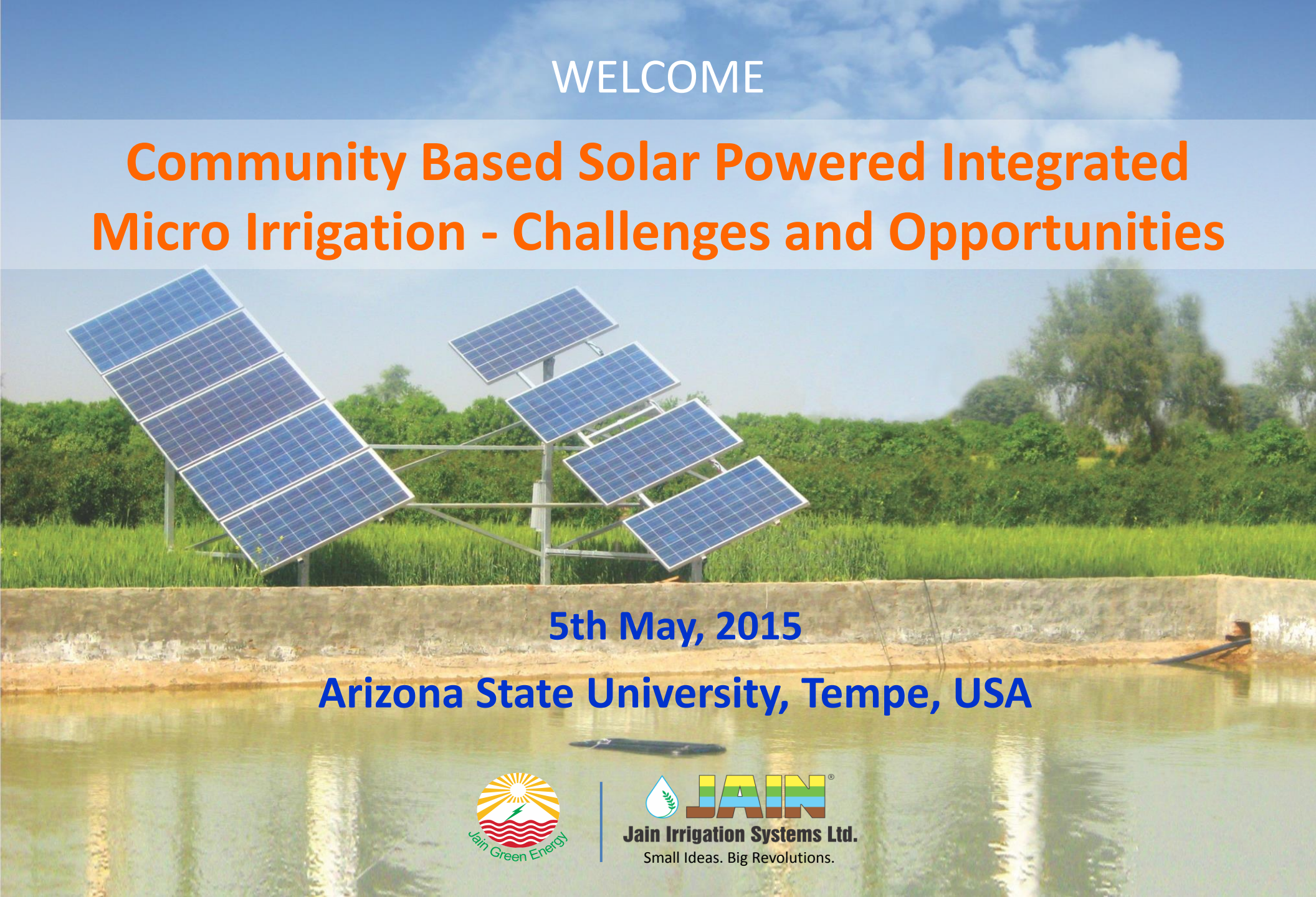
WELCOME

Community Based Solar Powered Integrated Micro Irrigation - Challenges and Opportunities



5th May, 2015

Arizona State University, Tempe, USA

Jain Green Energy

JAIN®

Jain Irrigation Systems Ltd.

Small Ideas. Big Revolutions.

Disclaimer

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The claims including benefits, such as increasing yield, Water savings etc. depend on climate, cultivation practices and many other factors beyond the control of Jain Irrigation hence they cannot be guaranteed.

Corporate Philosophy

Mission

Leave this world better than you found it.

Work Culture

Work is life; life is work.

Intensely Committed to

An Integrated approach for improving complete Agri Value Chain through sustainable and affordable technological interventions.

Corporate Vitals

Enterprise Life	50 years completed.	
Turnover 2014-15	More than US$ 1 Billion	
Manufacturing Plants	India – 12 in 5 states.	Abroad – 15 in 4 continents
Permanent Manpower	India – 9,200.	Abroad – 1,100
Dealer Network	India – 2,711.	Abroad – 901

"Invested capital of about US$1 Billion has enabled the enterprise to be the largest & most integrated private sector Agricultural Institution in India."

Corporate Product Range

Hi-Tech Agri Inputs

- Micro Irrigation Systems:
  Green, Poly & Shade Houses,
  Solar Agri Pumping Systems,
  Tissue Culture of Banana & Pomo
- Integrated Irrigation Solutions

Food Processing

- **Pulp, Concentrates, IQF:** Mango, Guava, Banana, Pomegranate and Tomato.
- **Dehydration:**
  Onion and Garlic.

Green Energy

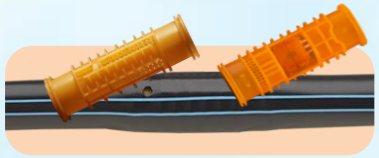
- Solar Water Heating, Home Lighting & Off Grid Systems.
- Solar Photovoltaic Power Generation.
- Bio Gas Power Generation.
  (Agri & Fruit Plant Waste)

Polymer Processing

- Plastic Piping Systems .
  (mostly used in Agriculture)
- Plastic Sheets.
  (wood substitute)

Product Range - Micro Irrigation

Inline Drip System

Online Drippers and Spray heads

Jain Filtration System

Jain Fertigation System

Jain Rainport/ Micro Sprinklers

Jain PVC/PE Pipes & Fittings

Automation System

Product Range - Jain Solar Agri Pumps

Pump Sets

Controller

Solar Panel

Product Range - Jain Solar Agri Pumps

Jain Surface Solar Pump Models – 0.1 Hp TO 3 Hp

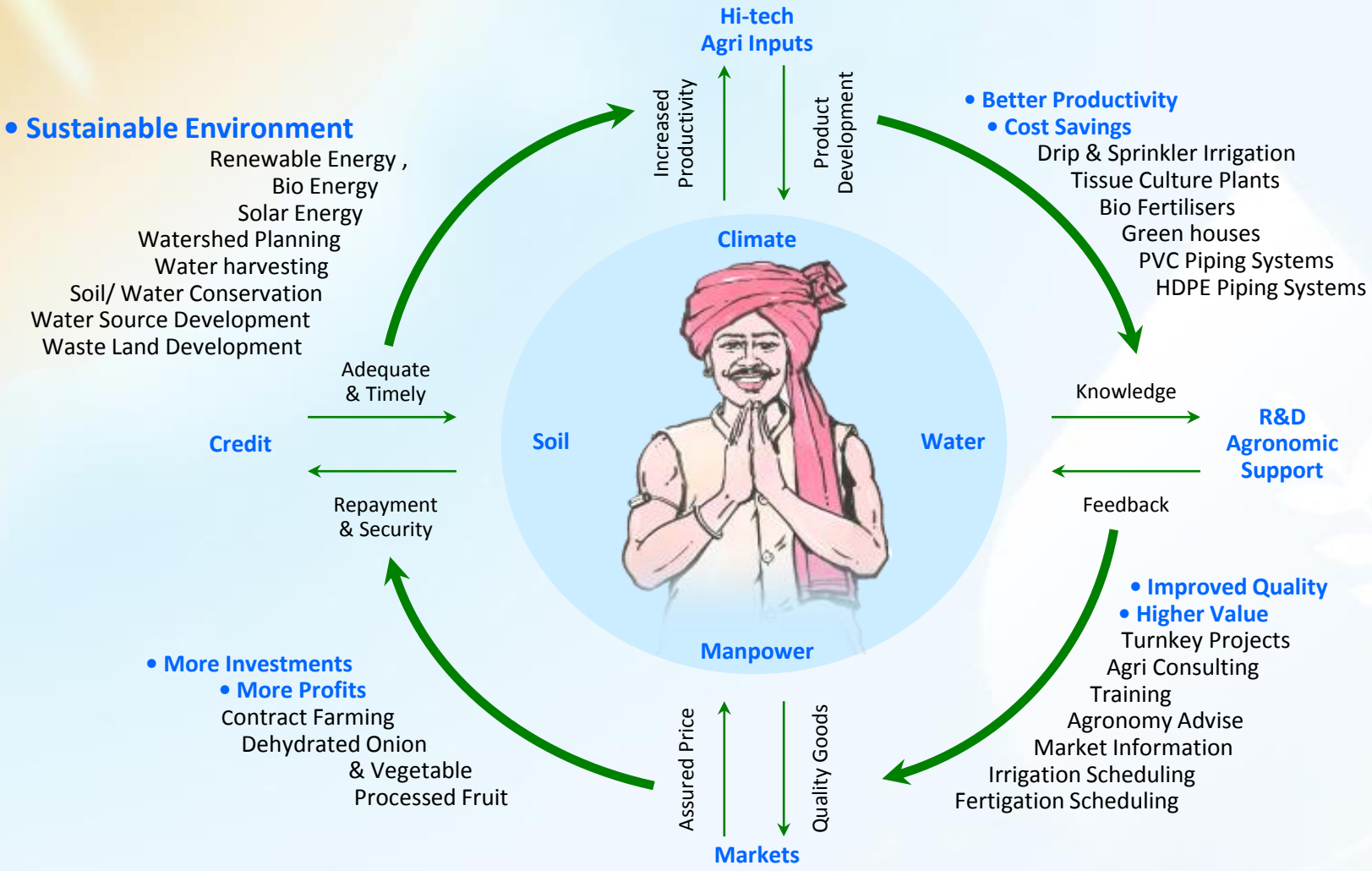
- Surface pumps are available from 0.1 Hp to 3 Hp.
- The maximum suction head is 6 to 8 meters.
- The maximum vertical lift is 120 meters.
- The maximum flow rate (at minimum head) that can be achieved is 37,000 lph.

