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A study of improvement in the field of agriculture in Punjab, using Israeli technology

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Abstract

Israel, the Biblical holy land, known for its rich culture and infrastructure, was established on May 14, 1948. Jews from all over the world converged on Israel and developed the country with a missionary zeal. Despite having geographical conditions that do not favour farming, Israel has managed to script a success story in the field of agriculture. India, an ancient land with centuries of knowledge, expertise and experience in various fields coupled with its rich natural resources is a force to reckon with. It was with the intent of sharing the best practices and technical knowledge that in 2006 the Israeli and Indian Agriculture Ministry signed a long-term cooperation and training deal. The deal has since been supervised by field experts from MASHAV; an international development programme of Israel's Foreign Ministry. Agriculture in Israel is a highly developed industry, despite the fact that Israeli geography does not favour farming and is not naturally conducive to it. More than half of the land area is a desert. Climate conditions and lack of water resources are unfavourable factors. Over half of Israel's saline soil was arid or semi-arid. Only 20 per cent of the total land was arable. Israel took the challenge chin up and soon tripled the area used for farming. The production multiplied 16 times. Today, Israel produces 90 per cent of its own food requirements. It is a major exporter of fresh produce and a world leader in agricultural technology.

With small and big tunnels of greenhouses and long series of greenhouse tunnels, agriculture in Israel is like an industrial produce. Half of Israel's total agricultural produce includes fruits and vegetables. Israeli greenhouse tomatoes, cherry tomatoes, herbs, pepper, melons are of the highest international standards. Cactus plants are also grown to cater to food security. Oranges, grapefruits, apricots, grapes, peaches, mangoes, plums, dates, lemons, apples, and pears are major fruits. Another fruit that is grown is mandarin – a very sweet fruit that is seedless and with thin skin. Israeli potatoes are also of very high quality. Successful use of drip irrigation is a major contribution of Israel in agriculture. Through drip irrigation, water goes directly to roots. This saves wastage of water. Israel highly values water and knows how to save each drop. Computer-controlled drip irrigation, computerised early warning system for leaks; thermal imaging for crop water stress detection, biological pest control, new varieties of fruit and vegetables are the main achievements of Israel in the field agriculture. Dairy and desert farming are impressive in Israel. All this is despite the fact that Israel's natural water supplies are below the United Nations definition of water poverty. Around 86 per cent of water is reused and stored after desalination through plants. Israel exports agricultural technology all over the world. Equipment is the backbone of agriculture in Israel.

Israel manufactures its equipment locally. Agriculture, with its allied sectors, is the largest livelihood provider in India, more so in vast rural areas. It also contributes a significant figure to the Gross Domestic Product (GDP). Sustainable agriculture, in terms of food security, rural employment, and environmentally sustainable technologies such as soil conservation, sustainable natural resource management and biodiversity protection, is essential for holistic rural development. Indian agriculture and allied activities have witnessed a green revolution, a white revolution, a yellow revolution and a blue revolution.

Punjab: The bread basket of India: Punjab State has 5.03 M hectare geographical area out of which 4.23 M hectare is under cultivation. About 75% of its population depends directly on agriculture. From 1965-66 to 2004-05, the cropping intensity increased from 126% to 186%. The area under wheat has increased by 216% and the production by 756%. The area under rice cultivation has increased by 895% and the production by 3307%. Punjab state has played a prominent role in agriculture. It has achieved self-sufficiency in food grains. It contributes 60% wheat and 40% rice to the central pool. The productivity of wheat has increased from 1236 kg/hectare to 4209 kg/hectare. Since the advent of Green Revolution, the state has made rapid strides in agricultural production. New innovative techniques were adopted to reduce the cost of cultivation. Zero-till age technology was promoted for wheat sowing amongst the farmers. An area of 3.14 lakh hectare was sown during 2004-05 which saved Rs. 42crore on the use of inputs. For increasing the efficiency and performance in the agricultural sector, the Government of India has taken several significant steps like collaborating with other nations for the latest techniques and technology.

