INFLUENCE OF DRIP IRRIGATION ON AGRICULTURAL SYSTEM GROWING IN INDIA

JAGANATHREDDY S. CHITKOOR

Research Scholar, Dept. of Economics,

Sri Satya Sai University of Technology & Medical Sciences,

Sehore, Bhopal-Indore Road, MadhyaPradesh, India

Dr. Kanchan Shrivastav

Research Guide, Dept. of Economics,

Sri Satya Sai University of Technology & Medical Sciences,

Sehore, Bhopal Indore Road,Madhya Pradesh, India.

ABSTRACT

The general importance of micro irrigation and drip irrigation has been given to politicians, academics, economists and so on for its perceved ability to make a significant contribution to the production of groundwater supplies, to agricultural productivity, to economic growth and to environmental sustainability. The effect of drip irrigation on agriculture system growth in terms of crop pattern, resource use and yield has been studied in this paper. It has been found that the drip method of irrigation dramatically affects resources saving, growing prices, crop yields and agricultural profitability. The strategy should therefore be geared towards encouraging drip irrigation in those regions where there is a troubling shortage of water and work and a move to more wide-ranging crops. Although there has been a very clear documentation of the positive effects of irrigation on agricultural intensification and increased crop yield, marginal irrigation returns relative to other inputs like agricultural technology and rural infrastructure growth continue to be a controversial issue. Improved understanding and knowledge on the scale of irrigation and other inputs to agricultural growth and development and alleviation of poverty have significant public impacts on rural development policy. In setting irrigation, farm investment and finance policies it is especially important. This knowledge is also relevant in view of the recent increased public policy goals and strategies for poverty reduction.

KEYWORDS: Drip Irrigation, Agricultural System, Growing, India, groundwater resources development, agricultural productivity, economic growth, environmental sustainability.

INTRODUCTION

In many developing economies, particularly in arid and semi-arid tropical countries like India, water resources infrastructure and their management have been the common policy agenda. A research by the IWMI showed that approximately 50% of the rise in water needs can be met by rising irrigation performance by 2025. The study of previous studies has shown that there are two solutions to the issue of increasing freshwater depletion and ongoing

deterioration of groundwater supplies across regions. The first is the management of supply-side activities such as water-shed development, development by major irrigation projects, medium and small, etc. The second is to effectively use the current water in the short-term and long-term perspectives by demand management. This includes drip irrigation and other improved practises for water conservation. Since the late 1970's, many demand management strategies have been launched to increase efficiency in the use of water particularly in the use of surface water with a recognition for the importance of sustainable water use efficiency in agriculture. The use of micro irrigation systems, such as dripping and sprinkler, is one of the requirements management mechanisms. Evidences indicate that in a properly designated and operated drip irrigation system, water quality increases by up to 100 percent. Drip irrigation system helps minimise the overuse of groundwater, which is partially caused by wasteful water use under surface irrigation process. Also totally absent in the case of irrigation by dripping are environmental issues associated with irrigation surface approaches such as water logging and salinity. Drip method helps to reduce irrigation water efficiency, boost water use, reduce laundering needs, increase the quality of goods, increase crop yields and increase the efficiency of fertiliser usage. While the possible advantages of gout irrigation methods are evident, the use of gout irrigation in regions, states and elsewhere still needs to be widely promoted. It was found to be a prorata of pricing energy, which would establish a direct incentive for productive water usage, as the best policy climate for the promotion of micro irrigation technologies within well irrigated areas. In semi-arid, well-irrigated regions, where farmers have independent irrigational sources and groundwater scarce, the adoption of micro-irrigation systems is likely to be rapidly recovered. In addition, large sections and a method of agriculture dominated by large-scale crops, which are also very valuable, provide the perfect climate for the same crop (Kumar et al., 2005). Evidence suggests that several researchers tried to examine the effects of drop irrigation and found that gout irrigation has the desired positive effects. It shows that the technology of drip irrigation, especially if farmers rely on groundwater sources, is technically feasible. However there are few and still much to be studied studies on the impacts of drop irrigation on the entire farming system.

