

# Time for change: Breathing life back into the MENA region agricultural transformation



**ZEF  
Bonn, Germany.**

**5 May 2016**

**Andrew Noble**

**ICARDA Deputy Director General**



# Presentation Outline

- The challenges facing MENA.
- Addressing the challenges through an agricultural lens – examples of interventions.
- Concluding remarks.



# The challenges facing the MENA Region

- Population growth.
- Rapid and uncontrolled urbanization.
- High rates of unemployment.
- Weak institutions and political systems in transition – failed and fragile states.
- **Disenfranchised rural communities – predominantly agrarian economies.**
- Climate Change and Resource Constraints (water)!

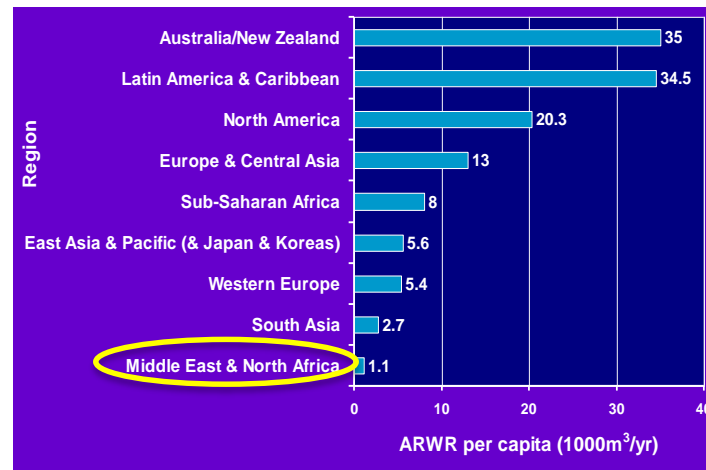


**A general sense of disappear.**

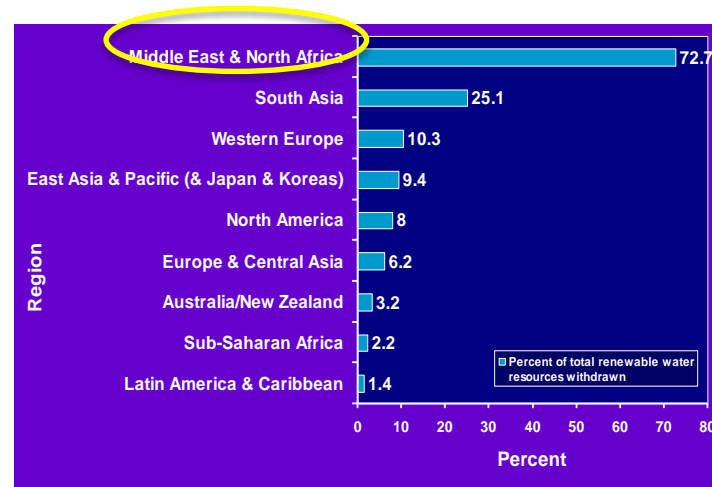
# Water Use in MENA Region

- MENA the world's most water-scarce region
- Highest water withdrawal is in MENA
- On-farm water use efficiency is as low as 40%, suggesting over-irrigation of scarce resource

Actual Renewable Water Resources (ARWR) per capita



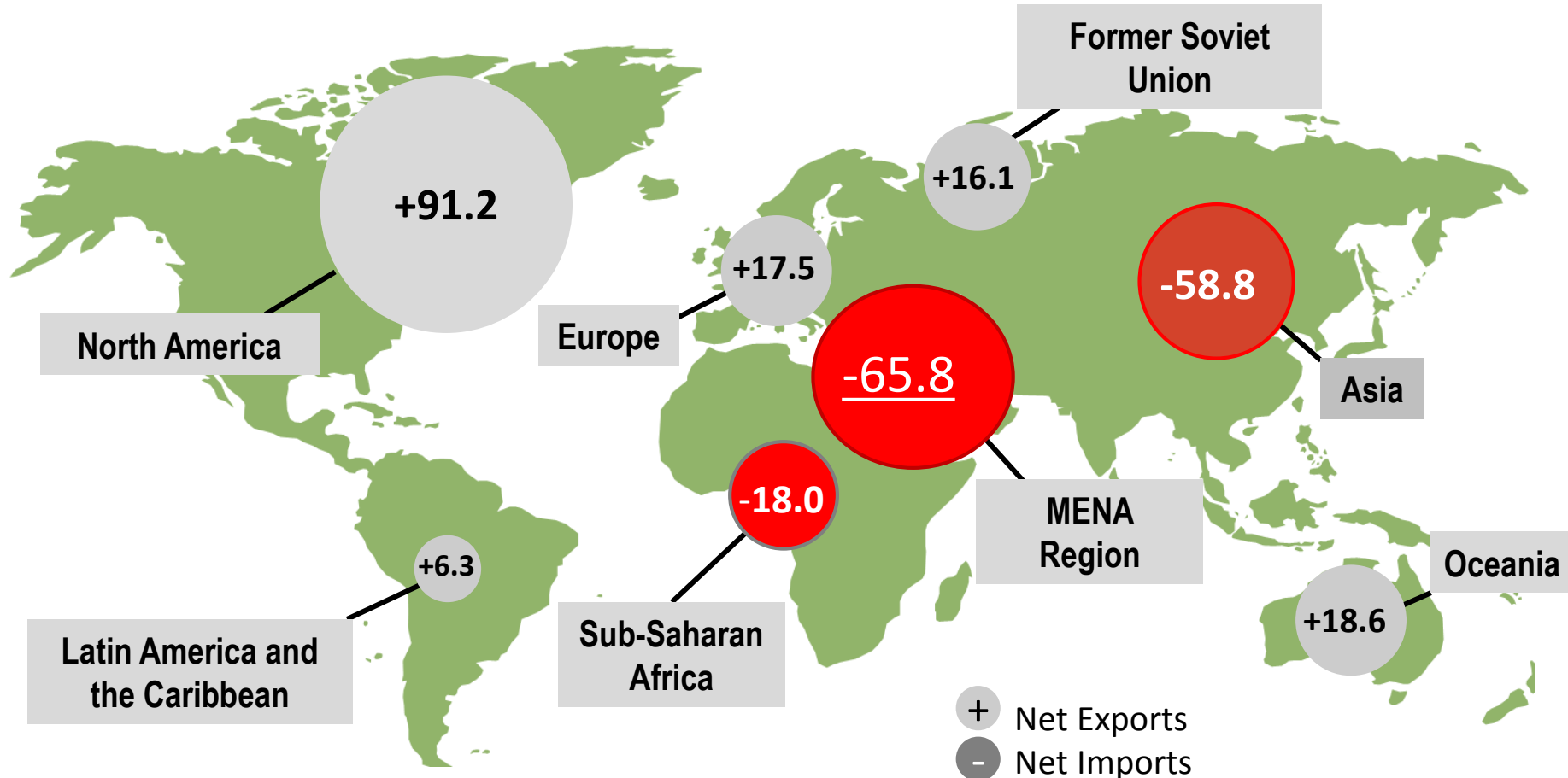
Total renewable water resources withdrawn (%)



