

Feeding hungry and thirsty soils increases yield and protects the environment: some results of WFD experiments in LIVES



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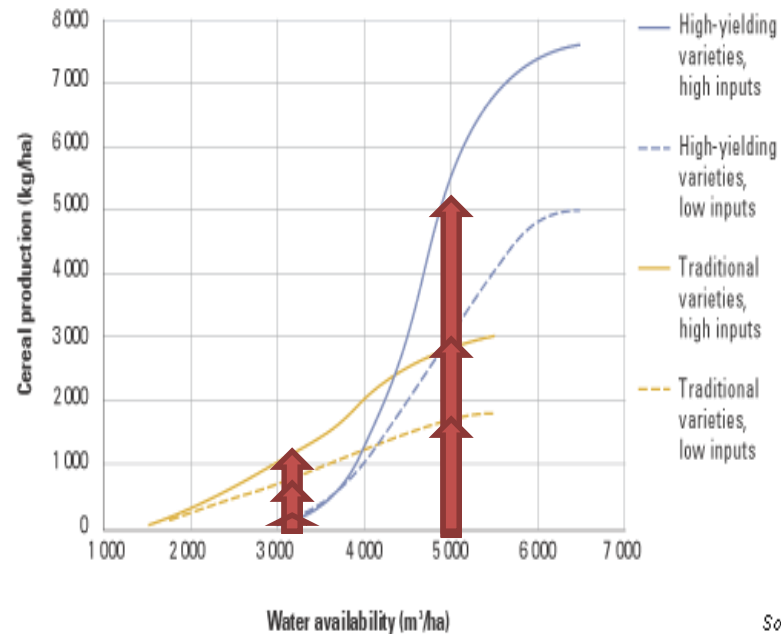
Workshop and Exhibition on Promoting Productivity and Market Access Technologies and Approaches to Improve Farm Income and Livelihoods in Ethiopia: Lessons from Action Research Projects, ILRI, Addis Ababa, 8-9 December 2016



IRRIGATION IN ETHIOPIA



- Fast development
- On-farm water management:
 - Individual farmers = f(depends on water lifting & labor)
 - Schemes = f(irrigation interval, gravity/pumping, WUA)
- Consequences:
 - Over-irrigation in schemes has led to periodic water scarcity issues in large schemes
 - Low yield and water productivity
 - Fertilizer leaching and increased groundwater tables



The graph shows the yield response of crops to water availability. High yielding varieties produce more than rainfed varieties only when provided with adequate amount of water.

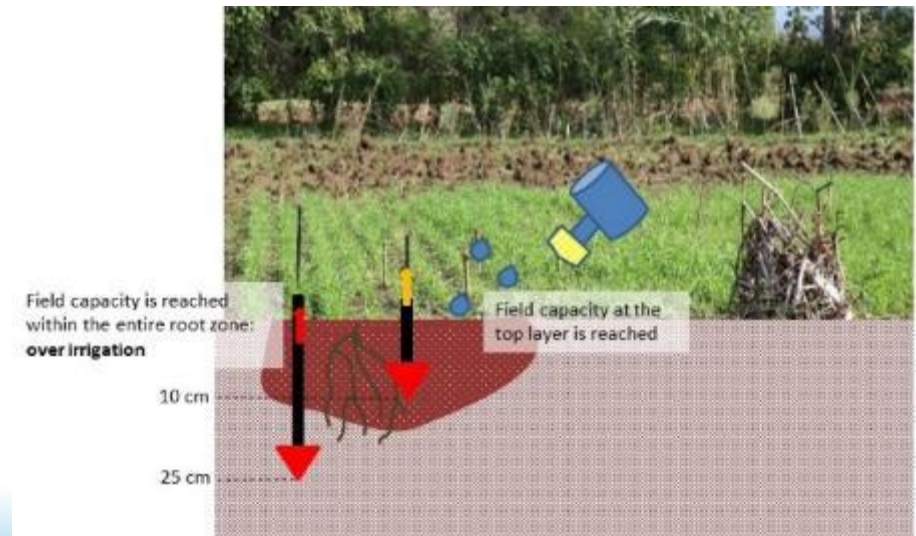
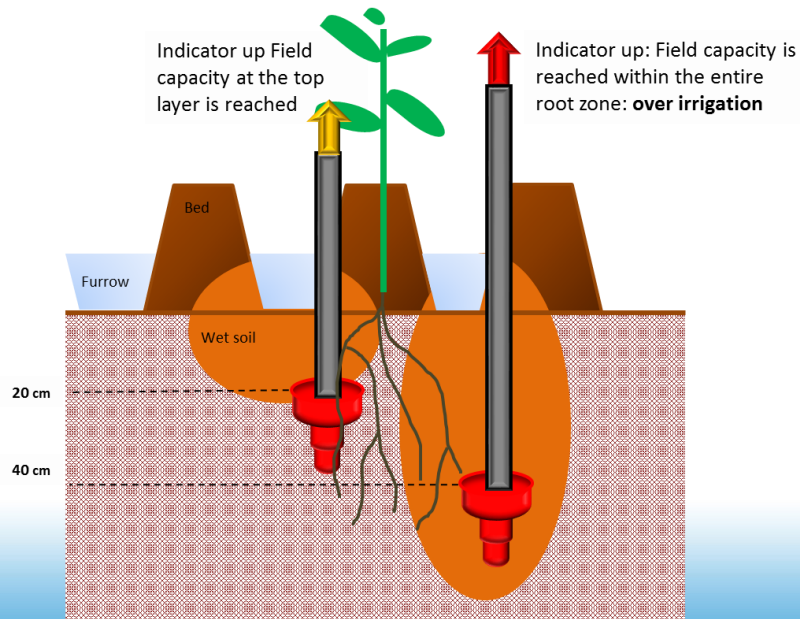
Source: Smith et al., 2001.