Agricultural Growth and Poverty Alleviation

This study aims to examine the increased influence of irrigation and other factors on growth and its effects on poverty alleviation in India in the last two and a half decades, as well as the effects of irrigation on total factor productivity growth and other inputs. The overall productivity factor of all the inputs taken together is often called productivity, which differs of the indicators of productivity conventionally understood, such as crop yields, water productivity or labour productivity. Furthermore this study explores the structure and relative significance of factors influencing poverty disparities and rural consumption levels in India. This is achieved using annual time series data from 1970 to 1994 for 14 major Indian states representing over 90 percent of India's agrarian economy. Global agricultural growth and technological change have a major effect on the growth of the economic

foundation and poverty alleviation in a country. Past empirical studies have demonstrated the ultimate significance of agricultural growth in all-factor (TFP) productivity in developing countries for alleviating rural poverty.

In the review of the previous literature, Mellor (2001) states that agricultural development in developing countries, including a decline in inequality over time, has significant consequences for reducing poverty. The actual impacts on poverty of agricultural growth differ according to the existence, location and length of the studies selected. While most of the preceding studies indicate that agricultural productivity growth has a positive effect on poverty reduction in Asia, the current rural poverty literature neglected to research the growing impact on agricultural productivity growth from each factor input and their marginal impact on reducing poverty and increasing rural income. Several studies in India have shown the profound role of irrigation management in poverty reduction. Some of India's recent combined longitudinal studies have also shown that access to irrigation has a positive effect on reducing poverty. However no direct ties were identified between irrigation and the alleviation of poverty. And many other intermediate factors affect the effect of irrigation on poverty alleviation. In order to establish efficient and effective poverty alleviation policy instruments, it is therefore important to better understand the structures of the influence of different factors and quantify the marginal effects on poverty measures of each factor input.

This study has successfully differentiated the incremental marginal effect of such inputs in agriculture and rural growth, amid polémics in incremental impact assessments of factor inserts and inputs for each factor. Results show that improving irrigation and rural literacy rates are both of the two main factors in Indian agriculture's recent growth and overall development. Taking into account the important role played by agriculture growth in reducing poverty in a region by the previous literature, factors, irrigation and literacy, obviously have to play a larger role in rural overall development and in alleviation of poverty. The increased influence of rural literacy on inter-state productivity variations clearly shows the important role that production of human capital plays in rising farm productivity and increased agricultural income. The findings indicate that the potential strategy to reduce poverty

in rural India will largely depend on how well the irrigation sector is treated efficiently and how well a large number of agricultural workers in regions still without the Green Revolution of the 1970s and the 1980s have access to irrigation. Furthermore, irrigation will increase the lower income quintile of the population more than other high income quintiles of the population just under the poverty line because of higher jobs and other retroactive impacts on the rural economy (wage and employment safety). Increasing access to irrigation is therefore in reality a pro-poor policy to alleviate poverty in an area.

Farm Level Impacts of Drip Irrigation

Our goal here was to observe major changes in the land tenure, cultivated area and irrigated area due to drip irrigation. The drip-adopters were contrasted with control households for this reason. Compared to the control villages, the average holdings among the drippers were substantially high. Since the irrigation drip system requires huge initial investment, big farmers take it as much as small and marginal farmers take it on (Table 1). Pre-drop adoption data were gathered on the basis of the recall. For control villages, the pre-adoption reference period was considered to have been 10 years before, namely 1995 when drop irrigation is considered a viable method of water-saving that increases cropland and irrigation areas. Our research confirms the earlier findings on the increase in net seed areas, net irrigation areas and net irrigation area by means of drip irrigation technology. In drop villages, for example, the net sown area has risen from 4,51 hectares to 5,31 hectares, while the gross crop area increased from 4,77 hectares to 6,36 hectares. In the net irrigated area and the gross irrigated area a similar positive trend has been observed. It has been shown during the survey that drip irrigation has had a big effect. It has helped to increase the irrigated area and conserve water as an effective water saving technology. In tropical villages between drip adopters, the percentage of area irrigated by wells in the total cultivated area has increased substantially. As a result of the drop-out intervention, the proportion of the area irrigated by wells has risen from 82.0% to 98.03%. Study of the major positive effects of the drip irrigation technology in the farming method is lucid.