In one of such deals, India is collaborating with Israel on improvements in various sectors in agriculture. The current challenge is to look for external markets for the surplus food grains from Punjab. Therefore, negotiations in the international trade markets have become most important. There has been a growing occurrence of multinational corporations in developing countries, particularly in trading agricultural commodities. Punjab's policymakers must bring the brains together, both domestic and international, to stand for the development strategies of Punjab. Getting the bankers, entrepreneurs, and farmer leaders on the same table and meeting their needs to make progress is essential. The latest slogan is "Innovate or Perish". It's time for Indians to develop their dry lands to accommodate and feed the growing population, by learning lessons from Israel. For a country like Israel where 60% of the area is desert, exporting high-value farm produce like mangoes and avocados is a matter of pride, whereas for India, among the largest food producers globally, the challenge is to counter the effects of erratic rainfall, raise productivity and use water efficiently.

Keywords: Punjab agricultural land, Israeli technology startup centre, Improvement through Israeli technology, Awareness among people about possible high and good quality productivity

Introduction

Food efficiency is a crucial component of security studies because the human race can't think of its survival without food. The agriculture sector is taking various efforts to accommodate population demands; however certain challenge, such as climate change, is posing threats to the agricultural sector. Many emerging countries including India still rely on agricultural products, which often requires international technological cooperation and help to get better yield. In such a case, the bilateral cooperation between India and Israel can assist both countries in getting more yields in day-by-day deteriorating scenarios. Since 1992; India and Israel initiated bilateral relations between them and worked together in various fields including food security. Agriculture is one of the most important aspects of the relationship because in both economies agriculture sector plays a critical role and they both are somehow agrarian economies. An agrarian economy is centered on the agricultural industry, such as crop cultivation and livestock raising. Agriculture accounts for around 70% of the Indian economy, which is a large percentage when compared to other countries. According to Yatish Yadav, India's agricultural output has grown, with rice production rising from 2,400 kg per hectare in 2015 to 2,659 kg per hectare in 2019. India has two goals: the first is to achieve sustainable agriculture, which entails using farm practices that do not damage the environment or natural resources, such as water. The second objective is to broaden the food basket by including more vegetables and fruits. The National Horticulture Mission of India was tasked with achieving these goals (NHM). Talking of Israel; it has evolved a variety of unique knowledge and procedures to deal with its dry and semi-arid climatic circumstances. The state has limited natural resources, which it effectively manages by incorporating technology into its agricultural operations. This system has aided the country's economic development. As a result, NHM chose Israel as a partner for India in advancing the goals outlined in India's Green Revolution. Between the two countries, agricultural cooperation has been one of the most utilized and explored. The signing of an agreement for agricultural cooperation in December 1993 was a turning point in the relations. The agreement was signed by then-Indian Agriculture Minister Balram Jhakar and his Israeli counterpart Yaakov Tour. Both states have agreed that using the technology in India will help solve the country's long-standing water logging and soil alkalinity issues. This technology could be used to combat desertification in Rajasthan and Gujarat, as well as boosting agricultural productivity in the dry areas of Maharashtra. Israel has made their desert blossom despite the limited availability of water. India can also benefit from its advances in horticulture, aquaculture, floriculture, and arid-zone farming. Rajasthan and other semi-arid states in India aim to benefit from Israeli expertise. Earlier, Israel had hosted an Agro-Tech show in May 1993. Shard Pawar, Maharashtra's then-chief minister, led a six-member group to Israel for the expo. M.S. Gill, the Union Agriculture Secretary, and Punjab Minister for Cooperation were also in the delegation list. Around roughly 600 farmers from Maharashtra and another 300 from Andhra Pradesh, Karnataka, Punjab, and Haryana took part in the expo. Following that, various joint venture proposals

were developed, particularly in the field of seed production and agricultural/ industrial machinery manufacturing. Pilot projects and turnkey projects were also identified to promote Indo-Israeli agricultural collaboration. A travelling conference was also organized by Israeli and Indian experts, which included an excursion to the Indira Gandhi Canal and Rajasthan's desert areas. It was believed that by doing so, effective water management and micro-planning might be developed in these locations.