Jain Submersible Solar Pump Models – 0.5 Hp TO 24 Hp

- Available in centrifugal & helical rotor models from 0.5 Hp to 24 Hp.
- The maximum total head available is 350 meters.
- The maximum flow rate (at minimum head) that can be achieved is 90,000 lph.

Jain Integrated Model

The Jain Self Sustaining Agri Cycle



Indian Agriculture Scenario

Land	India has overall geographic area of 329m ha of which about 140m ha is sown area. 2nd largest arable land bank in the world.
Water	Despite having the highest irrigation acreage globally, 70m ha of agri-land in India is rain-fed (50%) & 17m ha is partly irrigated (12%). 70% of water used in Irrigation.
Climate	Diverse climatic conditions. 12 hours average sunshine per day. Average Rainfall 1000 mm. However erratic and unevenly distributed.
Population	More than 1000 Million (growing at a rate of 2% per annum). 53% of the population is directly dependant on agriculture with another 27% indirectly dependant on the sector.
Land Holding	At less than 1.5ha, India's average land holding size is one-hundredth that in the USA. Marginal holdings (< 1ha) make up 70% of total land holdings.
Productivity	Agricultural productivity in India are still one-third to half that of world best levels in many crops. China produces 40% more agri-output than India from 40% less area than in India. Better nutrient management and agri-input usage is a key reason.
GDP	Indian Agriculture accounts for 18% of the nation's GDP (Gross Domestic Produce) & 14% of Exports. Share of agriculture in overall GDP came down from 57% in FY51 to 18%.

Characteristics of Existing Agriculture

- Marginal Land Holdings
- Widening productivity disparities between irrigated and rain-fed areas
- Uneven and slow acceptance of technology
- Lack of adequate incentives and appropriate institutions
- Degradation of natural resource base, e.g. Water Pollution, Soil Degradation etc
- Rapid and widespread decline in ground water table.
- Increased non-agricultural demand for land and water
- Inadequate mechanization and labour shortage
- Inefficient use of inputs e.g. fertilizers, irrigation and pesticides
- Wastage of agricultural produce due to inadequate Post Harvest operations.
- Lack of awareness among farmers for modern crop production methods
- Ineffective extension service
- Insufficient financial resources for investments.
- High level of consumption subsidies resulting in wastages
- Low per hectare income for farmers

Demands of Future

PROJECTED FOODGRAIN DEMAND AND IRRIGATED CROP AREA				
	unit	**2010**	**2025**	**2050**
Food grain demand	million t	247	320	494
Net cultivated area	m ha	143	144	145
Total cropped area	m ha	193	204	232
Total irrigated crop area	m ha	79	98	146

Source: National Commission on Integrated water resources development, GOI

Scenario -Food

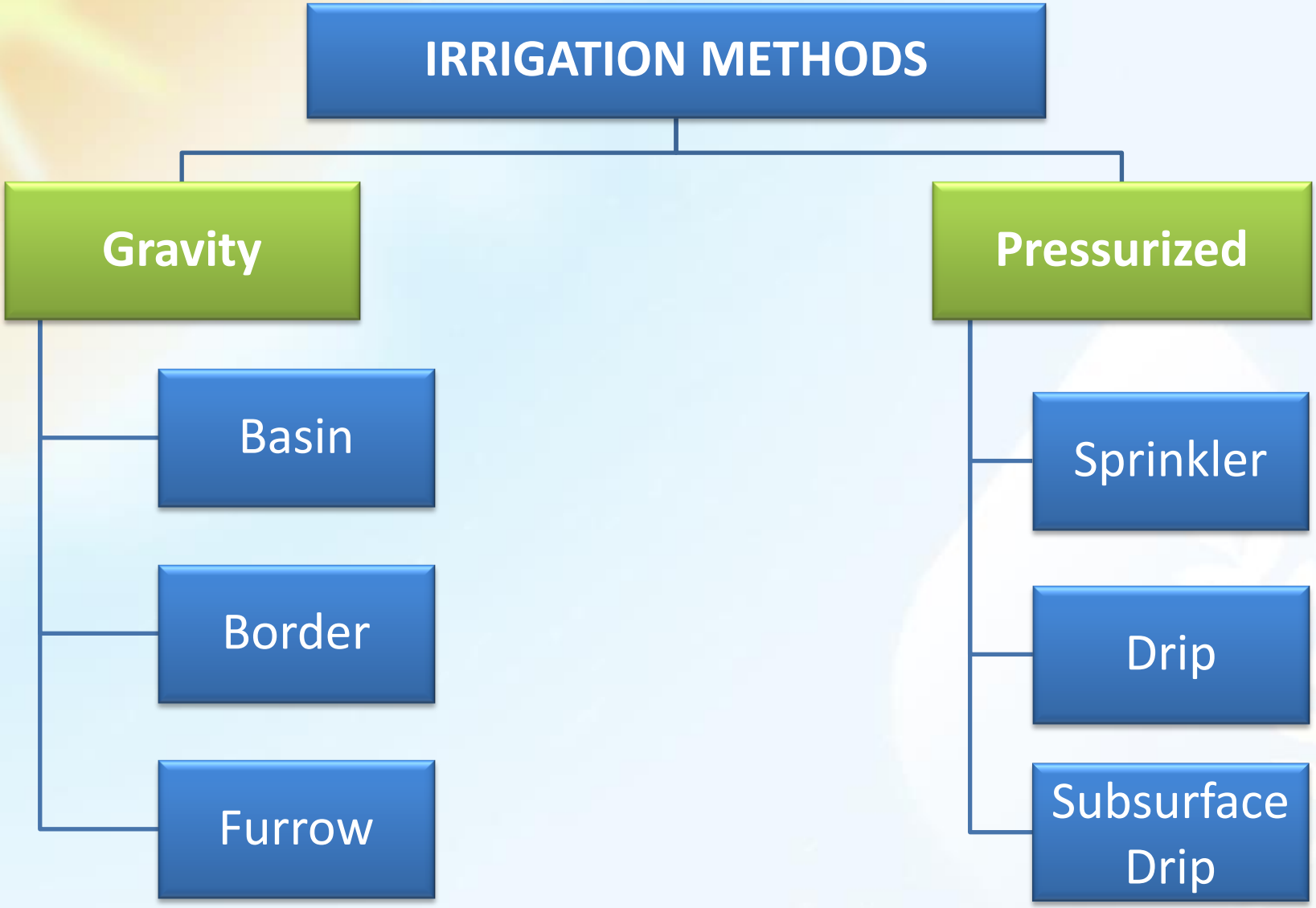
- Food production has to increase from 247 to 494 m MT (AD 2050) to feed the ever increasing Population.
- Increase in cultivated area will not add much to this requirement. (Possible increase only 2 m ha from the present 143 m ha).
- Converting rain-fed crops to irrigation cover (Partial or Full) is the only way out (79 to 146 m ha).

Scenario- Water

- Gross Water Requirement increases to 1200 BCM from the present 700 BCM.
- Available water remains at 1137 BCM
- Water deficit will force us to take ***extreme measures*** by 2030-2050.
- Before that happens conservation of water would help us survive better.
- Irrigation is the largest water user (+ 83%)
- Reducing water use in irrigation by increasing use efficiency will generate more water for irrigating more land area.

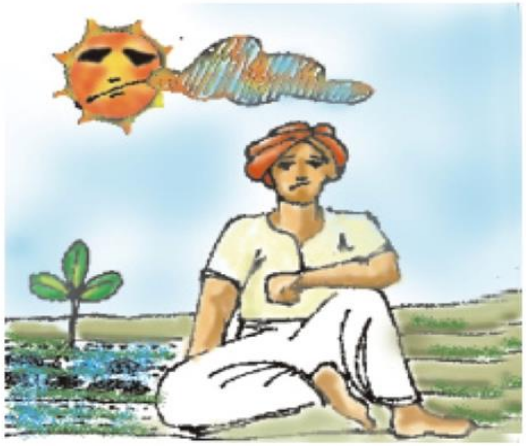
Scenario- Power

- India is a power deficit country.
- Solar Pumping Systems in Conjunction with Farm Ponds and Micro Irrigation Systems in Dry Land Areas
- It would be much wiser to give additional capital base subsidy to the farmers for purchase Solar Pumping Systems


IRRIGATION METHODS
Gravity
Pressurized
Basin
Border
Furrow
Sprinkler
Drip
Subsurface Drip

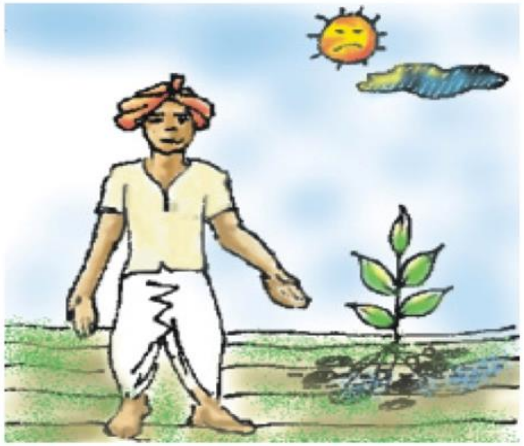
Drawbacks in Conventional Irrigation Method

First Three Days After Irrigation



During first three days of irrigation soil pores are saturated with water. In this condition, total air in the soil is replaced by water & field capacity level is not maintained in the soil. Though sufficient nutrients are avaiable in the soil, the excess water condition suffocates the roots of the plant & water absorption by roots is totally ceased. As the plant is under suffocation the growth is hampered.

Middle Three Days



During next three days, due to evaoration & percolation losses, the excess soil moisture is reduced & soil comes to field capacity level wherein air, moisture & nutrients are available at optimum level.

Plant growth takes place only during this phase.

Last Two Days

In last two days, the moisture level in the soil goes below the root zone hence, plant is under stress condition in this period.

Even though air and nutrients are sufficiently available in the root zone they can not be taken easily by plant as the plant is under stress and hence growth restricted.

Conclusion: It is very clear from the above phenomonon that for the plant growth, optimum moisture level available is only for about three days out of 8 days' cycle. Rest of the time plant is either under stress or suffocation condition, hence gorwth is restricted thereby yield is reduced.

