Drip irrigation – A Key Pillar in Sustainable Productivity

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Session 6b: Tools, Techniques, Innovations

Introduction

Netafim introduced drip technology to the world more than 50 years ago. It has taken close to 30 years until drip was widely recognized as the most efficient and environmentally friendly irrigation technology addressing many of the world's critical sustainability challenges.

Over the years Netafim has come to realize that there are two main, overarching components that influence and determine the success of drip adoption by farmers:

1. The technology – in order to be widely and successfully accepted by the market the technology needs to be reliable, of high quality and relevant to the requirements of the farmer (financially, operationally, in terms of life style and much more).
2. Training & capacity building – training is a key component in ensuring the optimal use of what drip technology can offer. This is a key to success, especially when introducing new, revolutionary technologies to traditional communities and environments.

Experience shows that training and the introduction of new technologies are significant contributors to capacity building outside the roams of the technology and its immediate surroundings. This has been at the core of Netafim's development efforts and value proposition for many years.

Key Issues and Challenges

Water, a valuable resource – water is well recognized as one of the critical sustainability challenges of the 21st century. Problems related to water availability, quality, and sanitation are undermining development in many regions of the world—exacting an enormous human cost while also undermining critical life-giving ecosystems. Therefore preserving water and using it more wisely has to become a priority.

Arable land – arable land on planet earth is finite, of the world's total land area of approximately ~150 million km^2, the vast majority is not suitable for agriculture. Nearly all of the world's productive land is already exploited (for example, in Asia, nearly 80% of potentially arable land is now under cultivation). Arable land is also in decline due to desertification, climate changes, nature disasters, etc.

Most of the unexploited land is either too steep, too wet, too dry or too cold for agricultural land use:

- Arable land: 10.57%
- Permanent crops: 1.04%
- Other: 88.39% (2005)

The environmental impact – the environment we live in is a precious and delicate resource to be admired and protected. Unsustainable agricultural practices present one of the greatest immediate threats to species and ecosystems around the world. Farmed areas provide important habitats for many wild plants and animals. When farming operations are sustainably managed, they can help preserve and restore critical habitats, protect watersheds, and improve soil health and water quality. But when practiced without care, farming presents the greatest threat to species and ecosystems.

Food security – nearly one billion people lack access to adequate food and nutrition. By 2050, the global population will surpass 9 billion people, and demand for agricultural products is expected to double. In order to ensure food security the world will need a new vision for agriculture—delivering food security, environmental sustainability and economic opportunity through agriculture. This will require producing more food with fewer resources while reinvigorating rural economies.

Energy supply – fossil energy, a finite resource, is currently one of the most sensitive resources; in the past few years, we have seen extreme shifts in oil prices—from all-time record highs to periodic lows.

This price instability will further motivate the world to develop alternative energy resources. Indeed, the world will need to find alternatives to traditional fossil fuels on a massive scale if the global economy is to thrive.

Ensuring successful adoption – as with all new technologies drip requires training in order to understand how to adequately operate the system. Without the training we run the risk that this technology will not be used wisely and will achieve the desired results.

Opportunities

We all learn at school that water makes up more than two-thirds of the worlds surface. Yet what we don't often realize is that only 2.5% of the earth's total water is fresh, less than 1% of all freshwater resources on earth are usable and out of that about 70% is currently being used by agriculture.

Water supply, while underdeveloped, is limited (though desalination, reuse and storage can increase available water dramatically). In addition climate change is

causing many areas to dry out and within the next generation, the number of people living in water-stressed countries is set to increase times six.

Although surface irrigation, mainly flooding, results in a significant amount of wasted water, leaching of fertilizers and relatively lower crop yields compared to competing methods, it is by far the most common type of irrigation throughout the world, accounting for ~80% of total irrigated area.

When analyzing available arable land suitable for agriculture and available fresh water sources in the vicinity of that land you come to realize the magnitude of the challenge, the conclusion can only lead in one direction:

The way we use water in agriculture will have to change on a massive scale if current and future food production is to keep up with worldwide population growth and global climate changes.

Drip irrigation – in analyzing the benefits of drip irrigation compared to flood or sprinkler, drip irrigation provides substantial advantages to the crop, the grower, and the environment.

In the vast majority of cases it proves to enable the grower to achieve better yields, higher quality, improve his financial performance and better his lifestyle.

Let's take for example a case study where corn was grown in Mexico using flooding and converted to drip irrigation. In this case, the use of drip irrigation led to a decrease in water usage by ~60%, and an increase in yields by ~15%.

Another example is sugarcane in Peru, comparing drip irrigation with furrow irrigation. In this case, the use of drip irrigation led to a decrease in water usage by over 50%, and an increase in yields by ~30%.

