English Abstracts

Date palm survey in the Negev and Arava

Roy Galili [1] *, Ariel Meroz [2], Yuval Cohen [3], Guy Bar-Oz [1]

Date palms are a key species in desert ecology. The common date palm (*Phoenix dactylifera*) is a hydrophilic plant that evolved in naturally humid environments within desert regions. Date palms clusters (Dikliya) that develop in a family structure around an ancestral parent create microenvironmental conditions and provide essential ecosystem services, such as shade and shelter for various flora and fauna. The salinity tolerance of date palms in soil and water, the unique family structure of the palm clusters, and their developmental processes through both sexual and vegetative reproduction contribute to the high survival capability of date populations. We conducted an assessment of the composition of date palm populations in the Negev and Arava, surveying hundreds of individual trees, as well as small and large clusters. The location of the palm trees is associated with springs and desert oases along ancient roads crossing the desert, suggesting their ancestral cultivation. Extant populations of date palms growing in the Negev and Arava regions are restricted to a limited number of habitats and are characterized by significant variability: stable populations of date palms continue to exist in the central Negev, while the condition of many date palm clusters in the Arava is deteriorating, primarily due to declines in groundwater levels, salinization, and industrial pollution that have brought many to the brink of extinction. These threats, along with the impacts of climate change, are common to extensive areas of the southern Levant and compromise the existence of natural springs and the remnants of date palm populations, as well as their associated flora and fauna. The findings reflect immediate and significant risks to date palm populations due to soil and water contamination in widespread areas, particularly near mining, industrial zones, and agricultural areas.

1 School of Archaeology and Maritime Cultures, University of Haifa
2 Dead Sea-Arava Science Center, Mizpe Ramon
3 Institute of Plant Sciences, ARO, Volcani Center
* roy.galili@gmail.com

Management of the polyphagous shot hole borer beetle *Euwallacea fornicatus* and its symbiotic fungi in ornamental and forest trees in Israel

Zvi Mendel [1] *, Stanley Freeman [1], Ilan Nazarian [2], Anat Edelman [3], Nitsan Birenboum [3], Eli Beker [4], Paul Benjamin [5], Omer Golan [2], Shahar Samra [6], Daniel Bensimon [7], Maor Elron [8], Dana Ment [1] **

The polyphagous shot hole borer (PSHB), *Ewallacea fornicatus*, first discovered in Israel in 2009, has become a significant threat to various ornamental and forest tree species. Among the trees vulnerable to this ambrosia beetle and its associated fungi are sycamores (*Platanus orientalis* and *P. occidentalis*), oaks (*Quercus pedunculiflora* and *Q. robur*), and

1 Plant Protection Institute, ARO, Volcani Center
2 Cod-Ilan LTD, Tel Aviv
3 Forestry Department, KKL-JNF, Eshtaol
4 Jerusalem Botanical Gardens, Jerusalem
5 Bahá'í World Center, Haifa and Akko gardens
6 Plant Protection and Inspection Services, Israel Ministry of Agriculture and Rural Development
7 Extension Service, Israel Ministry of Agriculture and Rural Development
8 KKL-JNF Central Region
* zmendel@volcani.agri.gov.il
** Danam@volcani.agri.gov.il

box elder (*Acer negundo*). In environments where the symbiotic fungus *Fusarium euwallaceae* establishes rapidly, the PSHB population proliferates at an alarming rate. Even ornamental tree species not suitable for the beetle's reproduction, such as the silverleaf poplar (*Populus alba*), were severely damaged due to injury inflicted by pathogenic fungi; these fungi are inadvertently introduced by the beetles to potential host trees. While the PSHB create wounds in the process of 'testing' potential host trees they inoculate them with their symbiotic fungi.

As natural enemies or mass trapping methods proved ineffective in managing the beetle population, our focus shifted towards utilizing synthetic pesticides as a potential solution. We concentrated our efforts predominantly on two tree species renowned for their forestry and scenic significance: oaks and sycamores. We conducted two concurrent detailed experimental trials, one in the Hebrew University Botanical Garden in Givat Ram, Jerusalem, and another in gardens and backyard trees in Shekhania, a community settlement in the Western Galilee region. We also briefly outline two other experimental setups in this article. These were carried out in a botanical garden in Agamon HaHula, located in the KKL-JNF Nature and Ornithology Park in the central Hula Valley, and in a park in the town of Modi'in Maccabim-Reut, in the central Judean Hills. At all four locations, severe damage inflicted by the PSHB was notably evident, emphasizing the suitability of the study sites for experiments and the urgent need for effective management strategies.

In all four study systems, the systemic insecticide injected was a formulation containing the active ingredient Emamectin Benzoate. In the initial experimental trial, a systemic fungicide preparation, Thiabendazole, was also injected into the treated trees. In the subsequent experimental systems, a formulation from the pyrethroid group, consisting of Bifenthrin and Lambda Cyhalothrin, respectively was applied via spraying.

However, it became evident that a single application was insufficient to effectively prevent damage, as evidenced by the accumulation of additional lesions and the delayed recovery of the trees. From this observation and insights gleaned from previous studies in Israel and California, several significant points emerged. (1) Monitoring the beetle population is crucial to enable early intervention, emphasizing the importance of proactive measures at the initial stages of population growth. (2) There is a pressing need to broaden the exploration of formulations based on entomopathogenic fungi as a sustainable and environmentally friendly approach to combat the beetle infestation. (3) Considering the susceptibility of certain tree species to PSHB, future planting efforts should prioritize species that are less vulnerable to infestation, thus mitigating the impact of the beetle on ornamental and forest landscapes.