# Increased dependency on imports for food security

Global Trade: Net cereal imports (in million MT) by region, 2010

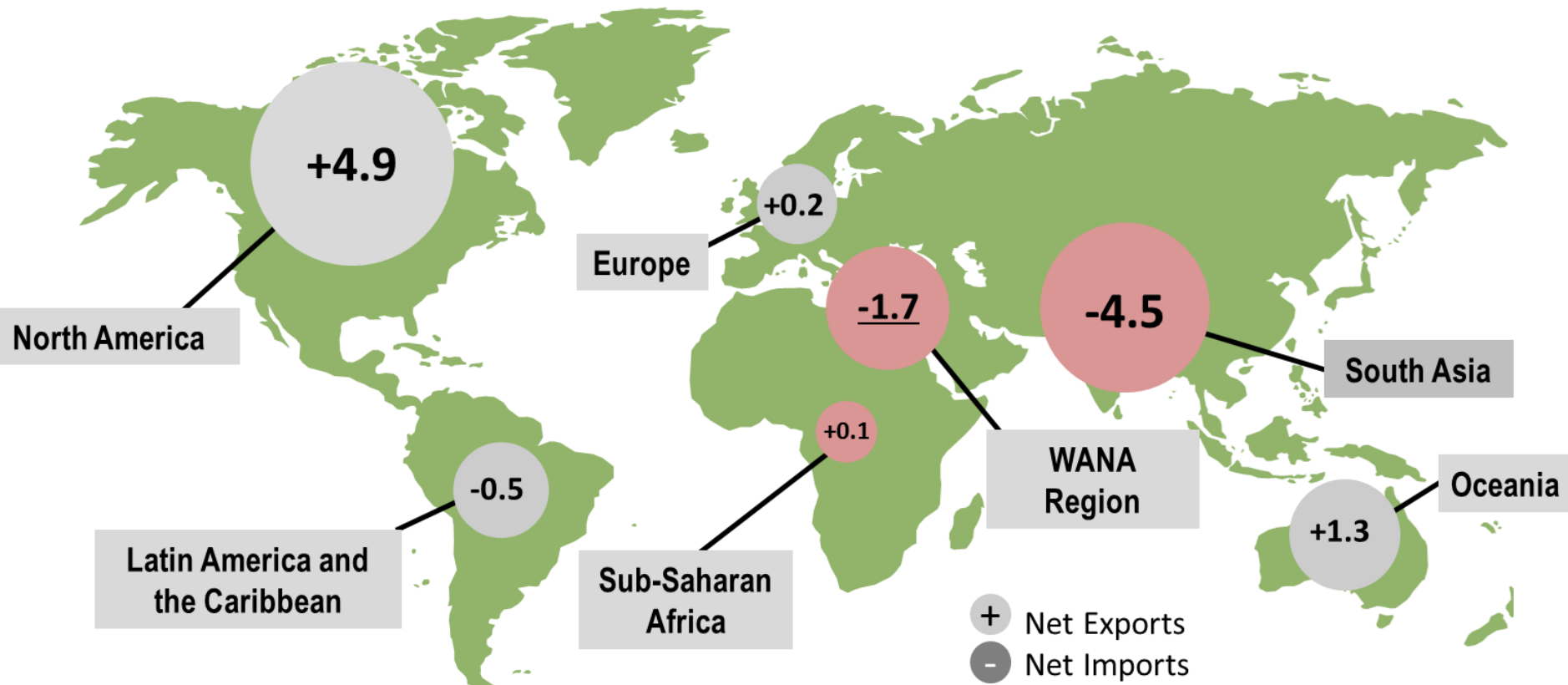
Safety nets/social protection systems are challenged by food price shocks.



