

# Abstracts

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## Evolution of Israeli Forestry from Pure Even-Aged Pine Plantations to Sustainable Uneven-Aged Mixed Forests

### Part B: Practical Implications of the New Policy for the Forest-Planting Stage

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In 1990 KKL-JNF adopted a new forest policy that aimed at creating multi-aged and multi-layered mixed forests. In support of the new policy, ecological surveys were conducted in planting sites, to enable preparation of detailed planting plans that would be matched to site characteristics. Mechanical digging of planting pits was mainly applied, with especial care given to preservation of native broadleaf species that were found in planting sites. In forest areas that had undergone clear-cutting and regeneration following fires or other damaging factors, outstanding individuals and clusters of conifer species as well as native broadleaf species that were not affected were left as a basis for uneven-aged, multi-layered mixed second-generation growth. Use of prescribed fires for site preparation was stopped, and weed control was implemented in a selective manner. In mixed plantations, native broadleaf species were either randomly scattered among the coniferous species (single-tree mixture) or, alternatively, planted in separate patches of varied sizes (group mixture) to create a complex mosaic pattern. Difficulties in establishing plantations, particularly because of grazing damage, led to the use of various methods to establish native broadleaf stands (Table 1).

### From “Collaboration” to “Participation” and from “Attachment” to “Involvement”: Evaluating a Public Participation Model for the Migdal HaEmek Community Forest

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Involving the community living in proximity to a forest is a basic principle in establishing and managing a ‘community forest’. The Balfour Forest, which surrounds the town of Migdal Ha’emek, was neglected by the community who felt alienated from it. The Jewish National Fund (JNF, the agency responsible for Israel’s forests), in its efforts to promote the development of ‘community forests’, initiated a process that aimed to engage the local community in developing and taking responsibility for the forest. An additional goal was the creation of a model that could be applied in other JNF forests.

The process was active over two years (2008–2009), during which community activists were identified, recruited and empowered to create a team of ‘forest trustees’. A comprehensive analysis of the process uncovered major issues relating to public involvement

and participation in planning and management processes, and the results can be applied to the development and management of other community forests in Israel:

- Collaboration vs. participation – creating the community forest required a conceptual change within the JNF that had, in essence, to transfer responsibility for the forest to the local community.
- Indifference vs. responsibility – creating the community forest required a conceptual change in the municipality – prioritizing the forest as an urban space worthy of cultivation, assuming long-term fiscal responsibility, and delegating power to the community, via its representatives.
- Involvement vs. attachment – the most significant conceptual change is required from the residents – raising awareness of the importance of the forest, active involvement in managing and maintaining the forest, and creating a feeling of ‘owning’ and experiencing it as both a public and a personal living space.

During the period when the community forest was being established, the JNF and the municipality developed parks, recreation areas, and bicycle and pedestrian trails in the forests surrounding Migdal HaEmek. Some of these projects are the direct results of the forest vision developed with the ‘forest trustees’ group, whose activity considerably strengthened and advanced the community forest project. The group remains unified, active, and very significant in the city’s community and cultural life. This process of community empowerment places the community and its needs at the center, in a model of cooperation that encompasses the JNF, the municipality, and the residents. Consequently, the forest benefits from maintenance, infrastructure renewal and, especially, from embracing by the local residents; they, in turn, gain a feeling of significance and belonging, and enjoy a welcoming forest environment that provides space for recreational activities in nature.

The model for establishing and managing a community forest developed in this study is based on collaboration among the JNF, the Migdal HaEmek municipality and the community. We suggest that the principles developed during this process may form a model for successful implementation in other communities as well.

### Seasonal Grazing of Bedouin Sheep and Goats in the Forests of the KKL-JNF Central Region: Developments during 2009–2014

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The grazing pressure of livestock in the planted forests in the KKL-JNF Central and Southern regions is low, so therefore, forest fires are a constant hazard. The Forest Authority has adopted seasonal grazing

in the forests as a means to reduce this fire hazard. Till 2008 about 15,000 head of sheep and goats (of which the latter form about 10%) owned by Bedouin from the northern Negev grazed the forests each year. In 2009, all herd owners were obliged to keep income tax records as a prerequisite for obtaining a grazing permit, and subsequently the grazing numbers dropped to 2,100 sheep and 300 goats, even though the grazing season was longer in the forest than in the Negev and the cost of supplementary feed significantly lower. The aim of the present research was to determine if there were other factors over and above the tax requirement that were discouraging seasonal grazing in the forests. During 2009 and 2010 all the Bedouin herd owners who grazed in the Central and Southern Regions of the Forest Authority, in addition to five who grazed in the western Negev were interviewed. The average age of the herd owners was 56 years (47–67) and most of them had children who intended to continue managing the herd (Fig. 2). Most of the flocks/herds were from the Dimona-Hura-Arad area, and had a long record of nomadic grazing in the forests of the Central Region (Fig. 1). Nomadism involved splitting the family, because the children were obliged to go to school in the northern Negev. Therefore herd owners with two wives could manage this situation more easily. The interviews revealed a number of problems, apart from the tax obligation, that deterred the nomads from using the forests; and solving them could increase the profitability of the herd as well as the motivation of the herd owners. These problems include mortality caused by poisonous plants, (tick) fevers, predation, and low night temperatures, all of which affect lambs and kids in particular; as well as transport costs from the Negev to the forests in the Central Region (Figs. 3, 4, 5). In addition the herd owners would appreciate veterinary supervision, improvement of drinking water facilities, extension services for herd management, and better relations between the authorities and the herd owners.

