



# **Role of efficient management of non-conventional and brackish water resources in sustaining agricultural production and achieving food security in the United Arab Emirates**

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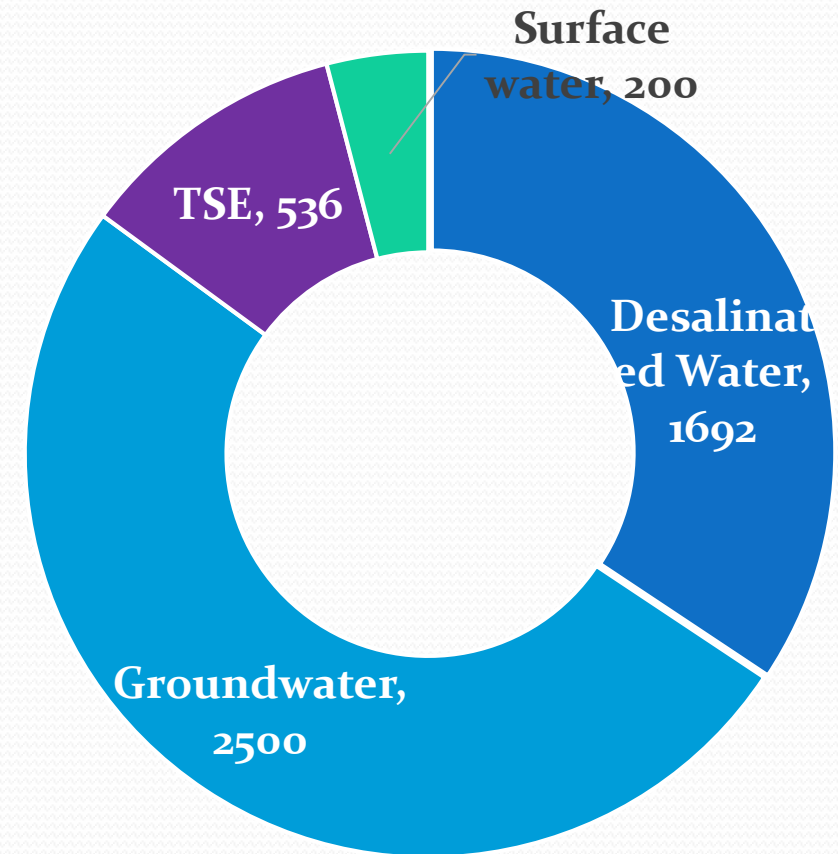
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# Overview

- Introduction
- Current agricultural production and productivity
- Food Needs and self sufficiency
- Options for improving agricultural water productivity
- Conclusions and recommendations

# Introduction

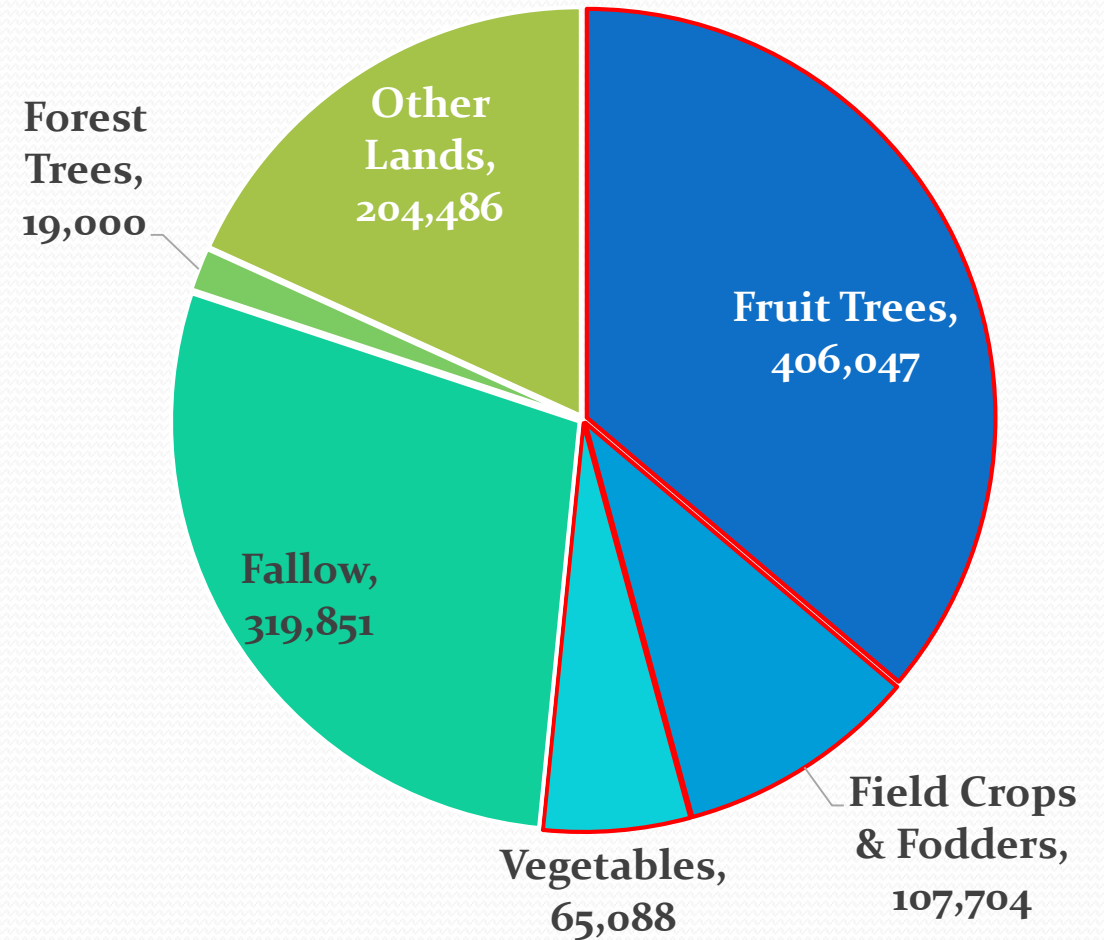
- Water scarcity and growing food demand
- Total annual water use is 5 billion cubic meters
- Groundwater is mainly used in Agricultural production
- Desalinated water is used for Municipal and industrial uses
- Treated wastewater is used for landscaping
- Wastewater is used for groundwater recharge and agricultural use