Sources: adapted from USDA  
2011

# Pulses deficit regions

Global pulse trade at present: almost 12 million tons

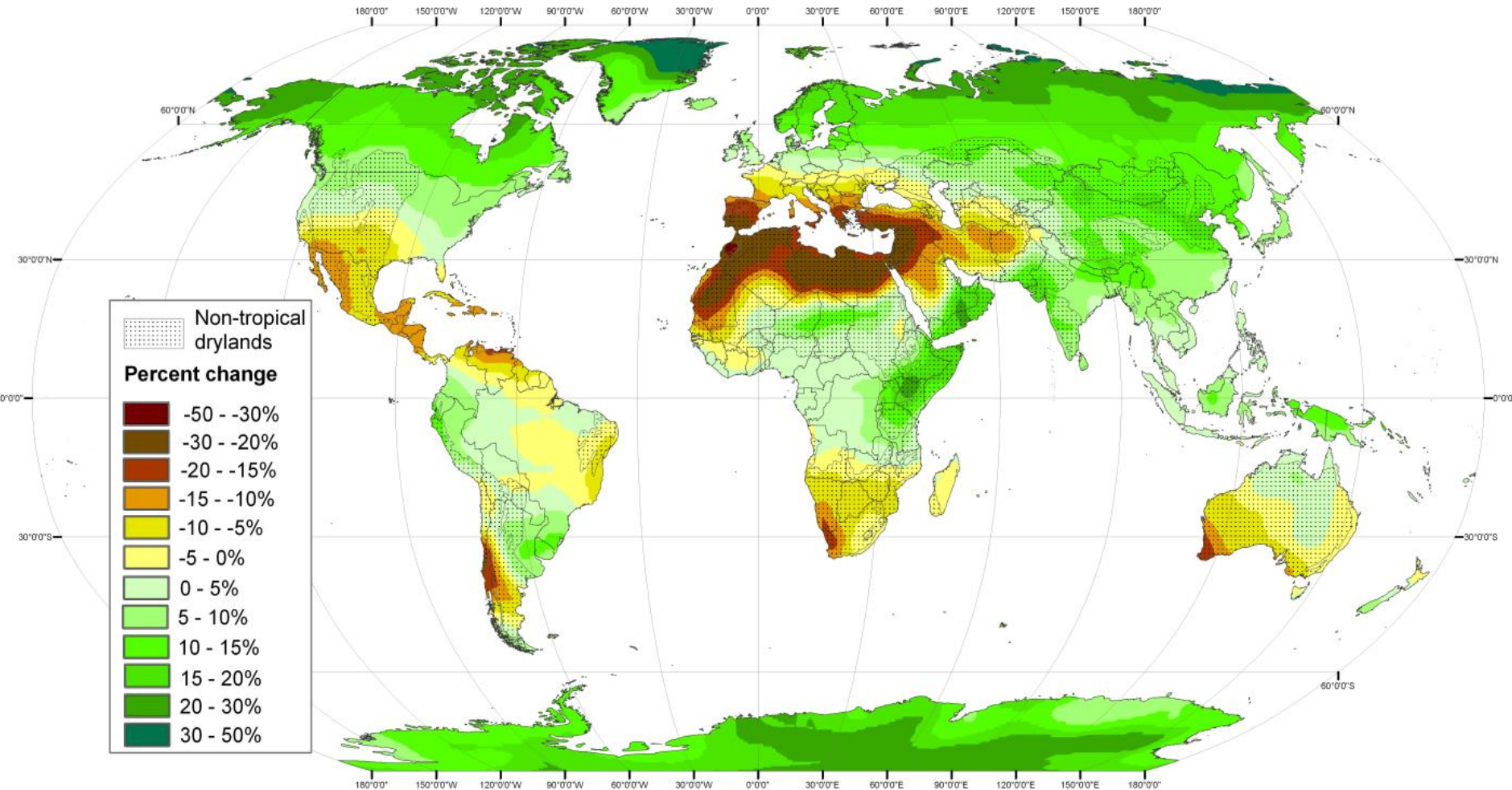


Sources: FAOSTAT (2011)

in Million MT by region (2011)

# Relative change of mean annual precipitation

1980/1999 to 2080/2099



*While it is possible to reduce spending on imports by reducing waste in supply chains, trying to import much less by producing much more is likely to be too costly for most countries. Jobbins and Henley, 2015.*