Israel was also willing to transfer its technology in response to India's demands. In December 1996, the then-Israeli president, Ezer Weizman, paid a five-day visit to India, ushering in a new era of Indo-Israeli collaboration. An Indo-Israeli Research and Development Farm was inaugurated in the Indian Agricultural Research Institute, IARI at Pusa in New Delhi, during President's visit. The farm would showcase Israeli expertise in high-tech agriculture and would seek to develop new production techniques and procedures fit for India's diverse agro-climatic zones. The farm's objective was to exhibit crop cultivation technologies and crop protection methods, the two domains in which Israel excels. Several projects involving Indian state governments have also been launched. This included dairy development initiatives in Karnal between the Punjab Agro-Industries Cooperation and the Israeli Ozcot Company. In addition to the proposal for an Israeli-designed 100-cow dairy farm, the Israeli Dairy Board and the Punjab government inked an MOU to create a sophisticated satellite dairy farm in Punjab. Tahal, an Israeli water management firm working on wasteland development, irrigation and water and modern agricultural pilot projects started work in Rajasthan, Gujarat, and Tamil Nadu. Projects for the installation of tissue culture laboratories in India were offered by an Israeli agricultural enterprise. There are more than 150 joint ventures between Indian and Israeli businesses out of which the majority are in agriculture. Leading agricultural enterprises of Israel are part of these efforts, therefore, creating a win-win situation for both. Today, Israel's well-known drip irrigation system is being manufactured at three places in India. On May 11, 2006, India and Israel inked a three-year work plan for agricultural cooperation. It was the first work plan of its sort, and it was anticipated to usher in a new era of practical cooperation. Sharad Pawar, the then Agriculture Minister of India and Shalom Simhon, the Israeli Minister of Agriculture and Rural Development, signed the work plan on behalf of their respective governments in Tel Aviv. Both also intend to establish a collaborative research and development fund, which will provide seed money for joint agricultural innovation projects. The work plan also pays attention to Extension Service Systems, which provide real-time solutions and access to agricultural expertise and research and development to the farmers, an area where Israel has acquired expertise.

During the visit of Israel's Minister of Agriculture to India in January 2008, an Action Plan (2008-2010) was agreed upon based on field visits and discussions. A set of variables were identified on which joint efforts might be undertaken in the states of Maharashtra, Haryana, and Rajasthan. The National Horticulture Mission, under the Ministry of Agriculture of India, and MASHAV, Israel's Agency for International Development Cooperation under the Ministry

of Foreign Affairs, would be the implementing partners. To meet the cooperation agreement's stated goals, it was agreed to construct "Agricultural Centers of Excellence," which would be sponsored by both the federal government, NHM, and individual state governments, and would be responsible for allocating land and professional labour. The areas identified for co-operation are as under:

- Collaborative Research
- Development of Techniques in the following aspects:- Energy-efficient greenhouse, Recycling of domestic wastewater for irrigation, Input delivery and extension services, PHM for horticulture and dairy products, GAP standards and Dairy development through genetic improvement.
- Training and Visiting facilities in respective Countries
- Private Sector Collaboration
- Visit of Farmers and Farmer Organizations
- Higher Education in Agriculture
- Training and Demonstration etc.

In May 2021, the two governments agreed to further strengthen their agricultural cooperation and signed a three-year work programme agreement for development in agriculture cooperation, affirming the ever-growing bilateral partnership and recognising the importance of agriculture and water sectors in the bilateral relationship. MIDH, India's