Progress in Irrigation Water Management

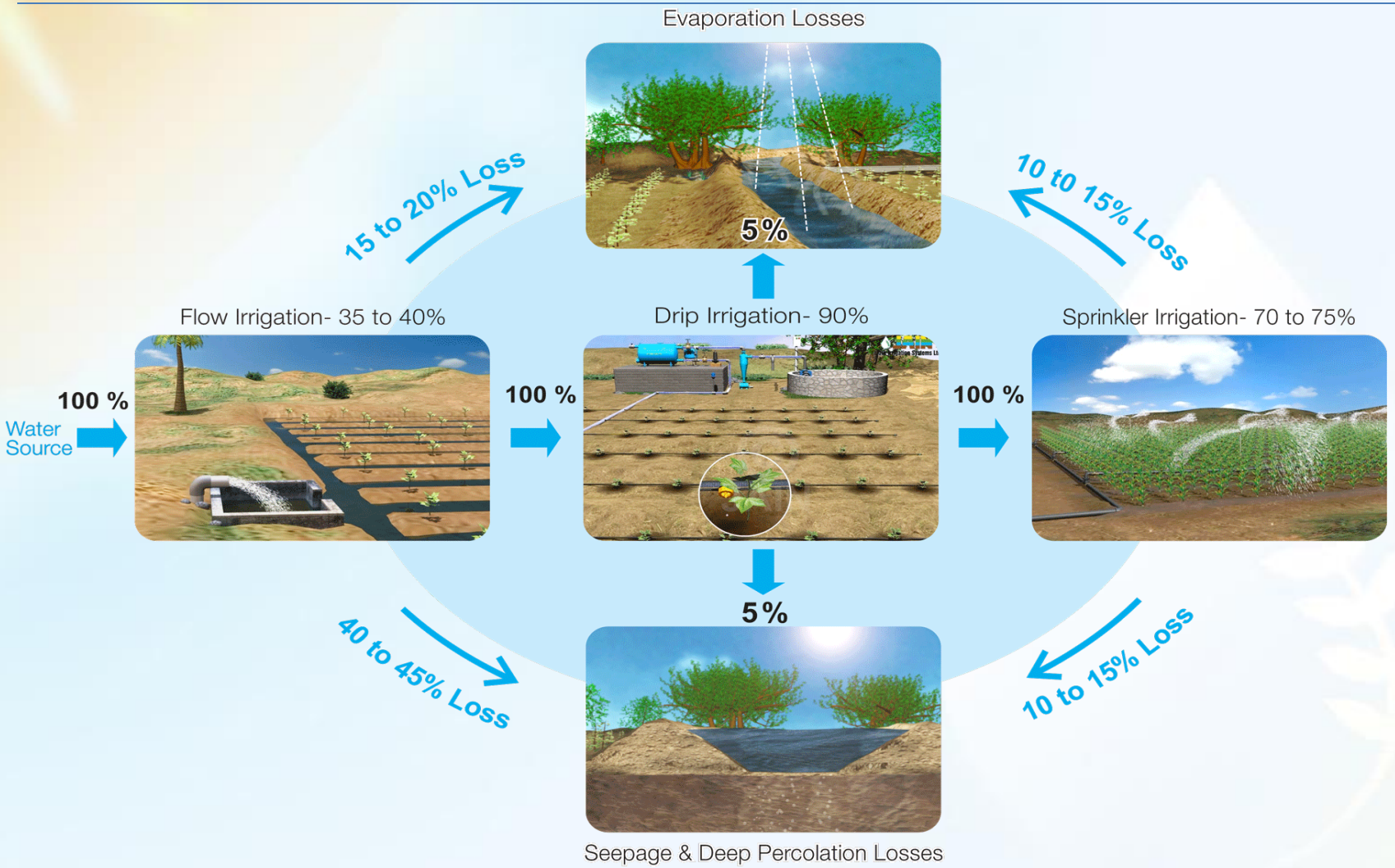
More Crop Per Drop

Jain Drip

Jain Solar Pump

JAIN Jain Irrigation Systems Ltd.

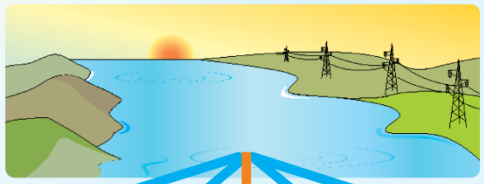
Water Losses in Irrigation Methods



From Resource to Root ™

Legend

- Canal
- Pipe Line
- Conveyance Efficiency
- Field Application Efficiency
- Overall Project Efficiency

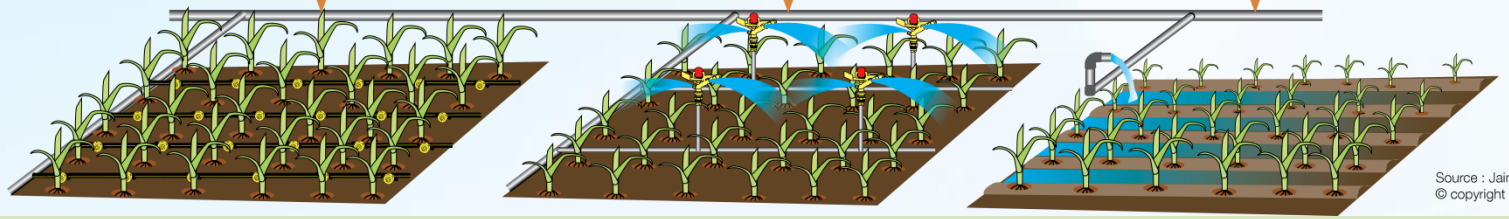


Water Source

Energy Source

1) In the diagram given below, Red line indicates efficiency from water source to root zone (86%). This means the entire network is closed (piped).
2) In Blue Lines, if the entire network upto water courses is of canal & on field irrigation is flow, the maximum achievable efficiency would be 34%. If the water courses are replaced with pipes & on field drip irrigation is provided, achievable efficiency would be 56% and so on...

	86 %	76 %	95 %	66 %	56 %
	Main / Branch	Distributary	JIIS	Minor	Water Courses
	95%	95%	95%	95%	95%
	Drip 90%	Drip 90%	Drip 90%	Drip 90%	Drip 90%
	74 %	65%	86%	56 %	50 %
	95%	95%	95%	95%	95%
	Sprinkler 75%	Sprinkler 75%	Sprinkler 75%	Sprinkler 75%	Sprinkler 75%
	61%	54%	71%	47%	42%
	95%	95%	95%	95%	95%
	Flow 60%	Flow 60%	Flow 60%	Flow 60%	Flow 60%
	52%	44%	57%	38%	34%



Source : Jain Irrigation internal study-2015

More Crop Per Drop

Jain® Drip

Jain™ Solar Pump

JAIN® Jain Irrigation Systems Ltd.

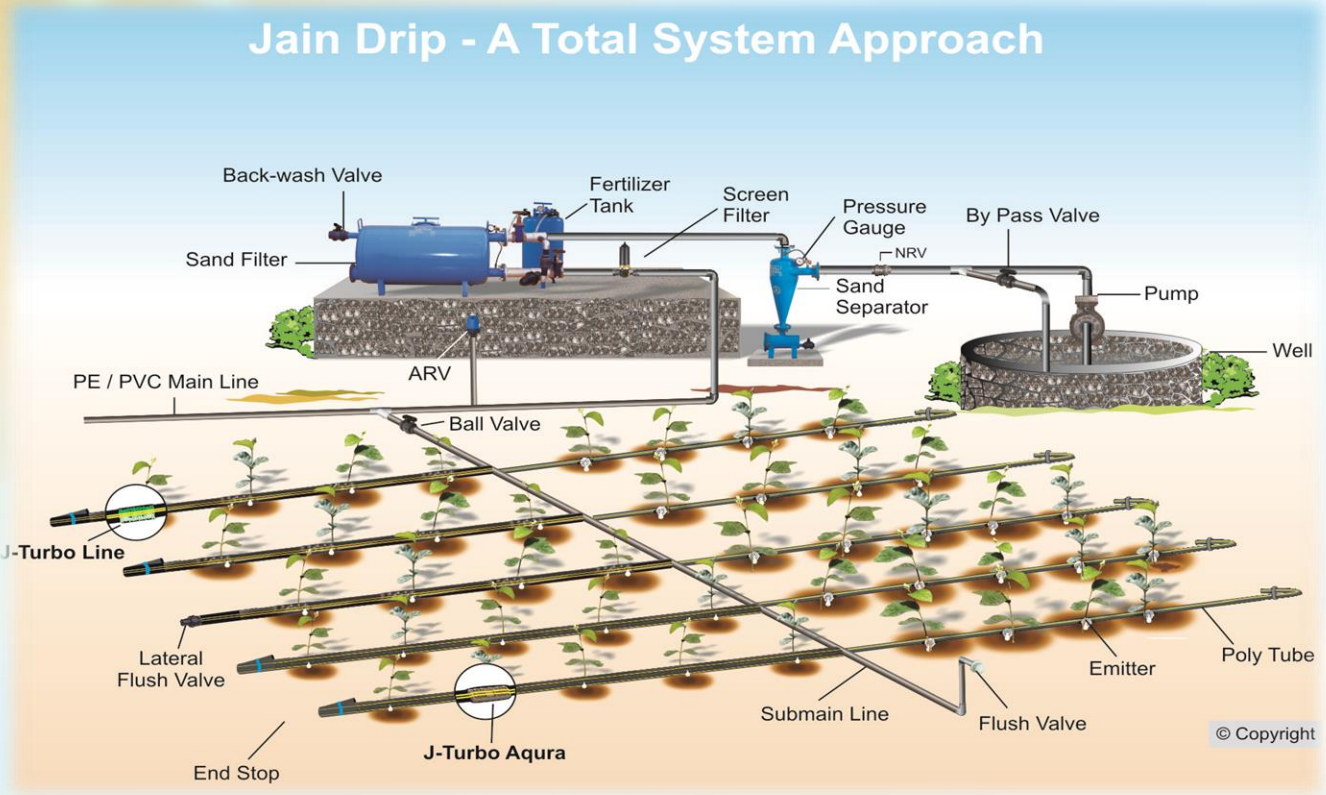
Why Pressurized Irrigation Technologies?

- The productivity of irrigated land is low compared to its potential
- The productivity per unit water is very low.
- Water available for irrigation is becoming scarcer.
- Cost for generating water source is ever increasing.
- The predominance of soils with low water retention capacities and very low hydraulic conductivity's makes the Arid & Semi-arid regions an ideal case for light and frequent irrigations i.e. Micro-irrigation.
- Pressurized Irrigation will increase the irrigation cover using the existing available water.
- Pressurized Irrigation with fertigation will enhance production per unit input in these nutrient poor low dense soils.

