Plant Agriculture and Protection

The Israeli orchard - The future of a cultural landscape

Citrus orchard - cultural landscape of national importance (Photo: Amit Mendelson)

The orchard was, for many years, the symbol of Israeli agriculture • 81% of the farms that grow citrus orchards in Israel are family farms • A research (presented here) is part of a comprehensive project whose purpose to examine the current plight of the Israeli family farm, as well as its future

Liron Amdur*, Tal Shahor** and Moshe Ben Shahar***

>>Introduction

The orchard was, for many years, the symbol of Israeli agriculture. Orchards were grown in Israel since the end of the 18th century, growing in size and economic importance since the beginning of the 20th century. The Jaffa Orange, a leading brand name, is famous in many countries all over the world. Pictures of Zionists pioneers ("Halutzim") packing oranges for export were the symbol of the resurrection of Jews in the land of the bible. A number of the towns and villages that were established by the Zionist movement include reference to orchards in their names, for example Pardes Hanna (literally: Hanna's Orchard; named in honor of Hanna Rotschild), or Pardesia (literally: the orchard of God). In a recent project of the Israeli Nature and Parks Authority, the orchards of the area north to Tel Aviv ("HaSharon") were identified as cultural landscapes of national importance. Old packaging houses of oranges and grapefruits, which are scattered in citrus groves all over Israel, are recently designated for preservation.

Notwithstanding their cultural value, orchards are also (or mainly) an economic industry, that should support the livelihood of the farming family. In the 2nd half of the 20th century, orchards were a leading agricultural branch in Israel, spreading over up to 40,000 hectares (about 10% of the farmland in Israel). During the 1990s, the branch experienced a severe crisis, and by the early 2000's was reduced to about 15,000 hectares only. Around that time, an original variety of tangerine was developed by Israeli experts and named "Ohr" (Hebrew for light). This variety is especially successful due to a number of factors: early ripening (around February-April), and being seedless, especially sweet and easy to peel. Soon enough, the abandoned citrus groves of Israel were re-planted by "Ohr" trees. Today there are around 20,000 hectares of citrus groves all over Israel.

81% of the farms that grow citrus orchards in Israel are family farms; the rest belong to Kibbutzim (cooperative villages) or farming corporations. This means that the future of citrus in Israel, both as a cultural landscape and an economic branch, depends on the competitiveness of the small family farm. In industries where there are economies of scale, family farms will have difficulty competing, since larger farms have evident advantage. Therefore, the question of whether or not there are economies of scale in the citrus branch is vital.

The research that we present here is part of a comprehensive project whose purpose is to examine the current plight of the Israeli family farm, as well as its future. Recently, there is a sense of an increase of incorporation of Israeli family farms as a result of economies of scale. The Israeli Ministry of Agriculture initiated a study on the various components that can help sustain the existence of the Israeli family farm. We deal here with one of these components: the existence of economies of scale in citrus orchards. If there are economies of scale, over time, small and medium sized orchards will disappear from the Israeli landscape.

> *"Small family farms are often more efficient than large farms. In addition, there are unique goods and services that are often produced only in small farms, such as organic fruit and vegetables, niche varieties or farm tourism"*

>>Economies of scale of citrus groves

There is an age long discussion regarding the size of the optimal farm and whether economies of scale exist in agriculture. It is customary to distinguish between two types of farms - the large farm (individually or collectively owned) and the small or medium sized family farm. The advantages of the large farm include the ability to maintain machinery, access to capital or credit, and marketing power. On the other hand, family farms are usually more intensive and make better use of land and labor resources.

Family farms specialize in products that have greater value. When farms are managed by family members, there are savings on professional management and workers' supervision. Therefore small family farms are often more efficient than large farms. In addition, there are unique goods and services that are often produced only in small farms, such as organic fruit and vegetables, niche varieties or farm tourism.

We studied the question of whether or not there are economies of scale in the Israeli citrus branch using data on 70 farms originating from packaging houses. The data details the size of the grove versus the amount of yield and the quality of the produce. If we find that an increase in farm size leads to an >>

increase in average output per unit of land, this would imply that the larger the farm, the more efficient the production, and therefore there are economies of scale. If an increase in the size of utilized land leads to a decrease in average output, we can conclude that there are no economies of scale, and there exists a future to the small citrus farm in Israel.