*Annual Water use per source of water in UAE  
(Million cubic meter) –  
Federal Competitiveness and statistics Center 2020,  
MOEI, 2019*

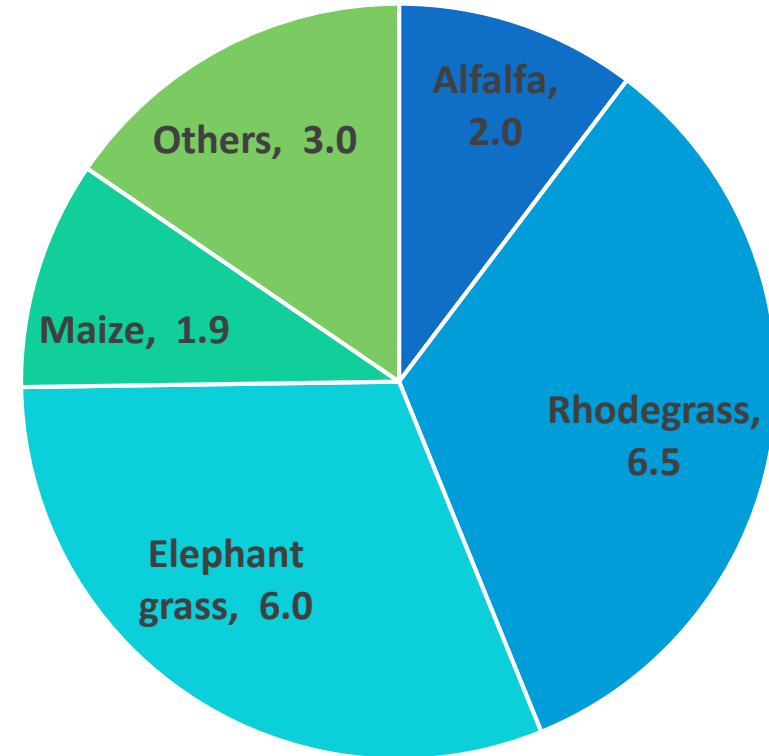
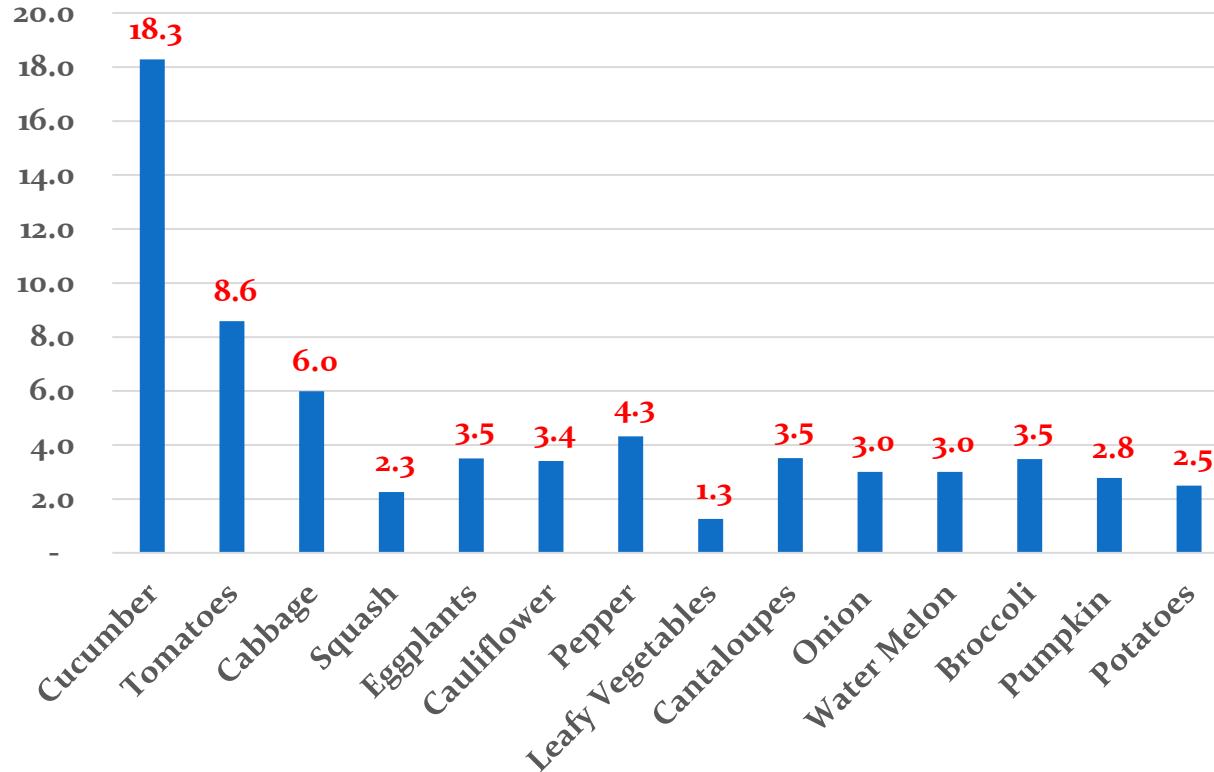
# Agricultural land use

