Agriculture Report – Torah VeHa’aretz Institute
For 5784 - 2024

Torah VeHa'aretz Institute
The Institute for Torah and the Land of Israel

Israeli agriculture is no longer merely just another commercial branch of the economy. Since our existence as a nation began, and even in our latest return to Zion, agriculture has been an anchor connecting the Jewish People to their land. As Joseph Trumpeldor said, "Wherever the Jewish plow plows its last furrow, there our border run." Despite the extensive areas occupied by agriculture, part of the general public is not exposed to the trends in the field. Many organizations promote agriculture and disseminate information about it, but sometimes the general public lacks a concise and comprehensive perspective. This report aims at providing this overview.

The report attempts to provide a general picture but also focuses on specific areas such as the border regions, where agriculture is a basic security need and a vital interest for the country's existence. It also identifies the crops where major processes are occurring for better or worse. The data is based primarily on information from the Ministry of Agriculture and the Central Bureau of Statistics (CBS), with all caveats regarding the accuracy, as stated by these entities in their reports. Since CBS data is available only up to the previous year, the report mainly refers to the years 2020-2022, with references to trends over the past decades.

Agriculture constitutes a significant part of the nation's connection to its roots and the values of the Land of Israel. We hope that the publication of this report will assist in understanding the importance of agriculture, the challenges it faces, and our obligation to find ways to sustain it. For the sake of settling the land, for our sake, and the sake of future generations.

Report Highlights - Trend Overview

- Economic output – The output for 2022 amounted to NIS 19.3B (moderate increase).
- Agricultural areas in Israel – 2,805,000 dunams (nearly 700,000 acres; moderate decrease). There is a continued moderate decline in citrus orchards, contrasted with an increase in avocado orchards. Wine grape vineyards are beginning to recover from viruses that ravaged them in recent years.
- Agriculture in periphery regions – stable in cultivated areas.
- Agricultural production – approx. 4,785,000 tons (a moderate increase, but lower than peak figures).
- Imports – increase in scope of import to Israel; 2022 was a peak year - 10.5% for personal consumption.
- Exports – decrease in vegetable exports and increase in fruit exports (especially avocado).
  Overall, there is a downward trend in export quantity.

1

Scope of Territory and Production

Israeli Agriculture – Economic Power

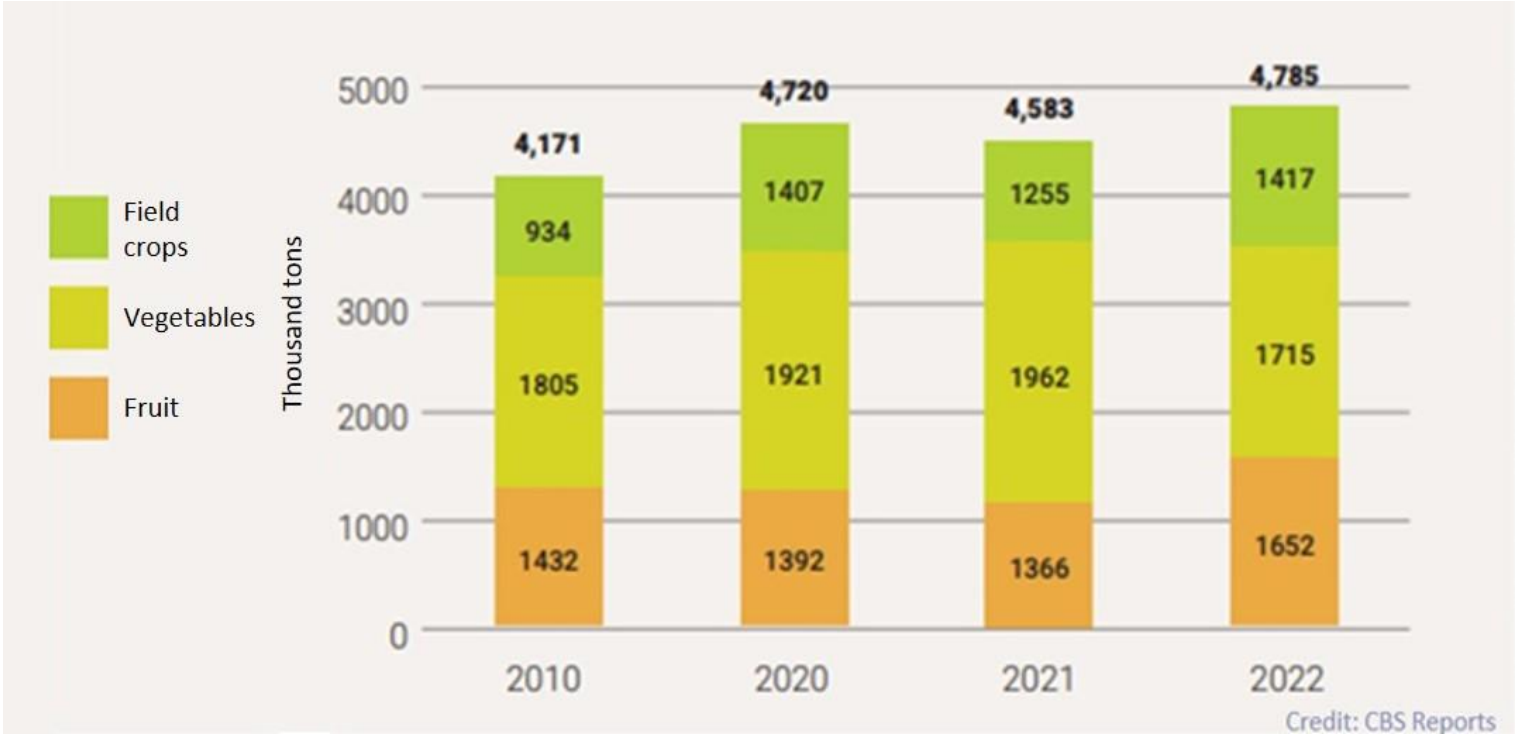
Production in NIS billions, showing an upward trend

Peak year: 2016 – NIS 19.5B

In 2022, the production from plant crops was NIS 19.3 billion. Compared to 2020, the fruit and vegetable sector showed a moderate decline. The main increase in production in recent years is attributed to the orchard sector, particularly avocado, and to the field crops sector.