Table 1. General characteristics of sample households

Crops	Drip villages		Control villages	
	Before	After	Before	After
Number of workers in the household (No.)	2.7	2.7	1.92	1.92
Farm size (ha)	5.52	5.41	2.23	2.28
Net sown area (ha)	4.51	5.31	1.41	1.35
Gross cropped area (ha)	4.77	6.36	1.46	1.39
Cropping intensity (%)[a]	105.57	124.34	103.54	102.96
Net irrigated area (ha)	3.65	4.97	1.27	1.22
Gross irrigated area (ha)	3.84	6.26	1.28	1.22
Irrigation intensity (%)[b]	104.88	130.16	100.18	100.00
Percentage of area irrigated by wells to the total cropped area (%)	82.0	98.03	94.65	94.26
Percentage of area irrigated under drip to gross cropped area (%)	67.14			
Percentage of area irrigated under drip to gross irrigated area (%)	68.57			

Cropping Pattern

An attempt was made to decide if drip irrigation had led to a new crop system as a result of the increasing water shortages or the crops had adopted drop technology? A strong indicator of the growth of resource donations and agricultural production is the cultivation trend, i.e. proportion of area under different crops. Drip irrigation methods are also expected to help improve the capacity for water supplies and help farmers produce more crop and revenue for each drop of water. The longitudinal analyses in farm households and villages of crops have shown that several factors drive the use of drip irrigation. The two key disadvantages of agricultural production are human labour and the lack of water. Both factors have pushed farmers to shift their crop pattern to less labor-intensive and hydraulic crops. Rainfed crops such as sorghum, maize etc. were used by poor farmers. Nevertheless the large farmers who had access to capital implemented different water conservation and coping policies. Drip irrigation was introduced, as one of the most important technology for water conservation. So there was a change from labor-intensive cultivations such as vegetables, sugar cane, cotton, paddy, etc. to less labor-intensive crops, such as the use of coconut in areas that had extreme water and labour shortages, and the decrease was accompanied by drip adoption. As the drip-dry method dramatically saves people's labour by eliminating irrigation and weaving, after the drip-irrigation plants were planting water loving crops like bananas and grapes.

Impact of Drip Irrigation on Agricultural Production

The economics of gout irrigation on major crops were established for the purpose of assessing the effect of drip irrigation on agricultural production. The use of gout irrigation has an important beneficial effect on farmers' prices for planting, production costs and returns. The economics of banana growing have reported that labour costs are considerably less than in the control villages (Rs 9761/ha, 69% lower) (RS 31487/ha). The drip system saves the work performed by humans in crop production substantially. It also saves work for irrigation and weeding. On average 17 working days/ha under the drop system and 60 working days/ha under the flood irrigation method used for weeding bananas had been used. Compared to the flood irrigation system, the drip method saved about 71 per cent of weeding. The irrigation work was carried out with 168 working days per hectare under flood procedure, and 18 working days per hectare by drip irrigation system. As a result, the cost of cultivation over the flood approach was considerably lower. The decline in labour costs has an important effect on the costs of cultivation. While drip farmers incur the cost of installing and maintenance of drip equipment, cultivation costs per hectare are Rs 80396/ ha, which is approximately 23% lower in drop farms than those in control villages (Rs 109685/ha). Rs 200232/ha in drips and Rs 163048/ ha in control farms was found to have a gross margin per hectare. It shows clearly that a 22 per cent improvement in the gross margin over control was observed by the drip irrigation system. With the implementation of drop irrigation, water and energy productivity in drip farming is much higher than the control villages that regulate flood irrigation. The water efficiency of drip farms and 4.9 kg/m3 water of control villages for example has been achieved at 7.4 kg/m3 of water. There has also been a substantial difference in energy productivity. Renders per unit of water and resources have shown that the returns on drip farms are

considerably higher. It could therefore be inferred that the introduction of drip will be a feasible technology that has important consequences for private benefit.