- Total agricultural and forest area is 1.1 Million Dunum
- Actual cultivated area (Crop Area) is 52% or 0.578 Million Dunum, of which:
  - Fruit trees (95% dates) share is 70%
  - Field crops share is ~ 20%
  - Vegetable's share is ~ 10%

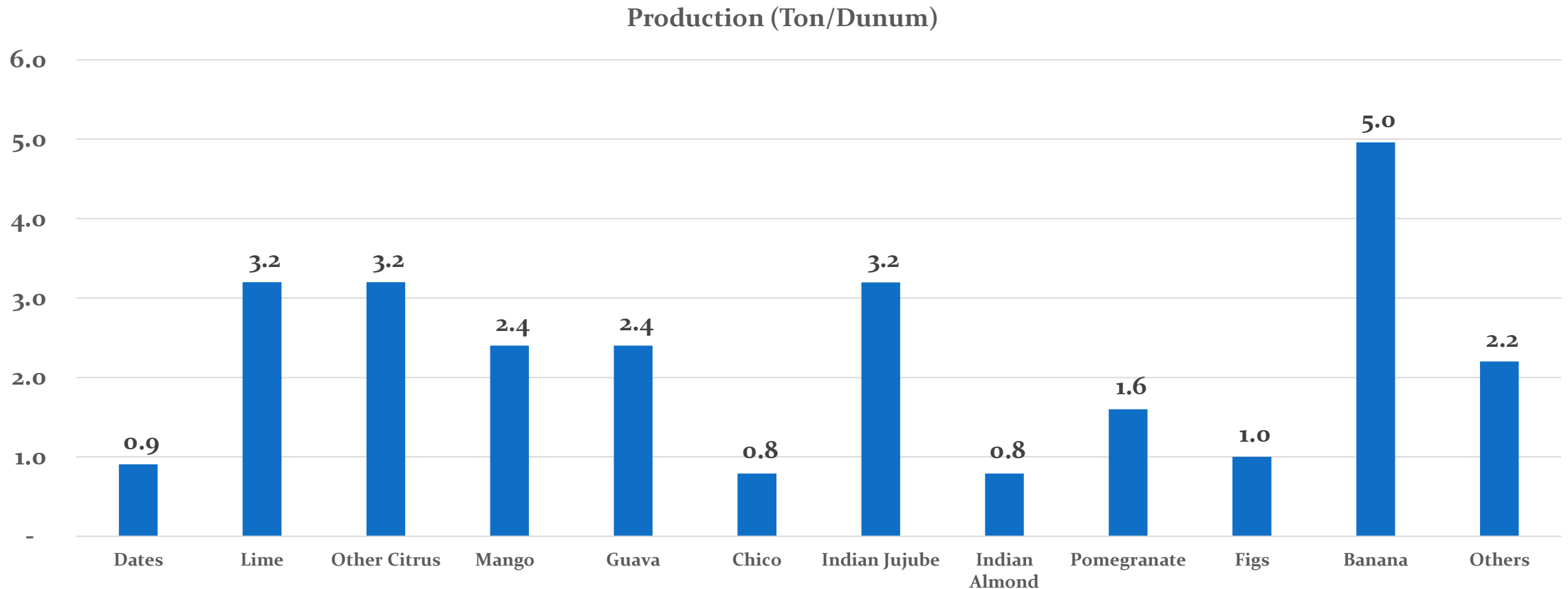


# Current Agricultural Production and Productivity

Production (Tons/Dunum)



# Current Agricultural Production and Productivity

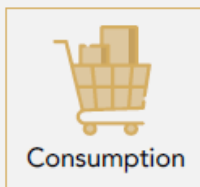


# Food Basket in UAE

## Main Food Items

7 food items were introduced to UAE's staple food as a result of COVID-19 pandemic due to their nutritional content, being specialized food for certain age group and risk of shortage of supply

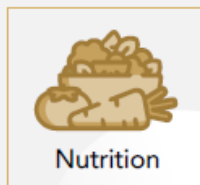
### Original Criteria



Consumption



Production



Nutrition

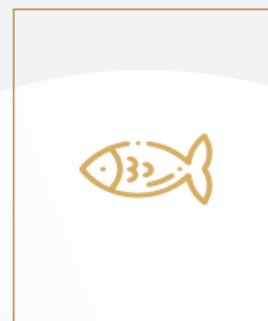
### Plant Products

Fruits			Vegetables			Grains & Pulses		Other	
Apples	Bananas	Lemon	Greens	Tomatoes	Onion	Pulses	Rice	Oils	Infant Food
Dates	Oranges		Potato	Cucumber	Pepper	Wheat	Sugar	Coffee	Tea