Ministry of Agriculture and Farmers' Welfare, and MASHAV, Israel's Agency for International Development Cooperation are leading Israel's largest G2G cooperation, with 29 operational Centres of Excellence (COEs) across India in 12 states, implementing Advanced-Intensive agriculture farms with Israeli Agro-Technology tailored to local conditions. Annually, these COEs germinate more than 25 million high-quality vegetable seedlings, 387 thousand high-quality fruit plants and train more than 1.2 lakh farmers in modern technical know-how. On this occasion, Shri Narendra Singh Tomar, Minister of Agriculture and Farmers Welfare said that the agriculture sector has always been a priority for India. Prime Minister Shri Narendra Modi is committed to increasing farmers' income. This is the 5th IIAP. According to him, "So far, we have successfully completed 4 action plans. This new work programme will further strengthen the bilateral relations and mutual cooperation between the two countries in the field of agriculture for the benefit of the farming community. The COEs established under these Israeli-based action plans are playing an important role in doubling farmers' income. The exchange of technology between India and Israel will greatly improve the productivity and quality of horticulture, thereby increasing the income of farmers". The Status of Centres of Excellence under India – Israel Cooperation is given in Table 1.

Table 1: Status of centres of excellence under India – Israel cooperation

S. No.	State	Name of Centre	Amount Approved (Rs. in lakh)	Status
Phase – I (2008 – 10)				
1	Haryana	CoE for fruits at Mangiana, Sirsa	970.00	Completed
2		CoE for Vegetables at Gharaundha, Karnal	600.00	Completed
3	Maharashtra	CoE for Mango at Dr. B. S. Konkan KrishiVidyapeeth, Dapoli, Dist. Ratnagiri.	636.00	Completed
4		CoE for Citrus at Horticulture Section, Collegeof Agriculture, Akola, Nagpur	454.00	Completed
5		CoE for Pomegranate at Mahatma Phule KrishiVidyapeeth, Rahuri, Dist., Ahmednagar	458.00	Completed
Phase – II (2012 - 15)				
6	Haryana	CoE for Sub-tropical Fruits, Ladwa, Kurukshetra	910.35	Completed
7		CoE for Integrated Bee-Keeping DevelopmentCentre at Kurukshetra	1050.00 Under State Budget	Completed
8	Gujarat	CoE for Vegetables at Sabarkantha	1147.50	Completed
9		CoE for PHM for Date Palm at Kutch	450.00	Completed
10		CoE for Kesar Mango at Junagadh	400.00 RKVY	Completed
11	Maharashtra	CoE for Keshar Mango at Fruit ResearchStation, Himayat Bagh, Aurangabad	744.00	Completed
12	Punjab	CoE for Vegetables at Kartarpur	973.00	Completed
13		CoE for Fruits (Citrus) at Khanaura, Distt.Hoshiyarpur	1039.00	Completed
14		CoE for Treatment of Brackish water atBathinda	1496.00	Completed
15	Rajasthan	CoE for Citrus (Kinnow & Mandarin) at Progeny Orchard, Nanta, Kota	644.00	Completed
16		CoE for Pomegranate at Rajhans Nursery, Dhindol, (Bassi), Jaipur	295.00	Completed
17		CoE for Date Palm at Date Palm Farm, Sagra Bhojka, Jaisalmer	552.00	Completed
18	Karnataka	CoE for Mango at Kolar	197.65	Completed
19		CoE for Pomegranate at Bagalkot	352.33	Completed
20		CoE for Vegetables at Dharwad	474.05	Completed
21	Bihar	Centre of Excellence for Mango & Lichi, Vaishali	970.00	Completed
22		Centre of Excellence for Vegetable at Chandi, Nalanda	600.00	Completed
23	Tamil Nadu	CoE for flowers at Krishnagiri	880.00	Completed
24		CoE for vegetables at Dindigul	1018.00	Completed
25	Telangana	CoE for Flower and Vegetables at RangaReddy (with technical assistance from CoE,Gharounda)	920.00	Completed
26	Uttar Pradesh	CoE for Fruits at Basti	740.00	Completed
27		CoE for vegetables at Kannauj	780.00	Completed
Phase – III (2015 - 18)				