Principles of Micro Irrigation

- Water is applied to the root zone of the plant directly.
- Water is applied at frequent intervals (daily) in controlled quantities as per requirements of the plants.
- Water is applied through a low pressure network including main, submain and lateral lines with emitters/drippers spaced along the lateral lines.
- Water is essentially passed through a filtration system to prevent suspended impurities, which may block the emitters.
- Water soluble fertilizers and nutrients can also be applied along with micro irrigation through a fertilizer tank and/or ventury.

Components of Micro Irrigation System



- Drippers/ Emitters
- Emitting Pipes & Fittings.
- Micro Sprinkler & Sprayers.
- Impact & Floppy Sprinklers.
- Filtration Units.
- Fertigation Equipments.
- Control Valves.
- Poly Tubes & Fittings.
- PVC / PE Pipes & Fittings.
- Quick Release Coupling (QRC) Pipes & Fittings.
- Automation System

Technical Advantages

- Low Application Rate
- Precision Placement of Water
- Better Control of Root Zone Environment
- Quality Improvement of Produce
- Improved Disease Control
- Prevents Weed Growth
- Substantial Saving in Irrigation Water
- Suitable for Difficult Land Terrain
- Ideal for Marginal Lands
- Maintains Soil Health
- Suitable for inferior quality water.

Economic Advantages

- Increased Yields will ensure Food Security.
- Reduced irrigation requirements would lead to substantial saving of water , which will result in to irrigation of additional area and generation of additional farm produce.
- Waste lands/water logged areas/ undulating terrains can be brought under cultivation, thus increasing cultivated area and farm produce.
- Reduced Input Costs including fertilizers, labour and power

Social Benefits

- **Employment Generation:** In many cases, farmers perform agricultural operations themselves including operation and maintenance of micro irrigation systems/drip kits, fertigation etc. This leads to the skill development and a lot of empowerment among the farmers, apart from financial security.
- **Social Justice** : Uniformity of Water Application leads to social justice
- **Literacy :** Increased yield and reduced input costs would ultimately result in to social prosperity. Farmers would be able to send their children to schools and even to the colleges.
- Stops migration of rural youth to urban areas.
- The saved water can be diverted to fulfill increasing domestic water demands.
- Adoption of Drip Irrigation for Cotton would help to ensure fulfillment of clothing needs.

Environmental Benefits

- Lower Energy Requirements
- Lower GHG emission
- Lower Methane emission in case of Drip Irrigated Rice
- Maintains Soil Health

Advantages of Drip Irrigation for different crops

Crop	Yield (MT/ha)			
	Conventional	Drip	% Yield increase	Water Savings (%)
Banana	57.5	87.5	**52**	45
Grapes	26.4	32.5	**23**	48
Sweet Lime	100	150.0	**50**	61
Pomegranate	56.0	109.0	**98**	45
Tomato	32.0	48.0	**50**	31
Water Melon	24.0	45.0	**88**	36
Chilies	4.2	6.1	**44**	63
Sugarcane	128.0	170	**33**	56
Average	53.51	81.01	**54.75**	48.12

Source: Report of Task Force on Micro Irrigation, 2003

What does it means?

Crop	Yield (MT/ha)				
	Conventional	Drip	% Yield increase	Water Savings (%)	Increase in water use efficiency (%)
Banana	57.5	87.5	**52**	45	176
Grapes	26.4	32.5	**23**	48	136
Sweet Lime	100	150.0	**50**	61	289
Pomegranate	56.0	109.0	**98**	45	167
Tomato	32.0	48.0	**50**	31	119
Water Melon	24.0	45.0	**88**	36	196
Chilies	4.2	6.1	**44**	63	291
Sugarcane	128.0	170	**33**	56	204

Food security

Water security

Energy Security

Innovation for You

Jain Modern Irrigation Technologies For Small Holders

A Step Towards Sustainable Livelihood

Jain Revolutionized Agricultural Irrigation for small farmers

- Pioneered Drip Irrigation Technology for small holders in the world.
- Developed tailor made and affordable modern method of irrigation.
- Synchronized location specific Irrigation Technology with matching agronomic practices.
- Introduced Integrated Approach with shared values in agriculture.
- Increased water, fertilizer and energy use efficiencies.
- Drip Irrigation made feasible even for tiny plots.

Socio-Economic Benefits

- The approach challenged the firm belief that small scale farming is unviable.
- Reduced production cost & improved yields.
- Use of waste, degraded, undulating and uncultivable land rendered feasible.
- Ensured that soil health is maintained.
- Generated of local employment, helped stop migration to urban areas.
- Continued R&D efforts for enhanced income for marginal farmers.
- Benefits have reached over 5 million small farm families.

Innovation for You

Rice with Drip!

Believe Your Eyes! So Little Water, Still Tons of Rice!

An innovative method of PADDY CULTIVATION with PRECISION FARMING
Ensuring prosperity and sustainable use of Water and Energy for Food Security.

Economic Benefits

- Rice yield enhancement up to 40% · Water Saving up to 70%
- Energy Conservation up to 50% · Water and Fertilizer use efficiency up to 80%
- Soil health protection, leading to consistent crop production

Health Improvement of farm hands

- Reduction of skin, respiratory and mosquito bite diseases

Reduction of environmental pollution

- Lower Nitrate leaching into water bodies
- No or low methane emission. · Ozone layer protection
- Global Warming mitigation

Innovation for You

AgroVoltaic Precision Farming!

Integrated Food and Fuel Farming for Sustainable Development

Banana Cultivation-Solar PV Panel

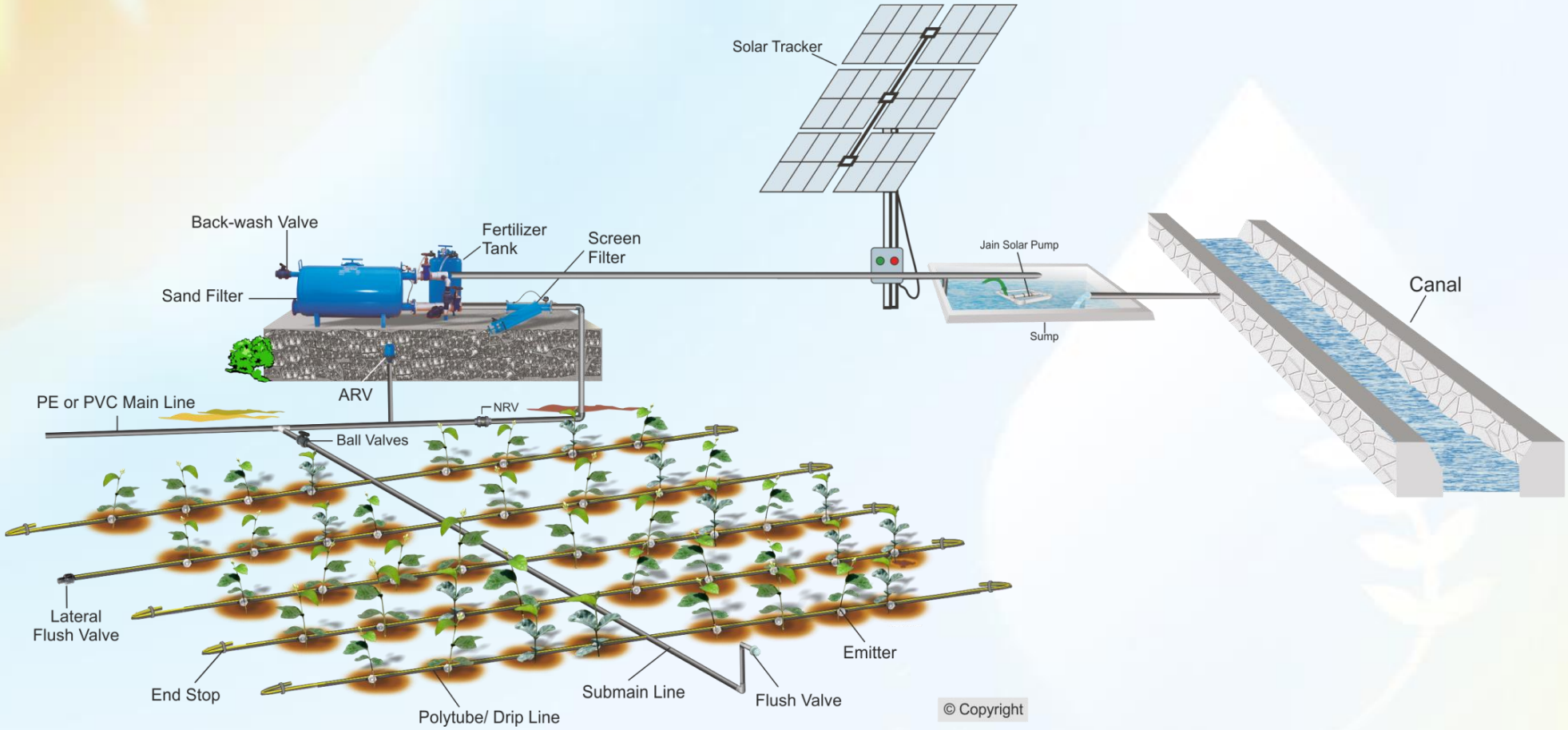
Crop Cultivation-Solar PV Panels

Rice Cultivation Solar PV Panel

The innovative AgroVoltaic Precision Farming offers several advantages.

- Optimal use of resources such as Land, Water & Sunlight
- Precision Farming Technology Integrated with Renewable Energy
- Architecture of Solar panel & Crop Geometry ensures optimum conditions for crop growth
- A holistic approach to farming: TC Plants, Superior Seeds, Solar Energy, Drip Irrigation, Mulching, Fertigation, Automation & Hi-Tech Horticulture Practices
- Sub-surface drip, Sub-soil drainage, mulching & PV Panel as roof results in 99% water use efficiency
- PV Panel grid protects crops from extreme weather · Rain water harvesting & recycling
- No or lower methane emission due to Drip Irrigated Rice
- Zero net Green House Gas emission, reduces Global Warming effect and protects Ozone layer
- Food and Energy production from same land gives higher income

Project Concept



Concept

Background

- The idea is to replace the electrical pump in MIS, with a solar pump.
- This calls on for designing the drip system, suitable to follow the nature of Solar pump.
- The solar pump also has to be properly selected considering the pressure losses in the systems.

Logic

- System starts its operation as soon as solar radiation occurs in the morning.
- Initially, in morning hours, when the solar radiation is relatively lower, the discharge through the drippers is less. In afternoon hours, when the sunshine intensity is relatively higher, the pumping system delivers higher discharge. This, many a times, suits the crop water requirements
- Hence use of solar pumping system with drip irrigation can be a perfect combination for maintaining favourable soil moisture conditions of the plants and ultimately for proper growth of the plants.