### Livestock Products



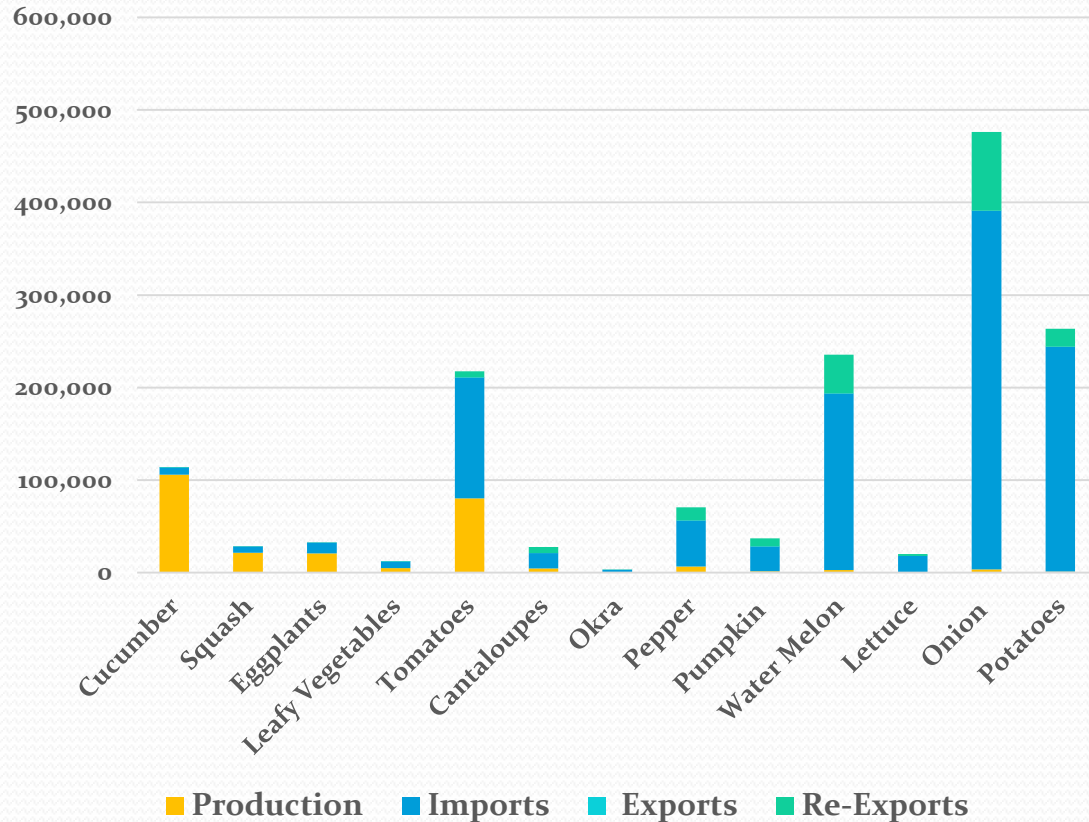
### Fisheries



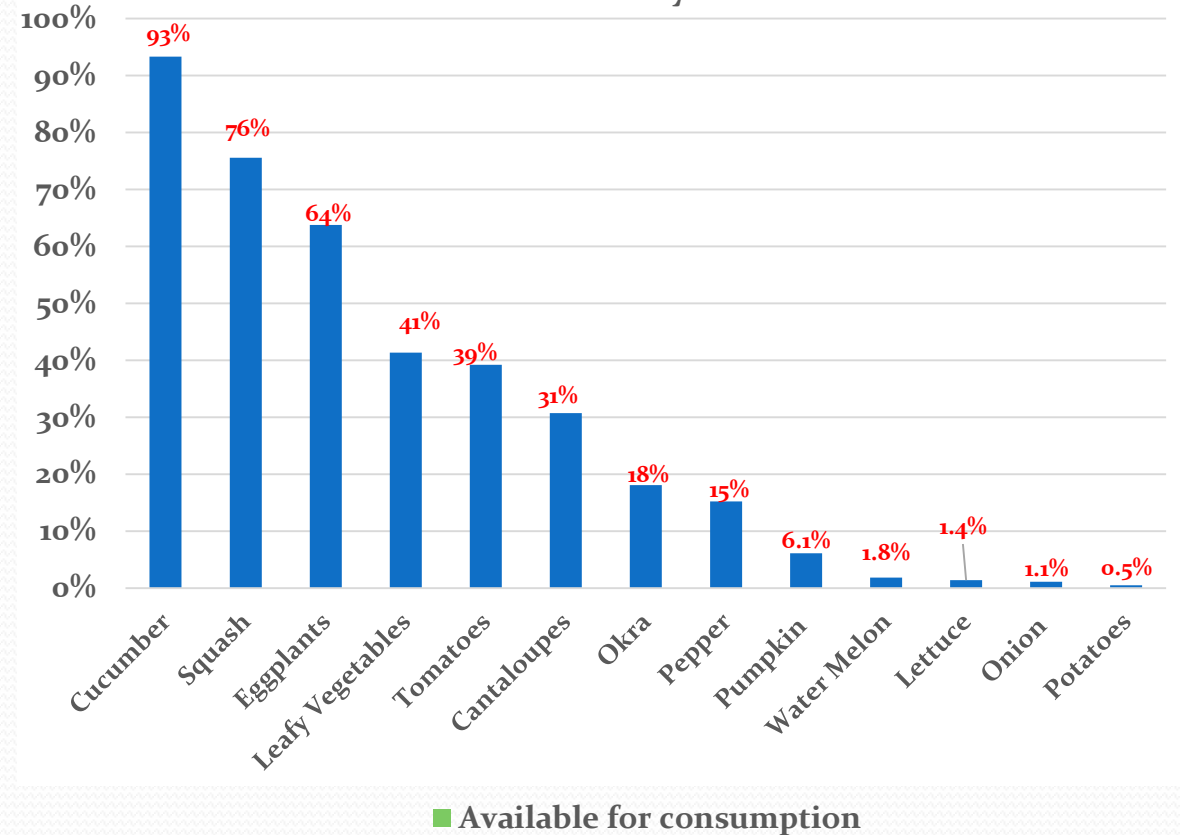
New food items

# Food Needs and Self Sufficiency

Available Crops for Consumption

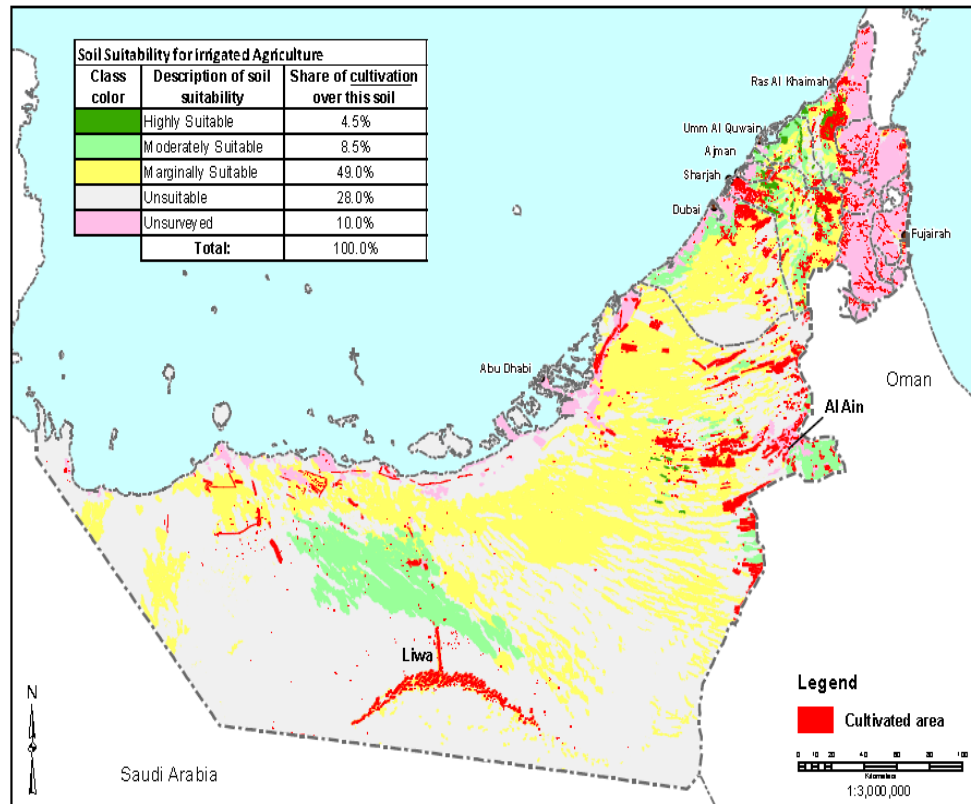


Self Sufficiency Rate





# Options to improve agricultural productivity



- Selecting the best crops that suits local environment- soil, and water suitability, and local climate
- Alternative crops, shifting to crops with lower water demand or to crops with higher economic return or physical productivity
- Improving water use efficiency, and providing better estimates of crop water requirements and irrigation scheduling
- Increase sustainable use of non-conventional water resources