Simple technical advisory units on water application to high value crops will lead to a reduction in water demand

WETTING FRONT DETECTORS



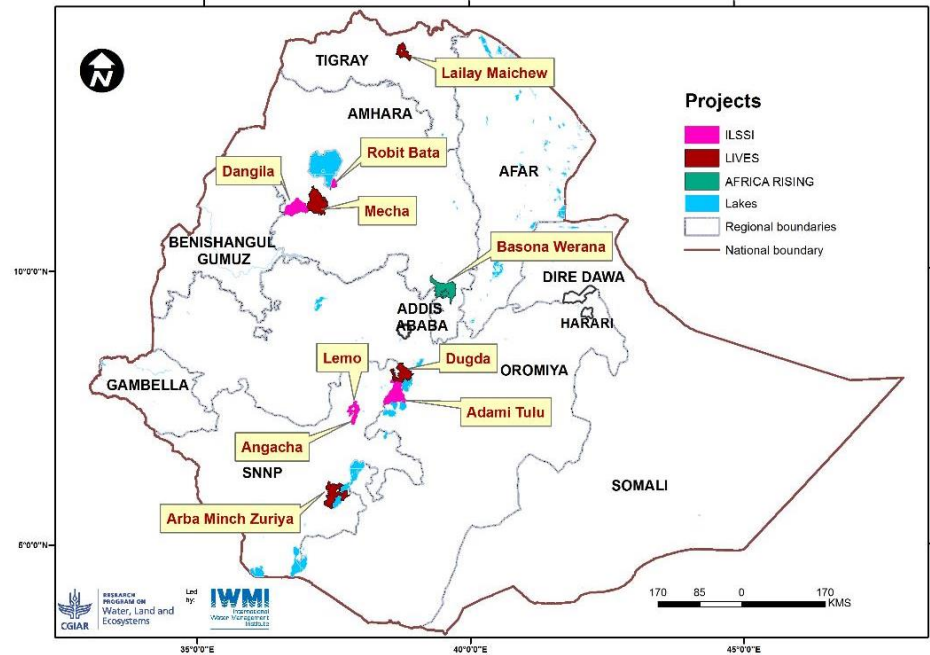
- A mechanical device to monitor the wetting front
- 2004©CSIRO
(<http://www.agriplas.co.za/>)
- Installation depth depends on the application, soil & crop type