**Is this statement true?**



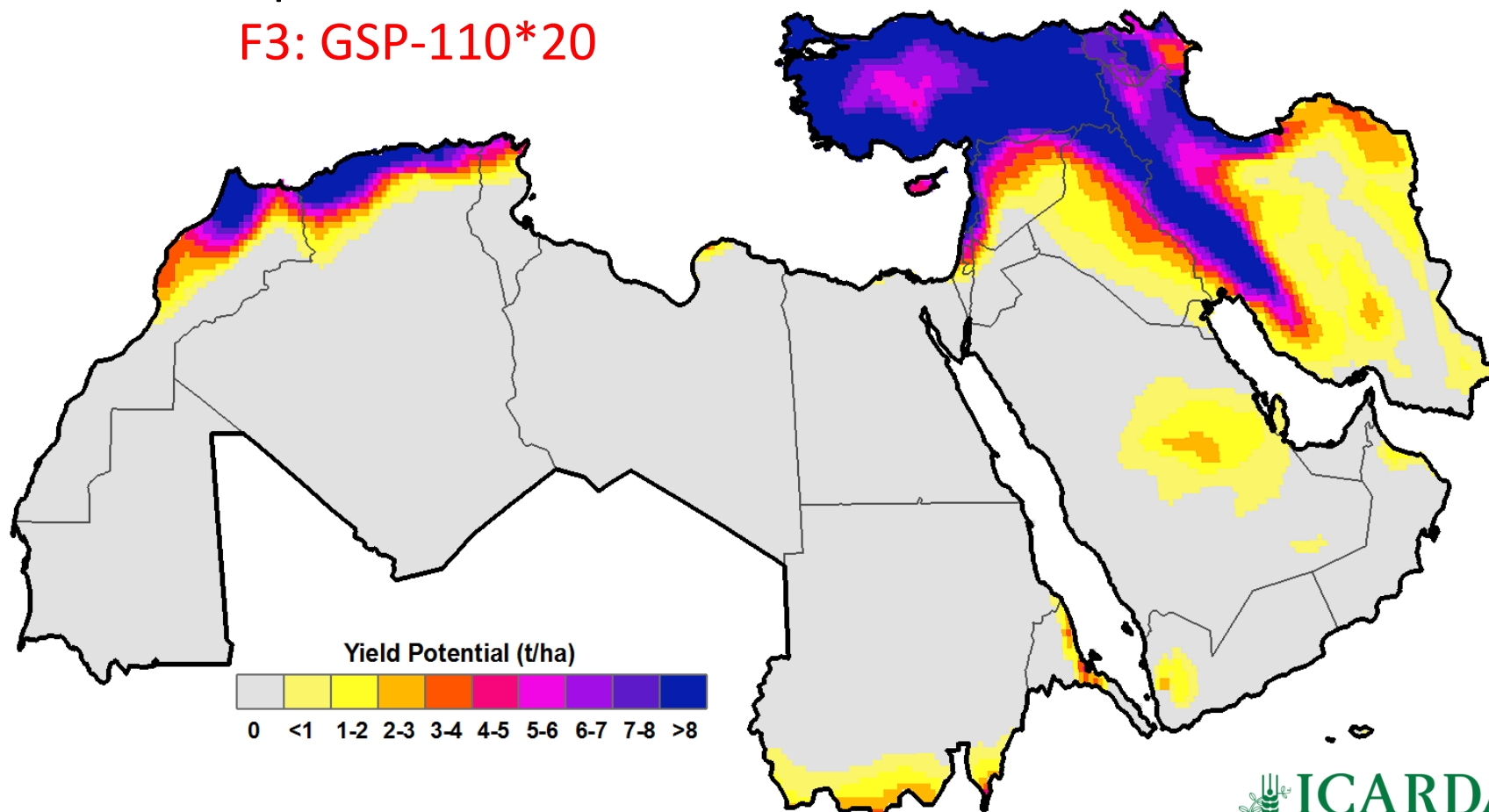


# Envisaging Solutions: Crop Yield Potential for Rainfed Wheat

Environmental conditions in MENA limit the potential to grow food – is this correct?

