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# Agricultural Production and Market Outlook

The Rising Agriculture....

## Pressurized Irrigation Network Systems:



A Pressurized Irrigation System is a network installation consisting of pipes, fittings and other devices properly designed and installed to supply water under pressure from the source of the water to the irrigable area (FAO, 2000). In this system of irrigation, water is pressurized, supplied to farm plots that uses MIS such as drip and sprinkler and thus precisely applied to the plants under pressure through a system of pipes. Pressurized irrigation systems, as opposed to the surface irrigation systems, are more effective in water saving and in increasing area under irrigation. They provide improved farm distribution, improved control over timing, reduced wastage of land in laying field distribution network, reduced demand for labour and better use of limited water resources.

The Pressurized Irrigation Network System (PINS) is an innovative concept which facilitates all the basic requirements of MIS viz. (a) Daily application of water and (b) Pressurized flow using Surface water resource (Canals) and acts as an interface between Canal waters and MIS. It comprises of pipe network with controls, pumping installations, power supply,

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filtration, intake well/diggy (Figures:1). It is a common and shared infrastructure (by Group of farmers) facilitating individual beneficiary for installing and operating MIS.



**Figure 1: Components of PINS in Gujarat**

The PINS-MIS helps in ensuring more crops per drop of water by enhancing water use efficiency and covering more area under irrigation with saved water from switching over from flow irrigation.

**Table 1: Advantages of PINS-MIS over Conventional Flow Irrigation**

Sl	Particulars	Flow	PINS+MIS
1	Distribution	Gravity	Pressure
2	Water losses a. Conveyance losses b. Application losses	7 to 9 % 25%	Nil Drip- 2- 3%; Sprinkler -10 -15%
3	Water availability	Not enough for optimum irrigation and yield	Availability can be increased
4	Water productivity	Low	High
5	Conjunctive use necessity	More	Less
6	Poor quality of water	Use will deteriorate soil and crop productivities	Reasonably poor quality of water can be used without affecting soil productivity
7	Land requirement/Ha	170 m2 required for sub minor and FC	24 m2 required for storage (8 hrs supply)
8	Land topography restriction	Restriction	No restriction
9	Maintenance of water courses	Recurring maintenance expenditure	No maintenance problems
10	Drainage	Is a must. In long run problems may arise	Drainage related problems minimal
11	Soil health	Prone to deteriorate	Health maintained.
12	Poor irrigable soils	Cannot be irrigated	Can be irrigated
13	Other than command areas	Cannot be irrigated	Can be brought under irrigation

14	Incidences of pests, Diseases, weeds	More	less
15	Cost of cultivation	More	About 20 % lesser than flow
16	Watch and Ward	More	less
17	Ground Water pollution	Highly prone	Nil
18	Double cropping	Not possible	Enough scope
19	Crop Quality	Normal	Improved
20	Employment generation	Labour/unskilled	Skilled manpower
21	Energy requirement	No	Yes

Micro irrigation has seen a steady growth over the years. Since 2005, area covered under micro irrigation systems has grown at a CAGR of 9.6 percent. Geographically, states with the largest area under micro-irrigation include: Rajasthan (1.68 mh), Maharashtra (1.27 mh), Andhra Pradesh (1.16 mh), Karnataka (0.85 mh), Gujarat (0.83 mh) and Haryana (0.57 mh). Majority of the area covered under micro irrigation systems comes under sprinkler irrigation with 56.4 percent, while 43.6 percent comes under drip irrigation.

Since the concept of PINS is very new one, there is dearth in research in this field. It is pertinent to examine how the PINS systems are performing and what are the major constraints and prospects of their future growth in various parts of the country.