28	Mizoram	CoE for Fruits at Lunglei, Mizoram	900.00	Completed
29	Andhra Pradesh	CoE for flower and vegetables at Kuppam	892.00	Completed
30.	Haryana	CoE for flower cultivation and seed production at Sondhi, Jhajjar	787.10	Under Progress
Phase – IV (2018 - 20)				
31.	Haryana	Centre of Excellence for Semi Arid Horticulture, Gignow (Bhiwani), Haryana	825.90	Under Progress
32.	Madhya Pradesh	CoE for Vegetables at Nurabad, Distt. Morena, MP	969.27	Under Progress
33.		CoE for Citrus at Kuddam, Chhindwara, MP	668.22	Under Progress
34.	Assam	Centre of Excellence for Vegetables (Protected Cultivation)	583.58	Under Progress

Indo-Israel initiative to create a model ecosystem in Agriculture

taking forward the ever-growing partnership in agriculture between Israel and India, the two governments have agreed to enhance their cooperation in agriculture and signed a three-year work programme agreement for development in Agriculture cooperation. The governments also affirm the ever-growing bilateral partnership and recognize the centrality of agriculture and water sectors in the bilateral relationship.

India and Israel are implementing the “Indo-Israel Agricultural Project Centers of Excellence” and “Indo-Israel Villages of Excellence”.

The Mission for Integrated Development of Horticulture (MIDH), the Ministry of Agriculture & Farmers’ Welfare, Government of India, and MASHAV, Israel’s Agency for International Development Cooperation, are leading Israel’s largest G2G cooperation, with 29 operational Centers of Excellence (COEs) across India in 12 States, implementing the concept of Advanced-Intensive agriculture farms with Israeli Agro-Technology tailored to local conditions.

The Centers of Excellence generate knowledge, demonstrate best practices and train farmers. Every year, these COEs produce more than 25 million quality vegetable seedlings, more than 387 thousand quality fruit plants and train more than 1.2 lakh farmers about the latest technology in the field of horticulture.

According to Narendra Singh Tomar, Union Minister of Agriculture & Farmers’ Welfare, the agriculture sector remains a priority for India. Due to the agrarian policies of the Government of India, there is a definite change in the lives of the farmers and the agriculture sector. The minister said that India and Israel have had bilateral relations since 1993 in the agricultural sector. This is the 5th IIAP. “So far, we have successfully completed four action plans. This new work programme will further strengthen the bilateral relations and mutual cooperation between the two countries in the field of agriculture. It is going to the benefit of the farming community. The COEs established under these Israeli-based action plans are playing a decisive role in doubling farmers’ income. The exchange of technology between India and Israel will greatly improve the productivity and quality of horticulture, thereby increasing the income of farmers”, he added.

Indo-Israel villages of excellence

“These Centres of Excellence established under the Indo-Israel Agriculture Action Plan (IIAP) have become

epicentres of transformation in the horticulture sector. Our focus during the new work programme will be to convert the villages surrounding these COEs into Villages of Excellence through massive outreach programmes”. Sanjay Agarwal, Secretary, Department of Agriculture, Cooperation & Farmers’ Welfare, stated this in May, 2021. According to Ambassador Dr. Ron Malka, “The three-year work programme (2021-2023) reflects the strength of our growing partnership and will benefit local farmers both through the Centres of Excellence and the Villages of Excellence”.

The work programme aims to grow the existing Centres of Excellence, establish new centres, increase COE value chain, bring the Centres of Excellence into the self-sufficient mode, and encourage private sector companies and collaboration.

As for the “Indo-Israel Villages of Excellence”, these are aimed at creating a model ecosystem in agriculture across eight states, alongside 13 Centres of Excellence within 75 villages.

In Punjab, one such centre is set up on a large agricultural farm of about 15 acres abutting the Jalandhar-Amritsar Road. Since the main objective of the centre is to promote horticulture, a maximum percentage of the area of this centre has been kept for it. Out of about 15 acres, 13 acres have been reserved for cultivation. Only three acres have been kept for necessary building infrastructure.

