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# **PARTNERING FOR WATER EFFICIENCY IN SUGARCANE**

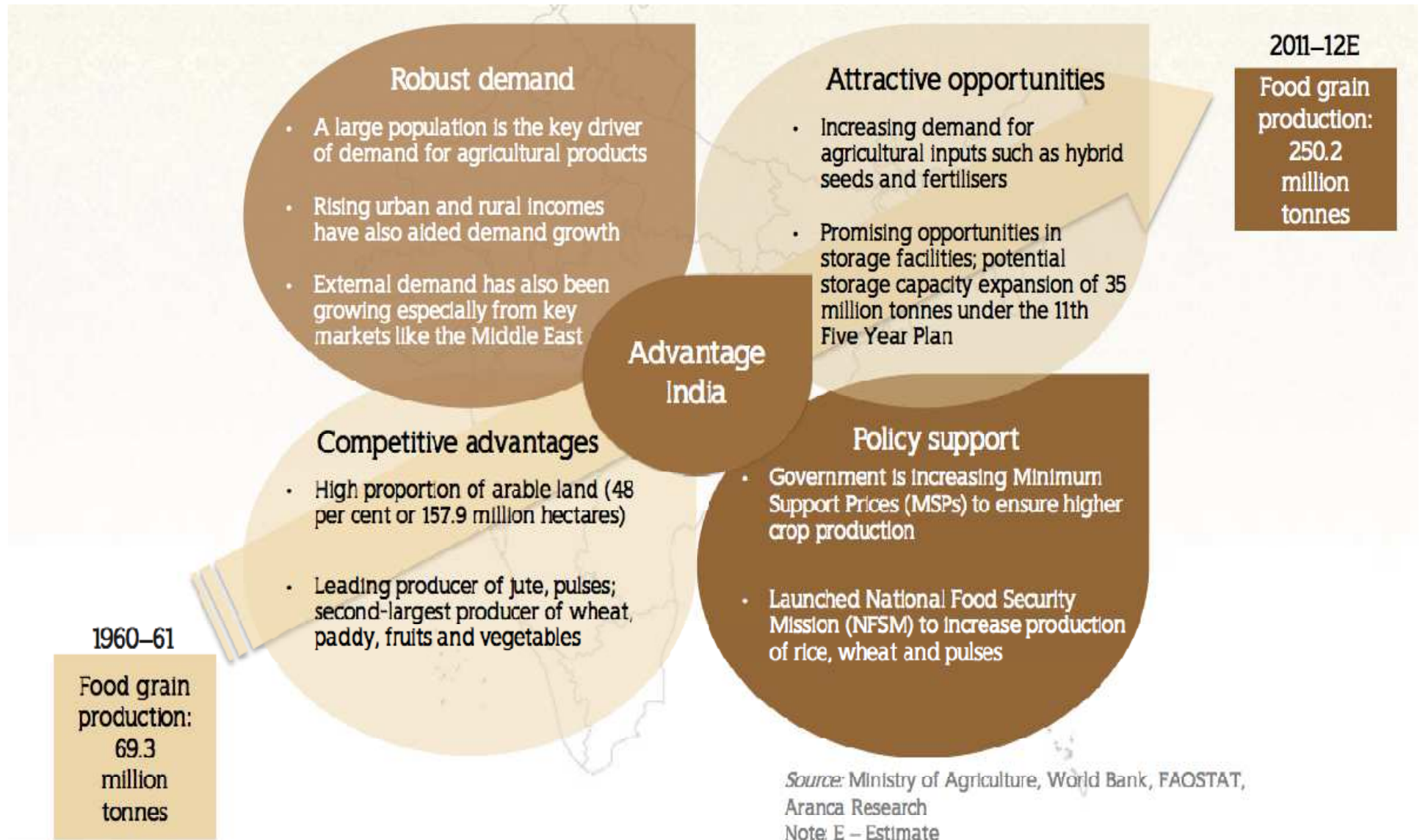
Prashant Pastore & Dilip Sinha  
Solidaridad Network Asia