Israeli Agriculture - Production

Agricultural production in thousands of tons - unstable upward trend

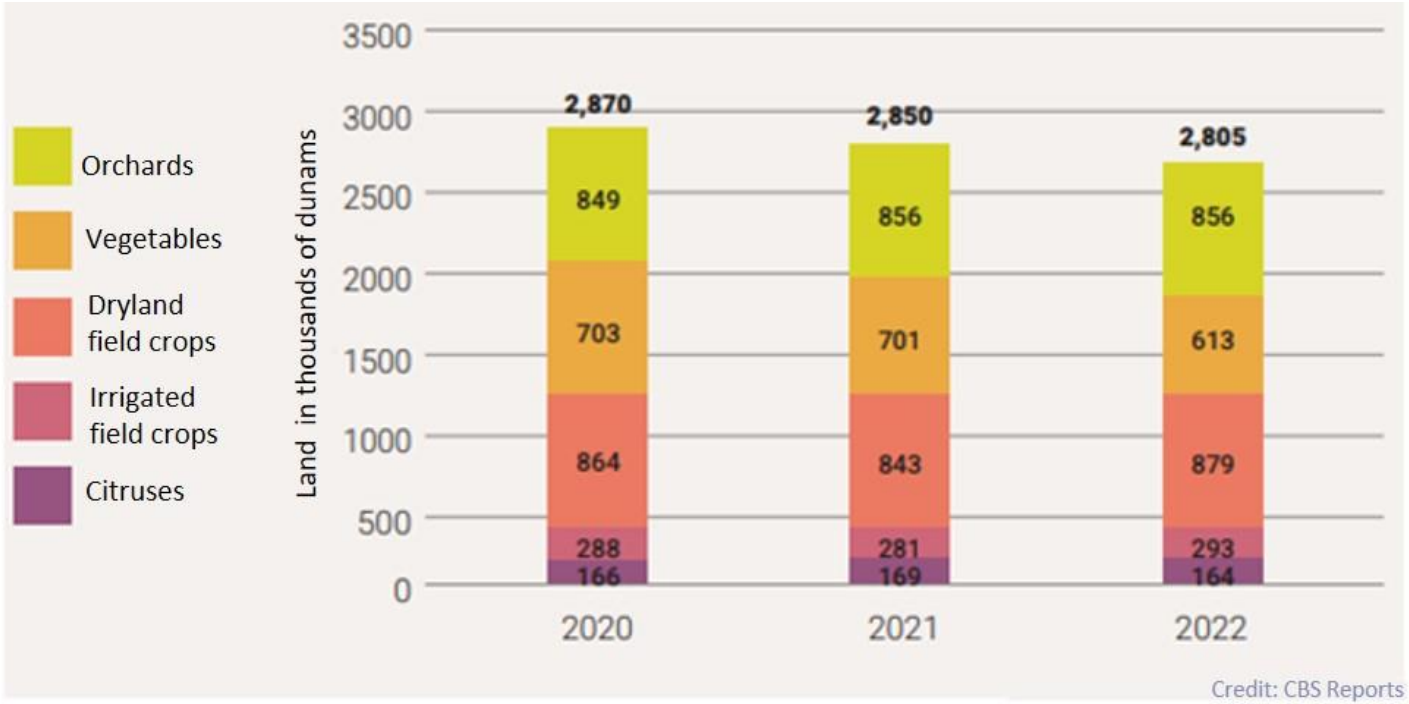


Peak year: 2014 – approx. 5,534K tons

In 2022, agricultural production amounted to approximately 4,785K tons. The fruit sector saw an increase, particularly in avocado and olive oil. The citrus sector stabilized but showed an increase compared to the previous decade. The vegetable sector remained relatively stable but declined compared to the last decade. The olive oil yield was very high in 2022, doubling compared to 2021. However, that year's increase is not representative and reflects a rare abundant fruit load on the trees. The continuing trend is a decrease in olive grove areas, raising concerns about a decline and instability in yields, linked, among other factors, to intermittence and climatic challenges.

Farmed Dunams – Agricultural Areas

Downward trend with a moderate decline in recent years



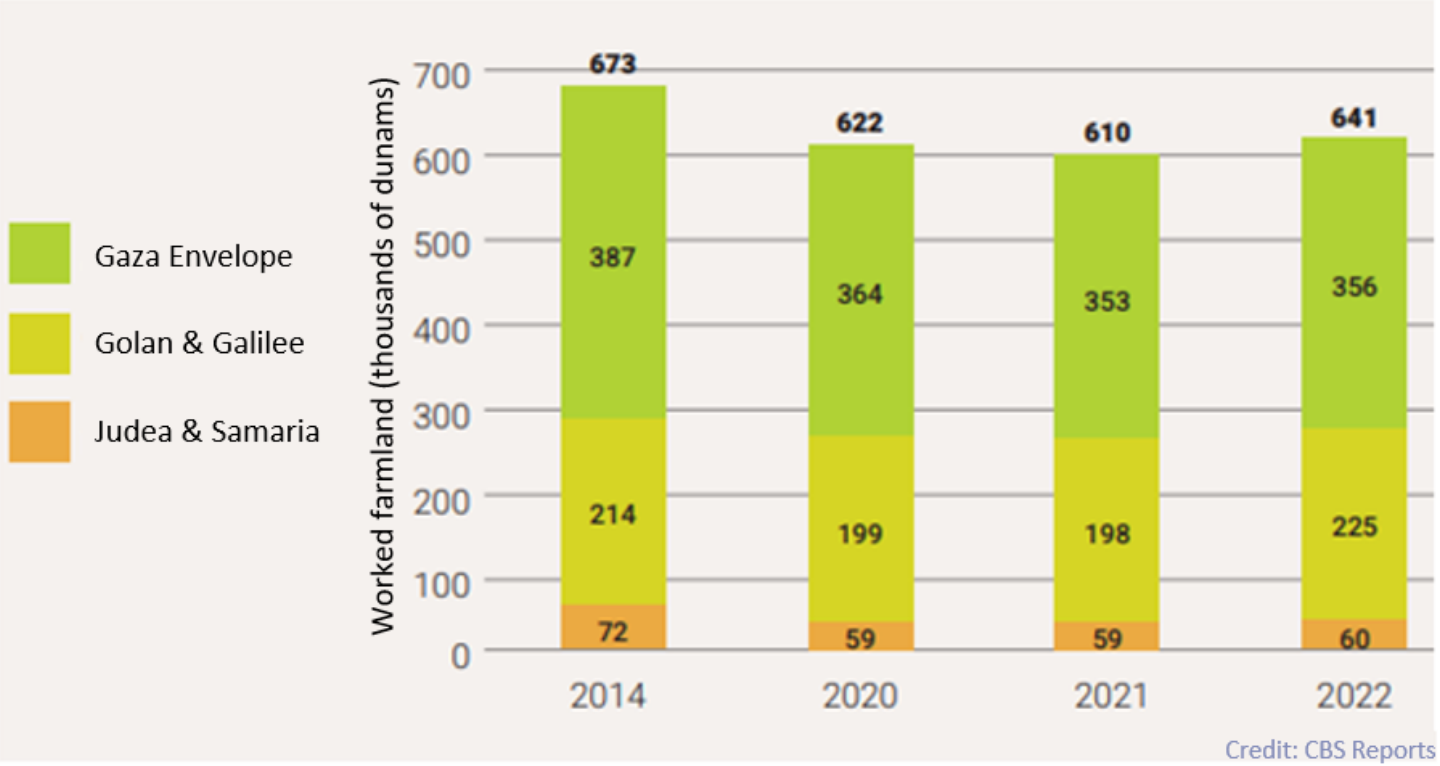
Peak year: 2003 – 3,292K dunams (813,000 acres)*

Decrease in 2022 to 2,805K dunams (nearly 700,000 acres). The decrease may also be related to the sabbatical year but reflects a trend over several years. The calculation of the areas is based on estimation only (reported areas) but reflects trends. There is a decrease in citrus areas to 164K dunams (40,525 acres), with the main crops being oranges and mandarins, particularly the Ori variety. In contrast, there is a continuous increase in avocado dunams, with an estimated 140K dunams (nearly 35,000 acres). A significant portion of avocado areas is designated for export, which is a main destination for the produce.

* Prior to 2003 the mode of calculation changed, so it is not possible to compare to preceding years.