In the larger 13-acre part of the site, an extensive network of paths has been planned so as to give access to big chunks of land in between. These chunks of land are used for cultivation, both in the open and in poly houses. The mini complex of 2 acres has been built in one of the corners on the southwest side. It houses the necessary components of the centre, including an administrative-cum-guest house block, pack house, workshop, staff quarters, canteen, guard room/retail outlet, etc. All the buildings except the pack house and workshop have been constructed using conventional building materials like brick and concrete. The buildings are either single or double storied and with an elevation of cement plaster and uniform paint to give a harmonious look. The pack house and workshop have been constructed in hi-tensile, pre-engineered steel structure popularly known as PEB or pre-engineered building which is most economical, fast to construct, precise, easy to construct, and has a long-term durability. The entire complex is linked by a simple network of roads that extends up to the cultivated area.

The administrative block is the hub of all major activities. Designed to serve multifarious functions, it houses

necessary administrative offices and a conference hall. A guest house wing and plant health clinic/ laboratory are located at the first-floor level. All these wings are interlinked by a spacious lobby. The triangular-shaped lobby accommodates a sculptural staircase in one corner and a seating space in the other corner. A rectangular porch gives the building an inviting entry. The double-storied administrative building is an innovative piece of modern architecture. It incorporates all the ingredients of modernity like unadorned bold and seamless facades, the ingenious play of spaces, volumes, forms, solids, and voids. The complex is a showcase of the architect's excellence which brings modern architecture to the remote countryside.

Transformation of traditional farms

The IVOE programme, with its objective of increasing the net income of farmers and improving the livelihood of the individual farmer, is transforming traditional farms into modern-intensive farms based on the IIAP standards. Large-scale and complete value chain approach aims at economic sustainability, but at the same time the Israeli novel technologies and methodologies are being tailored to local conditions. The IVOE programme focuses on: (1) Modern agriculture infrastructure, (2) Capacity Building, (3) Market linkage.

The Indo-Israel Agricultural Project, a \$50 million shared agriculture fund, was launched in 2008. The focused areas of the project include dairy, farming technology, and micro-irrigation. The implementing partners for the project are the National Horticulture Mission (NHM) under the Agriculture Ministry, MASHAV, Israel's agency for international development cooperation, and Indian state governments. They help set up centers of excellence as per the local needs. In 2011, both the nations signed an agreement to encourage cooperation on sharing the technology-related urban water systems. This came after more than a decade of joint research.

The Israeli agricultural companies highly active in India include the following: Naan Dan Jain, Netafim, Agrotop, Plasson, Hazera Genetics, Maximilk, Plastro Gvat, Agrexco, Zeraim, ICL fertilizers, Sion, Avshalom Group.

For micro-irrigation via drips or sprinklers, India has some 200 micro irrigation companies. The biggest is Jain Irrigation (the company purchased 50% stake in Israel's Naan-Dan Irrigation in 2007). Jain Irrigation is also the world's second largest irrigation company. Israel-based Netafim has nearly 45% of the world market. Netafim India is the country's second biggest player, with a 15% market share.

Maxximilk produces high quality ready-for-transfer pedigree embryos. Maxximilk has been in touch with dairy farms in Andhra Pradesh, Punjab and Kerala. In May 2013, Israel announced that it would help India expand its horizons in fruit and vegetable farming. Israel offered India its advanced technology and know-how for diversifying and increasing the yield of fruit and vegetable crops. Israel pledged to set up 28 Centers of Excellence across India which would focus on native fruit and vegetable crops. By March 2014, 10 such Centers of Excellence became operational throughout India for offering free training sessions to farmers. These sessions help farmers to increase

their agricultural efficiency using Israeli technological expertise. Vertical farming, drip irrigation, and soil polarization are some of the examples of the farming techniques being taught at the centers. Farming at these centers focuses on mangoes, tomatoes, pomegranates, and citrus fruits. Israel and India inaugurated their 23rd joint Centre of Excellence in Mizoram in 2018.

Technology collaboration-Indo-Israel Agricultural Project (IIAP)

A growing partnership, IIAP, was initiated in 2009 after the signing of a bilateral agreement between Indian and Israeli ministers of Agriculture (2006). Each IIAP phase lasts for three years.

