منتدى التغيرات المناخية
Forum sur les changements climatiques
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Technologies in agriculture to adapt to/mitigate Climate Change

In the NENA region agriculture mainly relies on irrigated crops and extensive pastoralism. Both of these systems are already threatened - by great water scarcity and the unsustainable use of non-renewable aquifers for the former; and continuing land degradation (estimated to be at 70 percent) due to anthropogenic activities (overgrazing and deforestation for energy supply) for the latter - and are likely to be the most impacted by climate change. Therefore, designing and implementing strategies to adapt to climate change and maintain food security is a priority for the region. Although the region's historical level of emissions from agriculture (which accounts for 14 percent of global green house gas emissions) is one of the lowest in the world, its potential for mitigation is high due to the predominance of dry lands.

This section describes the technologies that are readily available in agriculture that could be deployed in order to achieve both adaptation and mitigation goals. The table below presents selected practices available to the NENA region to adapt to climate change and indicates their benefit for mitigation:

Agricultural Practices with Both Adaptation Potential and Mitigation Benefits

Category	Practice	Adaptation Potential	Mitigation Benefits
On-farm biodiversity management	Use of indigenous and locally-adapted crop varieties and livestock species	Increased resilience to extreme events (flood, drought, strong rainfalls, pest and disease) by increasing the genetic diversity and/or the ecosystem richness Improved water and nutrient efficiency	Reduced NO2 emissions from fertilization
	Mass-selection of varieties and species with higher resilience		
	Improved crop rotations, inter-cropping, strip cropping		
	Crop-livestock and crop-fish associations		
	Agro-forestry	Increased resilience to extreme events by increasing ecosystem richness Improved nutrient efficiency and water efficiency by the creation of more favourable micro-climate	Reduced NO2 emissions from fertilization CO2 biomass sequestration from Afforestation/ Reforestation (Reduced CO2 emissions from Avoided Deforestation)
	Farm landscaping systems (inc. use of hedges, vegetative buffers, strips, trees)		

Soil management	Low or zero tillage	Improved water and nutrient efficiency Limited erosion	Reduced NO2 emissions from fertilization CO2 soil sequestration
	Permanent soil cover (with residue, cover crop, diversified crop rotations)		
	Conservation Agriculture or Organic Agriculture with No-Tillage and permanent soil cover		
	Mulching	Limited evaporation (up to 30% less crop water requirements) and erosion Improved nutrient efficiency	Reduced NO2 emissions from fertilization
Nutrient management	Integrated N management (inc. green manure, compost, biochar)	Improved nutrient efficiency	Reduced NO2 emissions from fertilization
Pasture management	Precision farming, nano-enhanced and slow-release fertilizers	Improved water and nutrient efficiency Limited soil compaction and erosion Increased resilience to extreme events by increasing ecosystem richness	CO2 soil sequestration
	Pasture rotations		
	Re-seeding techniques		
	Sylvo-pastoralism		
Water management	Water conservation, harvesting and recycling	Increased resilience to drought	-
	Resource efficient irrigation system (inc. drip and furrow methods)		

On-farm biodiversity, soil, nutrient and water management categories offer a whole set of options to increase crop resilience to extreme climatic, pest and disaster events, while decreasing the region's agriculture dependency on irrigation water that should be combined to obtain the best result. However, these practices would have limited mitigation impacts as the regional level of NO2 emissions from fertilization is already low.

Pasture management practices are of particular interest in the region. Well managed grasslands provide important benefits for adaptation as they reduce the risks associated with prolonged drought periods and unreliable rains, assuring the revenue of a large part of the rural population relying on goats, sheep and camels breeding. At the same time grasslands can sequester up from 260 tonnes of carbon per hectare, a significant part of which (71 percent) being below the soil surface.

With such a mitigation potential, the development of methodologies considering soil carbon sequestration through conservation activities is crucial to foster the integration of pasture management into regional land and water conservation strategies.

References

Adaptation to climate change in agriculture, forestry and fisheries: Perspective, framework and priorities, FAO
Neely, C. and S. Bunning. 2008. Review of Evidence on Dryland Pastoral Systems and Climate Change: Implications and opportunities for mitigation and adaptation. FAO – NRL Working Paper.
Agricultural Production Systems – ICARDA Regional Programme for the Arabian Peninsula