CONCLUSION

The study showed that the use of drip irrigation technology increased the sown area, the irrigated area and thus the rate of cultivation and the irrigation. It was found that crops such as cocoa, grapes and banana are transferred significantly from annual crops such as vegetables, sugar cane and so on. The key factors for this were human labour and water scarcity. The adoption and suitability of gout-irrigated crops could be supported in regions where shifts to crops such as cocoa, banana and grapes are normal, as the crop pattern decides. The economics analyses of dripped and under control crop cultivation demonstrated that irrigation by dripping has a major impact on the saving of energy, crop cost, crop yield and profitability of the field. The physical water and the energy efficiency of the irrigation system are substantially dropped. We could assume that the drop affects the private costs and advantages and thus the farmers' benefit significantly. In these places, where water and labour shortage is worrying and where there is a move towards more space-filled plants, our policies will therefore be tilted to encourage drip irrigation.

REFERENCES

Collins, L. (1975) An Introduction to Markov Chain Analysis, Concepts and Techniques in Modern Geography No.1, University of Edinburg.

Dhawan, B.D. (2000) Drip irrigation:Evaluating returns, Economic and Political Weekly, 35(42): 3775-3780.

Dhawan, B. D. (2002) Technological Change in Irrigated Agriculture: A Study of Water Saving Methods. Commonwealth Publishers, New Delhi.INCID (Indian National Committee on Irrigation and Drainage) (1994) Drip Irrigation in India, New Delhi.

Kulecho, I.K. and Weatherhead, E.K. (2005) Reasons for smallholder farmers discontinuing with low cost micro irrigation: A case study from Kenya, Irrigation and Drainage Systems, 19 (2): 179-188.

Kumar, M. Dinesh (2005) Impact of electricity prices and volumetric water allocation on groundwater demand management: Analysis from western India, Energy Policy, 33 (1).

Kumar, M. Dinesh, Turral, Hugh, Sharma, Bharat, Amarasinghe, Upali and Singh, O. P. (2008) Water Saving and Yield Enhancing Micro-Irrigation Technologies in India:When and Where Can they become Best Bet Technologies?, International Water Management Institute, Patancheru, Hyderabad.

Lee, T.C., Judge, G.G. and Takayama, T. (1965) On estimating the transition probabilities of a Markov process, Journal of Farm Economics (August): 746-62.

Magar, S. S., Firke, N. N. and Kadam, J. R. (1988) Importance of drip irrigation. Sinchan, 7 (2) : 61–62.

Namara, Regassa E., Upadhyay, Bhawana and Nagar, R. K. (2005) Adoption and Impacts of MicroirrigationTechnologies : Empirical Results from Selected Localities of Maharashtra and Gujarat States of India, Research Report 93, International Water Management Institute, Colombo, Sri Lanka.

Narayanamoorthy, A. (1997) Drip irrigation: A viable option for future irrigation development, Productivity, 38 (3): 504-511.

Narayanamoorthy, A. (2003) Averting water crisis by drip method of irrigation: A study of two water intensive crops, Indian Journal of Agricultural Economics, 58(3): 427-437.

Narayanamoorthy, A. (2005) Economics of drip irrigation in sugarcane cultivation: Case study of a farmer from Tamil Nadu, Indian Journal of Agricultural Economics, 60 (2): 235-248.

Palanisami, K., Vidyavathi, A. and Ranganathan, C.R. (2008) Wells for welfare or illfare: Cost of groundwater depletion in Coimbatore, Tamil Nadu, India, Water Policy, 10(4): 391-407.