India and Israel set to jointly develop new crop varieties and share post-harvest technologies. This followed the success of the 10-year-old Indo-Israeli Agriculture Project (IIAP) wherein cherry tomatoes were grown in Haryana, mango orchards were rejuvenated in Maharashtra. All these achievements highlighted the effectiveness of the state-of-the-art irrigation technologies to the Indian farmers.

"Our goal is to help the Indian farmers by exposing them to new technologies tailored to their local needs," said Dan Alluf, counsellor of science and agriculture at MASHAV, Delhi.

"There is a concentrated focus on drip irrigation and designing of better farms by using canopy management. The focus is also on the use of improved irrigation and fertigation technologies," Alluf said, adding, "Each centre showcases a range of greenhouses to farmers depending on their needs and capabilities. A unique feature is to teach the farmers the language of irrigation – when to irrigate and by how much – to increase water use efficiency."

The current approach of Israeli projects in India, particularly in the agricultural sector, needs some major improvements. India and Israel signed the Agreement for Agricultural Cooperation in 2006, which evolved into the Indo-Israeli Agricultural Cooperation Project in 2008. During the last few years, the Indian government completely revamped its old institutions and policies. This is good time for Israel to update and align its cooperation strategy with the changed reality and vision of the New India. Now the focus should be on Agribusiness and Agro-Value Addition. Israel can participate proactively to turn the Indian Agricultural sector into a profitable enterprise.

On January 1, 2015, Prime Minister of India, Narendra Modi, replaced the Planning Commission of India with the NITI Aayog (National Institution for Transforming India). This change reflects the change in the approach of the government in India. Now the focus is on "functioning" in place of "planning".

The Planning Commission of India was an institution that formulated India's five-year plans. It was established on 15 March, 1950. In his first Independence Day speech in 2014, PM Modi shared his intention to establish a new institution, with a "new design and structure, a new body, a new soul, a new thinking, a new direction, a new faith towards forging a new direction to lead the country based on creative thinking, public-private partnership, optimum utilization of resources, utilization of youth power of the nation." All key initiatives of the Indian government are aligned with the vision of New India.

Recent initiatives of the Indian government

The Indian government is working on a mission mode to transform the agricultural sector. The government's initiatives like National Rurban Mission, Innovative Crop Insurance Scheme, Soil Health Card scheme, Soil Testing Laboratories, Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Paramparagat Krishi Vikas Yojana (to promote bio-farming), India Emergence through Village Emergence Campaign, 'My Village My Pride' scheme (to provide the methodology of scientific farming and new technology to every village) are very encouraging.

The NITI Aayog has proposed several reforms for India's agricultural sector, including liberal contract farming, direct purchase from farmers by private players, direct sale by farmers to consumers, and single trader licence etc. The Krishi Vigyan Kendras provide advanced agricultural assistance to farmers across the country. The Indian government is using digital and mobile technologies for the benefit of the farmers.

In April 2016, the government launched Electronic National Agricultural Market (e-NAM), this online platform will integrate 585 wholesale markets across India. To boost agricultural productivity, the Indian government is focusing on four key areas: Irrigation, Seeds, Fertilizer, and Technology. The Indian government is also promoting the use of drip and sprinkler irrigation technologies under the 'Per Drop, More crop' component of Pradhan Mantri Krishi Sinchai Yojana (PMKSY).

The Central Rice Research Institute (CRRI) has been elevated to the National Rice Research Institute (NRRI). This Institute has developed 114 rice species for different agriculture climate conditions. The scientists of NRRI have also developed an interesting mobile app called "rice expert" to provide information to farmers in real-time on insect pests, nutrients, weeds, nematodes, and disease-related problems, rice varieties for different ecologies, farm implements for different fields, and post-harvest operations. This app has received very good feedback from Indian farmers.