Farmed Dunams – Farmland in Periphery Areas

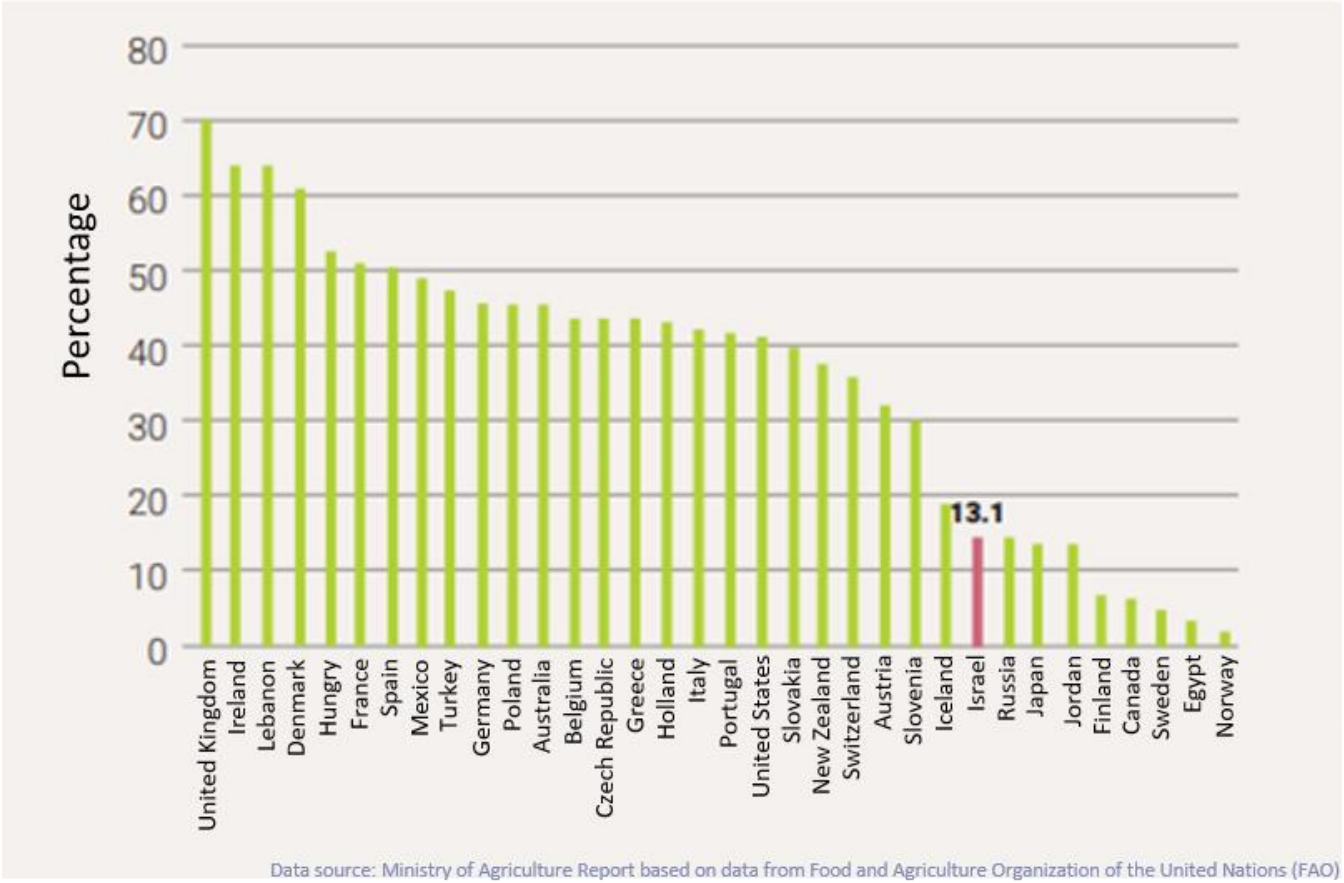
Downward trend with a moderate decline in recent years



Overall, there is stabilization in the agricultural areas in these regions. There are approximately 641K dunams (nearly 158,400 acres) of farmland in these areas, constituting about 20% of the country's total farmed dunams. Farmland in these regions has a dual significance—agricultural production and land preservation. It's worth noting that the Eshkol region, which accounts for a large percentage of tomato cultivation, has been addressing the recent tomato cultivation challenges. In the Judea and Samaria region, there is a lack of reliable data, but the situation reflects fewer dunams compared to the geographic area. In the Jordan Valley region, agricultural importance can also extend to ecological preservation, as currently, there is very minimal utilization of purified wastewater in agriculture, with most being directed to wadis. There is also a theoretical possibility of significant expansion in dunams for agriculture in this area, as it provides a climate similar to the north—major cultivation areas that receive significant irrigation.

