



Tropentag, September 18-20, 2019, Kassel

“Filling gaps and removing traps
for sustainable resource management”

Investigation of Soil Quality Index at Different Land Management Practices in North of Iran

REZA MIRZAEITALARPOSHTI, HOUMAN LIAGHATI

Shahid Beheshti University, Environmental Sciences Research Institute, Iran

Abstract

Several different soil management-based approaches have been developed for assessing changes in soil quality caused by land management practices. Most Iranian soils have been severely exhausted since many decades because of over utilisation and mismanagement. Because sustainability in agricultural production systems is closely related to soil quality, its assessment has received a great attention. The current study was conducted to evaluate soil quality under different land use management on Talar Sub-Basin, Northern Iran. Sixty-five soil sites were sampled under (i) native forest (NF), (ii) pasture (P), (iii) cropland converted to orange (O), (iv) double-cropping rice, followed by winter fallow (DR), (v) rice followed by winter faba-bean (RF) and (vi) single rice followed by winter fallow (RF). We adopted 10 physico-chemical and biological soil indicators to evaluate overall soil quality index and its chemical, physical, and biological sectors using the Soil Management Assessment Framework (SMAF). Land use change effects were efficiently described by SMAF scores representing soil quality over different land management practices. Native forest showed the highest overall SQI for its chemical, physical, and biological sectors by scores ranging from 0.83 to 0.93. The overall SQI of native forest soil was 0.91 showing a major proportion of functioning of their potential capacity. SQI values decreased significantly when native forests were converted to pasture and agriculture production systems. The SQI values ranged from 0.69 at DR to 0.81 at O and RF production systems. Generally, conversion from cropland to perennial trees like orange and adopting legumes in rice-based cropping systems led to significant improvement in SQI. A positive linear correlation was obtained between SQI scores and soil organic carbon representing 73 % of the overall SQI variability. SMAF enabled to combine the individual soil indicators into an overall index for assessing land-use management effects on soil quality and functions. Evaluated SMAF scores could identify the principle soil limitations and therefore can be used to adopt priorities for specific management practices. Therefore, appropriate farming management practices must be developed to improve soil quality and the sustainability of agroecosystems in Northern Iran.

Keywords: Agroecosystems, forest, land management, SMAF, soil quality index