The KKL-JNF and the Ministry of Agriculture implemented the following measures: Owners of goat herds will be given long-term grazing permits for 4 years instead of the current 4-month seasonal-grazing permit, whose usefulness is further limited by the requirement to return to the Negev every year. The KKL-JNF has undertaken to set up watering points and to ensure a continuous supply of water; collapsible, mobile, tent-like stock shelters were built and installed for protection against night-time cold in winter (Fig. 7); and herd owners were compensated for herd transport costs. The KKL-JNF has subsidized provision of veterinary supervision and flock/herd-management extension services of the Ministry of Agriculture. In 2014, 7,000 sheep and 1,350 goats grazed in the Central Region forests, mainly for maintenance of fire-breaks.

## The Influence of Four Types of Individual-Seedling Protection Fences on the Survival and Development of Four Native Broadleaf Species in Planting Sites that Were Subjected to Cattle Grazing

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Most new plantations of the KKL-JNF in the coming decades will be of native broadleaf species planted at low density (100–200 seedlings/ha). For the last 30 years the main method used to protect broadleaf seedlings from cattle grazing was by fencing around the entire planting area and using plastic tree shelters. Under this method, broadleaf seedlings, particularly of slow-growing species such as oak, did not always succeed in establishing themselves, because of deliberate or accidental penetration of cattle into planting sites. Individual-seedling protection in forest plantations was first examined in Israel as long ago as 30 years,

but only in recent years has this method become more prevalent.

In the present study we examined the influence of four types of individual-seedling protection fences (Table 2, Picture 2) on the development of four native broadleaf species – *Ceratonia siliqua*, *Quercus ithaburensis*, *Pistacia palaestina* and *Cercis siliquastrum* – in three planting sites (Table 1) that were subject to cattle grazing.

The damage caused to Australian cattle fencing by cattle was much greater than that to the other individual-seedling protection means (Fig. 1). It should be noted that the kind of damage caused to the heavy-duty green-PVC-coated wire mesh fence did not usually hamper the height growth of the seedlings. Height and diameter growth of most native broadleaf seedlings were better within the wire mesh fence than under the other individual-seedling protection methods (Figs. 2 and 3). The cost of Garden wire mesh fence was lower than that of the other individual-seedling protection methods (Table 2). It is recommended to continue to use heavy-duty green PVC coated wire mesh fencing as the sole individual-seedling protection method in plantations of native broadleaves in Israel. Height and diameter growth were significantly higher in Kfar HaHoresh than in the other sites (Figs. 4 and 5). Since soil/rock type are very similar across the three experimental sites and the yearly amount of precipitation at the Kfar HaHoresh site was the lowest (Table 1), it is considered that the reason for the better growth in Kfar HaHoresh was the application of higher irrigation levels during the first three years after planting.

## Review of Hybrids of *Pinus brutia* × *Pinus halepensis*: Distribution, Controlled Hybridization, Identification, Propagation, and Resistance to *Matsucoccus josephi*

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Natural hybrids of *Pinus brutia* × *Pinus halepensis* were first discovered in Italy in the 1920s and later in Greece. Although there is a phenological barrier between the two species, i.e., their flowering periods do not fully overlap, there is some overlapping between the female flowering of *P. brutia* and the male flowering of *P. halepensis*, which enables formation of hybrids. In controlled hybridization performed in Greece it was observed that hybrids could be formed only when *P. brutia* was the female parent. The growth rate of these hybrids, which were planted in various sites in Greece, was significantly higher than that of the two parents, particularly in inferior sites.

Natural hybrids of *P. brutia* × *P. halepensis* were also discovered in various forests in Israel, in light of their exceptional dimensions. These hybrids appear in pure stands of *P. brutia* or in mixed stands of the two parents, whose seed sources were imported to Israel from abroad, probably from Greece. Several research programs in Israel have addressed various characteristics of these hybrids, focusing particularly on morphological, biochemical, and molecular markers for their identification. Recently, a new method, Cleaved Amplified Polymorphic Sequencing has been successfully employed for identification of the hybrids. Local natural hybrids also occur in several sites in Israel.

