Put water where it's needed

Drip irrigation technology is spreading rapidly and helping small-scale farmers to escape the poverty trap, writes J M Colyer of Integrated Irrigation Systems, Zimbabwe.

Part of IIS's Drip Kit, 0.35ha version, being used to irrigate tomatoes at Cairns factory.

THREE-QUARTERS OF the world's farmers cultivate less than three hectares and many of them, due to a variety of constraints, have not increased production substantially over the last few decades. Large-scale farmers, on the other hand, have tripled their yields over the last four decades due to advancing technology and investment in mechanisation, irrigation, plant breeding, and pest and disease control. Small-scale farmers have been unable to fully take advantage of these developments and, consequently, have become vulnerable to land and climatic constraints giving rise to low yields and returns, resulting in cycles of rural poverty.

Drip irrigation technology, which was initially developed in the arid areas of the United States and Israel, is now the fastest growing irrigation system worldwide. It not only results in significant increases in yield and quality, but reduces the quantity of water, energy, labour, nutrients, and chemicals needed to produce a crop.

Integrated Irrigation Systems (IIS) of Harare, Zimbabwe, has had 10 years experience in promoting drip irrigation on a wide range of crops grown by large-scale commercial farmers in Central Africa, and has become increasingly aware of the advantages of introducing a multicrop rotational concept to the small-scale sector. Initially resistance was encountered by some development agencies and advisors who assumed that the potential users did not have the skills or incentive to maintain such a farming system, and would not be able to afford or service borrowings.

Pilot projects

These arguments are rapidly being overtaken by results obtained by pilot projects sited in Zimbabwe and adjacent territories. IIS developed completely pre-assembled kits together with manual and assembly instructions, which allows the farmers to install areas of 0.35 ha or one ha. The concept envisages growing high value crops to pay back the initial capital investment, and thereafter a combination of cash and subsistence crops as well as forage crops can successfully be grown on a solid set permanent surface or subsurface drip system. At present, schemes are designed for small scale commercial producers rather than for poverty alleviation schemes or subsistence users, who might consider the advantages of a smaller bucket or tank drip system, which is being successfully developed in India.

The IIS system envisages linkages between the grower and the development and funding agencies, the purchasers of the enhanced production, and suppliers of complementary inputs such as seeds, nutrients, and chemicals. The drip kits then cease to be merely a more efficient way of delivering water, but are a complete and sustainable farming system using mixed rotations, minimum tillage, and modified agronomy practices.

Development work is being continuously carried out to ensure the company maintains its lead in such aspects as pumps and pumping methods using motorised wind, solar and mechanical (hand and treadle) methods. Other aspects such as water scheduling, and the incorporation of inorganic and organic nutrients, soil ameliorants, pesticides and chemicals, are being researched and developed.

Organic farming techniques, permaculture and other alternative production methods, can easily be incorporated into a sustainable drip irrigation farming system, whilst conventional farming systems have shown dramatic results in crop yields ranging from tree and plantations such as coffee, citrus, bananas, deciduous fruit, pineapples, papaya, and berry crops, to field crops such as potatoes, and oil seeds such as groundnuts, sunflower, soya beans.

The full range of horticultural crops including capsicums, brassicas, legumes, curcubits, and graminaceous crops including seed and forage varieties, is very successful when grown under a sustainable drip system, whether it be for home or local consumption or sale as a cash crop.

There is a critical need for small-scale producers world wide to be able to produce sufficient crops themselves. At the same time crop surpluses may be marketed further away. A sustainable drip irrigation farming system appears to offer the best solution for small-scale growers, as correct use of the system will results in higher yields of better quality crops grown with less water, energy, labour, and other increasingly costly inputs such as nutrients and chemicals.

IIS has currently on offer two different sized drip kits which cater for areas of one ha and 0.35ha. The one ha scheme comprises eight manifolds supplying eight drip lines each, totalling 64 beds. The 0.35 ha scheme comprises two manifolds supplying 10 drip lines totalling 20 beds. The IIS drip kits are pre-assembled, and all parts are labelled, and with the aid of a simple and user friendly manual and assembly instructions, the end user can assemble the IIS drip kit quickly and easily. Pumps and fertiliser injectors are optional extras.

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