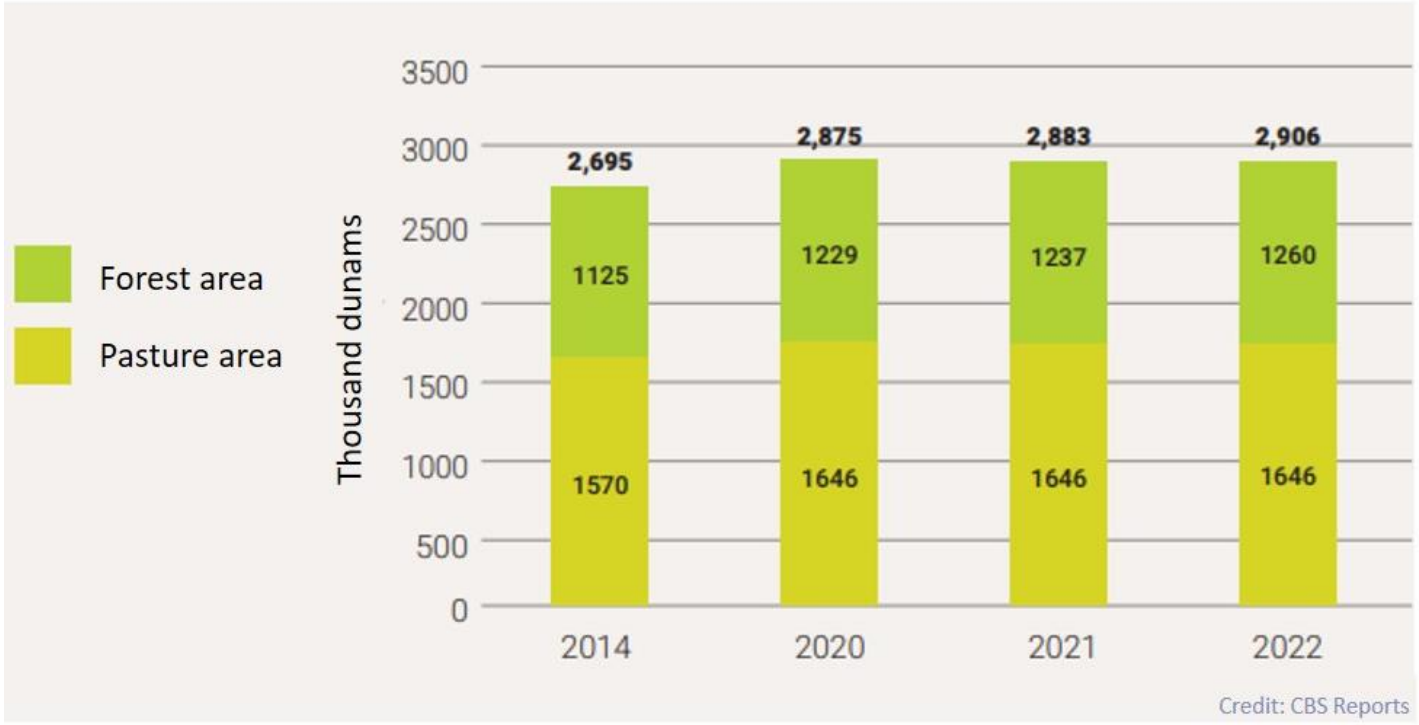
Percentage of Cropland by Country

International comparison for 2020

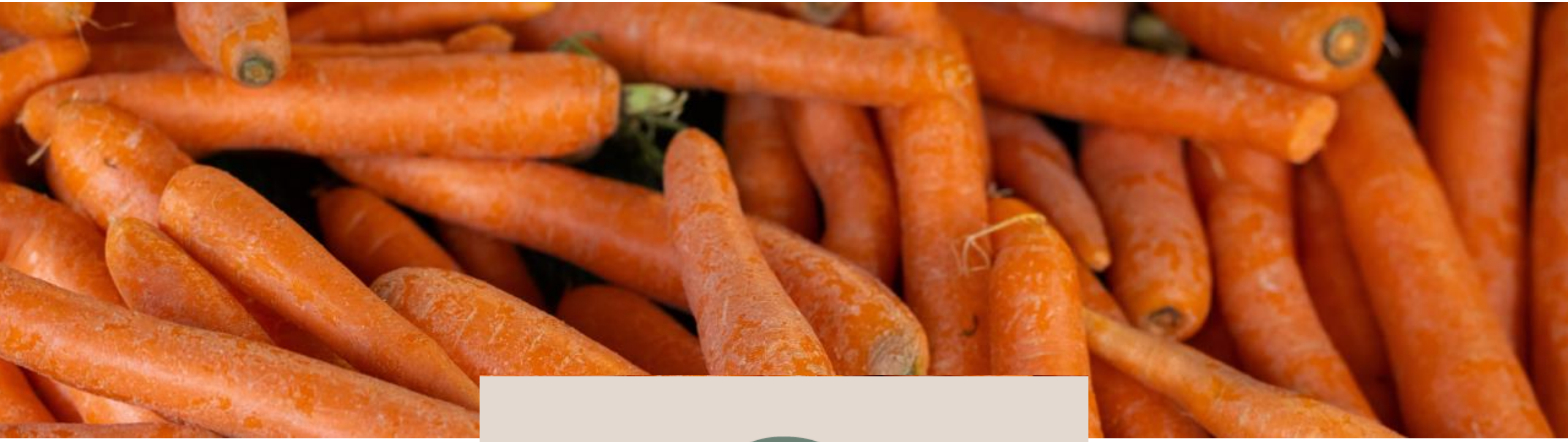


As the graph above indicates, the percentage of farmland in Israel is low (13.1%) compared to many countries; however, Israel has open spaces and limited amounts of precipitation. The utilization of new areas such as the periphery desert regions where agriculture is beginning to develop, and also the Judea and Samaria region, could expand cultivation areas in the future. This is important in light of estimates by professionals who suggest adding about 6,000 dunams (approx. 1,480 acres) annually to meet the country's needs in the coming decades.

Forest and Pasture Areas



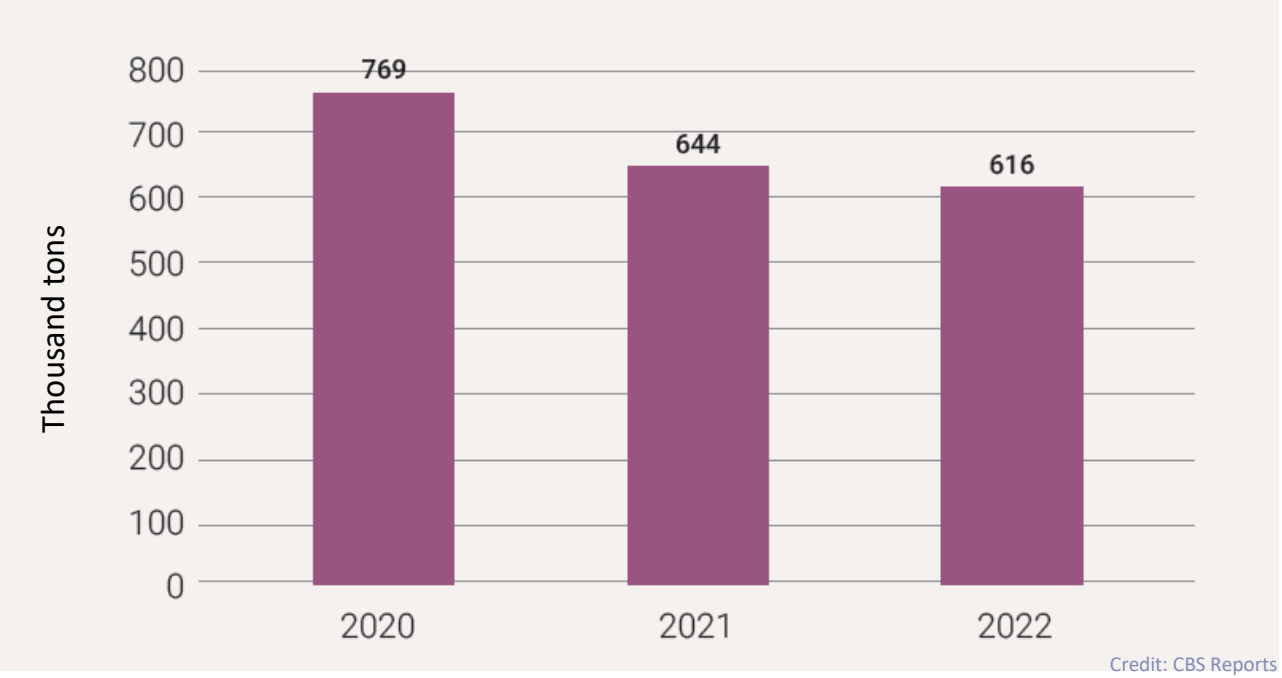
Forest areas are growing and expanding. According to estimates in 2022, there were approximately 1,260 thousand dunams. Special attention should be paid to tree plantings in areas of national importance for holding onto land. Despite ongoing debates in recent years about whether forests impact the ecosystem, forests are widely recognized for their significant role in realizing settlement visions and preventing land takeover. Overall pasture areas occupy about 5.8% of the country's area; forests account for approximately 4.5% (the percentage of forest area varies in different reports and depends on how the country's area is calculated).



2

Imports and Exports

Export of Fruits, Vegetables and Additional Crops



Credit: CBS Reports

The past decade has seen a general decrease in exports. The decline focuses on vegetable exports, while at the same time, there is an increase in fruit exports. Notable examples include avocados, constituting approximately 61% of the fruit exports, and dates, accounting for around 22% of the exports. Cotton has seen significant growth in exports in recent years.

Citrus fruits have seen a decline in exports over the years, but it has stabilized recently. Among vegetables, potatoes represent 53% of the total vegetable exports, and carrots account for 26% of the total exports. The percentage of agricultural produce exports is around 12%. Exceptions include avocados, where exports account for approximately 70% of the total production.

Export-oriented agriculture is indeed profitable but carries risks and instability, especially as Israel competes with countries with much cheaper labor and water resources. For example, watermelons, citrus fruits, and potatoes, significant exports in the past, have seen a noticeable decline in their exports over the years.