Controlled hybridization between *P. brutia* and *P. halepensis* performed in Greece and Israel revealed that the proportion of hybrids exhibiting heterosis was very low. These results clearly show that in practice it would not be possible to produce the hybrids by using seeds originated from controlled pollination; it would be preferable to use vegetative propagation to produce seedlings from the successful hybrids that appear in the forests. A method for vegetative propagation of pines, including hybrids, was developed in Israel; it also enables propagation of mature cuttings that are usually difficult to root. However, for mass propagation it would be necessary to utilize other methods, such as rooting cuttings developed from needle fascicles (brachiblasts) following pruning or somatic embryogenesis.

In experiments conducted in Israel, hybrids of *P. brutia* × *P. halepensis* proved to be highly resistant to *Matsucoccus josephi*, but their resistance was somewhat lower than that of *P. brutia*.

The climate changes, particularly the long drought periods that occurred in recent years in Israel, and the resulting mortality of *P. halepensis* trees, require the utilization of drought-resistant species. The exceptional development of hybrids in stands in various regions in Israel, including the northern Negev, indicate that they are suitable for this purpose. This topic is currently being investigated.

### “Under the deep Galilean sky – on the dark Galilean soil”: The Story of *Kfar Hittim*

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The communal village of *Kfar Hittim*, located in the eastern Lower Galilee, was first established as a *Moshav Ovdim* (workers' village) in 1923, on land purchased by the Jewish National Fund in 1905, in its first land transaction. *Kfar Hittim* was initiated by the *Mizrachi* movement and supported by the World Zionist Organization but, nevertheless, this first experiment failed because of a lack of harmony amongst the inexperienced members, and because of the shortage of water. The settlers left the place in the early 1930s and in December 1936 a new group of immigrants from Bulgaria resettled the place as a communal settlement – an innovative pattern at that time. Its members created a new framework, which combined their cooperative ideology with the individual lifestyle of the *Moshav Ovdim*.

Richard Kaufman, the Zionist Executive's architect and settlement planner was asked to redesign his original plan of the village. The new plan integrated the economic structures of the *kibbutz* and the social structure of the *moshav*.

*Kfar Hittim* was also the first settlement built as a tower and stockade settlement, the Jewish response to the Arab rebellion in 1936.

### The Tabor Oak (*Quercus ithaburensis*) Forest of the Sharon – Past, Present and Future

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The geographical extent of the Sharon stretches from the Yarkon River in the south to the Taninim stream in the north, and from the Mediterranean sea shore in the west to the Samaria foothills in the east. There are references to the ancient forest of the Sharon going back to the biblical era, such as Joshua's remark to Josef's sons, of whom Menashe occupied the Sharon area: “if thou be a great people, get thee up to the forest, and cut down for thyself there...” (*Joshua* 17:15). In 1191 the crusaders under the command of Richard the Lionheart defeated Saladin's army in the battle of Arsuf. The Crusaders had to

cross one of the few forested regions of the Holy Land, the “Wood of Arsuf”, on their way from Caesarea to Arsuf. This forested area ran parallel to the sea shore for more than 12 miles and Saladin's strategy was to hide his army in the woodland, awaiting a convenient time for attacking the crusaders.

About 600 years later, the troops of another famous military leader, Napoleon Bonaparte, entered the Meski oak forest in the southern Sharon, three miles after crossing the Yarkon River, on their way from Jaffa to Acre. The forest extended to the village of Tira, and its boundaries appear in Jacotin's maps (Map 1).

In 1880 the British Palestine Exploration Fund (PEF) drew the boundaries of two great oak forests: in the northern Sharon around Pardes Hana-Karkur (Map 2); and in the central Sharon, from Natanya in the north to Hod-Hasharon in the south (Map 3). In the area of Petah Tikva, south of the Yarkon River, traces of ancient forest were described (Map 4).

Most of these forests were logged under the Turkish regime, which desperately needed the wood to fuel railway engines during World War I. Other researchers claim that some of the Sharon forests, especially in the southern Sharon, were logged as early as the 1830s by Ibrahim Pasha, the Egyptian ruler at that time. The widespread planting of orange orchards by the Jewish settlers from the early 1920s, replaced the ancient forest, as known from biblical times.

The Sharon oak forest did not completely disappear, and many old Tabor oak trees that survived the Ottoman wood-cutting, can be found in many locations in the Sharon area. The location and pictures of some of these magnificent trees are shown next to the maps, to enable comparison between past forest boundaries and the present distribution. Many young Tabor oaks colonize uncultivated lands in the Sharon through succession processes, and also, ironically, many abandoned orchards.

Our aim is to advocate for the preservation of the Tabor oak and for its increased planting by the KKL, municipalities and agencies, through their gardening, roadside rehabilitation and stream restoration programs. The Tabor oak is part of the history and cultural heritage of the Sharon and therefore must be on the agenda of the municipal education systems as well as of community-based forest and environment activists and NGOs.



עצי אלון התבור ברחוב הלימון ברמות השבים.

Tabor oak trees in Halimon st. in Ramot Hashavim.