

FOOD SECURITY THROUGH TECHNOLOGICAL INTERVENTION OF MICROIRRIGATION IN INDIA

SECURITE ALIMENTAIRE PAR INTERVENTION TECHNOLOGIQUE DE L'IRRIGATION MICROENTREPRISES EN INDE

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INTRODUCTION

Indian economy depends on agriculture. The population is increasing in absolute numbers though the rate of growth has come down. The food requirement is multiplying. Hence there is a need to increase the agricultural production in the country. Agricultural production can be increased by adopting the following methods:

Introduction of high yielding hybrid varieties

During the first green revolution, this alternative was tried and found that use of hybrid varieties even though high yielding, have limitations, since many times new hybrid varieties bring diseases along with them and they are more prone to diseases rather than the original indigenous varieties. They also need high and costly inputs for their potential performance.

Bringing additional area under cropping

In fact because of growing urbanization, the area under cropping gets reduced unless we bring additional waste lands under cultivation. Even this is a limited option.

Increasing area under irrigation

This is the most practical and technically feasible solution. It is proven that by increasing area under irrigation we can increase production and productivity of crops. However, there are exceptional cases where because of over irrigation the soils have become saline/alkaline. These types of problems can be taken care of by judicious use of available water resources by introducing modern irrigation systems such as drip & sprinkler irrigation.

Thus irrigation and judicious use of water resources plays vital role in increasing the productivity of crops. It seems to be the only solution to increase the food production and thereby provide food for all. By bringing more area under irrigation cropping intensity can also be enhanced; bringing about tangible increases in crop production and agriculture growth rate.

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1. LIMITS AND CONSTRAINTS IN FOOD PRODUCTION

Following are the limits and constraints in increasing the food production in the country:

Shortage of arable land

Population increases while the land remains constant. Hence the land availability per capita is getting reduced day by day. Also it is a tradition in India that the land gets divided into number of pieces while handing over from one generation to the next generation. This also helps in reduction of per capita availability of arable land.

Land degradation

Due to excessive use of chemical fertilizers, the quality of the land is degrading and the land is becoming more unproductive or infertile. The excessive use of water also results in degradation of the good quality lands.

Loss of agricultural land to urbanization

Due to increase in urbanization and development of urban colonies etc, the agricultural land is converted into non-agriculture every year and thus the area under agricultural land gets reduced.

Water shortages and pollution

Fresh water available in India (1908 BCM) is only approximately 4% of the total fresh water available in the world (37500 BCM). This is disproportionate to the population that India holds. The per capita availability of fresh water in India was 3100 cum in 1975 which has come down to 1900 cum in 2000 which will further go down to 1400 cum in 2025. This is mainly due to increase in population of the country. At present, irrigation contributes about 84% of the water consumption. With the increase in demand of quantity of water for other uses, the percentage share of water used for irrigation is likely to get reduced to about 73% by 2025.

2. INDIAN IRRIGATION SCENARIO : A REVIEW

1. World Bank (1999) intimated that the development of surface irrigation was reaching practical limits in many of India's river basins.
2. Central Water Commission (2004) stated that though the irrigation potential of the country had increased at a healthy growth rate of about 1.5 million Ha per year, the lag in the utilization had also increased from 1.22 million Ha in 1956 to 9.77 million Ha in 1997.
3. It can be seen that despite significant progress in the creation of irrigation potential, under-utilisation continues to persist. Hence it is necessary to focus on the on farm irrigation in order to utilize huge irrigation potential created in the country. The Command Area Development Programme (CADP), in operation since 1974-75, particularly aims at bridging the gap between potential created and its utilisation. The programme also includes measures to installation of sprinkler & drip irrigation and farmers' participation in irrigation water management.
4. It can also be noted that the productivities in case of canal irrigated areas are less as compared to well irrigated areas. In well irrigated areas, the productivities are better due to reliable water supply and demand based water supply. The farmers are able to irrigate their fields as and when required by the crops due to tremendous flexibility they have in case of well irrigated areas.