Competition with Imports – Israeli Agriculture Prevails

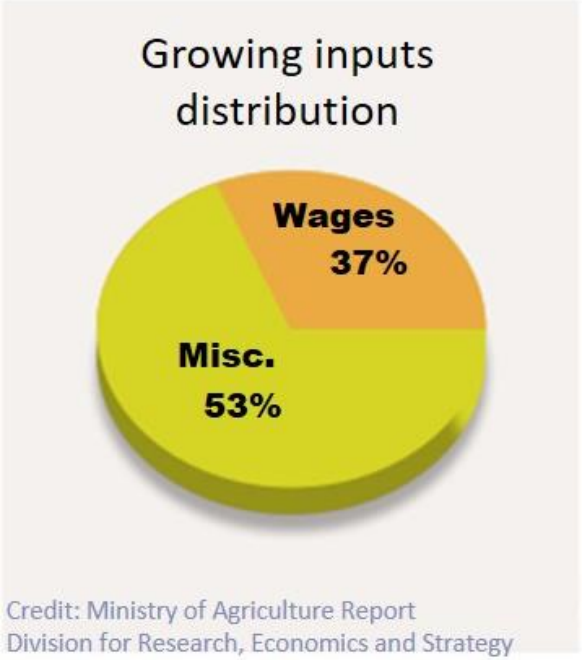
Over the past decade, imports have been on the rise, but have stabilized over the past 3 years

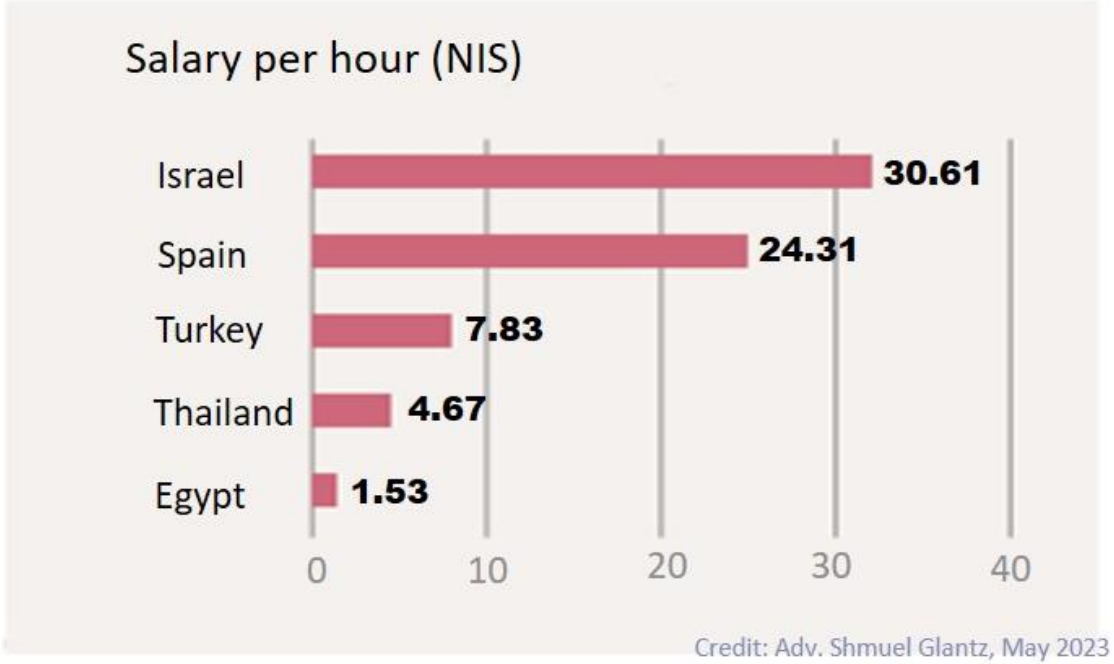
Peak year: 2022 – 10.5% of personal consumption

Imports currently account for about 10% of personal fruit and vegetable consumption. Crops with high import increases include tomatoes, cucumbers, apples, pears, onions, and garlic. Note that a significant portion of these imports are from countries with low-level quality control for their agricultural produce, including Turkey, Jordan, and China. For example, Israeli garlic contains approximately 4 to 5 times more allicin than imported garlic, a key compound responsible for garlic's aroma and health benefits. Thanks to the introduction of the Country of Origin Labeling Law, now everyone can identify whether the produce is Israeli or imported and choose accordingly. Local agriculture supplies about 40%-50% of the total personal food consumption. However, Israel is significantly dependent on imports for grains and meat products. An increase in the percentage of locally produced food out of total consumption would enhance the food security of Israeli residents.

Coping with Imports

Wages





According to CBS data, wages account for approximately 40% of total inputs (direct cultivation expenses). Therefore, the fact that wages paid in Israel (to foreign workers) are significantly higher than in many countries from which imports originate helps us understand the difficulty in competing with them. Over the years, due to legislation and court rulings, the wage conditions paid to foreign workers have increased significantly. This is in addition to other input costs, such as water, which is generally more expensive in Israel.

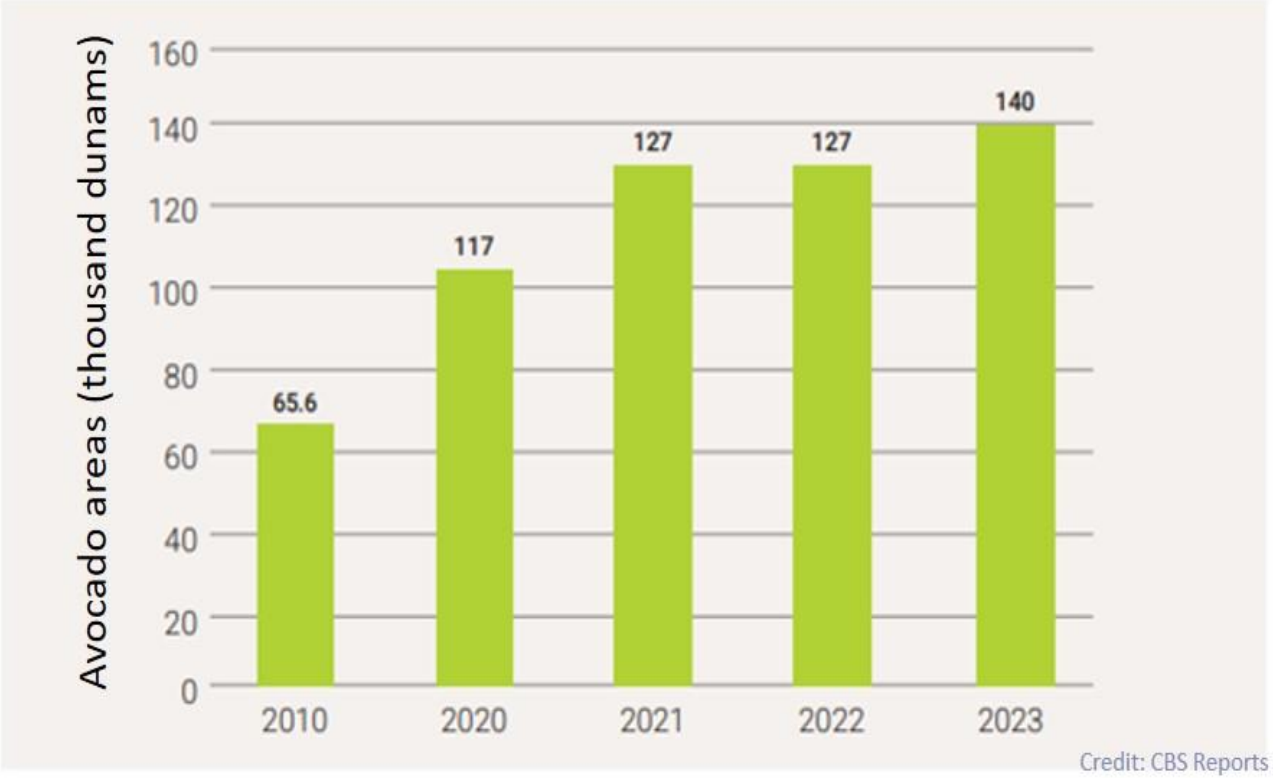
Moreover, Israeli farmers must comply with quality regulations related to water quality and pesticide use, which are much stricter and costlier than those in countries like Turkey or China. Therefore, promoting mechanization in additional sectors and areas, such as vegetable harvesting, is essential to enhance competitiveness and reduce consumer prices.