# Climate-resilient crops

**Date Palm**



**Quinoa**



**Forages**



**Sporobolus**



**Salicornia**



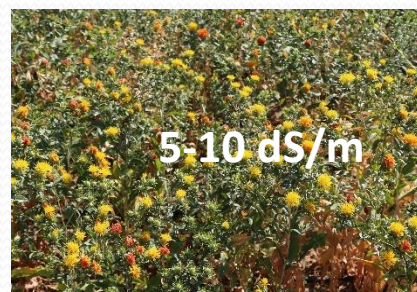
**Barley**



**Moringa**



**Safflower**



**Cowpea**



**Lablab**



**Sunflower**



**Mustard**



**Pearl millet**



**Sorghum**



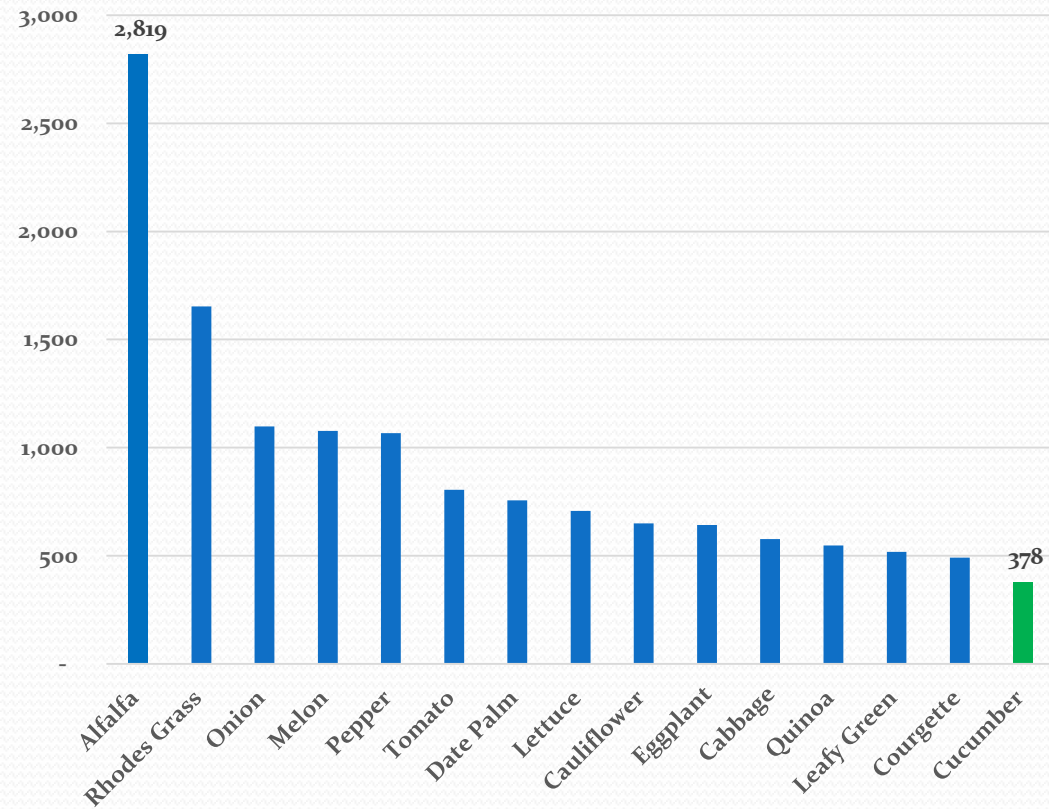
**Amaranth**



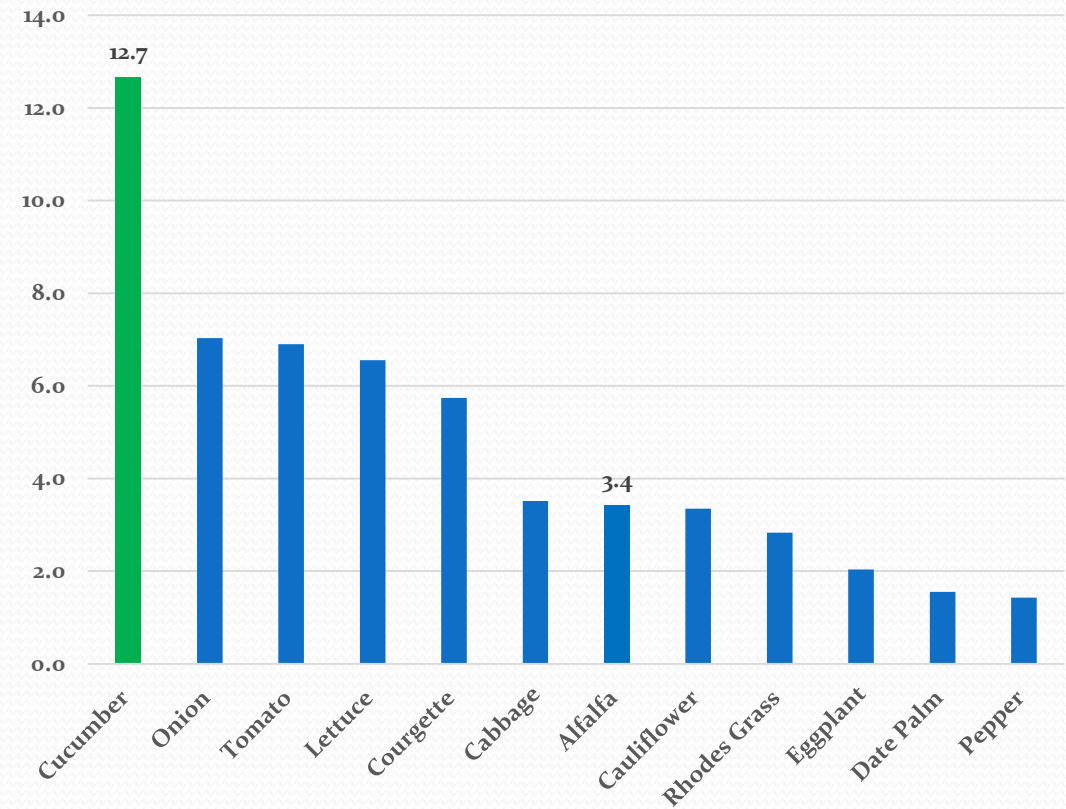


# Increasing productivity per unit of water used

Supplied Water Needs (m<sup>3</sup>/dunum)

