



Tropentag, September 20-22, 2023, hybrid conference
“Competing pathways for equitable food systems transformation:
Trade-offs and synergies”

Rural-urban transformation determines cropping patterns in an oasis of Morocco’s High Atlas Mountains

YOUNESS BOUBOU, KIRA FASTNER, THANH THI NGUYEN, ANDREAS BUERKERT

University of Kassel, Organic Plant Production and Agroecosyst. Res. in the Tropics and Subtropics, Germany

Abstract

Traditional oasis agriculture in Morocco, characterised by integrated crop-livestock farming and sophisticated irrigation systems under difficult environmental conditions ensuring soil fertility, biodiversity, and subsistence livelihoods over millennia, undergoes highly dynamic changes. While wheat (*Triticum vulgare* L.) and barley (*Hordeum vulgare* L.) were mainly cultivated for subsistence needs and fodder production on rainfed land, irrigated fields are dedicated to different vegetables, maize (*Zea mays* L.), alfalfa (*Medicago sativa* L.) and fruit trees, such as citrus (*Citrus* L.) and fig (*Ficus carica* L.). Cropping patterns in oases, comprising crop rotations and mixed cropping of two or three crops, are a key determinant for the systems’ sustainability. Rather than by effects of climate change, the survival of Morocco’s mountain oases is increasingly determined by rural-urban transformations, including out-migration of the local population to urban centres and decreasing economic importance of oasis agriculture. This study was carried out in Tizi N’Oucheg in the High Atlas Mountains of Morocco and investigates (i) changes in cropping patterns from 1990 to 2023 through GIS-based analyses of satellite images and drone-based surveys of different growing seasons, (ii) socio-ecological and economic factors driving changes in cropping patterns, and (iii) transformation effects on soil fertility through soil sample analyses. Use of rainfed agricultural land and terraces with multiple cropping patterns decreased in recent years due to increasing market orientation, implying enhanced monocropping of specialty crops, such as potato (*Solanum tuberosum* L.) and onion (*Allium cepa* L.) on irrigated land close to the village, as well as fodder production for partly stable-fed livestock. Due to decreasing economic returns of low-input cropping systems with relatively low yields, remittances from migrated family members along with seasonal employment in cities serve as main income sources for local households. Shifting cropping patterns and increasing abandonment of agricultural land threatens soil fertility, sustainable land management practices, and preservation of traditional knowledge.

Keywords: Crop-livestock systems, High Atlas, multiple cropping, oasis agriculture, rural-to-urban, time series