Objectives

1. To explore the possibility of use of solar pumping systems in integrated project of micro irrigation
2. To study technical challenges in use of Solar Pumping Systems with micro irrigation systems
3. To study opportunities available for such an integrated community based projects
4. Study socio-economic impact among the community after execution of the project

Requirements

- Command Area
- Active Farming Community
- Adequate Water Availability
- Good Solar Insolation at least for 8 hours
- Required Funding
- Co-operative Implementing Authority
- Co-operation among farming community
- Good Implementing Agency

Major Components

- Solar Pumping Systems
- De-silting Tank
- Pump House and civil work
- Automation System
- Piped Network
- Drip Irrigation System
- Filtration Unit
- Fertigation Unit

Design Considerations

- Operating hours should be assumed to be 8 hours in a day 9 am to 5 pm
- Water should be available adequately to fulfill the daily water requirement of crops
- Irrigation Intensity is assumed to be 100%
- Canal (water source) should flow for 24 x7
- Storage capacity of the De-silting tank is assumed based on canal rotation
- It is assumed that sowing and harvesting time for all the farmers would be in the same fortnight. So that there would be minimal variation in the water requirement and irrigation scheduling.

Challenges

- In dry states, water allocation is limited, hence it has to be used judiciously
- To operate drip irrigation systems, one would require constant head and constant discharge during the complete day.
- There is a fog problem in winter. During this period, solar insolation would be an issue.
- During monsoon, it will be a great challenge to get the desired pressure and head to operate drip irrigation systems.
- High level co-operation among the community would be required
- During monsoon, the water would carry a lot of silt. Silt disposal would be an issue.

Opportunities

- Available Irrigated Area in the globe : 276.2 Mha
- Micro Irrigated : 39.10 Mha (14% of available Irrigated Area)
- Drip : 6.1 Mha
- Sprinkler : 33.0 Mha
- (Source : Koncept Analytics, August 2009)

- Electrical Pump sets: 180 Million (India)
- Diesel Pump sets : 100 Million (India)
- Solar Pump Sets : About 15000 (India)

Reliability of Technology

- Less maintenance
- The entire construction is in SS resulting in long life
- Choice of centrifugal and helical rotor pumps to suit specific head and discharge needs.
- No batteries required in most cases.
- All required built in protections in the controller

Limitations of Solar pumps

- High initial cost
- Solar module protection is a major factor
- Needs clean water to avoid pump clogging
- Shadow free area required for solar modules

Life and Maintenance

- Solar module life is about 25 years
- Pump and controller works for at least 10 years with proper maintenance
- Only periodic cleaning of the glass required

Advantages of the Project

- Higher Crop Productivity. Increase in yields up to 50-60 %
- Increase in Water Use efficiency up to 85%
- Fertilizer savings up to 30%
- Other input cost savings
- Reliable water supply
- Uniformity of water application
- Reliable Power
- Complimentary to crop water requirements
- Clean energy source which is eco-friendly.
- No land acquisition
- No Land Leveling required
- Faster Implementation Time
- Local employment generation. Will stop migration to urban areas.

Anticipated Benefits to Government

- Government would **save huge amount on creating electrical infrastructure** to bring the electricity to the rural areas from the power generation stations, since solar is decentralized way of delivering power for pumping.
- This will also **avoid /eliminate theft issues**
- Farmers will get **reliable power for pumping**, which will bring sustainability to farming.
- Solar power is a **green power which will reduce GHG effect**.
- **Recurring costs in case of solar systems would be Zero.** Hence there is no question of recovery issues.
- Farmers would be able to run other electrical appliances such as tube lights/fans etc on the solar power.
- Government will always have a choice to offer the electricity to the farmers at commercial rates.

Installations

Jain Solar Agri Pump –State Covered

STATE	WP	QTY
Rajasthan	3000	5518
Bihar	1800	315
Hariyana	4800	83
	1800	
Andhra Pradesh	1800	73
Chattisgarh	3000	60
	1800	
Tamilnadu	4800	56
	1800	
Maharashtra	4800	42
	1800	
Madhya Pradesh	2200	24
	1800	
	500	
Gujraat	1380	12
	3000	
Punjab	4500	6
	8640	
Leh-Ladakh	13320	4
Himachal Pradesh	1350	3
Uttarakhand	1800	2
Manipur	900	1
Jharkhand	4800	1
West Bengal	240	1
Total Installations	6201	

Rajasthan Solar Pumping Project

2012- Bulk Execution started
Till 31.3.15 (in approx three years) - 5300 pumps have been commissioned
Total panel supplied :- Aprrox 75000 of over 230 W (70 per day)

Service to Nation :-

Generation and utilization of approx. 16 MW electricity in eco- friendly manner
Zero transmission loss,
Zero infrastructural cost,
No establishment cost,
No complexity of land acquisition etc..

Service to farmers :-

No dependency on electricity board – enabling 5300 farmers to plan independently
Over 2000 farmers of most interior areas could initiate Ag.
Over 15000 hact area under irrigation with Solar pumping

Jain Solar pump for Banana under Drip Irrigation

Jain Agri Park, Jalgaon

PUMP DETAILS

- Type : Submersible
- Model : JSP 1800 C
- PV panel power : 540 Watts
- Total head : 12 m
- Daily Avg. Q : 35,000 LPD
- Area : 1 Acre

Jain Solar pump for Pomegranate under Drip Irrigation -
Jain Agri Park, Jalgaon

PUMP DETAILS

- Type : Submersible
- Model : JSP 1800 C
- PV panel power : 720 Watts
- Total head : 12 m
- Avg. discharge : 65,000 LPD
- Area : 3 Acres

Jain Solar pump for Grapes under Drip Irrigation

Baramati (Pune)

PUMP DETAILS

- Type : Submersible
- Model : JSP 600 C
- PV panel power : 5400 Watts
- Total head : 10 m
- Avg. discharge : 22,000 LPD
- Area : 1 Acre

Jain Solar pump for Kinnu under Drip Irrigation with Floating platform , Ganganagar, Rajasthan

PUMP DETAILS

- Type : Submersible
- Model : JSP 4000 C
- PV panel power : 3100 Watts
- Total head : 21 m
- Avg. discharge : 1,20,000 LPD
- Area : 6 Acres

Jain Solar pump for Guava under Drip Irrigation with floating platform - Fatehabad, Haryana

PUMP DETAILS

- Type : Submersible
- Model : JSP 1800 C
- PV panel power : 1800 Watts
- Total head : 35 m
- Avg. discharge : 50,000 LPD
- Area : 2 Acres

Jain Solar pump for Red Gram under Drip Irrigation - ICRISAT, Hyderabad

PUMP DETAILS

- Type : Submersible
- Model : JSP1800 C
- PV panel power : 1100 Watts
- Total head : 50 m
- Avg. discharge : 25,000 LPD
- Area : 2 Acres

Jain Solar pump for drip irrigation for Shade houses & Nursery - JRBT, Jalgaon

PUMP DETAILS

- Type : Submersible
- Model : JSP 21K
- PV panel power : Watts
- Total head : 25 m
- Avg. discharge : 3,00,000 LPD
- Area : 15 Acres

“Jain” Solar Pumping & Drip Irrigation system

Farm Pond Model: Specially for dry land farmers

More Crop Per Drop

Jain® Drip

Jain™ Solar Pump

JAIN® Jain Irrigation Systems Ltd.

Jain Solar Tracking Systems

JAIN AGRI PUMP INSTALLED AT HIGHEST POINT OF LEH FOR DRIP IRRIGATION - 2012

Success Story

Name of Farmer	**Purshottambhai D. Patel**
Address	Village- Matied; Taluka- Ankleshwar
District	Bharuch
Contact no.	9825411071
Crop	Small gourd
Soil	Clay loamy
Drip (Sub-surface)	Inline; 16mm-4LPH-50cm
Lateral Spacing	2.13 meter
Area	1.29 Acre
Date of Planting	22/11/2013
Variety	Local

Success Story

Cost of Cultivation	
Land Preparation	6200.00
Trelling system cost	20115.00
Inter-cultivation Operations	5600.00
Manuring and Fertilizers	6500.00
Plant Protection	1800.00
Electricity	10450.00
Cost of Cultivation	50665.00
Drip System Cost per Year (considering for 5 yrs)	10231.00
Solar system cost per year (Considering 20 yrs)	4000.00
Total Cost of Cultivation including drip and solar cost	64896.00
YIELD (in Ton)	13.066

Success Story

Realization & Cost-benefit Ratio per acre	
Cost of cultivation (Rs.)	50665.0
Yield (Ton) (Rate @ Rs. 3000/ton)	13.066
Total Income (Rs.)	392000.00
Net Income (Rs.)	327104.00
Cost-Benefit Ratio	1:5.04

Kandi Solar Powered Micro Irrigation Project

- This is a community based integrated irrigation project in which farmers will irrigate their land with sprinkler irrigation systems operated by Solar Pumping Systems.
- It is proposed to lift water from Kandi canal at three places with the help of Solar pumps and deliver the same to Village Ponds located in command area.
- From village ponds, there will be a secondary pumping by solar systems to operate the sprinkler irrigation systems in fields.

