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Assessment of soil biological quality index (QBS-ar) in different crop rotation systems in paddy soils

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New methods, based on soil microarthropods for soil quality evaluation have been proposed by some Authors. Soil microarthropods demonstrated to respond sensitively to land management practices and to be correlated with beneficial soil functions. QBS Index (QBS-ar) is calculated on the basis of microarthropod groups present in a soil sample. Each biological form found in the sample receives a score from 1 to 20 (eco-morphological index, EMI), according to its adaptation to soil environment. The objective of this study was to evaluate the effect of various rotation systems and sampling periods on soil biological quality index, in paddy soils. For the purpose of this study surface soil samples (0-15 cm depth) were collected from different rotation systems (rice-rice-rice, soya-rice-rice, fallow-rice and pea-soya-rice) with three replications, and four sampling times in April (after field preparation), June (after seedling), August (after tillering stage) and October (after rice harvesting). The study area is located in paddy soils of Verona area, Northern Italy. Soil microarthropods from a total of 48 samples were extracted and classified according to the Biological Quality of Soil Index (QBS-ar) method. In addition soil moisture, Cumulative Soil Respiration and pH were measured in each site. More diversity of microarthropod groups was found in June and August sampling times. T-test results between different rotations did not show significant differences while the mean difference between rotation and different sampling times is statistically different. The highest QBS-ar value was found in the fallow-rice rotation in the forth soil sampling time. Similar value was found in soya-rice-rice rotation. Result of linear regression analysis indicated that there is significant correlation between QBS-ar values and Cumulative Soil Respiration.

Keywords: soil biological quality index (QBS-ar), Crop Rotation System, paddy soils, Italy