For all the above reasons we believe drip is a key pillar and a necessity in the paradigm shift towards sustainable productivity.

Training and Capacity Building – as with all new technologies, drip requires training in order to understand how to adequately operate the system and achieve the desired results.

In many cases that training goes well beyond the technical aspects of the drip system itself. In order to ensure optimal use of this tool and achieve maximum results a grower converting to drip needs to have a deeper understanding of the soil, air and water ratio. This in turn provides him not only with improved yields and financial results but also with a better understanding and appreciation of the environment he operates in and what he can do to help protect it.

It is therefore that we at Netafim see the technology go hand-in-hand with training and capacity building and spend much of our time and efforts training and up-skilling our end-users.

Recommendations

As mentioned previously, agriculture is the no.1 consumer of fresh water, using about 70% of available water; therefore, when addressing water scarcity, agricultural irrigation is the place to start.

Drip irrigation accounts for only 4% (estimated) of total irrigated areas, while surface irrigation (mainly flooding) accounts for ~80% and mechanized and sprinklers account for the remaining 16% (estimated).

In order to achieve the above mentioned target several things need to happen:

1. **Collaboration among stake holders** – substantial gains in agricultural productivity can be realized through investment, innovation, policy and other improvements. However, realizing these gains will require an exceptional level of collaboration among stakeholders in the agricultural value chain, including governments, companies, multilateral and civil-society organizations, farmers, consumers and entrepreneurs. Stakeholder alignment around shared priorities and large-scale initiatives is therefore a key to success.
2. **Massive scale change required in water and land use in agriculture** can only be achieved by adopting new technologies such as drip and ensuring successful implementation and maximum benefit is achieved. Although this is a challenge not to be underestimated, keeping to the old traditional ways of irrigation and growing practices will not yield the needed results. Growing more yield using existing limited resources is probably the biggest task modern farmers are facing.
3. **Drip irrigation** – drip irrigation, the most efficient and sustainable irrigation technology, needs to be adopted and become the standard in all applications where it is viable. In order to fully address the world's growing food security challenge the use of highly efficient irrigation technologies, especially drip needs to grow significantly. In the case of drip penetration needs to dramatically increase from the current less than 5% to double-digit share in the next few years.
4. **Training & Capacity Building** – in order to ensure the successful adoption of new technologies and growing practices it is necessary to establish the infrastructure and support network that will provide the training and the knowhow. This can be done, as an example, through the establishment of regional training centers, either as an independent entity or as part commercial entities serving a large number of growers.

Netafim introduced drip irrigation technology close to 50 years ago, and has continued to lead the way in technological development and innovation. Netafim's market leadership is established in all aspects of activities, from products through crops, to services and support. Today Netafim offers a broad range of solutions: from gravity-based and solar powered irrigation systems, mainly for small farmers, to mega projects in both developed and developing markets, integrating between farmers, governments, NGOs, financial and professional organizations. Netafim's advanced drip irrigation systems, together with its proven agronomic and application know-how, offer farmers complete solutions that enhance productivity and increase output while using less water and resources.

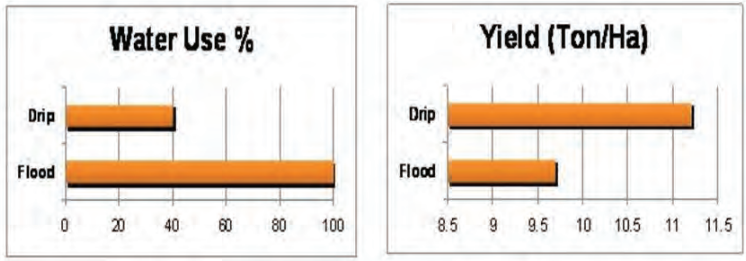
Table and Figure

Table – drip vs conventional irrigation (selected projects by Netafim India)

Field crops: Drip Fertigation Versus Conventional irrigation

CROP	YIELD (kg/acre)			WATER USE (m^3/acre)		
	Surface	Drip	% more	Surface	Drip	% saving
Sugarcane	30000	70000	133.3	9800	4960	49.3
Cotton	904	1700	88.0	3600	1680	46.6
Onion	14625	22500	53.8	2080	1120	46.1
Potato	6060	10880	79.5	2400	1100	54.1
Chillies	912	1520	66.6	1708	980	42.6
Grain corn	800	1400	75.0	2304	1500	34.9
Groundnut	1692	2436	43.9	2620	1680	35.9
Chickpea	1254	2200	75.4	1808	1048	42.0

Figure - Grow More With Less – Corn by Netafim Mexico



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Netafim market data