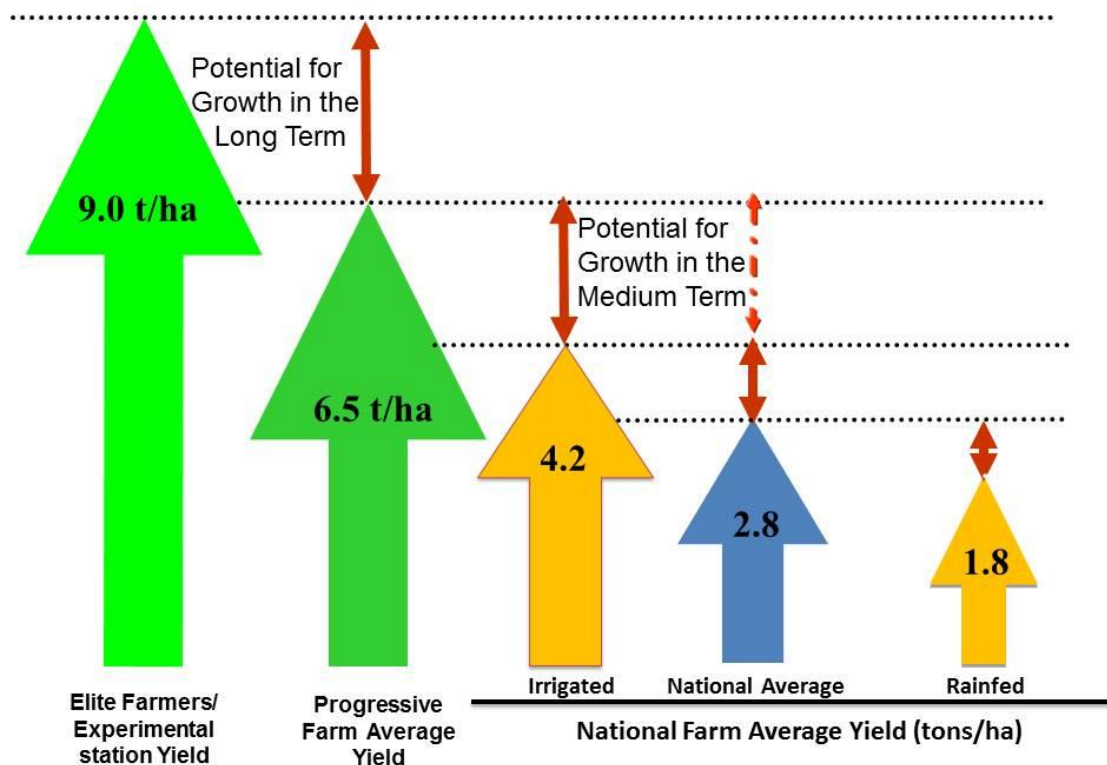
Crop Yield Potential

F3: GSP-110\*20

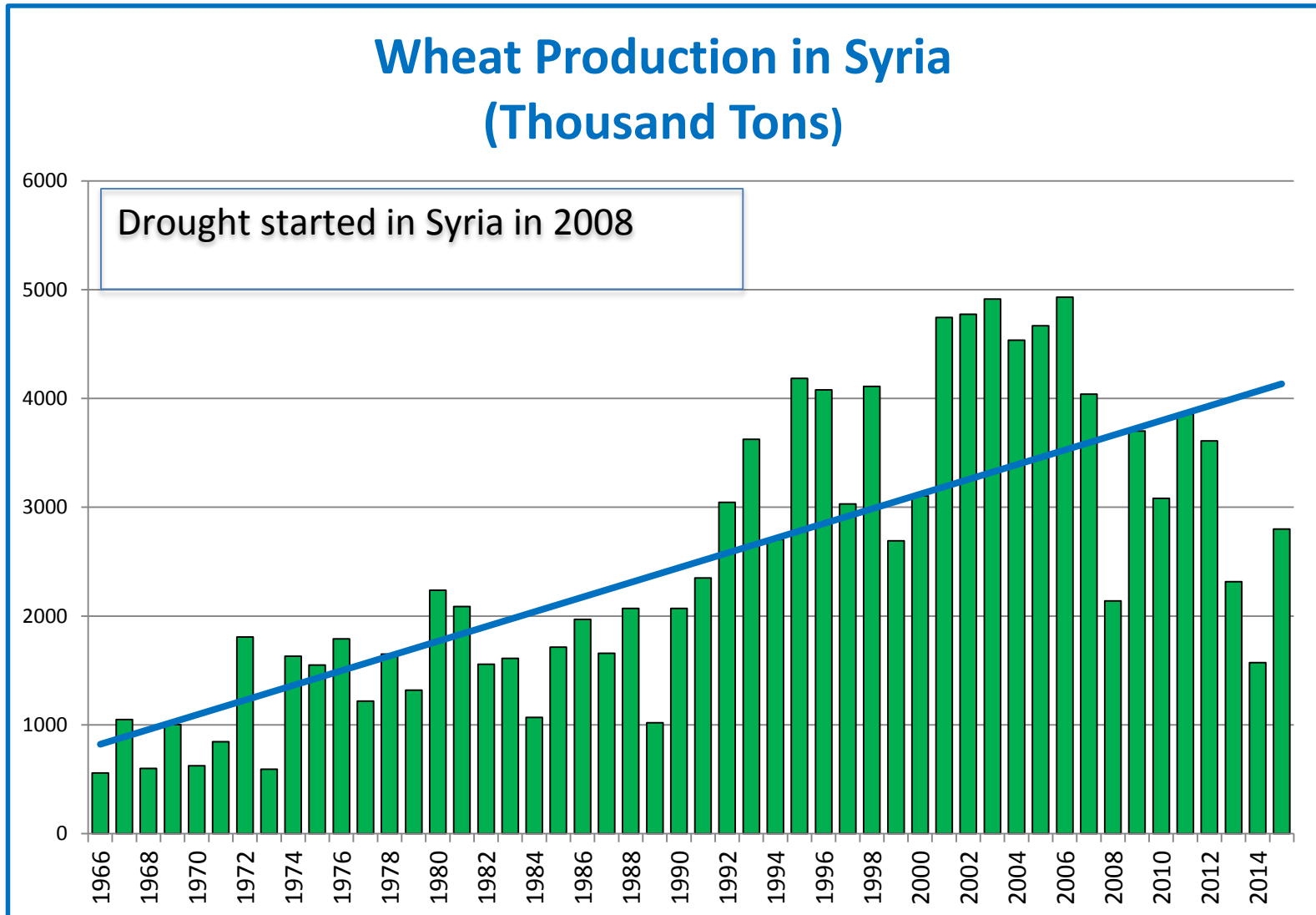


# The Syrian Case – Cause for cautious optimism

- Syria, a formerly wheat importer became self-sufficient in wheat production – and eventually a wheat exporter.
- A combination of new high-yielding varieties, supplemental irrigation, inputs of fertilizers & herbicides and supportive Government policies.



# Impact of the Sustainable Intensification on Wheat Production in Syria



# 1. Conservation Agriculture: Approach to Coping with Climate Change



- Minimum soil disturbance **stubble retention**
- Direct seeding (affordable machinery)

## Benefits

- Savings in time, energy (fuel), machinery wear
- Benefits soil structure and Moisture
- Timely sowing
- Higher yield potential
- less soil erosion



# Local fabrication of zero-tillage seeders: Part of the solution



**Imported seeders**

**Price: US\$ 30,000 to \$60,000**



**Locally manufactured seeders  
(Iraq, Syria, Morocco)**

**Price: US\$ 1500 to 6000**



Australian Government  
Australian Centre for  
International Agricultural Research

