

EGU22-9973

<https://doi.org/10.5194/egusphere-egu22-9973>

EGU General Assembly 2022

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Role of Anthrosols and Anthrosediments in the Early Islamic Plot-and-Berm Agroecosystem by Ancient Caesarea

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Plot-and-Berm agroecosystems agriculturally utilized marginal lands in a sophisticated fashion, where a high-water table existed within loose, aeolian sand sheets, in semi-arid to Mediterranean climates. The agroecosystems consist of polygonal ($\sim 10^4$ m²) agricultural plots sunken between ~ 5 m high berms. Here we focus on the role of sandy anthrosediments and anthrosols, based on analyzing stratigraphic sections in remains of a Plot-and-Berm agroecosystem, 2 km south of ancient Caesarea (Israel). Geoarchaeological methods included pedological analysis, penetrometer measurements, GIS-based mapping, and portable luminescence (PPSL) and OSL for the analysis of construction and possibly maintenance stages.

Ceramics and glass date the agroecosystem to the 10th-11th centuries (Early Islamic period) that are compatible with preliminary published OSL ages. Preliminary finds hint to a sand substrate mixed during Roman times. Anthrosols in the plots have distinct upper and lower boundaries with limited root casts suggesting that the Early Islamic crops were annual and not woody perennial species like vines. The anthrosol is currently only 1 m above the modern groundwater table, which appears to have enabled easy access by hand-dug pits for manual irrigation practices per plot. Their topographic setting probably provided protection of the soil and crops from aeolian erosion.

The anthrosols and anthrosediments have geochemical and textural properties that appear to reflect their role. Anthrosols were enriched to enhance soil productivity. Berm crests and slopes were coated with ~ 0.3 - 0.7 m thick and dark anthrosediments that were topped with flat pebble to cobble size artifacts. This coupling remarkably preserved the berm morphology and the whole agroecosystem from aeolian and fluvial erosion until modern times. Light grey anthrosediments comprised the internal berm fill. Additional results will help assess the social-economic effort needed to develop and maintain this agroecosystem, and its relation to ancient Caesarea.