3. MICRO IRRIGATION HISTORY & PRESENT SCENARIO IN INDIA

During early 70s few micro irrigation systems were installed in the country. These systems could not perform due to poor quality material and little or no support services by manufacturers. When Jains entered the market in India approximately 2500 Ha area was under micro irrigation in 1987. Jains with their integrated approach of survey, design installation and commitment for service and best quality material could sell the concept very well. The awareness about micro irrigation systems and its advantages was brought among the farmers through dedicated extension work and through media such as TV etc. and in a very short span of time, area under micro irrigation was almost doubled every year during the period 1987 to 92. Presently it is estimated that some 50 Lac Ha is under MIS (25 Lac Ha under drip and 25 Lac Ha under sprinkler) in India and there are more than 100 manufacturers of MIS in the country. The systems have been installed on more than 50 different crops. This indicates that the industry is growing at a very fast rate and India has already emerged as one of the largest consumers of micro irrigation systems including drip & sprinkler.

4. DRIP IRRIGATION SYSTEMS

Drip irrigation is a regulated application of water through specially designed emitters or orifices situated close to the root zone of individual plants. It is particularly effective in regions suffering from a shortage of irrigation water. In drip irrigation applications, drip systems carry a precise and on-demand quantity of water and fertilizers through a network of pipes and emitting devices to the roots of each plant helping to enhance crop yield. Table-1 shows the advantages of adoption of drip irrigation systems. It is observed that there is saving in water up to 68.5% and increase in yield up to 66.6% over the conventional flow irrigation.

Table 1: Benefits of Drip Irrigation (Avantages de l'irrigation au goutte à goutte)

CROP	LOCATION	YIELD (T/Ha)			WATER USE (cm)		
		TRI	MIS	% DIFFERENCE	TRI	MIS	% DIFFERENCE
Ashgourd	Jodhpur	10.8	12.0	10.0	84.0	74.0	12.0
Bottlegourd	Jodhpur	38.0	55.8	31.9	84.0	74.0	12.0
Tomato	Udaipur	14.4	17.5	17.7	41.0	28.0	17.7
Watermelon	Jodhpur	29.4	88.2	66.6	80.0	80.0	-
Onion	Delhi	28.4	34.2	17.0	52.0	26.0	50.0
Okra	Delhi	36.0	48.0	25.0	42.0	26.0	38.1
Cotton	Coimbatore	2.6	3.3	20.2	86.0	30.0	64.7
Sugarcane	Delhi	92.0	119.0	22.7	136.0	92.1	32.3
Sugarcane	Pune	128.0	170.0	24.7	215.0	94.0	56.3
Sugarcane	Navsari	70.6	116.1	39.2	142.0	105.0	26.0
Groundnut	Udaipur	9.1	34.7	73.8	87.0	54.0	37.9
Pomegranate	Hyderabad	3.4	6.7	49.3	21.0	16.0	23.8
Papaya	Coimbatore	13.0	23.0	43.5	228.0	73.0	68.5
Banana	Kharagpur	29.0	40.0	27.5	106.0	106.0	-
Banana	Bhawanisagar	27.7	32.9	15.8	186.0	172.0	7.5
Banana	Ludhiana	57.5	87.5	34.3	176.0	97.0	45.0
Grapes	Ludhiana	26.4	32.5	18.8	53.0	28.0	47.2

Ref: H.P. Singh, J.C. Samuel & A. Kumar, INDIAN HORTICULTURE April-June 2000
 TRI-Traditional Irrigation. MIS-Micro Irrigation (Réf: H.P. Singh, JC & Samuel A. Kumar, HORTICULTURE INDIEN Avril-Juin 2000 TRI-traditionnels d'irrigation. MIS-Micro Irrigation)

5. SPRINKLER IRRIGATION SYSTEMS

Sprinkler irrigation is a method of applying irrigated water in a manner similar to rainfall. Water is distributed through a system of pipes, usually by pumping, and then sprayed into the air saturating the ground with small water drops. Sprinklers can provide efficient coverage for both small and large areas and are suitable for a wide range of properties and irrigable soils since they are available in a wide range of discharge capacities. Table 2 shows the advantages of adoption of sprinkler irrigation systems. It is observed that there is saving in water up to 50% and increase in yield up to 100% over the conventional flow irrigation.