**In Gujarat :** Government of Gujarat has put in lots of efforts to replace conventional irrigation by micro irrigation so as to improve water use efficiency and to increase area under irrigation in the state. The pilot project on Pressurized Irrigation Network System (PINS) is one such effort started in 2007-08 in the command area of SSP. Accordingly, about 25 pilot projects were initiated in the state covering 1029 farmers with 1491.6 ha of CCA and estimated budget of Rs 1306.3 lakh. The average spending incurred per PINS was Rs 35.4 lakhs against the estimated Rs 52.3 lakhs. The estimated per hectare expenditure on PINS at Chak level was Rs 20340. Because of PINS, the per hectare water savings was estimated to be to the tune of Rs 15000 for Bhal and Bara areas (mainly saline areas) and Rs 19560 for other zones, respectively. The project work was carried out by Jain Irrigation Ltd (56%), Parikh Industries (32.0%), EPC Industries (8.0%) etc.



Though the Government of Gujarat followed a proactive approach to increase the adoption of PINS by the water users, the existing practices of farmers such as relying more on conventional flow method for irrigation did not change much due to various reasons. The farmers did not want to change the



cropping pattern which was highly water intensive. They did not want to spend anything on installation of MIS since canal water was available to them plentifully almost free of cost. There are no much strict rules and regulations enforced to check the illegal use of canal water and water theft.

However, the tube well PINS have been operating in the state since a long ago as a viable method of irrigation in the state. The Government of Gujarat introduced the policy of pressurized irrigation system in the command area of public tube wells under Gujarat Water Resources Development Corporation (GWRDC). As per the Government norms, Micro Irrigation System (MIS) provided in the command area of 309 tube wells covering 1452 Ha in five districts of the state i.e. Banaskantha, Mehsana, Patan, Gandhinagar and Sabarkantha. The State Government had decided in March 2013 to provide MIS in Government tube wells at 100% Government cost in total nine districts. Accordingly the State Government provided MIS system in 162 tube wells in 2013-14 covering 1531 Ha and 1037 farmers. The MIS works covering 2984 ha of 3780 farmers were in progress in 208 tube wells which was likely to be completed in 2014-15. Till January 2016, a total of 674 tube wells have been covered by GWRDC out of which 54.0 per cent was through government subsidy and remaining 44 per cent were given partial assistance.

#### **Performance of PINS Programmes in Gujarat:**



The tubewell PINS was popular in several districts in Gujarat whereas the canal PINS was not well adopted by the farmers. The majority of farmers (68.7%) had less than 1 ha area under tubewell PINS. About 95.3 per cent of sample beneficiary farmers adopted drip whereas the 10 per cent of them adopted sprinkler in the state. The total cost of drip and sprinkler systems was Rs42950 and Rs30133 per household (hh) in the study areas. The major motivating factors for the beneficiary farmers for adoption of PINS-MIS were to get assured amount of water for irrigation (79.3%), better and stable crop yield and farm income (78.0%), saving more water and to cover more area under irrigation (67.3%), facilitating judicious or efficient distribution of water among the water users (54.7%) and avoiding unnecessary conflicts with other farmers (28.7%).

The water saving due to judicious use of water (94.0%), increase in agricultural income (86.7%), getting water in right time (88.0%), proper distribution of water among farmers (62.7%), getting more information on how to use water judiciously (56.7%), electricity saving (54.0%) and improved maintenance of the system (26.7%) were the major benefits accrued by the beneficiary water users/farmers.

The proportion of area under more remunerative Rabi crops was also found to be higher (28.7% of GCA) in case of beneficiary farmers as compared to non-beneficiary farmers. It was observed that, except few crops like groundnut, mung and cumin, beneficiary farmers had enjoyed better crop yields as compared to non-beneficiary farmers. The percentage change in yield under drip over flood and change in yield under sprinkler over flood has been spectacular with respect to some crops like castor (117.6% and 102.1%, respectively) and cotton (83.1%). Among Rabi crops, major benefits were observed in the case of wheat (by 83.3% and 108.4%, respectively), fennel (55.1%), rapeseed-mustard (59.9%), and tobacco (by 84.6%).

Some of the factors those helped in generating some benefits were better water management by WUA members (58.0%), better education and awareness of the farmer (43.3%), more area under PINS-MIS (34.0%) and more area during Rabi (37.3%) were the major ones. The results of Probit model indicated that, more area under PINS-MIS, uninterrupted power regular supply, more depth of tubewell, sufficiency of water in PINS and group membership helped in realising the benefits like increase in yield and income, water saving and energy saving by the beneficiary farmers.

