

A publication of the International Society for Horticultural Science

Chronica Horticulturae



Horticultural highlights

The diversity of horticulture in Japan – flower production • How an Israel-India collaboration changed the destiny of date palm farmers in Kutch, Gujarat, India

Symposia and workshops

People Plant • Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems • Postharvest • Postharvest Pathology • Human Health Effects of Fruits and Vegetables • Strawberry

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> Contents

● News & Views from the Board

- 3 View from the cockpit, *P.J. Batt*

● Horticultural Science News

- 4 ISHS Young Minds Award winner summaries

● The World of Horticulture

- 7 The diversity of horticulture in Japan – flower production, *K. Ichimura, M. Nakayama, M. Ochiai and K. Yamada*
- 13 International 3-Minute Horticultural Thesis (3MHT) competition at IHC2026, Kyoto, Japan
- 14 How an Israel-India collaboration changed the destiny of date palm farmers in Kutch, Gujarat, India, *R. Kamenetsky Goldstein*

● Symposia and Workshops

- 18 XVI International People Plant Symposium
- 19 XIII International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems
- 21 Postharvest2024 – IX International Postharvest Symposium, VII International Symposium on Postharvest Pathology, and X International Symposium on Human Health Effects of Fruits and Vegetables
- 26 X International Strawberry Symposium

● News from the ISHS Secretariat

- 29 New ISHS members
- 30 Calendar of ISHS events
- 35 Recently published papers in eJHS
- 36 Available issues of *Acta Horticulturae*

Cover photograph: A promising line of chrysanthemum (*Chrysanthemum morifolium* Ramat.) with pink petals, independently selected from a cross-breeding population cultivated during student training at the Institute for Sustainable Agro-ecosystem Services, Graduate School of Agricultural and Life Sciences, The University of Tokyo (Photo courtesy of Assoc. Prof. Dr. Yohei Higuchi, The University of Tokyo). See article p.7.

➤ How an Israel-India collaboration changed the destiny of date palm farmers in Kutch, Gujarat, India

Rina Kamenetsky Goldstein

The date palm (*Phoenix dactylifera* L.) is one of the most important fruit crops in arid regions. It is widely cultivated because of its high productivity and the high nutritional value of the fruit, while mature trees also play a crucial role in preserving ecosystems threatened by desertification. The fruit of the date is not only delicious and naturally sweet, but also highly nutritious, for it contains carbohydrates (70%) along with essential vitamins A, B2 and B7, and essential minerals such as potassium, calcium, copper, manganese, phosphorus, sulfur and iron. Furthermore, the production of dates generates rural employment and provides a major source of income for smallholder farmers, contributing to food security and rural livelihoods.

In 2023, world production of dates was about 10 million tonnes, led by Egypt, Saudi Arabia, and Algeria. Approximately 150 million date palms are cultivated on 1,300,000 ha across the Middle East, North Africa and the Sahel region (FAOSTAT, 2025). Some cultivation also occurs in parts of East and South Africa, Mexico and the United States, but most regions in India are not suitable for date palm cultivation due to climatic limitations (Shah, 2014). Centuries ago, traders from Arab countries brought dates as food when they traveled to the Kutch district (also spelled Kachchh) in Gujarat, western India. After consuming the fruit, they discarded the seeds, which later germinated and grew into the first date palm trees in the region. Kutch, with its capital in Bhuj, is bordered by the Gulf of Kutch and the Arabian Sea to the south and west, and the Great and Little Rann of Kutch seasonal wetlands surround its northern and eastern regions (Figure 1).

Historically, Kutch was considered a backward region due to its remote location and partially submerged geography. The region's major food crops include wheat, bajra, millet and pulses, while mango, papaya, lemon and pomegranate are the major horticultural crops (<https://kachchh.nic.in/economy>).

Date palms play an important role in the region's agro-economy, helping to combat desertification. In addition to improving farmers' socio-economic status, the cultivation



■ Figure 1. Geographical location of Kutch. https://upload.wikimedia.org/wikipedia/commons/3/3e/Map_GujDist_Kuchchh.png

of date palms has contributed to reducing nutrient deficiencies within the local population and decreasing the dependence on imports.