Table 2 : Benefits of Sprinkler Irrigation (Avantages de l'irrigation par aspersion)

Sr.	Crop	Yield (T/Ha)		% Increase	Water Used (mm/Ha)		% Saving
		TRI	SIS		TRI	SIS	
1	Wheat	1.5	3	100	600	450	25
2	Maize	1.5	2.5	66	600	450	25
3	Vegetable	6	10	66	600	450	25
4	Wheat*	3.8	3.8	-	303	167	45
5	Groundnut*	0.8	0.9	11	475	225	52
6	Coffee**	4	7.8	95	600	300	50

* These are result of experiment conducted on various research station viz. Hanumanagr, Brore and Loonkaransar in Indira Gandhi Canal Area. Paper presented by S.K. Mathur & M.S. Shekawat, Krishi Bhavan, Bikaner, Rajasthan during June 1996 at Institution of Engineers, Bangalore-Sprinkler Workshop (Ce sont des résultats d'expérimentation menée sur le savoir la station de recherche différents. Hanumanagr, Brore et Loonkaransar au Indira Gandhi, Canal Zone. Document présenté par S.K. Mathur & M.S. Shekawat, Krishi Bhavan, Bikaner, Rajasthan pendant Juin 1996 à l'Institution des ingénieurs, Bangalore-gicleurs atelier)

** Result of the experiment conducted at Regional Coffee Research Station, Chundale, Wynad, Kerala (Résultat de l'expérience menée à la station de recherche sur le café régional, Chundale, Wynad, Kerala)

6. POTENTIAL FOR M.I.S. IN INDIA

Theoretically speaking, micro irrigation is suitable for all the crops including Paddy. Thus the entire irrigated area in the country i.e. 62 Mha is the potential available for micro irrigation. However it is estimated that considering the other constraints such as economical viability etc, the actual potential for MIS is estimated at about 30 Mha. Question is the choice of the technology suiting local conditions such as type of crop, type of water source, topography, economical viability and so on.

7. JAIN'S "TOTAL SYSTEM APPROACH"

For introduction of drip irrigation systems in the country we adopted integrated "Total System" approach. Our "Total System" approach includes:

Indigenization to suit India's small farms & varied climate:

We believe drip irrigation products which are marketed globally are ideally suitable for larger-sized mechanized farms and typically have short useful lives. As a result they are generally not well suited to Indian conditions. In 1998, we launched a variant drip irrigation system aimed at small sized farms with features such as drip emitters, drip laterals, filters and fertigation equipment to better suit India's small-sized farms and poor water quality.

Service support for products

We assist our customers in designing drip irrigation products installed by collecting and analyzing water and soil samples and recommending remedial measures. For larger projects, we also assist farmers in installing and maintaining our drip irrigation products through our crew of trained technicians.

Strong agronomic support to farmers:

We employ experienced agronomists who are available to educate our customers about irrigation and fertigation scheduling and better agronomic practices.

System demonstration through field R&D:

We demonstrate the benefits of drip irrigation through our own 400 Ha R&D Farm where drip technology and waste land reclamation are shown through water harvesting techniques and watershed planning.

8. CONTRIBUTION OF JAIN IRRIGATION IN INDIA

1. In India, Jain Irrigation has been taking-up supply and execution of lot of projects for Micro Irrigation Systems including drip and sprinkler irrigation systems. In India we have so far covered more than 25 Lac Ha for various crops and our presence is there in almost all the states.
2. Our current book is at Rs.3500 crore and we are growing by about 40% every year. We think that this will continue because there has been lot of new programmes from various states-Andhra Pradesh, Maharashtra, Gujarat, Punjab, Tamil Nadu. Plus Madhya Pradesh, Rajasthan, Chhattisgarh, Himachal Pradesh all these states are taking up micro irrigation projects in a big way.
3. Drip irrigation is growing quite a lot, Jain Irrigation helps the farmer to save water and improve productivity and at the same time save labour as well as fertilizer. It's a revolutionary technology and it is helping Indian Agriculture to go forward. It catalyses changes in bringing other aspects of crop production technology.