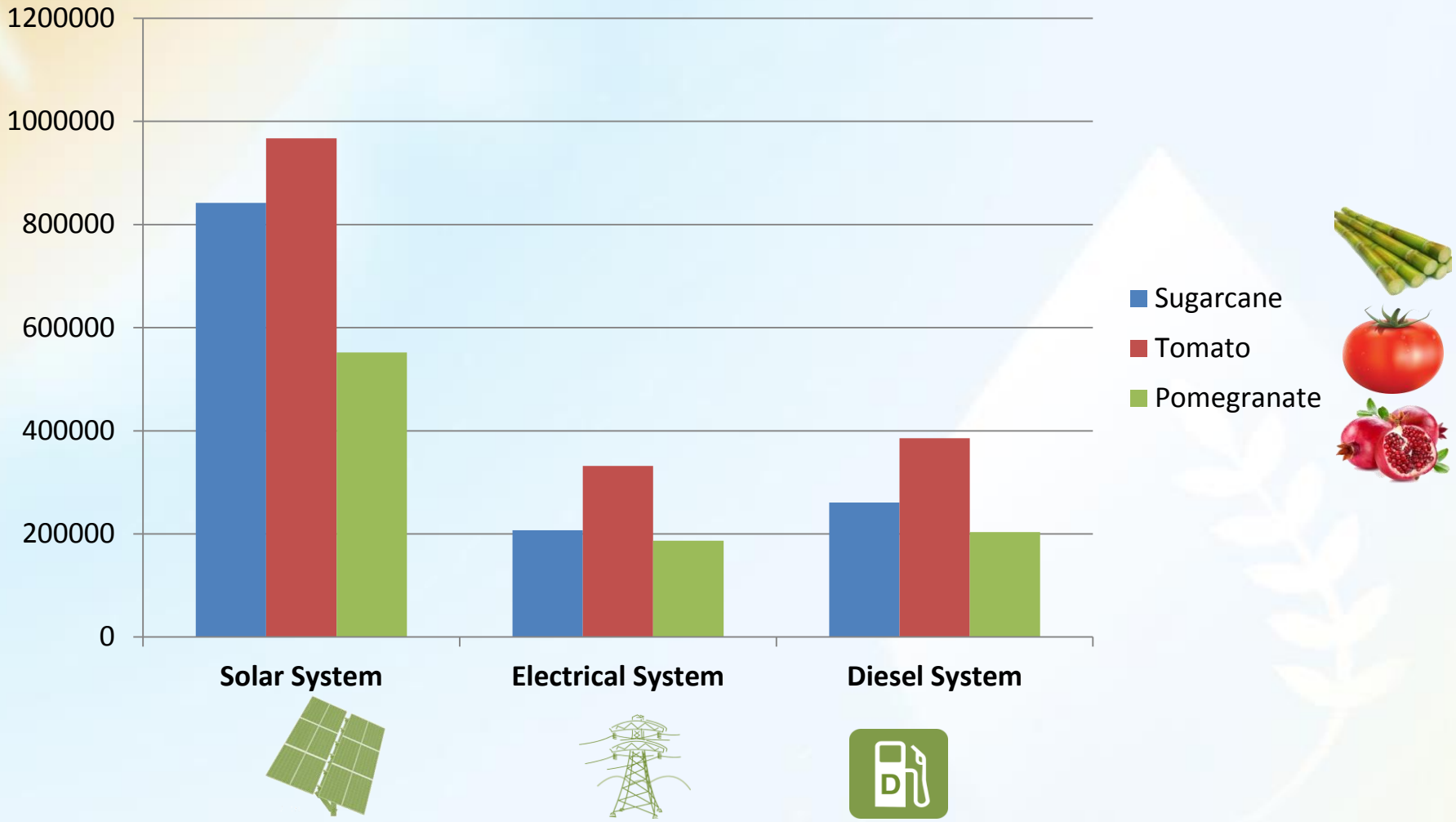
Salient Features of Kandi Project

- Location of Project : Near Kandi Canal, Talwara
- District : Hoshyarpur (Punjab)
- Area to be Irrigated : 1642 acre
- Crops : Wheat, Maize, Vegetable, Mustard
- System Used : Sprinkler Irrigation System
- Components Involved : Syphon, Sumps, Pump Houses, Filtration Unit, PE and PVC Main Lines, Sprinkler Systems, Automation
- No of Farmers Involved : about 1200
- No of solar pumping systems required : 41 No

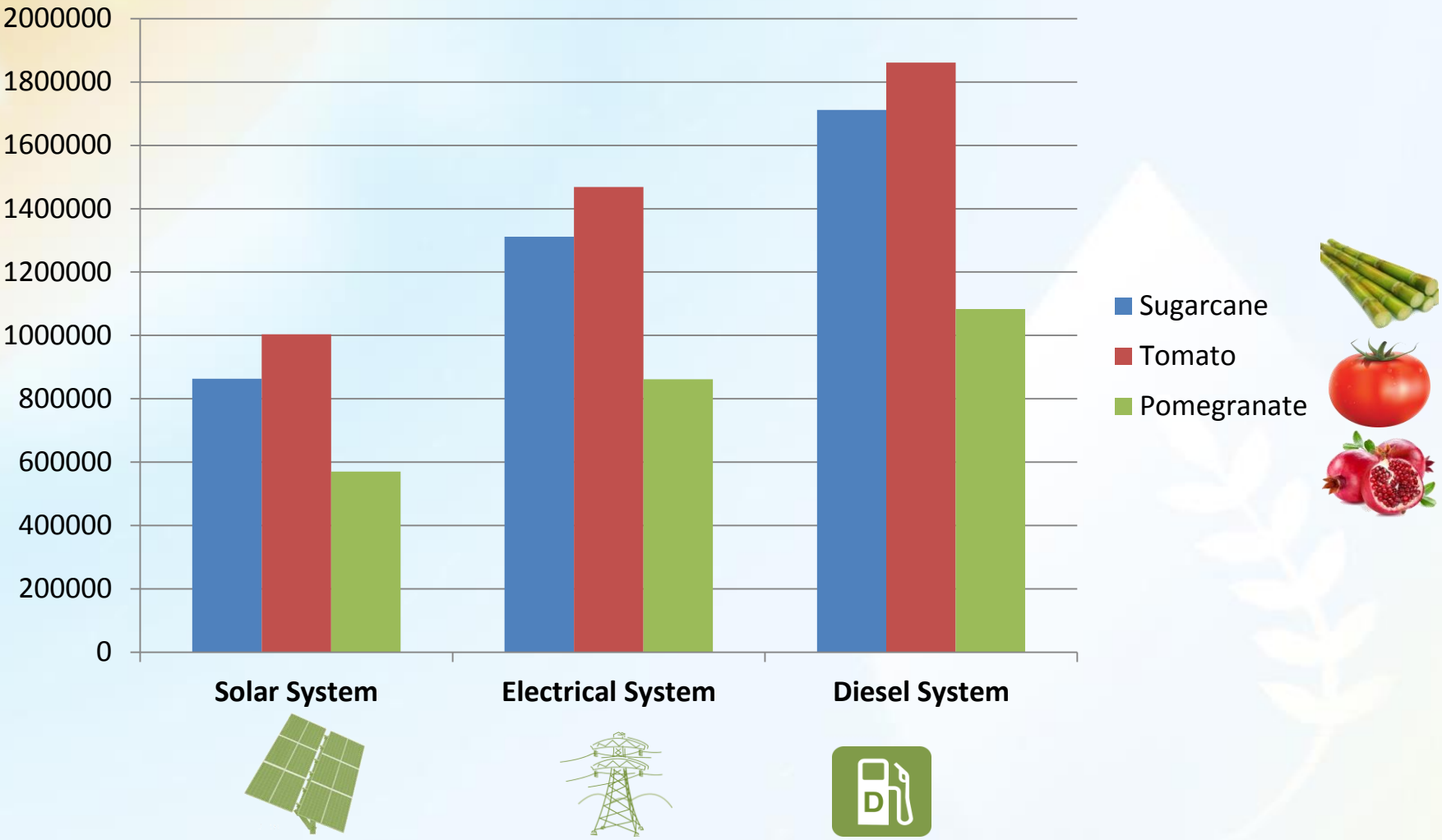
Comparison of Solar with Diesel Pump

- More reliable. Higher discharge and head than the diesel pumps.
- Simpler, has fewer moving parts
- Requires mostly unskilled labour to keep them running for years together.
- When solar and diesel pumps are compared in terms of total life cycle cost spread over a life span of minimum 20 years, the solar pump system is cost effective
- No fuel transportation and storage required.

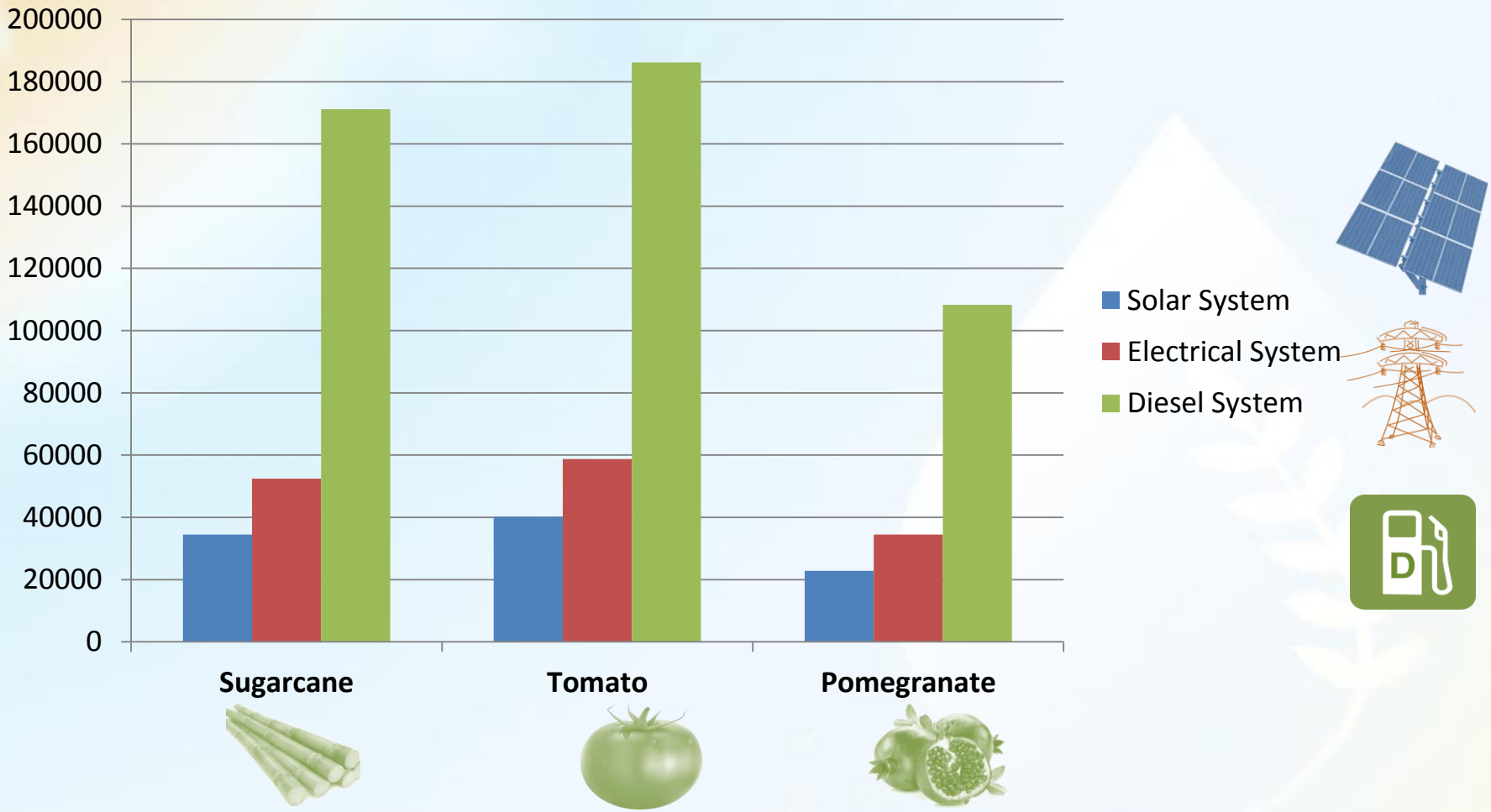
Capital Cost of Solar, Electrical and Diesel Systems with Micro Irrigation for 2 Ha(Rs)