3

Changes in Specific Crops

Winning Crop: Israeli Avocado

Avocado: a fast-developing crop mainly designated for export

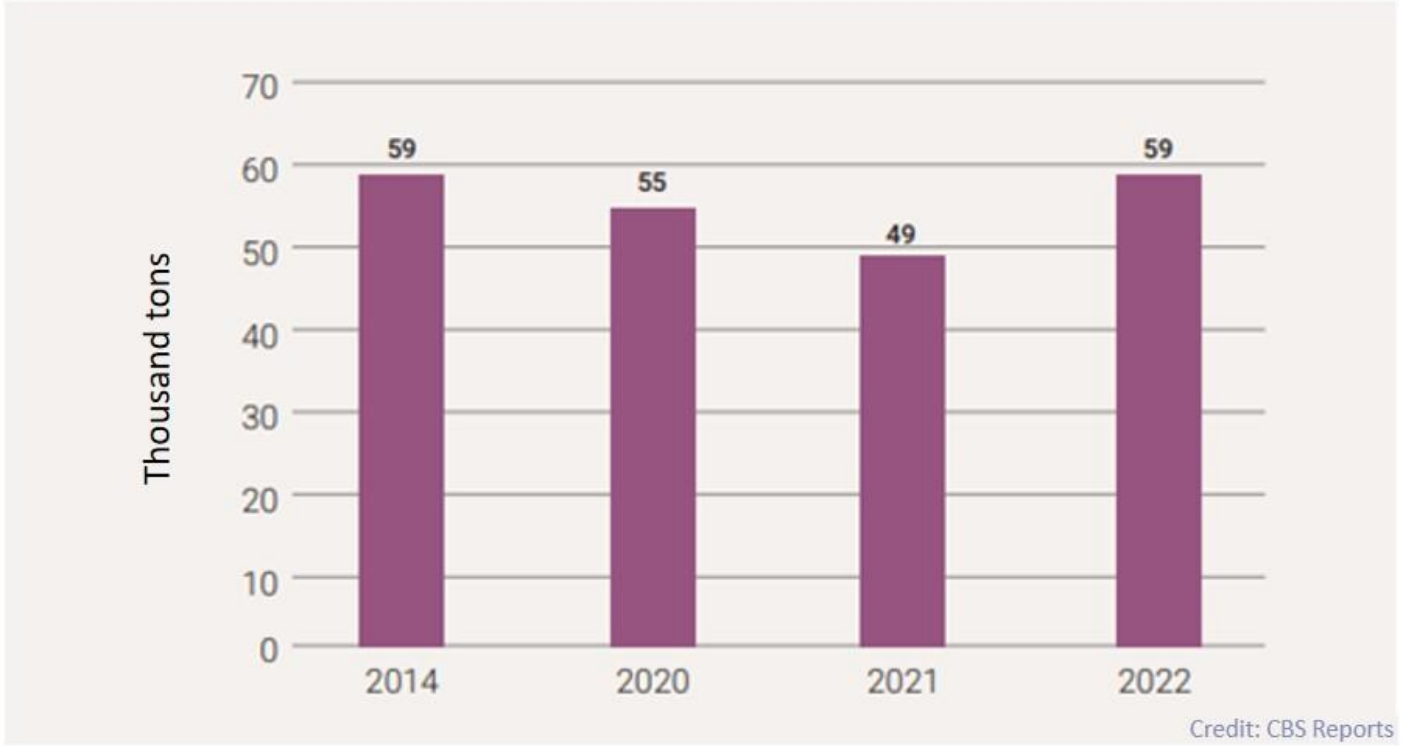


Avocado cultivation areas are consistently increasing due to the demand for export, which accounts for approximately 70% of total avocado production. The estimated yield in 2024 will reach a peak of 250,000 tons.

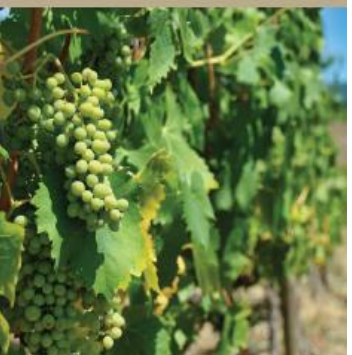
Avocado is a prime example of Israeli agricultural success – identifying an opportunity and global demand while recognizing the suitability of the Israeli climate for its cultivation. According to some estimates, Israeli avocado productivity is about 40% higher than the global average.

Over the years, the avocado season has extended and now lasts throughout the year, thanks to varieties that ripen at different times.

Crop in Progress: Wine Vineyards



Wine production in 2022 was estimated at 59,000 tons. Despite the increase in planted area, estimated at 65,000 dunams, annual production has not risen as expected. Wine vineyards have suffered from viruses for several years, resulting in delays in planting and reduced yields. A few years ago, virus-free vines and rootstocks were imported, and supervised production of virus-free seedlings began using new production methods. In recent years, many vineyards have been planted, and it is expected that local production will once again dominate the industry in a few years. Significant amounts of imported wine are currently available on the market, partly due to the recent sabbatical year (*shemitah*).



Crop in Distress: Tomato

Tomato production volumes have dropped dramatically, partly due to competition with imports

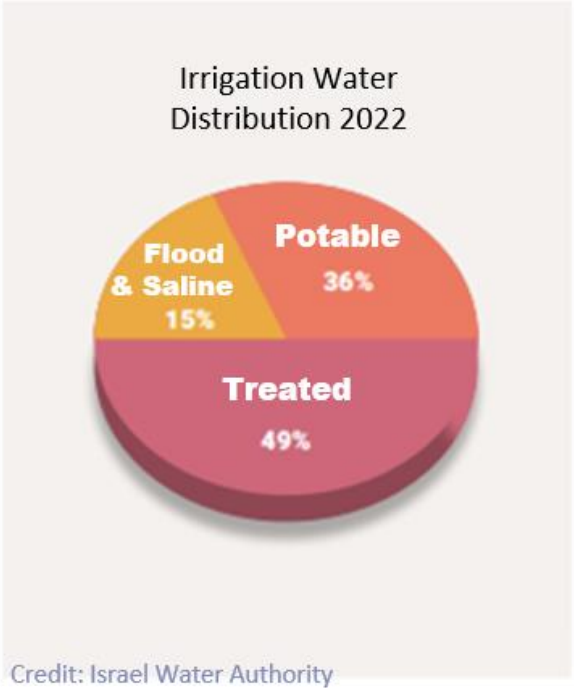
From 168,000 tons of local production in 2013, production fell to merely 119,000 tons in 2022. This decline is primarily linked to imports, which rose simultaneously to 46,000 tons, mostly from Turkey and Jordan. The tomato industry faces significant challenges, including new viruses and competition with imports. A source of hope lies in the development and initial application of automatic harvesting machines. These machines could improve competitiveness against markets where labor costs are much lower than in Israel. Additionally, there is progress in finding varieties resistant to the viruses that have afflicted the industry in recent years. Approximately 50% of the tomato-growing areas are located in the Gaza Envelope region, which recently suffered a brutal attack. Promoting the crop is therefore also crucial for the development and prosperity of this important region.