In most countries, date palm cultivation is based on true-to-type vegetative propagation from offshoots. In the last few decades, vegetative propagation has been performed through tissue culture. However, in Kutch, propagation has traditionally been based on sexual reproduction through seeds. As dates are a dioecious species, half of the seedlings turn out to be male that do not produce fruit. The other half are females, but each tree has different fruit characteristics. Long-term seed propagation has resulted in thousands of locally grown trees, displaying a wide range of fruit colors including yellow, pink, red and orange, with diverse taste profiles. Because of the Monsoon summer rains, date fruits seldom ripen completely and fail to dry like in other date-growing regions. However, the region produces dates with relatively low astringency for fresh consumption, harvested in June, just before the monsoon season begins in July.

Thirty years ago, the German-Israel Fund for Research and International Development (GIFRID) approved a project to introduce modern date palm cultivars and optimize production protocols in Kutch. In 1995, locally produced dates were sold for Rs 3-8 kg⁻¹, with an average fruit yield of 100 kg tree⁻¹.

To enhance productivity and quality, Mr. Moti Harari, a member of GIFRID's Board of Directors, proposed a technology transfer project. As part of this initiative, experts from Israel were invited to assist local farmers by sharing the latest advancements in date palm cultivation.

At that time, Israel's date palm industry already used advanced technologies, cultivar selection methods and research-driven practices. A coordinated farmers' council managed both the market and the industry, leading to significant advancements in knowledge. In 1996, Mr. Amnon Greenberg, manager and researcher at the Southern Arava R&D Station, was invited to lead the project in Gujarat. He collaborated closely with local experts, including Navin N. Sodagar, a date palm cultivation advisor; Dr. M.H. Mehta of

Gujarat Agricultural University; Mahubhai H. Pandit, director of the Shree Vivekanand Research and Training Institute in Mandvi, Kutch; and Hasmukh Patel, manager of AGROCEL Industries Ltd.

In Kutch, local dates are generally harvested at full maturity, just before ripening and drying (doka stage), prior to the onset of monsoon. However, most cultivars introduced to Kutch from arid regions need a longer period and are harvested in August-September, during the monsoon. Israeli experts decided therefore, to focus their efforts on the evaluation of local germplasm, selecting for valuable traits, and the development of quality propagation material.

During the first stage of the project, the research team visited over 20 date growers and asked them to choose their best trees. These trees were evaluated for various quality parameters: fruit size, weight, color, sweetness, yield, rain tolerance, and harvest time. From this evaluation, three exceptional genotypes were selected and observed over three seasons. This provided a basis for the further development of local cultivars (Figure 2).

The next step was the propagation of the selected genotypes. Asexual propagation by offshoots allows the progeny to be identical to their parents, but is limited to only a few offshoots per tree, and the survival rate in the field is relatively low (< 60%). To overcome this constraint, clonal propagation using tissue culture is the preferred method of choice to produce genetically stable planting material in large quantities. The Mundra tissue culture laboratory was established in 2000 for the propagation of local and important cultivars. Today, it has evolved into a well-established company, Kutch Crop Services Pvt. Ltd. (KCS), that supplies clean plant material of 'Elite Kutch' and other local cultivars (<https://kcslindia.com/>).

The Shroff family and Shroff's Foundation Trust (SFT, <https://www.shroffsfoundation.org/>) made a significant contribution to this large and ambitious project. Their generous support helped establish experimental plots and fund irrigation equipment for local farmers. Mrs. Ranjan Shroff played a key role in the dissemination of knowledge, farmer education and experimental trials over several years. She also traveled to Israel to gain insights into date palm cultivation. Another family member, Ms. Parinita Gohil, serves as the CEO of Kutch Crop Services Pvt. Ltd.