# WATER EFFICIENCY



THROUGH SUSTAINABLE AGRICULTURAL PRACTICES

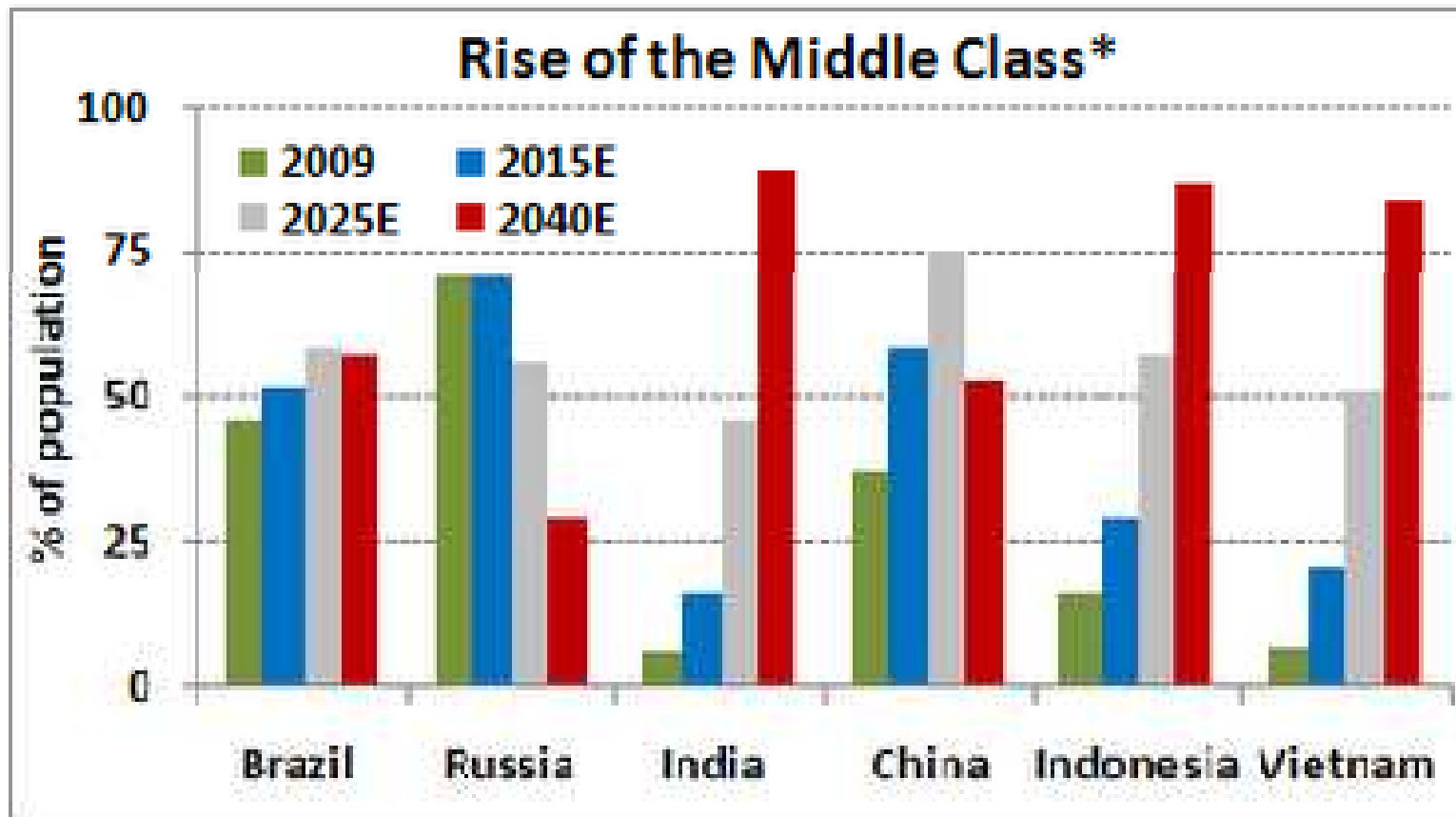
# INDIAN AGRICULTURE SECTOR



- **17.5% OF THE WORLD'S POPULATION NOW**
- **ITS POPULATION WILL REACH 1.6 BILLION BY 2050.**
- **ONLY 4% OF WORLD'S RENEWABLE WATER RESOURCES**
- **2.6% OF WORLD'S LAND AREA.**