# To scale out – need for service providers

*Opportunities for the emergence for new business models to service the sector.*

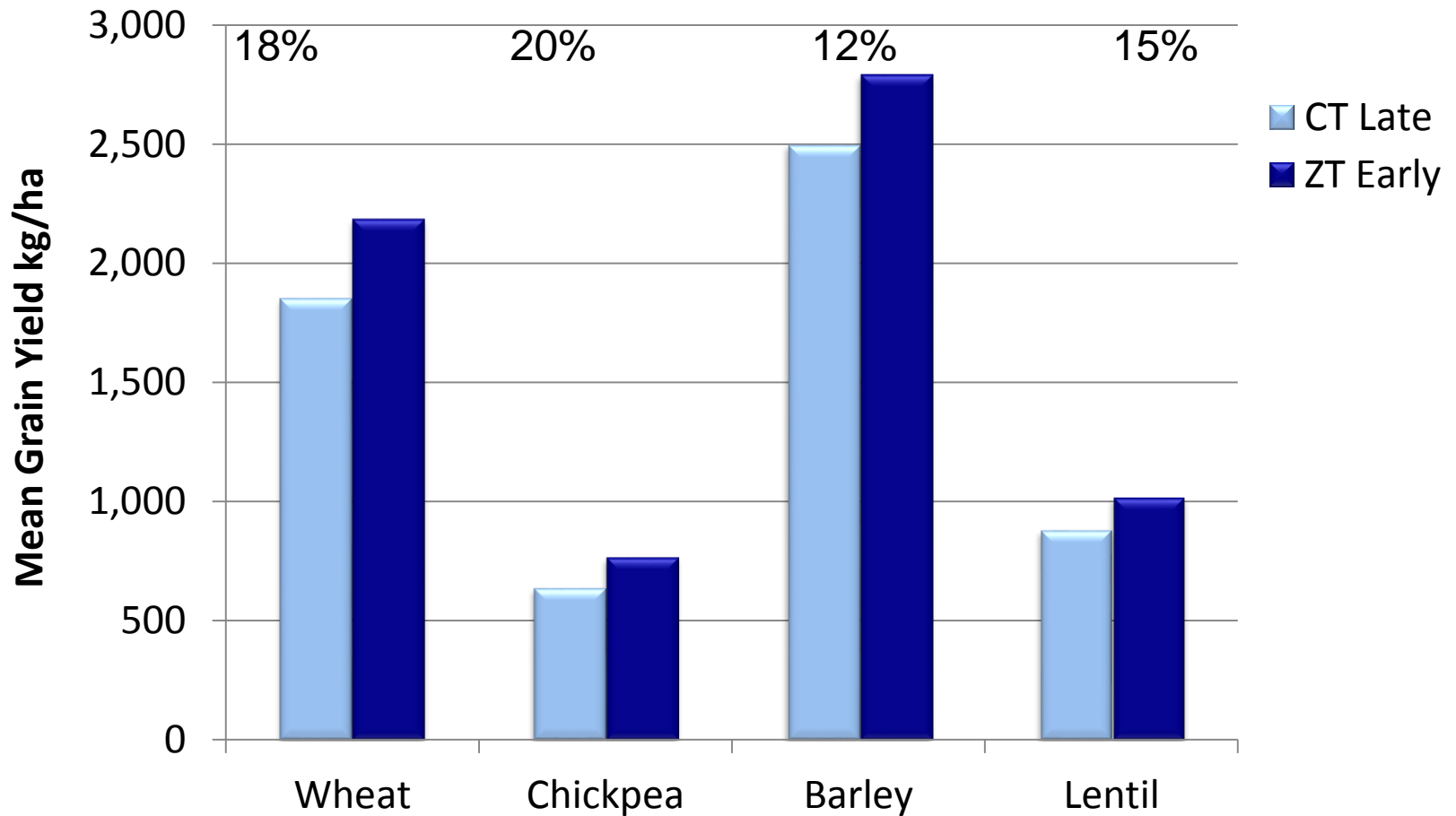


*Seeder training  
Erbil 2013*



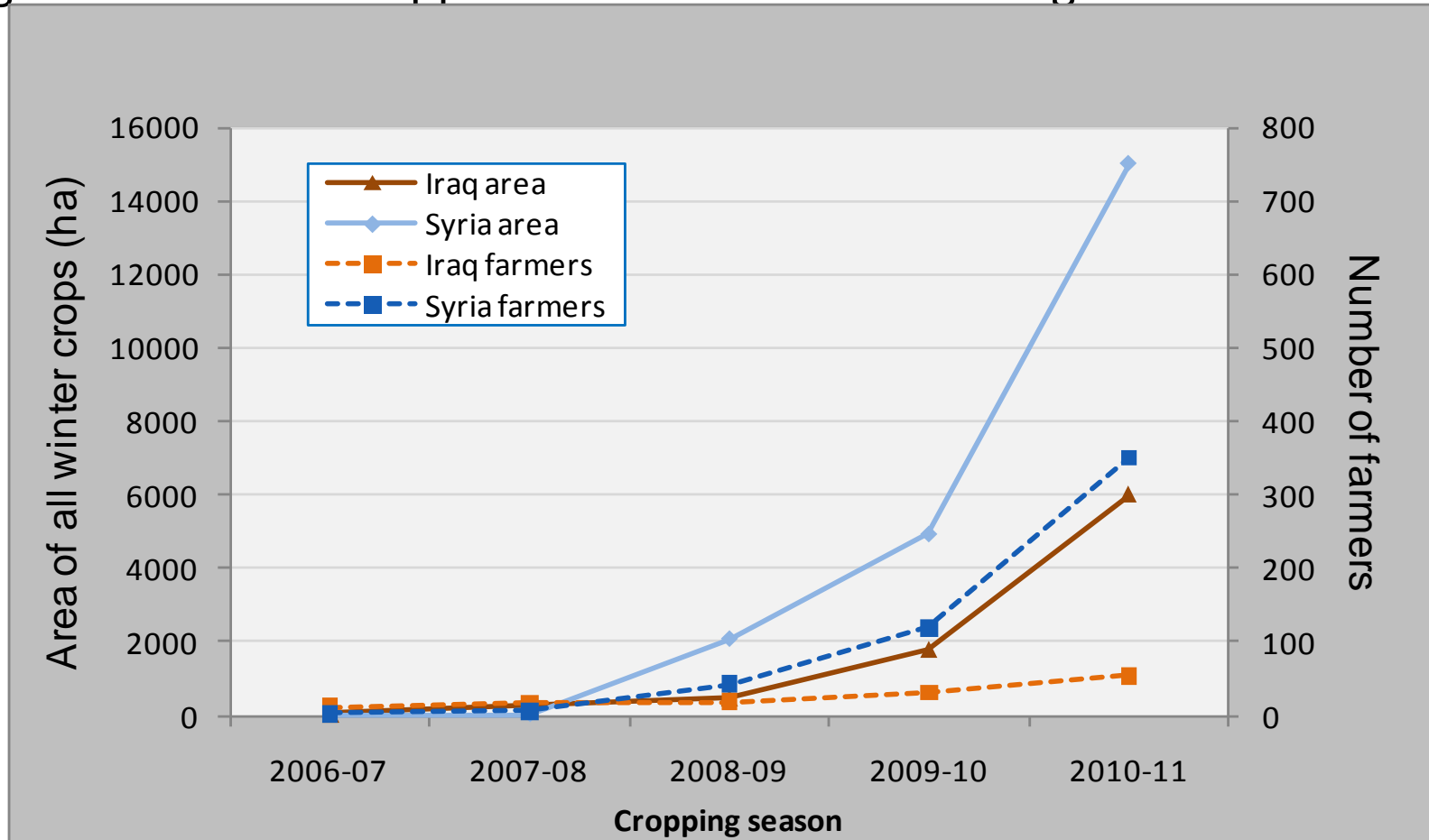
Australian Government  
Australian Centre for  
International Agricultural Research