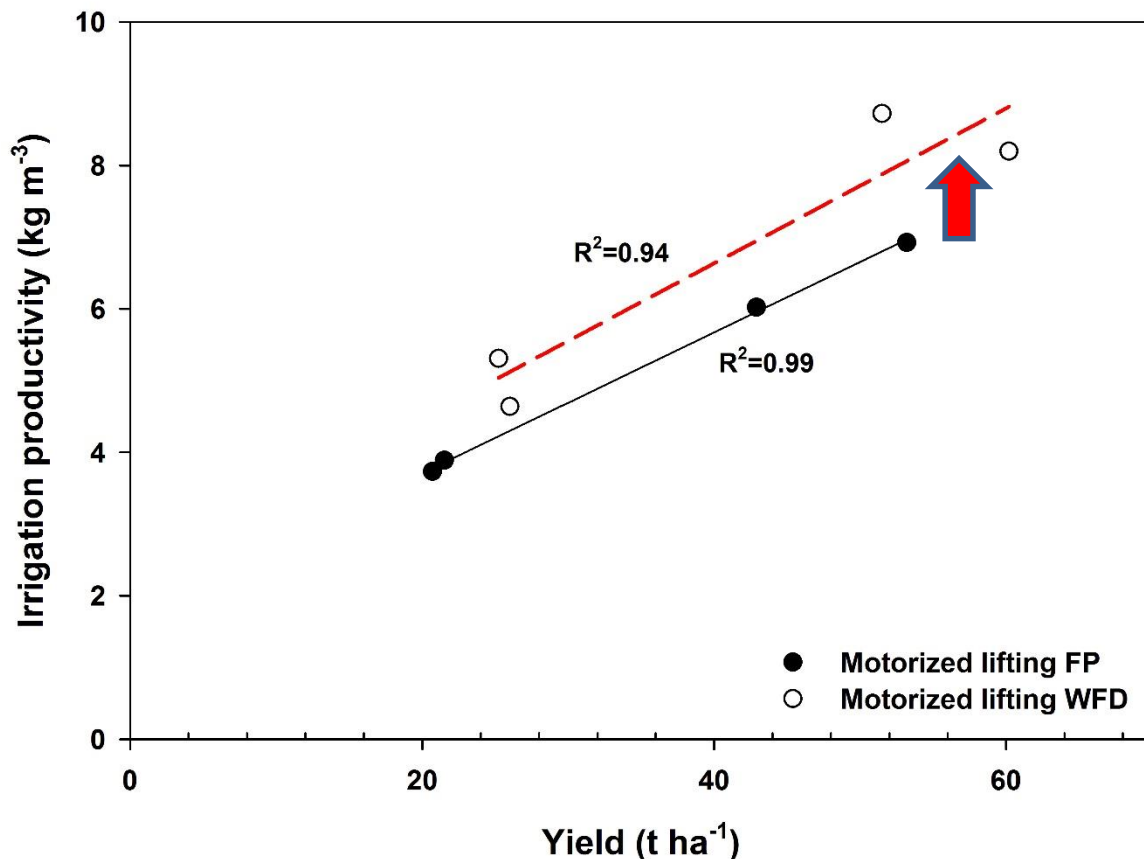
STUDY SITES, CROPS & MANAGEMENT



- Water lifting and irrigation:
 - Motorized lifting & furrow
 - Gravitational & furrow
- Crops:
 - Onion, tomato, cabbage, green pepper
 - Wheat, Potato
- Measurements:
 - Irrigation quantity
 - Crop performance & yield
 - Soil moisture and management



EFFECTS FOR SSI FOR FURROW DEPENDS ON



Installation at the same depth:

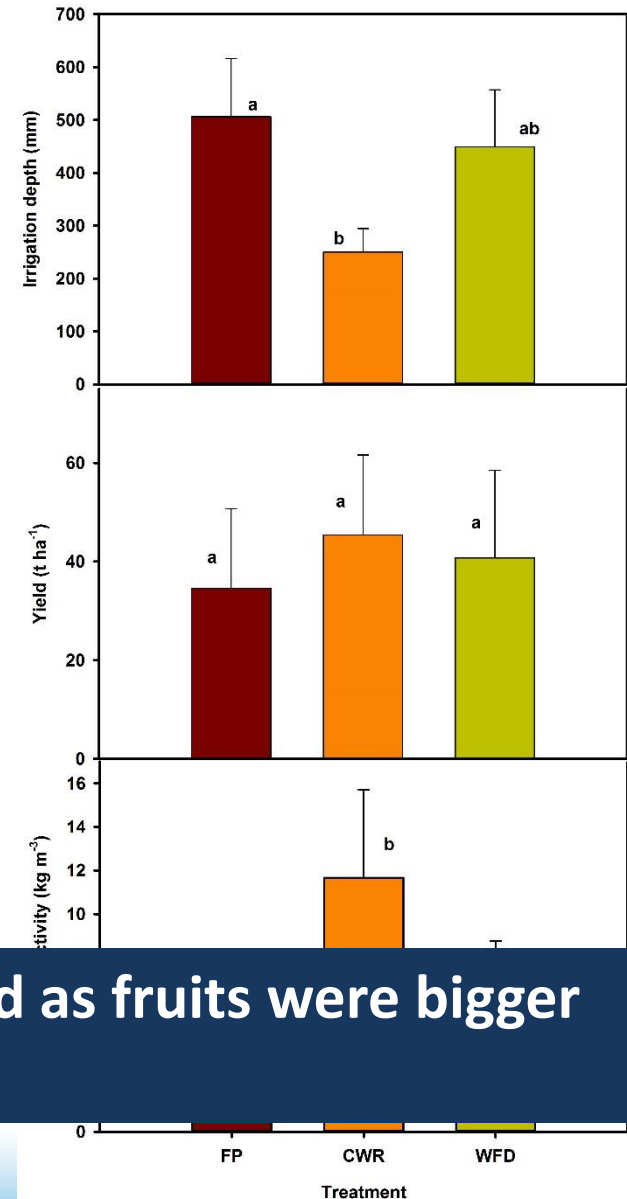
⇒ Effect depends on :

- Water availability
- Length of furrow
- Method of irrigation (1,2, 3 furrows at a time)
- Soil type
- Land size/ experience ?

MOTORIZED PUMPING & FURROW



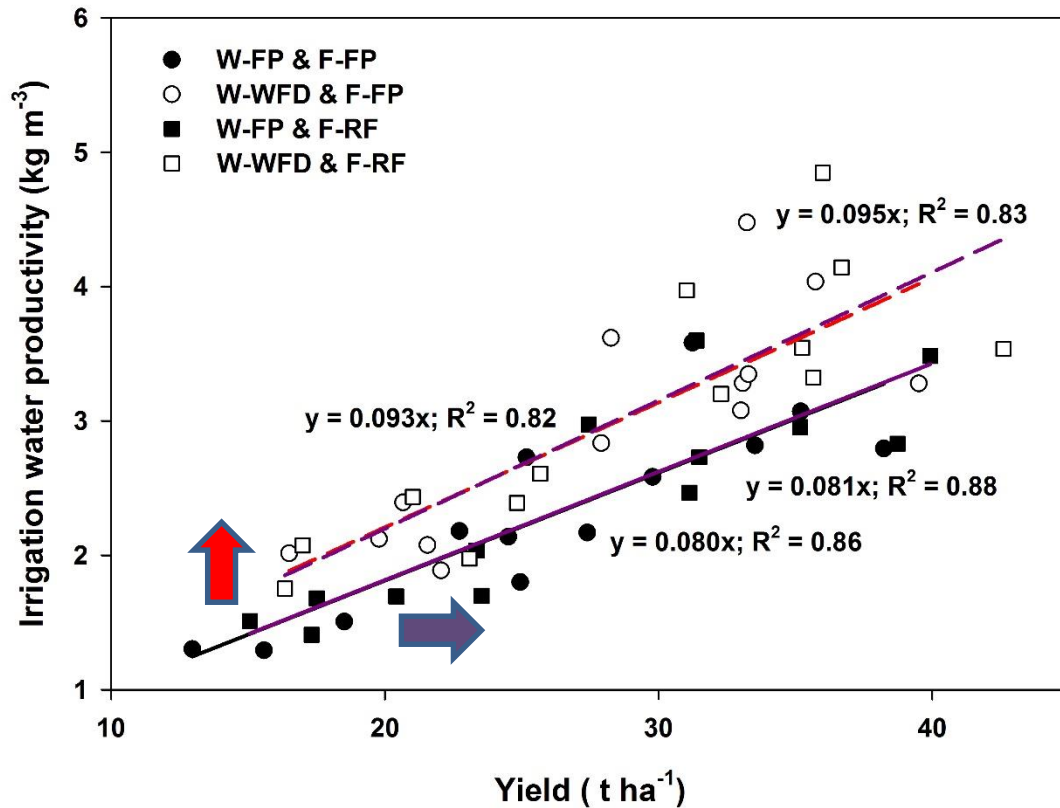
- Farmers practice (FP) used 12% > WFD and 50% > CWR
- Yield FP < 15% for WFD and 24% for CWR
- Fuel saving between 50 -150\$/ha
- Motorized pump in SSA could benefit 185 million people; 29,661 thousand ha generating revenues of US\$22 billion a year across the continent BUT needs CLIMATE SMART MANAGEMENT :
 - ✓ **US \$1.5 to 4.4 billion saving of fuel**
 - ✓ **3 – 29 billion m³/yr water saved**