# MIDDLE CLASSES IN INDIA



# COMPETING CLAIMS OVER LAND







# WATER CRISIS

IS NO LONGER A FEAR BUT A REALITY



# WE HAVE COME TOGETHER



**Solidaridad**



# **WATER EFFICIENCY IN SUGARCANE**

# OBJECTIVES OF THE PROGRAMME

- Focus on the demand side of water management in agriculture in different agro-climatic zones and diverse hydrological areas in the state of Tamil Nadu
- Seeks to build the capacity of smallholders, workers as well as communities for reducing water application in the crops.
- It seeks to enhance agricultural production in the selected region
- Involve smallholders, workers and businesses to join water platforms and enable them to engage on policy dialogues around water management in agriculture in selected crops.
- Develop an accurate measurement of water use through a credible water foot-printing exercise across the select water commodities.

# WATER SAVING TECHNIQUES USED

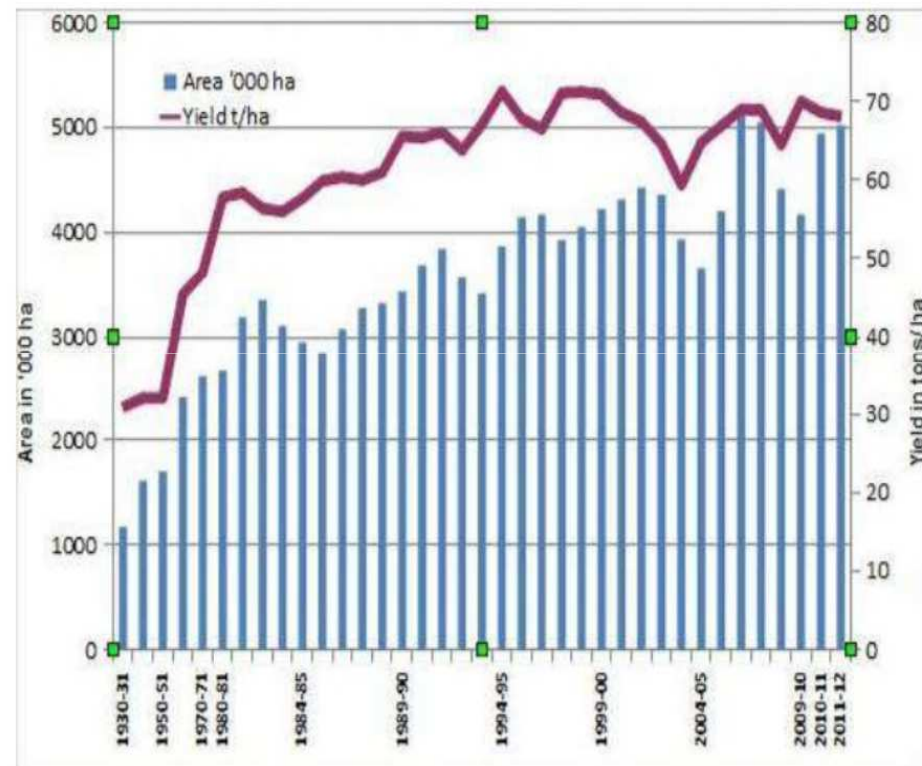
Sl.no.	FARM PRACTICES	Water Economy (%)	Reference
1.	Drip	50 to 55	Waykar et al,2003
2	Trench /Furrow	16.7	Prasad et al,1980
3	Skip Furrow	37.3	Prasad et al,1980
4	Land leveling	28.0	El Yazal and Wissa,1990
5	Organic Manure (Green Manure)	40.0	Valley courier water 2012:www.water2012.org.
6	Trash Mulch	28.7	Annual Report. IISR Lucknow 2008-09
7	Trash Mulching + skip furrow	50.0	Mathew and Varughese,2008
8	Irrigation at Critical stages	16.8	IISR Report,2007 (page 57-61)
9	Use of Gated pipe	12 to 28	Osman,2000

# SUGAR SECTOR OF INDIA AT A GLANCE

- India is the world's largest consumer and second largest producer of sugar
- The sugar sector in India is very substantial:
  - USD 17 billion annual turnover
  - 340 million ton / 5 million ha
  - 6 million sugarcane growers, largely smallholders; average 2 acres (0.8 ha)
  - Over 500 sugar mills employ > 0.5 million rural workers employed
- Sugar is a strategically important sector (food security)
- Cane prices (highest in the world) are set by the government, so predictable source of income for growers