Special attention was given to improving horticultural methods and practices on local farms. In collaboration with local growers, as well as the Kinu Wadi model experimental plot, Amnon Greenberg developed comprehensive blueprints for planting, irrigation, propagation by offshoots, fruit thinning,

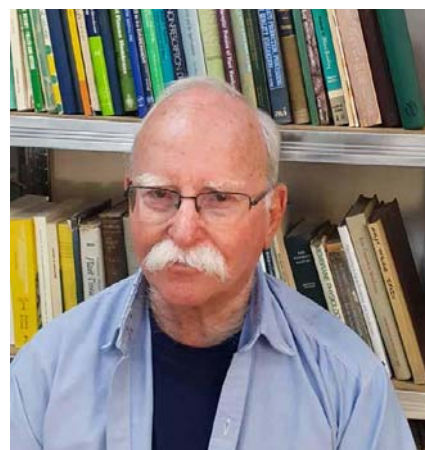
plant protection, and monsoon resilience. These protocols were successfully implemented, leading to a transformation in regional date palm production practices. Today, KCS produces 30,000 young plants annually, and fruit yield has risen to 200 kg tree⁻¹. The yellow variety sells for approximately Rs 25 kg⁻¹, while 'Elite Red' commands a premium price of Rs 120 kg⁻¹ in the Mumbai markets.

The GIFRID project ran for nine years. By 2003, technologies for production, plant protection and clonal propagation of several selected KCS cultivars had been successfully established. Later, Amnon Greenberg and his wife, Ilana, made three private visits to India, where they were always warmly welcomed as special guests.

Today, Kutch is the largest date palm growing district in India, with nearly 19,000 ha under cultivation, which produces almost 85% of the country's total production (Figure 3). Local scientists and agricultural experts at the Date Palm Research Station in Sardarkrushinagar Dantiwada Agricultural University, Gujarat (SDAU), and other horticultural centers, continue to enhance local cultivars and refine horticultural techniques.

Amnon Greenberg

Born in 1941, Amnon Greenberg has had a long and distinguished career in Israeli agriculture. After marrying Ilana in 1967, he moved to Kibbutz Yotvata in southern Israel, where he joined the date cultivation team. Following his graduation from the Faculty



> Mr. Amnon Greenberg.

of Agriculture at the Hebrew University of Jerusalem, Amnon became the director of the Arava R&D Station and the coordinator of the Agricultural Committee of the Regional Council. He later pursued studies in economics and business administration and led the Southern Arava R&D until 2013. Since 2016, he has served as the Chairman of the Date Growers Board of Israel.

Beyond Israel, Amnon has played a key role in international agricultural initiatives. He led the establishment and promotion of date cultivation in Gujarat, India (1996-2005), managed the first installation of a drip irrigation system in Chinese orchards (1992-1993), facilitated Israeli-Jordanian agricultural cooperation through the 'Rahma' project (1998-2010), and provided consultation for a date cultivation project in Chad (2024).



■ Figure 2. First steps of the date project in Kutch, 1996-1998. A) Local plantation, B) Amnon Greenberg instructs local growers, C) Ranjan Shroff is working in date plantation, D) propagation by offshoots.



■ Figure 3. Successful production of yellow and red date cultivars in Kutch, 2024. Photos: Parinita Gohil and Harshal Gala.

In recognition of his exceptional contributions to agriculture and international collaboration, Amnon Greenberg was honored with a Lifetime Achievement Award of the Ministry of Agriculture of Israel.

The Shroff family

Sustainable development and the responsible use of natural resources are causes close to the heart of the Shroff family. Originally from Kutch, the family settled in Bombay. Over the years they established a large chemical business and pioneered many innovations in the chemical industry in India. Their deep-rooted connection to Kutch inspired them to give back to the community. In 1975, they founded the Shree Vivekanand Research and Training Institute (VRTI) in Mandvi, and AGROCEL – a leading Indian company specializing in minerals, specialty chemicals, and plant nutrition.

Mr. Kishore Shroff, the son of one of the founders of the company, and his wife, Mrs. Ranjan Shroff, purchased a large farm in Kutch to maintain the connection to their childhood district. The farm specialized in growing dates, and Ranjan Shroff took a keen

interest in improving their quality. In the early 1990s, she traveled to Israel, where she worked in a date orchard to gain hands-on experience.

Mrs. Parinita Gohil is a dynamic representative of the younger generation in her family. She currently serves as the CEO of KCS. In 2008, KCS took over the complete operation of in vitro date palm propagation. Today, the

company produces over 30,000 plants annually, encompassing 16 different varieties.

As part of their commitment to agricultural development, the family donated a large plot of land and farm services for growing date palms under the GIFRID project. They actively participated in the Israeli-Indian collaboration, contributing to farmer education and knowledge exchange. ●



➤ Mrs. Ranjan Shroff.



➤ Mrs. Parinita Gohil.

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