>>Is there a future to the citrus family farm?

Our data relates to the years 2012-2015, and to 6 different types of citrus fruit: orange, tangerine, grapefruit, pomelo etc. The yield was on average 39,500 kg per hectare, but varied dramatically between farms, ranging from 9,700 kg per hectare to 71,200 kg per hectare.

Our analysis found that in general, in the smaller farms, the yield per hectare is larger. Moreover, we find that the relationship between average output and orchard size is shaped like a "U": when the farm area is small - an increase in land size causes a decrease in average output; but as the land size increases, the rate of decrease of yield falls. This continues until at a certain point (around farm size of 32 hectare) the average output ceases to decline for the larger farms, and begins to increase.

This means that both the smallest farms and the largest farms are producing more citrus fruit per hectare than the medium size farms. The most inefficient farms are those which size is about 32 hectares.

It is worth noting that according to economic theory, there are three shapes for the behavior of average output: (1) the average output increases over the entire relevant range; (2) The average output increases and then decreases over the relevant range; (3) the average output decreases over the entire relevant range. The situation whereby average output decreases and then increases contradicts the basic assumptions of accepted economic theory, and therefore the results of the study demand additional thought in the search for an acceptable explanation.

Old pack house (Photo: Amit Mendelson)

One possibility is that there are actually two production functions: one for small farms, the majority of which are family operated, and a second one for larger farms, the majority of which are not family operated.

We also found that regardless of their size, family farms are less efficient than non-family farms (mostly Kibbutzim). This means that if we compare two farms of identical size, a family farm and a non-family farm, the yield of the family farm will be smaller. This implies that family farms are less efficient, but not because of their land size. It could be that family farms are less efficient in their method of operation, management, work allocation etc.

As in many other agricultural sectors, quality of produce is a major factor in determining the price the farmer receives for his/ her citrus fruit. Therefore it is important to check the effect of land size and type of farm (family or not) on the quality of the fruit. Quality is determined at the packaging house where the fruit is segregated into two types: type “A” (the higher quality, fit for export) and type “B” (lower quality sold for juicing or other industrial uses).

> *"We concluded that small citrus farms are more efficient producers than medium sized farms, and are also producing fruits of high quality. However, for family farms, there are factors which constitute barriers to improving the yield that are unrelated to farm size"*

Citrus orchard - the symbol of Israeli agriculture (Photo: Amit Mendelson)

Our results show that as the size of the orchard increases, the percentage of type “A” produce modestly decreases: if the orchard increases in size by 10 hectares, the percent of type “A” produce decreases by about 1.8%. The adjusted R-squared of the regression is low and therefore it is difficult to say that we see a clear advantage in produce quality for small farms. On the other hand, we can reject the claim that there is an advantage in fruit quality to large orchards.

A brighter future for the family farm?

We concluded that small citrus farms are more efficient producers than medium sized farms, and are also producing fruits of high quality. However, for family farms, there are factors which constitute barriers to improving the yield that are unrelated to farm size. Cooperation between farmers, for example via farmers' organization, might be the key to improving the operation of family farms.

All over the world, farmers' associations help family farms in advertising their products, branding, supervising product quality, research and development, and environmental protection. In the United States there are about 30 such organizations and in the European Union there are about 1,500. The European Union supports the establishment of cooperative farming organizations and subsidizes 50% of their operational expenses.

The Israeli Ministry of Agriculture and Rural Development has recently launched a program to support the establishment and operation of farmers' organizations in Israel. Through that program, groups of farmers can receive consulting on business management, organizational management, marketing, logistics etc.

Our results show that small farms, in themselves, are not inferior to larger farms. Through organizing, for marketing and branding, family farms can increase their profitability and competitiveness so that their existence can be economically justified, and the cherished cultural landscape of the small citrus groves of Israel can survive.

Acknowledgements

The research work was carried out with the support of Ministry of Agriculture and Rural Development, The Chief Scientist Office. We are thankful to Uri Zuk Bar, Yael Kachal, Roni Hershkowich, Shai Dotan, Dudu Kochman and Eitam Berger for accompanying the research.

* Open Landscape Institute - The Steinhardt Museum of Natural History, Tel Aviv University
** The Academic College of Emek Yezreel, Israel
*** Valley Farmers Center