# PROBLEM / JUSTIFICATION

- Sugar consumption in India is projected to grow to 520 million ton p.a. by 2030 versus production of 340 million ton p.a. today
- Limited scope for area expansion, so productivity needs to be increased
- Sugarcane yields are stagnating



Source: Sugarcane Breeding Institute, India



# PROBLEM/JUSTIFICATION

- Sugarcane growing needs large amount water: 150-250 litres per kg of cane
- Rainfall is concentrated (monsoon) and insufficient to meet crop water requirement → 90% of sugarcane area is irrigated, by surface and groundwater resources
- Groundwater levels throughout India are dropping fast due to over-extraction
- **Challenge:** sustainable growth by expanding productivity while reducing groundwater extraction

# RATIONALE

- Maximize water use efficiency (water productivity) by:
  - Increasing crop productivity through improved agricultural practices
  - Reducing evaporation losses through improved agricultural practices
  - Minimizing irrigation water supply losses through improved technology
- Theory of change: business case driven
  - Increased net income for growers
  - Increased cane volumes
  - Generating man days

# **WATER BEHAVIOUR IN SUGAR**

- Initial Premises for estimation
- Actual Practices
- Conclusions

**Option # 1 - Based on Source # 1 - conservative**

**Water requirement at different stages of Growth**

<b>Stages</b>	<b>Duration in Days</b>	<b>Irrigation water Consumed in %</b>	<b>Source 1: BENEFITS OF MICRO IRRIGATION SYSTEM, SUGAR RECOVERY &amp; PRODUCTIVITY, AMIT BHARDWAJ DY. HEAD - INDIAN SUGAR MILLS ASSOCIATION 8TH OCT, 2013</b>
<b>Germination</b>	0-35	12	<a href="http://www.indiansugar.com/indian-sugar/micro-irrigation.pdf">http://www.indiansugar.com/indian-sugar/micro-irrigation.pdf</a>
<b>Tillering</b>	36-100	22	
<b>Grand Growth</b>	101-270	40	
<b>Maturity</b>	271-till harvest	26	

**\*\*In the state of Tamil Nadu the sugarcane crop total water requirement is 179-215 ha-cm. Approximately around 60-65 is met through rainfall. Thus the net water required through irrigation is 119-150ha-cm**

Option # 2 - Based on Source # 2

**Source 2: IS SUGARCANE A WATER GUZZLER IRRIGATION WATER "REQUIREMENT FOR SUGARCANE AND ALTERNATE CROP SEQUENCES IN INDIA - AN ANALYSIS, Dr. Narendra Singh Adviser, Cane Development, Indian Sugar Mills Association, Ansal Plaza, Andrews Ganj, New Delhi - 110 049**

average consumption of water in sub-tropical zone		average consumption of water in tropical zone	
22.5	11%	31	16%
32.5	16%	57.5	29%
52.5	26%	105	53%

# **STUDY ON ACTUAL WATER IN TROPICAL SUGARCANE**

- There were in total 14 types of treatment/Practices
- In total, 5 percent of the total area under intervention considered for the analysis.
- The representative samples were drawn from across all the divisions of 8 mills under the project.
- In total, 560 farmers selected for the survey

