

Israeli visit

– An Experience

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ICAR-CAAST Program on Next Generation Technologies in Adaptive Agriculture funded by world bank is giving opportunities to undergo National and International training on various areas for both students and faculty members. As a part of this program we visited Israel to undergo training on “Irrigated Agriculture in Times of Climate Change” organized by Galilee international management institute (GIMI) at Nahalal, Israel and made it possible to gain in depth knowledge about agriculture in Israel. The training opened us Israeli agriculture which has been anticipating the effects of climate change for decades by prosperous agricultural market founded on practical and cost-effective innovations and solutions, rather than natural resources.

Key words: Climate change, Irrigated agriculture, Israel

FOOD security is a critical concern as the global population expands and natural resources dwindle. Smart solutions for efficient farming, hardier crops, alternative sources of nutrition, safer food packaging and storage are essential. Israel has contributed breakthroughs in these areas than any other country. Since 1950s, Israelis have not only been finding miraculous ways to green their own desert but have shared their discoveries far and wide.

ICAR-CAAST Program on Next Generation Technologies in Adaptive Agriculture supported the training on “Irrigated Agriculture in Times of Climate Change” organized by Galilee international management institute (GIMI) at Nahalal, Israel made it possible to gain in depth knowledge about agriculture in Israel.

The training focused on strategies to combat climate change for higher yields and food security through demonstrations, in house classes and exposure visits for sustainable farms. The exposure visit comprised hi-tech protected cultivation of vegetables and fruits, desalinization of sea water and integrated resource management in desert areas, carmel crops (Hayogev), Arava valley, Jordan valley (An Orchard), M/s Roots for sustainable agricultural technologies

(Beit Halevi), salt water irrigated fruit tree farms in arid areas, vegetable and date farms in arid zones, high density mango farms, drip irrigation workshop at Nahalal, Netafim drip irrigation company (Kibbutz Magal), field and greenhouse vegetable production and packing facility (Baka El Garbia).

Israel farmers are practicing crop rotation to cope with climate changes as **Crop rotation** is the practice of growing a series of dissimilar or different types of crop in the same area in sequenced season for best use of soil. A great advantage of crop rotation comes from the interrelationship of nitrogen-fixing crops (Legumes like alfalfa and clover) with nitrogen-demanding crops beside suppressing pest and disease cycles.

Jordan valley livelihood is agriculture i.e., cultivation and rearing animals. It constitutes 55 per cent of the total irrigated area of land in west bank. It accounts for 60 per cent of the vegetables produced in west bank and 100 per cent of dates palm harvested in Palestine. The plantation crops viz., mangoes, citrus, banana, avocado and date palms were grown mostly in this area. The grafted of mangoes and avocado seedlings produced through high density

orchards. Quality herbs viz., green onions, coriander, parsley and mint were exported to America, Europe and Russian markets from here.

A physically challenged owner of the Carmel crops impressed by owning a huge company with hi-tech automated green houses to produce Asparagus, Snow pea, Kale, a variety of sprouts, Saranova lettuce and other wide range of green leafy vegetables in hydroponic green houses and in open farming field. These Carmel crops are packed in semi-automated solar operated packing hours, which made continuous operation of house with more sustainable environment. These Carmel crops are widely used in the daily diets of the Israel's population.

Roots: sustainable agricultural technologies situated at Beit Halevi are conducting experiments on technologies to optimize the root zone temperature which can help to increase the yield, quality, save energy and mitigate extreme heat and cold stress. Roots used the principle of ground source heat exchange (GSHE) by installing a closed loop system of pipes and circular pumps. The lower heat changing is placed at depth, and the upper heat discharging device is located in target crop root zone. By heating the root

zone during the winter and cooling at summer maintains stable temperature and increase the yield. Another breakthrough technology is irrigation by condensation (IBC) which provides water to plants through condensation of atmospheric water (Fig. 1.a). The cold water made to run through the pipes which are placed near plants and condensed water from outer surface of pipe will drip down to surface soil and meet crop water requirement.

One of the biggest achievements of Israel farmers is to convert desert areas into big stretches of green houses (Fig. 1.b). The economy forced many Israel farmers to cultivate barren areas rather than in expensive central part fertile lands. The Arava valley located along Israel Jordanian border from southern tip of Dead sea to Eilat. We visited green Arava farm belonging to Mr. Reuven Zimbel, whose grandfather and father transformed desert into cultivable land. This region has become one of the most fruitful for Israeli's farmer, who have learnt to use high level of sun radiation and dry weather to grow some juiciest vegetables. In total about 60-70% of the country's vegetables for export comes from Arava region. They strictly follow the export specification and guidelines to meet 100% expectation of importing countries.

The Sea of Galilee is the major source of sweet water for drinking, domestic and partly for irrigation. With rainfall only about 5 months out of the year, precipitation has always a major survival issue in Israel. Hence, they are using treated domestic water and desalinized water for irrigation. Uvi Yogev had been cultivating orchard of peach and plum with sweet water in Kibbutz Revivim in the Southern Negev. But, when he realized fresh water is not sufficient to get profitable yields, he started growing olives with the brackish waters even though olive trees were traditionally grown in climates where rainfall is plentiful and



Fig. 1.a. Irrigation by condensation of atmospheric water by Roots Research Institute



Fig. 1.b. Growing of onion and dates in desert through drip irrigation

the soil is fertile. They got positive results with higher olive oil.

During the course of the programme, an international evening was organized and participants from different Nations represented their Country with artifacts, songs and folk dances. That event made participants to know each other cultures and it created friendly atmosphere in them.

Mr. Shlowo Sasson organized workshop on drip irrigation at Nahalal main study centre and briefed different concepts of drip irrigation besides hands on experience on operation of drip and micro sprinklers using laterals of different diameters. With this experience, we visited Netafim, a drip irrigation company, Kibbutz Magal, which is pioneer in developing and manufacturing advanced technologies in drip irrigation. Netafim also manufactures and distributes crop management technologies including monitoring and control system and crop management system.

Israel technologies for Indian context.

India is one of the most water challenged country in the world, with

16% of World's population to access to only 4% of the world's water resources. In this scenario, micro irrigation with advanced application technologies can boost up production and productivity of crops.

Community farming: Israel have collective community called Kibbutz. The whole village lives as one community and practices farming as community. India with dominance of small and marginal farmers, investment on big machineries and advanced micro irrigation facilities are unaffordable. Community farming in line with Kibbutz system will sustain the livelihood of farmers in India. Community dairy is another boon for the women farmers in rural areas, the landless and small land holder women's can go for community dairy which will provide employment for the people and profit can be shared among the members.

Protected cultivation of high value crops through the support by government ensure high profit and reduce the risk for farmers. Roughly 90% of the wastewater generated in Israel is reused, making it the leading nation in water recycling. Hence, wastewater from urban domestic and industries can be treated and reused for the agriculture, gardening and industrial uses.

SUMMARY

India, an agrarian country, has been facing various challenges in recent years - lower productivity, resource crunch and erratic weather, all of these leading into lower returns. Hence, our Country should use recent technologies viz., efficient irrigation technologies (drip irrigation and mini sprinklers), protected cultivation high value crops, community farming and community dairy to uplift the agriculture and livelihood of farmers.

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