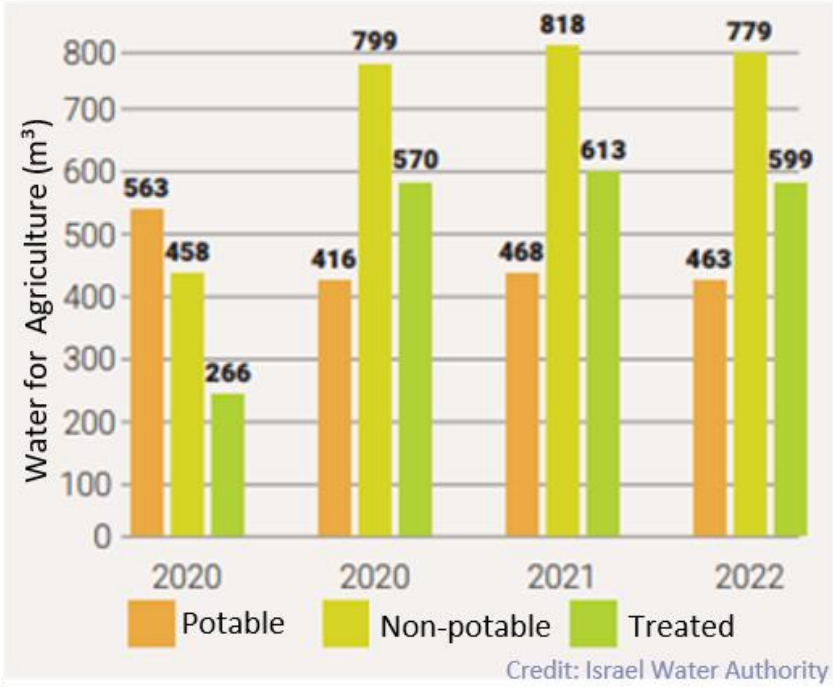
4

Water Consumption Precipitation and Climate

Irrigation Water

World leader in recycling





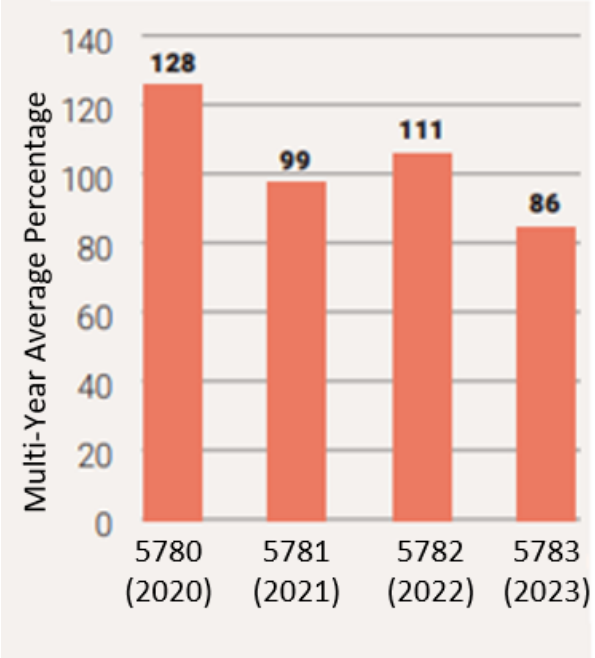
Potable water is water that is safe for drinking, while other non-potable waters fall into several categories: treated water - wastewater that has undergone high-level purification; floodwater - water collected from floods; and saline water - water that is not suitable for drinking.

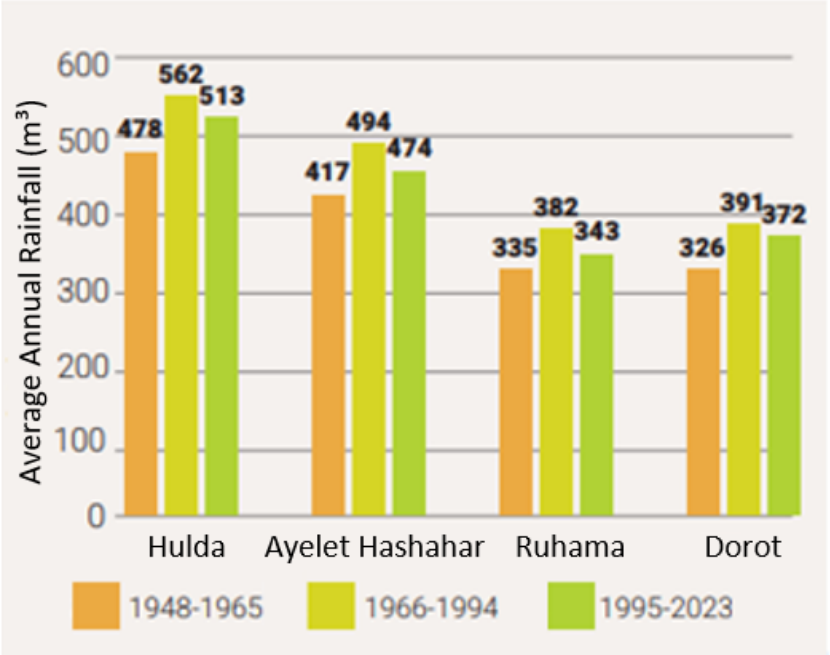
All of these non-potable waters can be used for agriculture. Over the years, the use of potable water for agriculture in Israel has decreased, and in 2022 only 36% of agricultural water was freshwater. By comparison, in 2001, 44% of agricultural water was freshwater. The use of treated water has correspondingly increased, now accounting for 49% of agricultural water. This positions agriculture as a significant resource utilization and environmental conservation source, with wastewater being purified and reused.

This is an exceptional Israeli achievement, as other countries are far from such levels of purification and utilization of wastewater and other non-potable water for agriculture. The situation has been relatively stable in recent years, with no further decrease in the percentage of freshwater used for agriculture.

Additional non-potable water sources should be considered to reduce reliance on potable water.

The data below was taken from the Meteorological Service database. The year 5783 (2023) was relatively dry, with 86% of the annual average precipitation falling nationwide. However, in the northern Negev region, similar amounts fell compared to the average. This year was preceded by four consecutive wet years, during which precipitation was at or above average. Since the beginning of measurements, the peak year for rainfall was 5752, with 172% of the annual average precipitation.