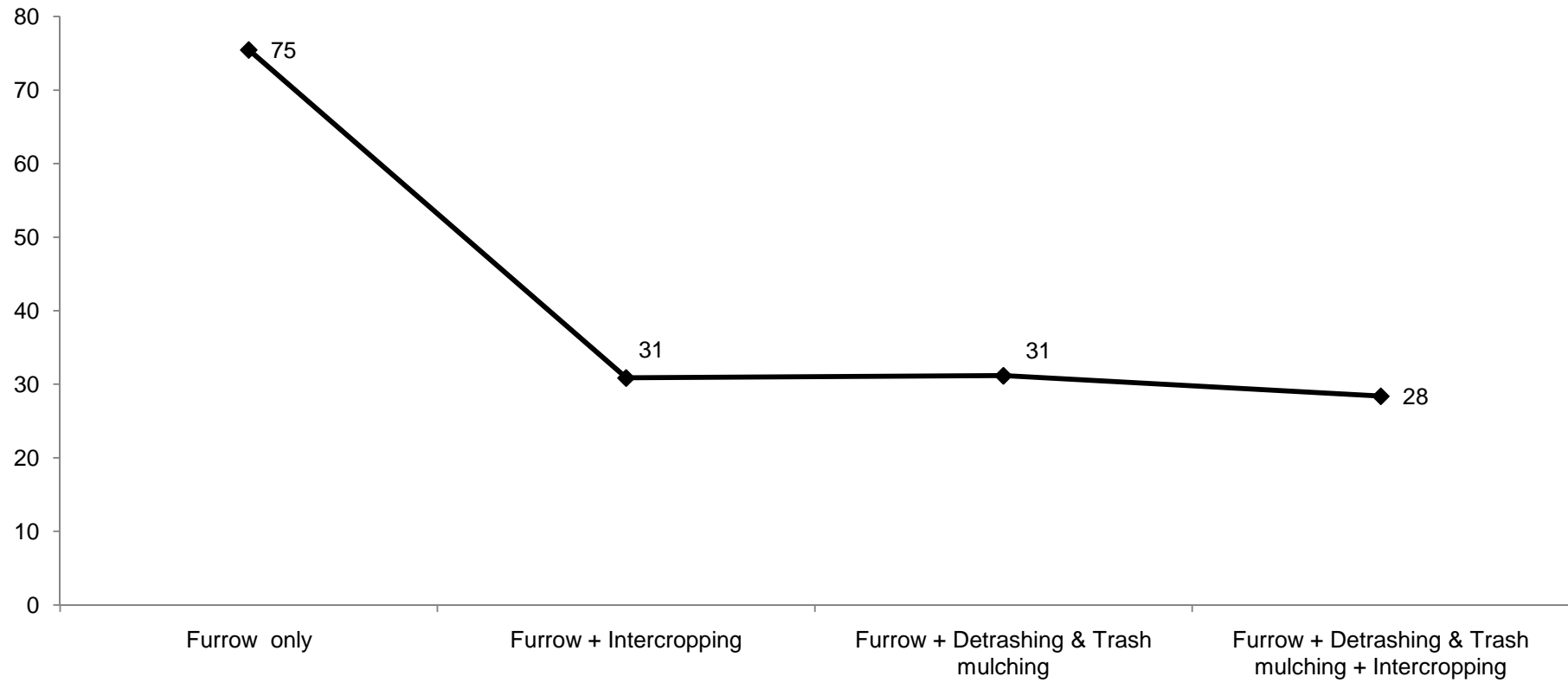


# TREATMENT TYPES

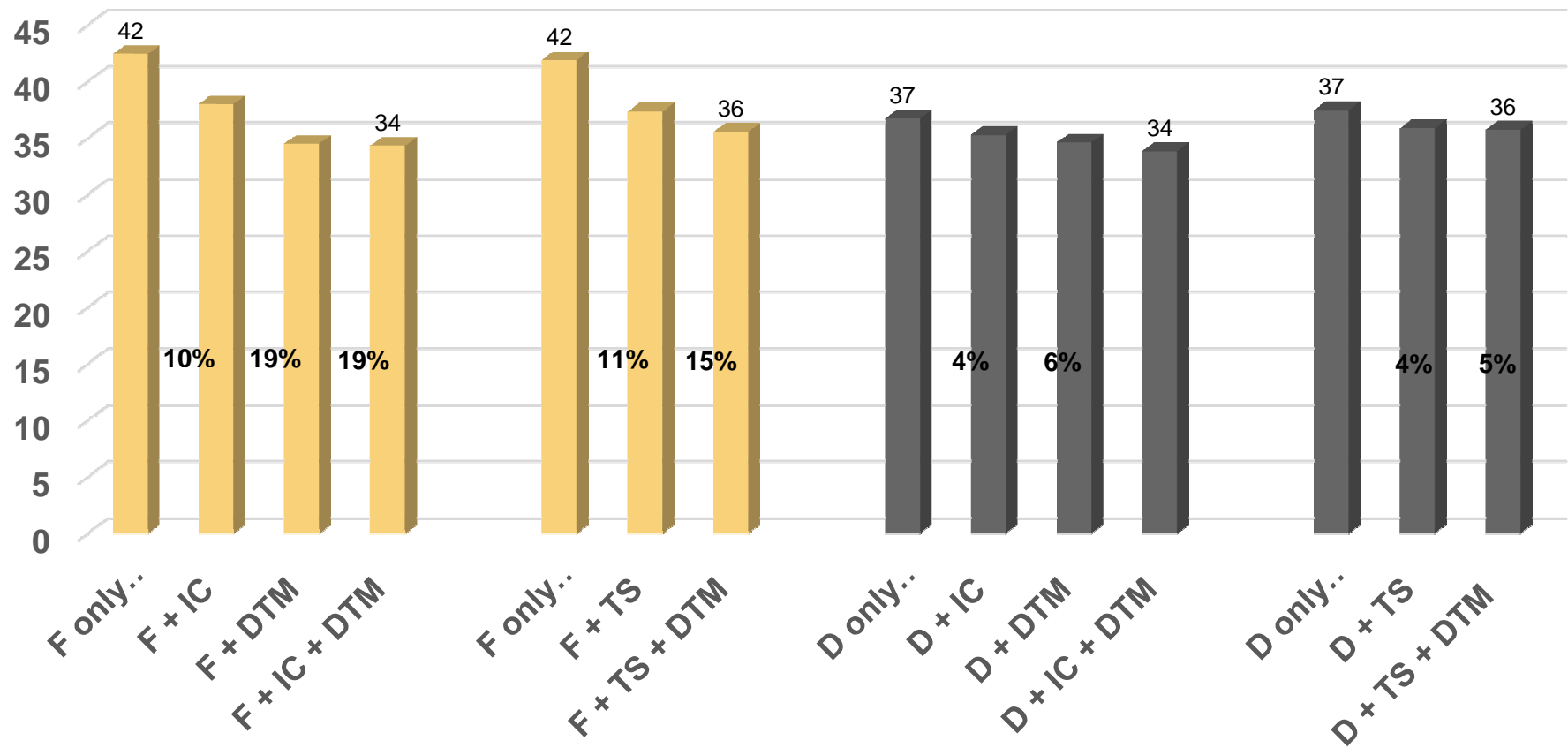
Treatment Sample/Mill				
S.No	Plant crop		Ratoon Crop	
1	Only Furrow	5	9. Furrow	5
2	Furrow+Trash Mulch	5	10. Furrow+Trash Shedding	5
3	Furrow+Intercropping	5	11. Furrow+Trash Shedding+Mulch	5
4	Furrow+Trash+Intercropping	5	12. Drip	5
5	Drip	5	13. Drip+Trash Shedding	5
6	Drip+Trash	5	14. Drip+Trash Shedding+Mulch	5
7	Drip+Intercrop	5		
8	Drip+Trash+Intercropping	5	Total/Mill	70

# IRRIGATION NUMBER

Total Number of irrigations per acre (No's)



# WATER USE ACROSS PRACTICES



# RESULTS

- The findings suggests that there is a clear improvement in terms of water use efficiency from conventional furrow to drip method (19 to 25 percent).
- Traditional methods were found to be equally effective when the farmers adopts inter cropping and trash mulching.
- The survey indicates that those farmers who were not been able to adopt drip practiced trash shredding and intercropping have equal efficiency levels.

# CONCLUSIONS

- The reduction in water through adoption of drip over conventional furrow ranges from 13 to 24 %. (Excess irrigation or the savings can be more – needs further awareness)
- In plant crop under conventional furrow - adoption of detrashing and mulching saves around 15 to 19% water over conventional furrow.
- No significant savings on adoption of Intercropping in plant crop – but more crop & profit per drop to farmer.
- In ratoon- the savings in water by adoption of Trash shredding ranges from 8 to 15%

# DIMENSION OF AGRI-WATER COMPLEXITY

## SCALE

- Quantity
- Intervention mix and applicability

## INSTITUTION

- Significant labor force into agri
- Agri is a private activity with fragmented land holding and behavior change a major challenge

## PROOF OF CONCEPT

- What intervention mix works where
- What is the water dynamic
- What is the social desirability
- What are the cost benefits



# THANK YOU

**SHATADRU@SOLIDARIDADNETWORK.ORG**



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