Analysis of visitor preferences among individuals aged 65 and over in KKL-JNF forest recreation areas

Eran Ketter [1], Yaara Spiegel [2], Noga Collins-Kreiner [2] *

The global population is aging, and by 2050, the number of people over the age of 65 is expected to double, reaching approximately 1.5 billion. This dramatic growth in the elderly population affects various aspects of life, including leisure, recreation, and tourism. The study examines the attitudes and preferences of older visitors (Israeli residents aged 65 and over) regarding leisure activities in forest recreation areas. The aging of the population in both the world and Israel, along with the importance of forests for the quality of life of older adults, calls for thoughtful planning of these sites and the services they offer. The aim of the study is to improve the design, services, and overall experience that forest recreation areas provide for this population. A visitor survey was conducted with 446 respondents aged 65 and over. The findings highlighted the

1 Department of Tourism and Hotel Management, Kinneret Academic College
2 School of Environmental Sciences, University of Haifa
* nogack@geo.haifa.ac.il

great importance of cleanliness, infrastructure (shade, trash bins, toilets, water taps), easy access from parking areas, accessibility features, signage and information, and the presence of picnic tables and benches. Analysis revealed significant differences mainly among age sub-groups within the older population, as well as between visitors with different visitation frequencies. According to the concept of "active aging," maintaining an active lifestyle is essential for achieving high levels of life satisfaction. Forest recreation areas play a key role, serving as places for connecting with nature and for social interaction, thus contributing to both the physical and mental health of visitors.

The study recommends treating older adults as a meaningful user group in the planning, development, management, and marketing of forest recreation areas, both because of the considerable benefits they gain from forest visits and due to their growing proportion in the population. Therefore, it is important to include representatives of this age group in the planning and development processes in order to incorporate their unique perspectives. In addition, we recommend promoting activity programs in KKL-JNF forest recreation areas for older visitors, based on the substantial benefits that such visits can offer. The study was conducted in KKL-JNF forests in the northern region of Israel, but its conclusions are considered relevant to KKL-JNF forests in general.

Using the UN's "Sustainable Development Goals" as an applied tool for evaluating recreational initiatives in KKL-JNF forests

Noga Lachman-Barak [1], Yael Ram [2], Noga Collins-Kreiner [1] *

This study presents an applied tool for evaluating initiatives in KKL-JNF forests, based on the United Nations Sustainable Development Goals (SDGs). The tool assessed ten recreational initiatives in various Israeli forests based on personal, social, environmental, and global criteria. The findings indicate that recreational initiatives managed entirely by the KKL-JNF are more effective at meeting the SDGs than initiatives with less controlled management. However, there remains a significant gap in the degree of the SDGs implementation, with less than a quarter of the goals being implemented in all the recreational initiatives. The study recommends future actions and emphasizes the importance of prioritizing the social and environmental aspects of recreational activities in forests and nature-based tourism.

1 School of Environmental Sciences, University of Haifa
2 Department of Tourism, Ashkelon Academic College
* nogack@geo.haifa.ac.il

Estimating sustainability aspects and the impact of agrivoltaic systems on open spaces in fields and orchards compared to greenhouses

Liron Amdur [1] *, Ibrahim Yehia [2]

Agrivoltaics are installations for generating solar energy using panels that are integrated into farmland, while simultaneously maintaining agricultural activity. The impact of agrivoltaics on open spaces is moderate compared to the impact of ground-based PV projects, but they affect sustainability from environmental, economic and social perspectives. This paper compares the sustainability aspects of agrivoltaics in open farmland vs. their placement in greenhouses. It is a component of the international research project REGACE, which is funded by the European Union, coordinated by the Triangle R&D Center in Kafr Qara, and includes experimental agrivoltaic greenhouses in 5 countries. The study is based on analysis of data from Israeli open farmland agrivoltaic projects, REGACE installations and an extensive literature survey.

Environmental aspects: Agrivoltaics in open

1 Open Landscape Institute (DESHE), the Steinhardt Museum of Natural History, Tel Aviv University
2 Triangle Research and Development Center
* amdurliron@gmail.com

farmland have a considerable landscape impact, due to the densely place iron poles in fields and orchards. In greenhouses, the panels are visually integrated into the greenhouse. Agrivoltaics in open farmland also have a considerable carbon footprint due to the use of iron in the panels' mounting structure, the production of which involves significant CO_2 emissions. The mounting structure of agrivoltaics in open farmland consumes about 103 kg of iron, with a carbon footprint of 178.2 kg CO_2/kW. In greenhouses, the mounting structure uses only about 48 kg of iron/kW, with a carbon footprint of 91 kg CO_2/kW.

Economic aspects: The cost of investment in agrivoltaics in open areas is on average about 1,200 EURO/kW, whereas in the REGACE study greenhouses the cost is on average about 921 EURO/kW, about 23% lower. The difference in costs may serve as an incentive for establishing renewable energy systems in greenhouses.

Social aspects: The labor cost (which reflects the number of working hours) for installing the REGACE systems in greenhouses is about 39% lower per kW than for installing agrivoltaics in open farmland. Integrating agrivoltaics in open farmland requires additional agricultural work due to the complexity of maneuvering agricultural machinery between poles. In greenhouses, the agricultural work is mostly manual, and no additional agricultural work is required following the installation of agrivoltaics. The study can help policymakers make informed decisions about the type of agrivoltaic projects to promote, based on various sustainability parameters.