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Early Islamic inter-settlement agroecosystems in coastal sand, Yavneh dunefield, eastern Mediterranean coast, Israel

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This study reveals an attempt to condition agriculture in coastal aeolian sand holding a high water table. Twenty-six small sites, clustering in topographic lows of the Yavneh dunefield, southern Israeli coastal plain, yield surficial Early Islamic finds, and eroded 1-2 m high berms built of grey sand partially covered by parabolic and transverse dunes. Small winter ponds develop by some of the sites.

A clay loam ∼2.5 m beneath the surface retains the water table at a depth of ∼2.2 m. Between the berms, a 10-50 cm thick grey sand unit dating by OSL to ∼0.9 ka (11th-12th century AD) underlays a loose aeolian sand cover and overlays sand whose upper parts date to ∼1.1 ka (9th-10th century AD). The grey unit displays slightly improved fertility (phosphate, potassium, nitrogen and calcium carbonate) in relation to the underlying sand suggesting an anthropogenic enrichment of ash and refuse. Particle size is similar to the sand. Organic carbon and magnetic susceptibility values (0-5 SI) values are quite low (0.4-0.8%) for both units.

The artifact assemblage is mixed and comprised of small (<10 cm) pottery sherds, ceramic roof tiles, glass, marble and granite fragments, mosaic tesserae, pottery production waste, iron slag, animal bones, seashells, and coins dated between the 8th and 10th century. The artifacts pre-date the OSL age of the underlying grey sand.

The pottery shares many characteristics with the rich ceramic assemblage of nearby inland Yavneh. The establishment of the sites may have been executed by the inhabitants of either Yavneh (or another major inland settlement) or the seashore Muslim military stronghold of Yavneh-Yam (Taxel, 2013). The density of the sites is remarkable compared with the paucity of Byzantine sites in the same region, indicating a distinct spatial pattern that served a specific purpose. The lack of buried artifacts and structures suggests that the sites did not serve for permanent/intensive occupation. The widespread utilization of the rich assortment of Early Islamic artifacts but the relatively younger OSL ages of the underlying grey sand and absence of older Byzantine pottery suggests that the artifacts were rapidly dispersed upon the surface, probably from an abandoned and possibly partly pedogenized town dump dating to the 8th-10th century.

The sites are interpreted to be part of an extensive agroecosystem comprised of berm-bordered agricultural plots in lows that allowed easy manual or root access to the high water table. The sites' character and ages closely resembles the well-preserved crisscross berms and inter-berm depressions south of ancient Caesarea that date to ∼0.86 ka (Roskin et al., 2015). The agricultural activity probably lasted no more than several decades to one century but its utility remains a question.

The study documents a challenging attempt to utilize uncultivated sand sheets in a Mediterranean environment for agroecosystem expansion, income, control and "greening" of the terrain. This effort partly reminisces other Early Islamic agricultural water systems (e.g. qanats) in arid regions. It demonstrates that spatial agroecosystems can be developed in times that are not necessarily characterized by socio-political stability.