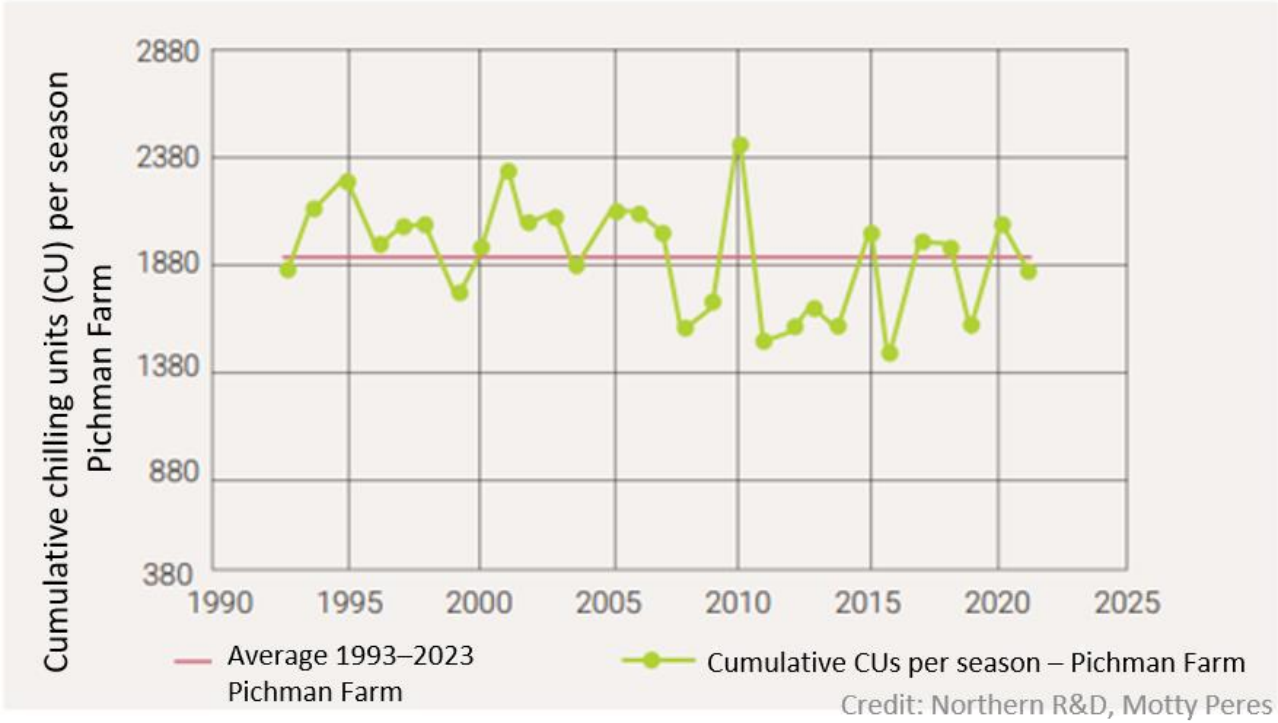




In a comprehensive multi-annual overview of annual rainfall amounts, three main rainfall periods can be observed: 1948–1965, characterized by the lowest precipitation averages recorded at many stations throughout the country; 1966–1994, the peak years; and the recent period of 1995–2023, showing a decrease compared to the peak but still higher than the first period. Graphs with data from stations across the country's north, south, and coastal plains depict this trend. The increased precipitation observed significantly in the southern region since the 1960s has spurred numerous studies, although explanations vary on the source of this phenomenon. Beyond water resources management, rainfall is vital for dryland cultivation, particularly wheat cultivation covering millions of dunams (most in the northern Negev region).

Chilling Units

Fewer chilling units in the past decades



In recent years, there has been a decreasing trend of annual chilling portions (CU). Sufficient CUs are crucial for breaking dormancy for many deciduous fruit trees, such as apple and cherry trees, and for the intensity and uniformity of bud formation. As seen in the graph of Pichman Farm data in the Golan Heights (the Tzur-Meron-Peres model), concerning the average for the years 1993–2023, most of the recent years have been below average, while in the first 15 years of the period, most years were above average. Although there are also chemical substances that induce breaking dormancy, a minimum amount of CUs is still required. There is concern that the CUs will be insufficient even when using dormancy-breaking chemical agents. Research is underway to provide additional solutions, such as cultivars with lower chill requirements.

Looking to the Future – Mechanized Harvest of Vegetables and Deciduous Fruits

Looking ahead, the development and sophistication of mechanization are crucial to increase the productivity of Israeli agriculture and enable it to compete with regions where cheap labor is available. One sector that was once thought to be unsuitable for mechanical harvesting is deciduous fruits. However, in recent years, the development of drones for harvesting deciduous fruits has begun, using the model of apple cultivation. Mechanization is currently at the semi-commercial stage, aiming to achieve an appropriate harvest pace.

The continued development of similar tools will help Israeli agriculture compete successfully in other markets by leveraging local advantages. Several harvesting machines are in advanced development stages in the fresh market tomato sector. Mechanized harvesting options also exist for lettuce and other leafy vegetables, but currently are not widely used for various reasons. The introduction of such tools could significantly benefit local agriculture.

Several companies are working on new developments in this field, including:

Tevel Aerobotics Technologies – Harvesting deciduous fruits using drones. Bill Gates identified this company as one of the top five robotics startups. Currently, trials are mainly conducted abroad. By integrating artificial intelligence, the drones can identify which fruit
to pick and gather data on the harvest and its quality.

MetoMotion – Tomato harvest employing robots. The company is in advanced development stages and plans to establish the first experimental greenhouse at Alumim and Be'eri kibbutzim (both situated in the Gaza Envelope) . The harvesting mechanization can provide a breakthrough for the sector, which has faced ever-increasing competition with imports in recent years.

In some cases, new cultivation methods are being explored to adapt the crops for mechanized harvest.
Continued progress in this area is vital for the prosperity of Israeli agriculture.

Conclusions

The coming years are expected to challenge the ability of Israeli agriculture to continue thriving amid current challenges and imports. Israeli farmers face rising input costs for water, fertilizers, and other necessities. Furthermore, labor costs have surged in recent years due to legal issues. It is incumbent upon the government and other stakeholders to find ways to strengthen Israeli agriculture while promoting the economy.

In recent years, discourse has emerged linking the cost of living with the importance of agriculture, including the issue of imports. We will not delve deeply into this matter here but are confident that if the unique value of agriculture is understood—for security, border protection, and many other values—a way will be found to support and sustain Israeli agriculture along with other values such as food accessibility for the entire population.

Regarding available dunams for expanding cultivation, we can mention the desert periphery areas, mainly in the Negev, where there is a slow process of finding suitable cultivation methods and utilizing local resources. Vineyards have been established in the Negev highlands, and vegetable cultivation has developed in the Halutza and Besor areas. Furthermore, thousands of dunams of orchards, mainly wine vineyards, have been planted in Judea and Samaria over the past decade. In the Jordan Valley, thousands of dunams are appropriated for covered vegetable crops.

Finding crops with relative local advantages, continuing to promote mechanization, reducing dependency on human labor, and ongoing research on crop health maintenance can advance agriculture in years to come. Israel is blessed with varied climate zones, allowing for optimal cultivation areas for each crop and season. It seems that this potential is still far from being realized. Furthermore, local agriculture should be encouraged to operate in ways that preserve the land, invest in infrastructure and cultivation methods that prevent future problems, and continue the innovative developments successfully promoted by agricultural research in the country. As consumers, we must remember that Israeli agriculture offers added value, making the cheaper option not always worthwhile.

This report was prepared by Agronomist Yehuda Heller, R&D Department of Torah VeHa'aretz Institute
Thank you to all of the professionals who helped us access the material