# Mean yield early ZT vs late CT over four years in Syria



# Adoption 2005 to 2011

Significant business opportunities for Manufacturing and Service Sectors

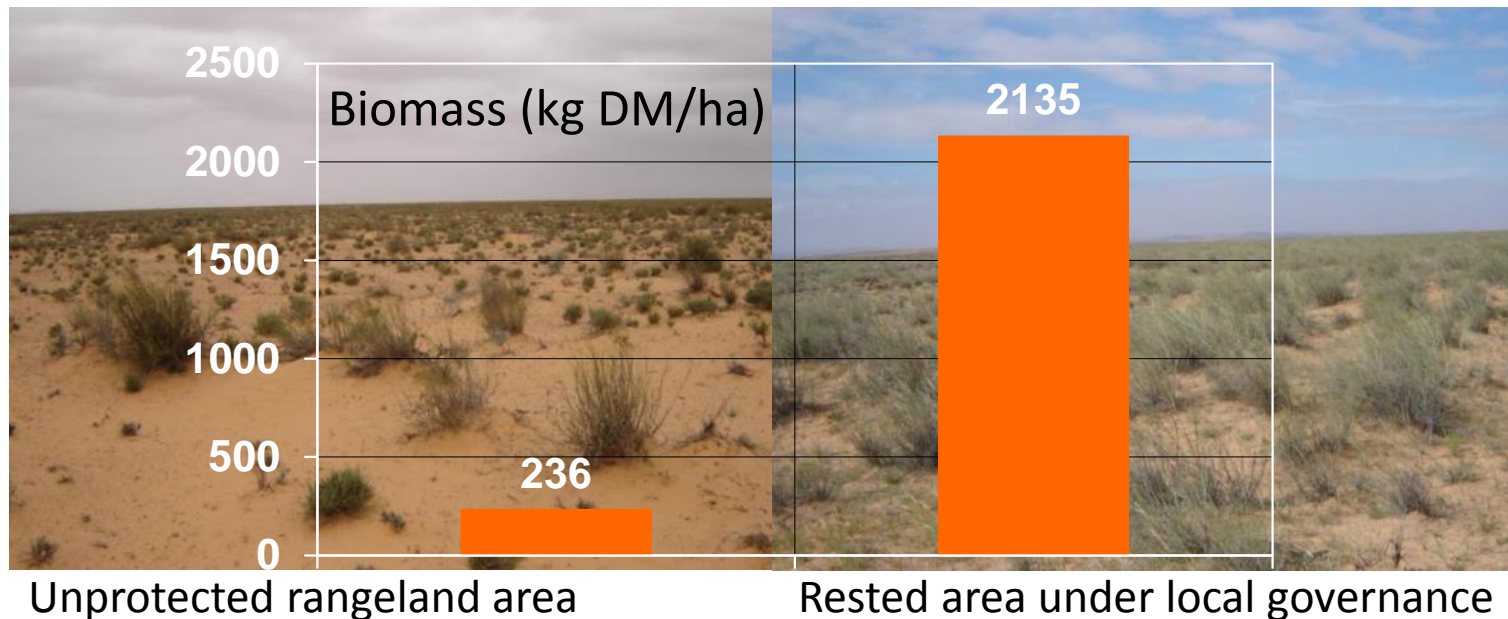


70-80% of area was true adoption, where farmers owned/rented/borrowed a ZT seeder

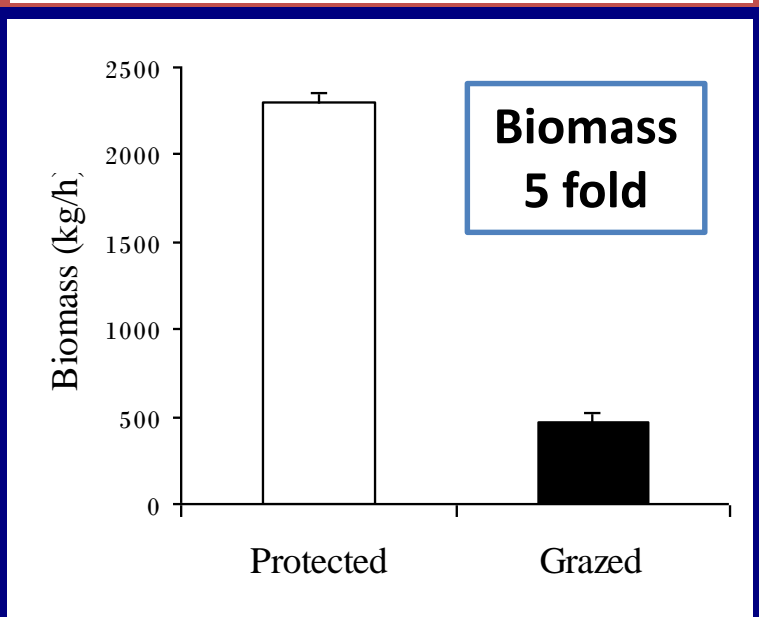
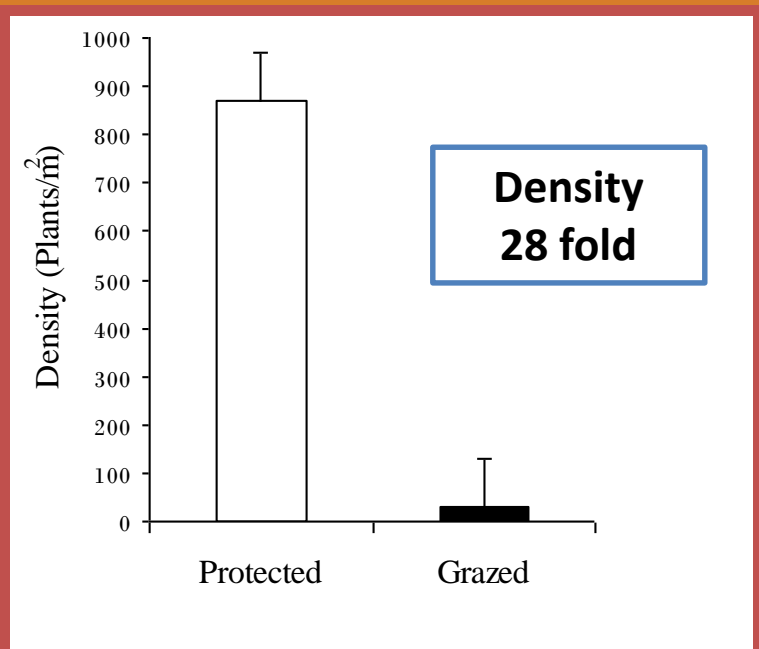


## 2. Productive and Sustainable Rangeland - Governance

- The key to sustainable management of communal rangelands is developing socially acceptable institutional arrangements
- Developing in Tunisia a specific pastoral code for managing collective rangelands
- Local self-governance systems (Himas) can act as innovation platforms for ecological sustainability, social fairness and economic growth



# Sustainable development of landscape depressions in pastoral ecosystems



## Impact of 2 years protection



# Water Harvesting in Marginal Land Agro-Ecosystem

- Micro-catchments
- mechanized contour laser planting
- Effective water harvesting
- Grazing management
- 40-50% increase in rainwater productivity



## *Atriplex* species in Alley-cropping systems with cereals



### Alley cropping Benefits:

- Provides fodder in times of scarcity.
- Provides rich and diverse diet for livestock.
- Reduces the need for chemical fertilizers and improves soil fertility.
- Reduces erosion in irrigated and rainfed areas.