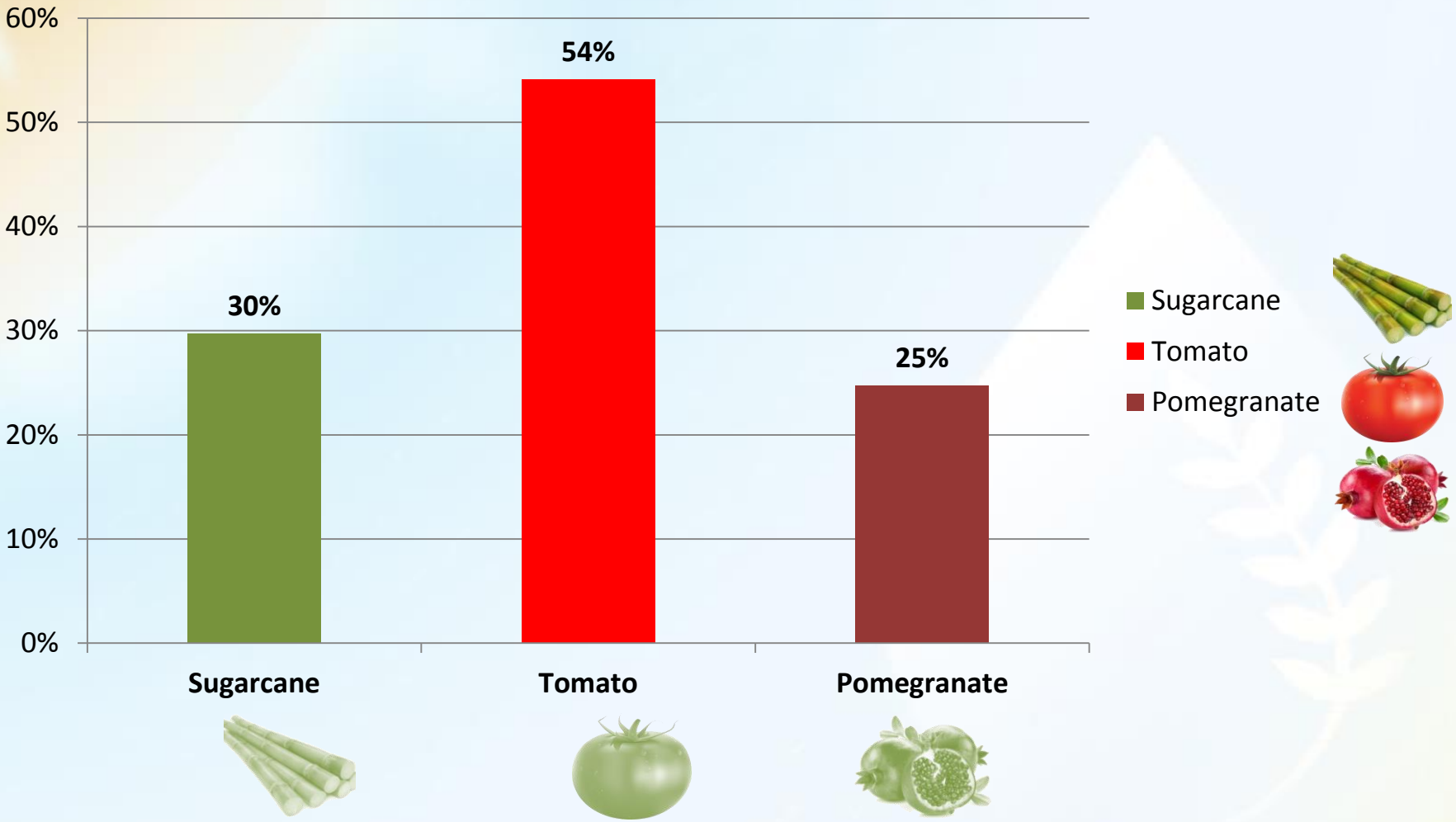
Total Cost of Solar, Electrical and Diesel Systems with Micro Irrigation for 2 Ha(Rs)



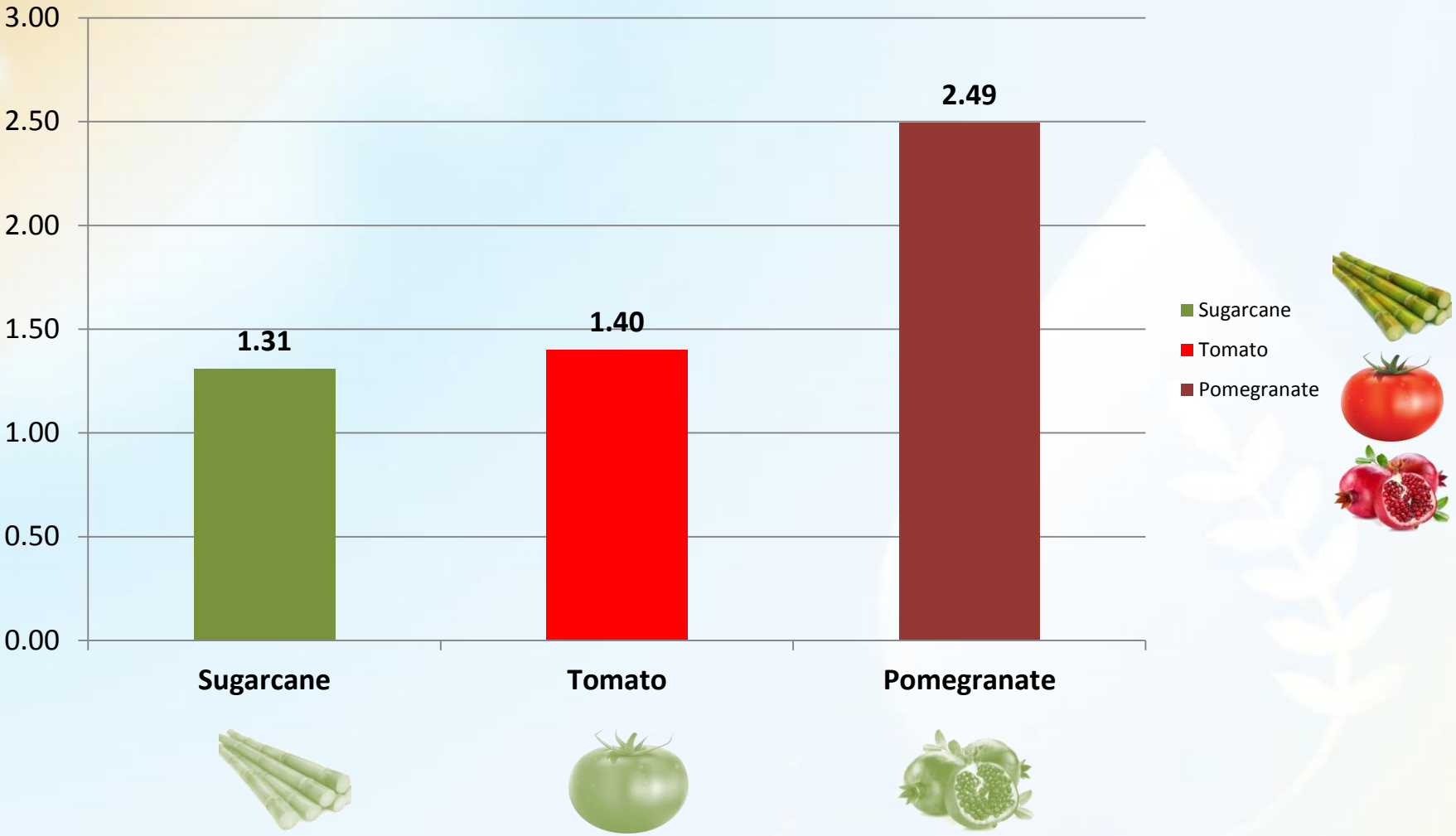
Life Cycle Cost of Solar, Electrical and Diesel Systems with MIS (Rs per Ha per Year)



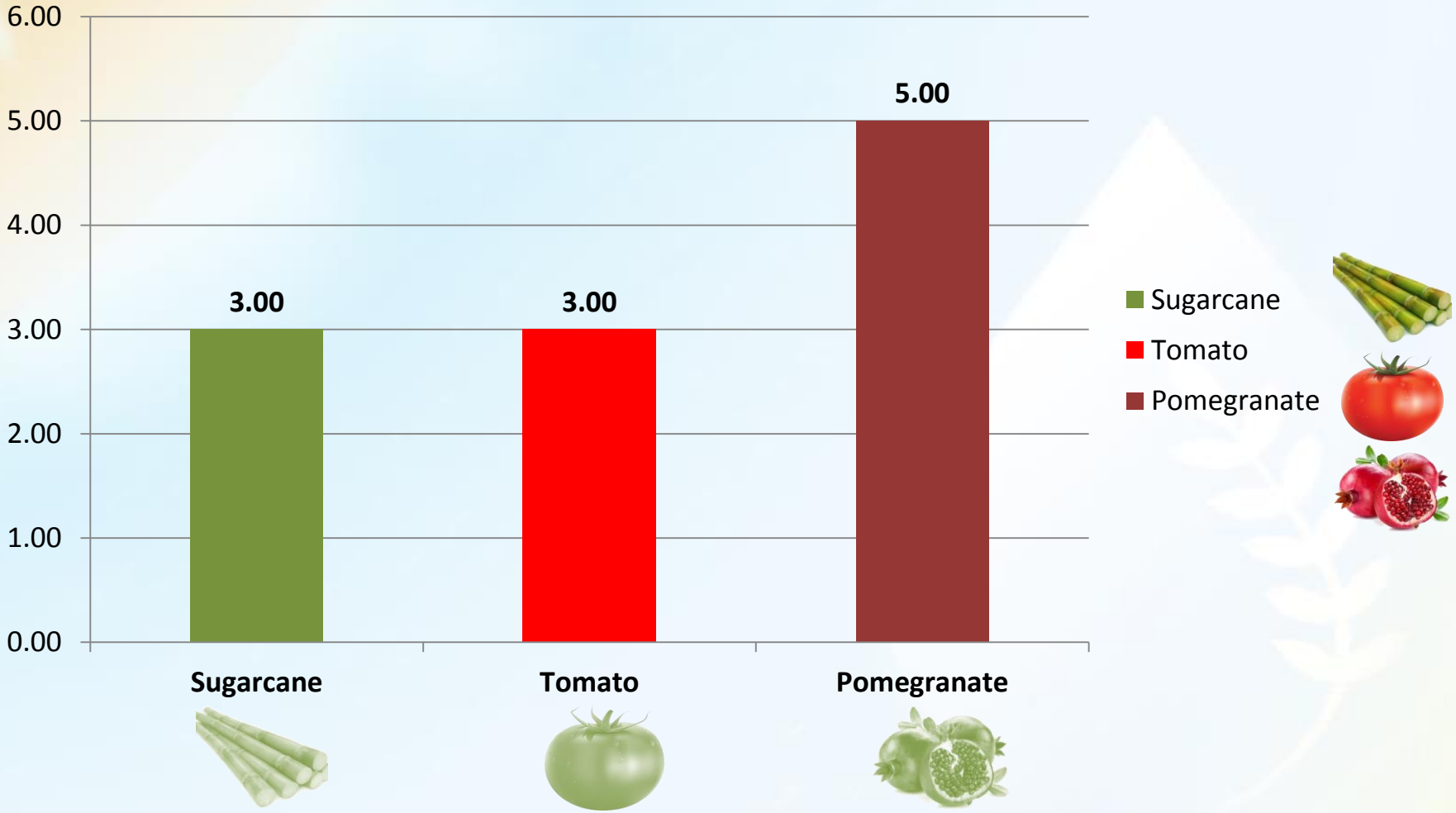
Internal Rate of Return for Solar Powered Micro Irrigated Crops , %