⇒ **Farmers preferred the CWR and WFD yield as fruits were bigger and fields had a higher marketable yield**

OPTIMIZING RESOURCES BEYOND WATER

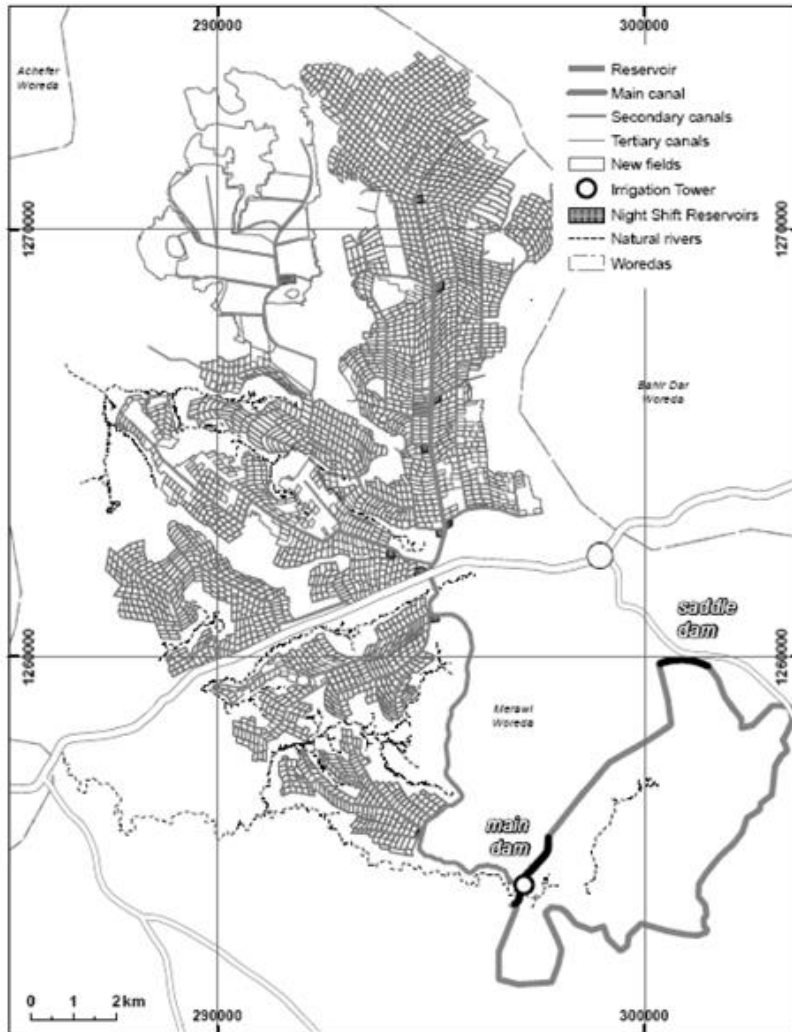
Onion



- Similar effect of WFD as for motorized lifting
- Water management improves yield by 7%
- Reduction of fertilizer: 20% N and 50% P
- 1,153 USD/ha profit (90% water, 10 % fert.)