Among the major activities undertaken by different types of PINS TUAs, operation and maintenance of PINS project, deciding the timing of water release, judicious water distribution, collection of water rates, collection of per capita operation and maintenance cost were the major activities of Govt. TUAs.

The main source of income for these TUAs were annual maintenance fees collected whereas the major heads of expenditures were the expenditure on electricity bill, repairing expenses, salary expenses. Besides, in case of PINS, the charges to Irrigation Department and some miscellaneous expenses were incurred by the WUA/TUAs.

The major benefits provided by the WUAs to its members were arrival of water in time, proper distribution of water among farmers, more information on how to use water judiciously, saving of water, electricity and labour cost, improved maintenance of the system and less conflicts around water. WUAs/TUAs also faced some constraints in management of their associations. Among these constraints, the funds constraints, unavailability of required quantity of water, unavailability of proper maintenance and repairing services and electricity problems are the major ones.

#### **Suggestions on Canal PINS**



*Acknowledged the information used/taken from the public domain*

- The farmers did not want to change the cropping pattern which was highly water intensive. Thus, it is necessary to discourage more water consuming cropping pattern, by encouraging suitable cropping pattern through some incentive structure.
- It was found that the farmers did not want to spend any amount on MIS since canal water was available to them almost free of cost. Thus, it is suggested to revise the water rates which are very less and strict rules and regulations should be enforced to check the illegal use of canal water and water theft.
- it is suggested to re-launch this canal PINS programme with required amendments by locating these projects at far off places where farmers are struggling to get irrigation water. Though it involves little more investments in term of infrastructure expenditure, the adaptation and long-term sustainability would be surely achieved just like the success of PINS projects in Sanchore region in Rajasthan.
- Majority of sample farmers were marginal with small land holdings who faced difficulties in getting bank loans due to incomplete land documents and other outstanding debts. The measures may be taken to provide affordable credit facilities to small and marginal farmers.

**Suggestions on Tube well PINS:**



- The study finds that maintenance and electricity cost for beneficiaries of tube well PINS is a major part of their expenses which is reasonably high, thus the subsidy may be given on electricity provided to farm plots.
- Services provided by some companies were unsatisfactory;

frequency of their visits was insufficient. Thus there is a need to take measures to regulate the agencies supplying MIS to the farmers and adhering to standard norms on maintaining quality and providing proper and regular services for the repairing of the PINS-MIS within reasonable time limits. There is also a need to have more testing facilities for quality checking of equipments.

- Farmers are unaware, uneducated about use of PINS and MIS. So the required extension advisory services should be provided to the farmers, especially on maintenance and applicability of PINS-MIS for different crops.

**Suggestions on UGPL with PINS:**

- Since underground pipeline system (UGPL) pipeline infrastructure is used as PINS as well as for conventional irrigation, the new scheme has been well adopted by some farmers in Gujarat. However, there are some issues in implementation of UGPL in Sub-Minors. Farmers were not willing to pay 10 per cent, their contribution, which was later on reduced to 2.5 per cent. Farmers are continuously growing some crops and hence not willing to allow laying of UGPL. There is a need of strict adherence of Government guidelines so as to complete the implementation work in a time bound manner. Provisions should be made to pay required compensation for crop loss for laying of UGPL.
- Due to poor management culture in WUAs, the maintenance and distribution of water was badly affected in some cases. Thus, there is need to strengthen existing WUAs and to form WUAs in a time bound manner, where they are not available.
- The combination of UGPLs and PINS replacing Minors, Sub-Minors and FCs need to be systematically promoted to help saving land as well as water. The UGPL system with PINS should gradually focus on more adoption of MIS with appropriate financial incentives for effective management of irrigation water while taking care of farmers' preferences for different cropping pattern. The services of NGOs and model WUAs may be taken as motivators for more adoption of water saving technologies under UGPL with PINS.

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