irrigation technology of massive type, which could not reach to poor small farmers. A typical "micro-farmer's" holding in developing countries is divided into 4 to 5 "micro-plots" and only mass use of low-cost small plot irrigation technology could improve their income by providing opportunity of producing high value, market oriented crops in their tiny plots. The invention of cheap plastic led to development of low-cost drip irrigation technology. Mr. Hansen from Denmark, Mr. Blass from Israel and Mr. Chapin from the USA were the pioneers in this field. Mr. Chapin, at first, introduced a low-cost Bucket Kit drip technology in Senegal after widespread droughts in 1970, and provided the opportunity of producing excellent vegetables for the poor children of the drought affected area. At present, field tests of low-cost drip technology are going on in China, Sri Lanka, Bangladesh and Vietnam. During the last 25 years, China has installed low-cost drip systems in thousands of hectares. In Mexico, 50 test plots are established in four states. The technology is also being promoted in Kenya through the Chapin Third World Project. The Bucket Kit is being promoted in Zambia, Mozambique, South Africa, Uganda and Nigeria. IDE first started to develop low-cost drip irrigation kits in India and Nepal in 1995 and has developed four principal types of low-pressure drip systems - Bucket Kit, Drum Kit, Shiftable Drip System and Larger Low-Cost Drip System (Stationary Micro Tube System) for small farmers, which are simple, divisible, low-cost, small-scale, affordable, dependable and highly productive. Each Bucket Kit in India costs US$5 and irrigates 100 plants covering an area of 25 m^2. Each Drum Kit costs US$25 and irrigates an area of 125 m^2. Larger Low-Cost Drip System costs US$250 and is capable of irrigating an area of 4,000 m^2. The cost

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is about one-third cost from that of conventional drip system. Poor farmers can start with a small kit and then expand by investing profits received from the crop produced by the technology. The technology provides water savings from 43% to 79% and yield increase from 25% to 40%. Moreover, it increases family intake of vegetables to almost daily consumption. Drip irrigated fields have less weeds and the system is environment friendly. IDE has already achieved a good deal of success with mass marketing of the technology by adopting some highly effective strategies. National, state and local governments have important roles to play in creating policy climates and conditions for introduction and spreading of low-cost drip irrigation. Sustainable micro credit for continuous few years is also a critical issue for easy adaptation of this technology. The system very easily pay for the farmers in one growing season and it is possible for them to payback the loans without any trouble. Poor farmers would not take up the technology without financial and technical support. Proper strategies from various corners can popularize the low-cost drip technologies among the poor small farmers in Bangladesh.

Introduction

For the first quarter century of the new millennium, we are faced with an exponential escalation of two mutually reinforcing world problems: water scarcity and rural poverty. One of the learning lessons of agricultural development of the past is that an adequate amount of food is necessary but not sufficient for eradication of hunger. World grain production has tripled since 1950, and now totals approximately 1.87 billion tons per year (Brown et al., 1999), more than enough to feed properly the world's 6 billion people. Yet the United Nations Food and Agriculture Organization (FAO, 1999) reports that approximately one out of five of the 790 million people in the developing world, are chronically hungry. The impressive increases in national per capita grain production, the result of green revolution, has left million of people under severe hunger and poverty. The production of more "surplus" food could not solve the problem of hunger because the very poor are unable to buy it, though the prices are historically low. India, since long time ago, is self-sufficient in grain production; but still more than half of India's children are underweight and many of them are half-fed (Gardner et al., 2000).

Opening small-holder access to irrigation water, as well as to affordable small plot irrigation, is a critical first step towards alleviation of poverty. New affordable irrigation technologies like low-cost drip systems not only open the door to a path out of poverty; they are also a path to saving water, and doubling irrigation productivity on small farms.

The overwhelming majority of hungry people live in rural areas of South Asia and sub-Saharan Africa. They are among the 1.3 billion people who survive on less than US$1 a day. They are typically landless labourers or cultivators of very small plots, from which they get neither sufficient crop production nor income to ensure household food security. More than half of the farmland consists of marginal and small farms in the so-called “poverty square” of South Asia. Moreover, because of rapid population growth, the average farm size in this region has decreased by half every 15 years since 1960.

Small farmers could double the crop output and income from these small plots if they had access to a key ingredient of land productivity – water. With a secure water supply, farmers can choose to invest in higher-yielding seeds, grow higher-value crops, and harvest an additional crop or two each year. Irrigated plots in developing countries commonly yield twice as much as rain-fed plots do (Postel, 1999).

Raising the productivity of small-holders requires an entirely new approach to the design of irrigation systems. The irrigation sector has focused on: (i) large scale canal projects that deliver large quantities of water to farms; (ii) large scale groundwater projects; and (iii) high-quality pressurized sprinkler and drip systems that greatly improve the efficiency of water application, but that are too expensive for small-holders. The missing piece in global irrigation is the system designed for poor farmers on small plots who need access to irrigation water and/or a way to stretch a scarce supply of water. Such system would meet the following criteria: affordability - an irrigation system that need to be cheap and can be purchased by farmers earning more or less US$200 to US$300 per year; rapid payback- poor farmers are very risk-averse and is supposed to pay attention only to technologies that pay back returns two to three folds, divisibility and expandability - system must fit to varying farm sizes, down to micro-plots of one-tenth of a hectare or less; water efficiency- the majority of the poorest farmers are in arid or semi-arid lands or tropical areas with a long dry season. For them, water is