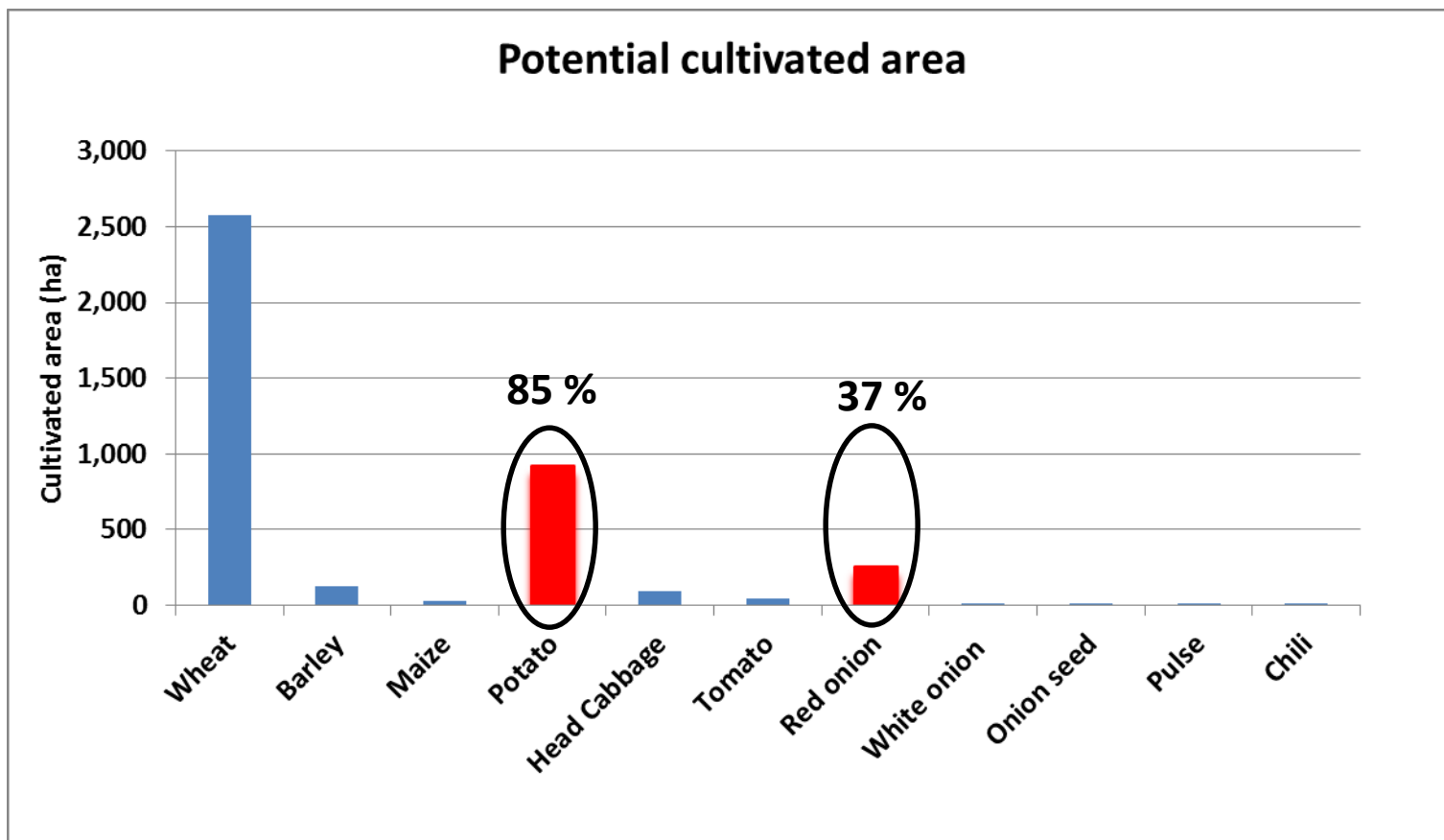
Simple technical advisory on water application will lead to a reduction in water demand and efficient use of inputs

INCREASING IRRIGATION COMMAND AREA



- Experiment was repeated using full farmer fields with WUA (1 WFD for 0.5 ha)
- Three blocks: Chihona, Tagel, Adibera
- Is water saving achieved?
- Does it impact yield?
- Can land be increased?

INCREASING IRRIGATION COMMAND AREA



When WUA distribute the information and manage water accordingly
=> increased irrigable land by 37% (onion) & 85% (potato)

CONCLUSION AND FURTHER OUTLOOK



- The **impact on water and crop** productivity depends strongly on **water lifting technology and management**
- **Impact goes beyond** the hypothesis- reduction in costs through reduced fertilizer; positive impact on quality of produce (bigger and better); compliments existing indigenous knowledge
- Efficiency gains in both water and fertilizer **contribute** to move towards **sustainability** (reducing water demand, reduction in loss of nutrients etc.) and meeting the **SDG on water** (e.g 6.4)
- Influences farmers' thinking about water use to **compliment their existing indigenous** skills (build trust in research for development) => well liked by farmers
- **Interest by National key stakeholders** to conduct National Research on irrigation scheduling using WFD

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