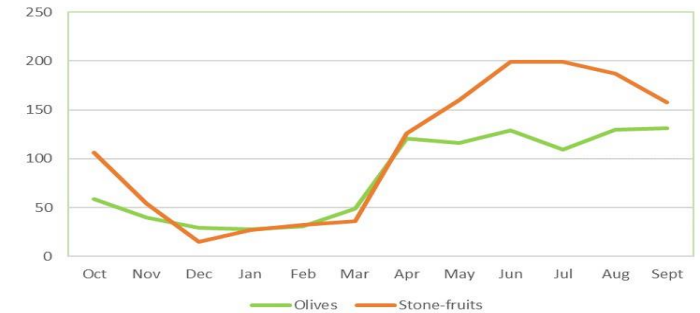
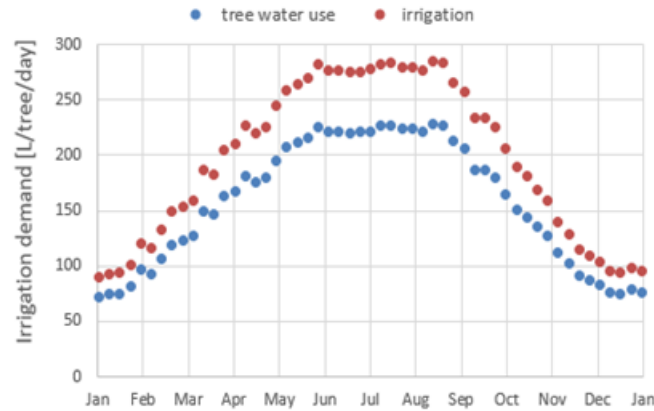


CWP=Physical crop yield/ Water use (kg/m<sup>3</sup>)



# Irrigation scheduling to improve crop yield

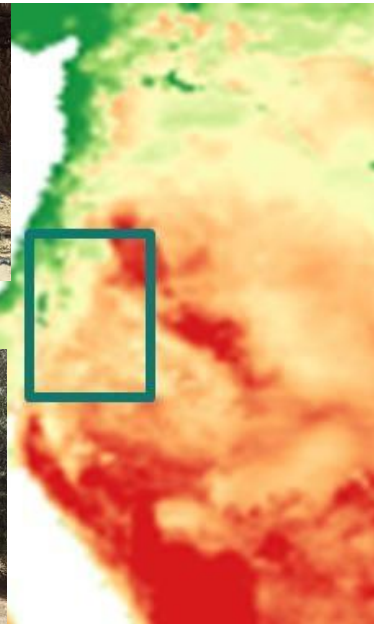
- Saving is about 35%
- Present Irrigation Water Application is about 280 l/tree/day
- Trees are using 50 -75 L/day (winter) and 200-250 L/day (summer)



