

Preliminary results of energy, water and food in traditional and high-tech greenhouses

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Background of Estidamah project

Main goals are:

- Increase productivity: more production & less losses
- Increase resource use efficiency: use less water
- Increase food quality: minimize the residues in products



More



Less



Better

Transition of horticulture

15x more productive

Open Field



3 kg



Plastic greenhouse



13 kg



Modern greenhouse



43 kg



Increasing control of production factors



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Technology makes it happen

Water Use Efficiency in relation to technology

Liters water per kg tomato

1kg



Outdoor production system



60 liters



Holland 'closed' greenhouse



4 liters



Source: Xinxin



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Step by step approach

- Low/standard Tech
(reference)



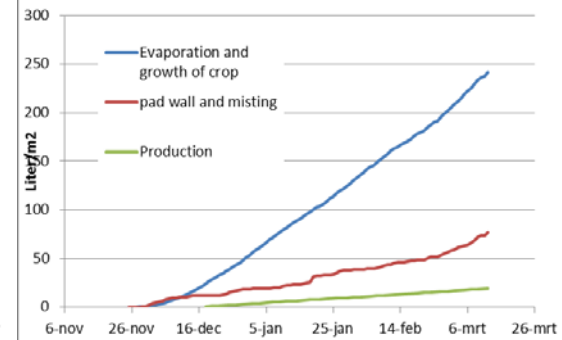
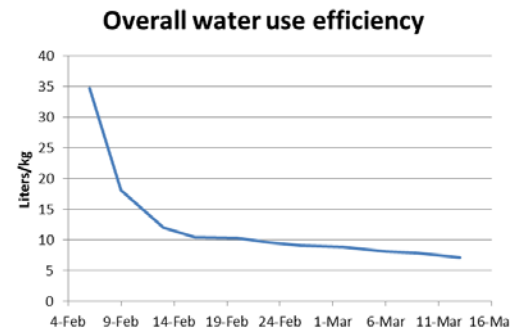
- Mid Tech



- High Tech



Research center in Riyadh (Estidamah)



Experiment low vs. Mid vs. high tech

- Two varieties tomato
- Evaluation on water use
- Energy use
- Production
- Operational costs (SAR/kg)



Current status

- Production Mid and low tech similar
- Water use Mid tech greenhouse half of the use of low tech
- Electricity use also half
- Production high tech almost double

Production (cluster)	
Low	30 kg/m ²
Mid soil	50 kg/m ²
Mid rockwool	50 kg/m ²
High	75 kg/m ²
High lamps	85 kg/m ²
Water use efficiency	
Low	300.0 l/kg
Mid soil	100.0 l/kg
Mid rockwool	100.0 l/kg
High	4.0 l/kg
High lamps	3.5 l/kg
Electricity use	
Low	30 kWh/m ²
Mid (also for heating)	120 kWh/m ²
High (COP=2)	600 kWh/m ²
High lamps	700 kWh/m ²

Thank you for your attention

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