# Cactus – a dryland multi-purpose plant

## Advantages of cactus:

- Drought tolerant
- Evergreen habit
- Easy to establish, to maintain & to use
- Multipurpose use
- Fodder potential
- Resolve livestock watering
- High palatability & high in soluble carbohydrates

- Introduction of cactus pear to several countries including Tunisia, Jordan, Syria, India and Pakistan.
- Promising and well adapted accessions are being disseminated to farmers.

# Sustainable rangeland management contributes to increasing incomes

## Technologies for improved yoghurt & cheese processing

### Problems:

- Eye formation
- Sourness and/or off flavor
- Risk of Brucellosis

### Solutions:

- Milk pasteurization prior to cheese making
- Use of thermometers for right temperature for pasteurization

### The benefits:

- Hygiene & high quality product reducing risks to transmission of diseases
- Improved marketability and increased net income



**Establishing small cheese making enterprises – potential markets into Europe**

# Non-Traditional Sources of Feed: Feed Blocks

## ■ Improved feeding management

- increasing feed use efficiency by balancing diets for protein and energy
- Provide sources of feed during the dry season

## ■ Better utilization of crop by-products

- e.g. urea treated straw: wheat straw reaches the quality of lentil straw

## ■ Better utilization of agro-industry by-products

- e.g. sugar beet pulp, cotton seed cake, molasses, tomato pulps, olive leaves and cake, etc.
- e.g. feed blocks as one technical option to produce homogenous mixtures

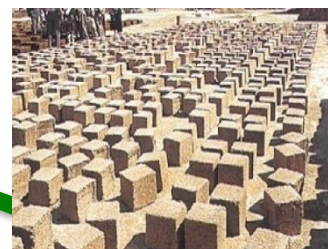


# Integrated Livestock/Rangelands/Crops Production Systems

## Successful Technologies



On-farm feed production



By-products - feed blocks



Flock management



Barley production



Cactus & fodder shrubs



Natural pastures & rangeland management



### 3. Raised-Bed Planting in Irrigated Systems



# Advantages of moving to raised bed technologies

FP: furrows irrigation



FIP: flat bed irrigation



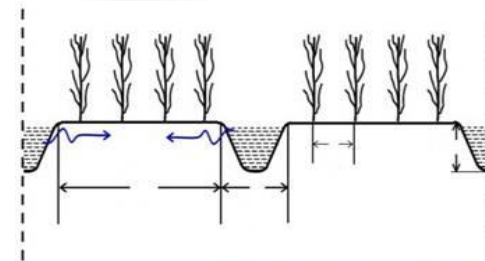
RBP: raised bed irrigation



# Raised-bed wheat improvement package –Egypt



- Reduce applied water by 30%
- Increased yields by 25%
- Reduced seed rate by 50%
- Increased WUE by 72%
- 70,000 feddan in Egypt in two years
- Egyptian government investing \$1.7 million in promoting.
- Cannot keep up with demand.



# 4. Breeding Crops for Drought Tolerance and WUE

## Example: Synthetic wheat, tolerance to heat and drought



Parent Variety	Yield t/ha	% recurrent parent
<b>Cham 6*2/SW2</b>	<b>1.6</b>	<b>147</b>
<b>Cham 6*2/SW2</b>	<b>1.5</b>	<b>138</b>
<b>Cham-6</b>	<b>1.10</b>	<b>100</b>
<b>Attila-7</b>	<b>1.3</b>	<b>-</b>

**Yield of “synthetic derivatives” compared to parents under drought stress. (Tel Hadya 2008 -- 211 mm)**

# Genetic Adaptation: Heat and Drought Tolerance of Wheat

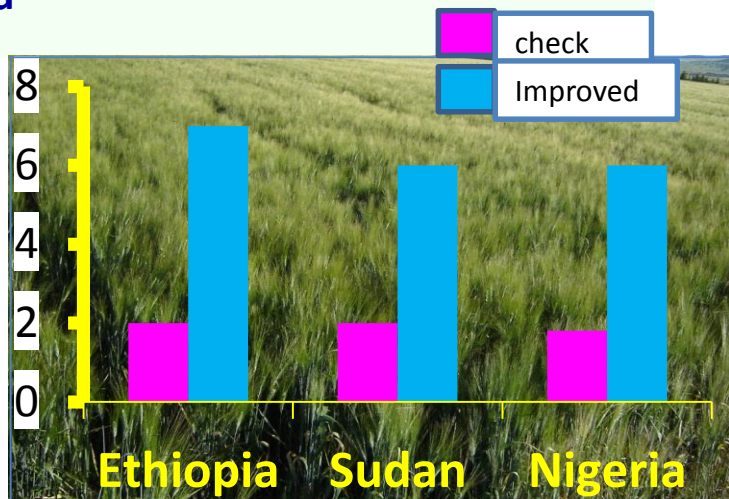
New varieties developed with management packages

Hub countries: 15 varieties released to farmers :

☀ 4 released in 2014

☀ 11 candidates in 2015

Merits: Highly adapted, heat tolerant, good quality, disease resistant with yields of 5-7t/ha



## Ethiopia:

- 2 released in 2014  
- 3 candidates in 2015



## Sudan

- 6 candidates in 2015



## Nigeria:

- 2 released in 2014  
- 2 candidates in 2015

# Breeding for enhancing Water Productivity by changing the cropping season

## Winter vs. Spring Chickpea in West Asia & North Africa

The biggest challenge is seed delivery systems – opportunities for young entrepreneurs



**Mature winter crop**

**Spring sown crop**

# Concluding Remarks

- ❑ Agriculture in MENA is and will be the dominant employer and contributing element to GDP; it is a neglect sector in these economies;
- ❑ We can reduce the need for food imports by transforming the agricultural sector – it part of the solution to a ‘wicked problem’.
- ❑ There are significant opportunities in developing business models to support local manufacturing, service providers and added value;
- ❑ MENA contains productive agro-ecosystems and provides significant opportunities for sustainable development. How we manage them will be key to living with future climates.

# Thank you