BC Ratio for Solar Powered Micro Irrigated Crops



Pay Back Period for Solar Powered Micro Irrigated Crops, Yrs



Integrated Approach by Jains

BASIC SERVICES

SURVEY & SAMPLING

- DETAIL ENGINEERING SURVEY
- COLLECTION OF SOIL & WATER SAMPLES
- AGRO-CLIMATIC DATA TO SCHEDULE THE SYSTEM OPERATION
- WATER SOURCE ASSESSMENT
- CROP-DATA
- FARMER PREFERENCES
- PREPARATION OF DRAWING FROM THE FIELD SKETCH CONSIDERING ABOVE FACTORS

COMPUTER AIDED SYSTEM DESIGN

- CO-RELATING AGRO-CLIMATIC DATA
- SOIL & WATER ANALYSIS
- INTERPRETATION OF SOIL, WATER & AGRO CLIMATIC DATA & RECOMMENDATIONS
- IRRIGATION, FERTIGATION & COMMISSIONING OF PROPER SIZE
- COMPONENTS & SUITABLE SYSTEM SELECTION
- HYDRAULIC DESIGN & QUOTATION
- ASSIST TO OBTAIN GOVERNMENT SUBSIDY
- FINAL LAYOUT & INSTALLATION DRAWING

INSTALLATION SUPPORT

- SUPPLY OF EACH & EVERY COMPONENT
- TRANSPORTATION TO THE FIELD
- LAYING, JOINTING, TESTING
- TRAINING FARMERS REGARDING IRRIGATION, FERTIGATION, OPERATION OF PUMPS, VALVES & VENTURY / FERTILISER TANK, TRAINING OF MAINTENANCE PERSONNEL ON PERIODIC MAINTENANCE & PROBLEM SOLVING PROCEDURE
- HANDING OVER THE SYSTEM FILE TO THE FARMER ALONGWITH MAINTENANCE MANUAL

Integrated Approach by Jains

SUPPORT SERVICES

AFTER SALES SERVICES

- AGRONOMIC SUPPORT
- ENGINEERING SUPPORT
- CUSTOMER SERVICE
- ENGINEER'S PERIODIC VISITS
- SUPPLY SPARE PARTS
- PROVISIONS FOR TRAINED OPERATORS
- PERFORMANCE FEED-BACK

EXTENSION AND TRAINING SERVICES

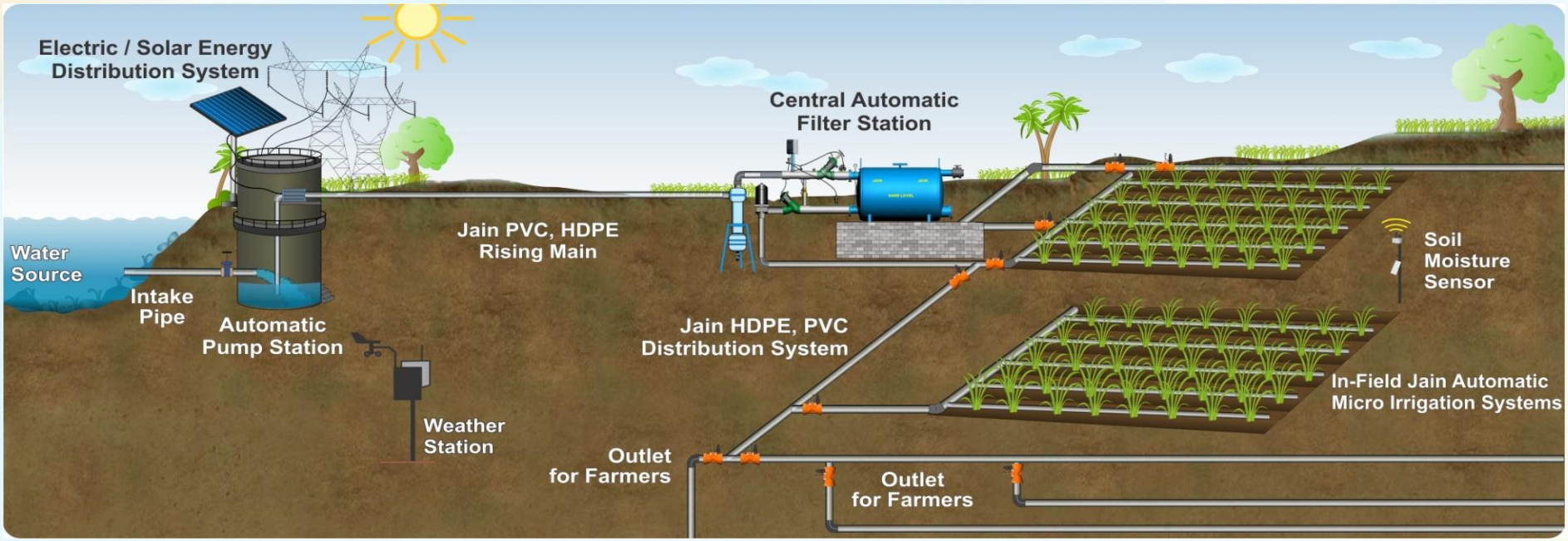
- PUBLICITY THROUGH VARIOUS MEDIA
- DEMONSTRATION PLOTS
- PRODUCT DISPLAY AND EXHIBITIONS
- PRESENTATIONS & SEMINARS
- FARMER'S MEETINGS, RALLIES AND SEMINARS
- TRAINING OF FARMERS, BANK OFFICERS, GOVT. T & V EXTENSION OFFICERS, IRRIGATION ENGINEERS AND OTHER USERS
- PUBLISHING LITERATURE IN REGIONAL LANGUAGES.

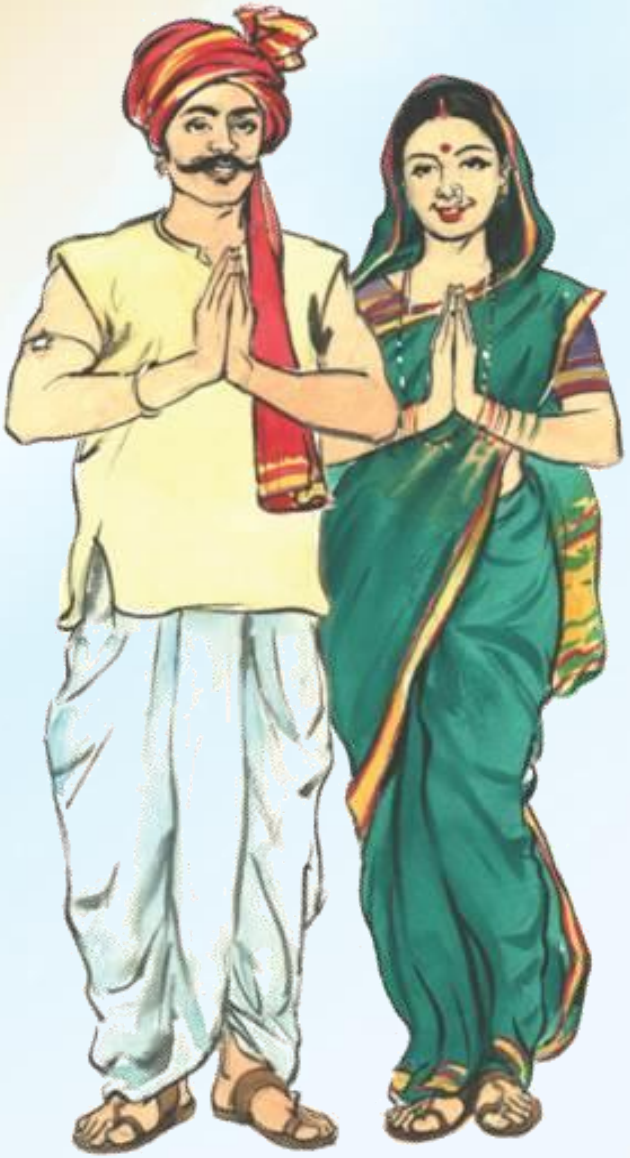
RESEARCH & DEVELOPMENT

- COMPANY OWNED R & D FARMS
- CUSTOMER DEMONSTRATION FARMS
- AGRI. UNIVERSITY EXPERIMENTAL DEMONSTRATION FARMS
- LIBRARY RESEARCH
- PREPARATION OF GLOBAL CROP FILES
- COLLECTION, COMPILATION OF RESULTS AND RECOMMENDATIONS FOR HIGHER PRODUCTIVITY.

Capabilities of JISL

1. Agronomical, Engineering and Design
2. Manufacturing and Material Supply
3. Execution
4. Manpower
5. Machinery
6. Financial





Thank You

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