CWR information sheets/guidelines: olives, stone fruits,

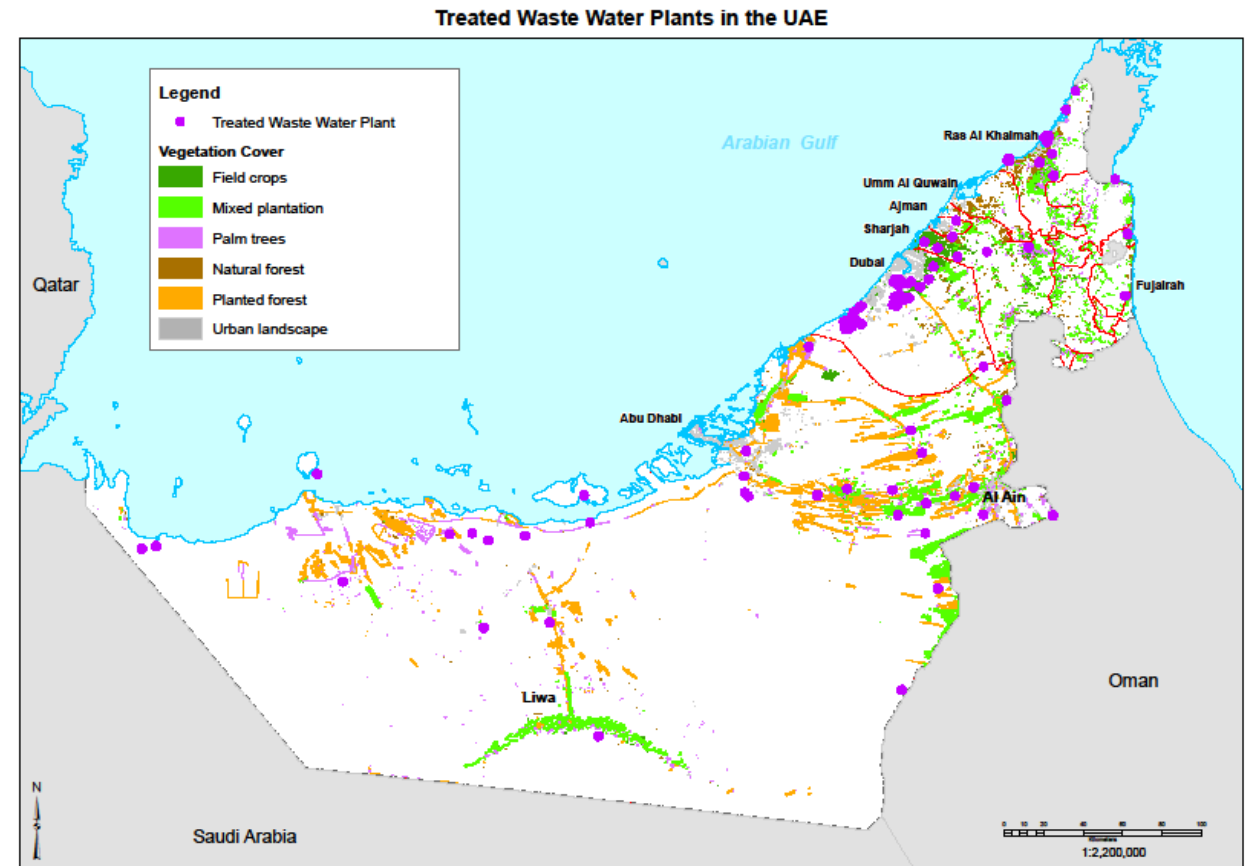


Sensors and Lysimeters



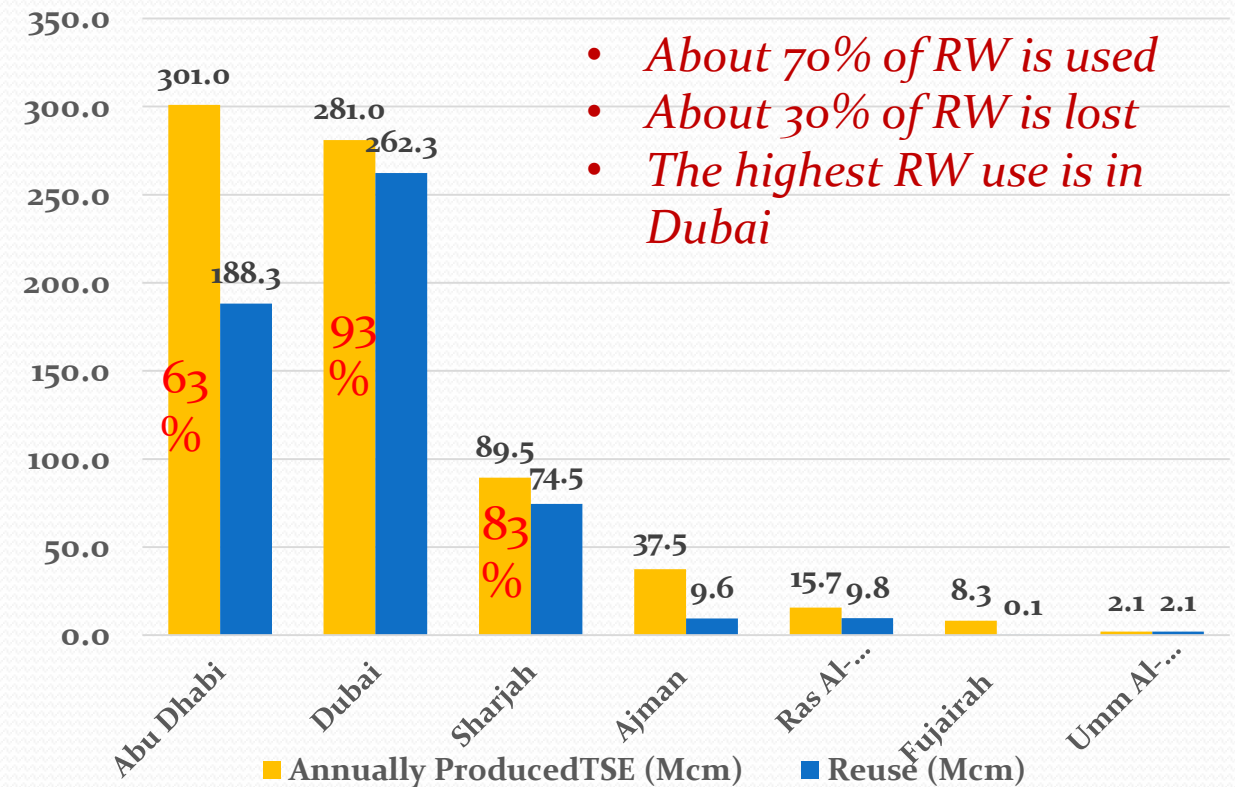
## 2. Use treated wastewater in agriculture

- TSE is a valuable water resource, rich with nutrients.
- Achieve food, water, and energy security
- Shifting the use to agricultural production
- Hard landscaping and using native plants that use less water for beautification



## 2. Use treated wastewater in agriculture

- Treated Sewage Effluent (TSE) use account for about 11% of total water demand
- Produced TSE is about 769 Mcm, of which about 536 Mcm are used
- Unused TSE water is about 234 Mcm or 30% of produced TSE



- About 70% of RW is used
- About 30% of RW is lost
- The highest RW use is in Dubai

TSE production and reuse (Mcm)

Source: Federal Competitiveness and Statistics Authority, 2020

# Conclusions

- Alternative crops that can tolerate heat, drought, and salinity can contribute to achieving food security
- Improving water use efficiency can help in sustaining the limited available water resources for longer time in the future
- Appropriate water demand management should be wisely applied to sustain the valuable water resources
- Alternative water resources like treated wastewater have high potential to be utilized to bridge the gap between water supply and demand