Smart villages in India

On 21st February 2016, Prime Minister of India, Mr. Narendra Modi, launched the National Rurban Mission (NRM), an initiative to develop 2500 smart villages and 300 rural growth clusters by 2019. The objective of the NRM has been to stimulate local economic development, enhance basic services, and create well-planned Rurban clusters. India is the world's third largest Smartphone user market. According to some recent reports, the usage of social media in rural India has grown by 100 percent. Some of the key initiatives of the Indian government to develop smart villages are Bharat Net (rural broadband connectivity project), Digital Village (for providing Wi-Fi hotspots in rural India), Transformation of Rural post offices into Common Service Centers (CSCs), India Post Payment Banks, GARV (Grameen Vidyutikaran App) and National Digital Literacy Mission, etc. The Smart Village programme offers great opportunities for technology, water management, agro-tech, solar energy, waste management, infrastructure, and financial players of Israel.

Israeli agricultural expertise

Agricultural innovations of Israel are remarkable. In Israel, scientists, consultants, farmers, and agriculture-related industries cooperate in agricultural research activities. The Agricultural Research Organization (ARO) of Israel, widely known as the Volcanic Institute, is responsible for research-related operations in the country. Israel's key agricultural innovations are Drip Irrigation (Introduced by Israeli inventor late Simcha Blass), Grain Cocoons (for toxic-free fumigation and safe storage of agricultural commodities), Biological Pest Control, Crop Protection, Dairy Farming (Israeli Dairy Firms provide advanced systems for herd management, monitoring, and feeding worldwide), Hardier seeds (a technology that enables the introduction of genetic materials into seeds without modifying their DNA), Desert Potatoes, GFA (Grow Fish Anywhere) etc.

Some noteworthy initiatives include gluten-free wheat. Ukko, co-founded in 2017 by Professor Yanay Ofran and Dr. Anat Binur, has succeeded in engineering a gluten protein that does not contain the component that celiac patients' immune system identifies as dangerous, while preserving all its positive attributes. Within a few years, the company hopes to produce a food product that will compete with the massive gluten substitutes market and take a cut out of its billions in revenues. In the future, the company hopes that the farmers will grow Ukko's "modified" wheat from the onset and thus eliminate gluten sensitivity and provide celiac patients with healthier, tastier products. Ukko's technology may also enable treating one of the most common, life-threatening food allergies – peanut allergy. Ukko's approach is unique in that it learns from the patient (with blood samples and biopsies) how to treat food, and the food, in turn, can treat the patient.

The current status of Indo-Israel cooperation in agriculture

Following Defence, Agriculture is one of the key areas of India-Israel cooperation. The agricultural sector is one of the largest contributors to the GDP of India. According to the statistics obtained from the Ministry of Labour and Employment, in 2014-15, 45.7% of India's workforce was employed in agriculture. The approach of the Indian government towards agricultural overhauling is severe. This is the best time to align the Indo-Israel agricultural cooperation project with the initiative of the New India.

In May 2021, Israel and India signed a three-year work programme for cooperation in agriculture. India and Israel are already implementing the "Indo-Israel Agricultural Project Centres of Excellence" and "Indo-Israel Villages of Excellence (IIVOE)".

Conclusion

Agriculture sector is the important factor in the strong relationship between India and Israel. Both nations are majorly tried to develop their agri- cultivation for the economic growth. They are working on upgrading their scientific and technological collaboration by supporting joint research and developments projects. India and Israel established a strategic-partnership in water and agriculture sector for many years and for many decades.

Food efficiency is a crucial component of security studies because the human race can't think of its survival without food. The agriculture sector is taking various efforts to accommodate population demands; however certain challenge, such as climate change, is posing threats to the agricultural sector. Many emerging countries including India still rely on agricultural products, which often requires international technological cooperation and help to get better yield. In such a case, the bilateral cooperation between India and Israel can assist both countries in getting more yields in day-by-day deteriorating scenarios. Leading agricultural enterprises of Israel are part of these efforts, therefore, creating a win-win situation for both. Today, Israel's well-known drip irrigation system is being manufactured at three places in India.

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