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Breaking new Ground in Indo-Israeli Agricultural Technology Transfer

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The purpose of the 'Indo-Israeli innovation villages' is to increase the income of Indian farmers that suffer from low productivity, malnutrition and food insecurity by finding innovative solutions and creating a platform for integrating and adapting Israeli technologies to the Indian rural reality.

Israel's experience and expertise in agriculture holds tremendous potential for Indian agriculture. While some Israeli technologies – such as micro irrigation - are gradually spreading in India, the diffusion of many other technologies with potential to enhance Indian productivity and resource use efficiency remains very slow. Barriers to technology transfer are not only technical/agronomical, but economic and social. Even though the physical environments in India and Israel are often similar, the economic and social environments are drastically different. Indian farmers operate under very different constraints than those faced by farmers in Israel where Israeli technologies have been proven to work (in terms of finance, scale of operation, institutional setting, knowledge, risk, access to market, etc...).

TAU and Tata Trusts – a leading Indian development organization – are embarking on a groundbreaking collaboration to fulfill the potential of Israeli technologies in India. Teams of Israeli and Indian students will be embedded in Indo-Israeli Innovation Villages (IIVs) for prolonged periods where they will develop a deep, data based understanding of the needs of local farmers, and then identify, adapt and pilot solutions based on Israeli technologies with appropriate business models.

In the summer of 2017, we were leading the first group of six Israeli students who undertook this collaboration. After 7 weeks of intense data collection within Indian rural population – both economic, agricultural and biophysical (including innovative sensors donated by the Israeli company SolChip) – we managed to create an operating platform to provide us with a flow of information updating weekly, comprised of local personal trained by us. After analyzing this data and with accordance to our insights, we engaged Israeli Agri-Tech companies we found to be the most suitable to overcome the challenges we perceived as most pressing. The selected interventions addressed: water conservation technologies, better agronomical practices, post-harvest treatment, integrated pest management and increasing dairy production. We than created specially adapted and innovative business models for piloting these technologies among smallholder farmers, and designed a set of scientific experiments to evaluate their diffusion and measure their economic impact. In the meanwhile, our scope of operation was broadened to an additional state in India (Andhra Pradesh), which we first visited during March 2018 in order to

provide data collection training for local extension officers. Then, we reached the stage of piloting and experimenting with three Israeli Agri-Tech companies: Tal-Ya, Amaizz, Rivolis. We then designed a set of scientific experiments to evaluate the diffusion of these technologies and measure their economic impact. Additionally, we are conducting a large experiment designed to assess local government interventions in the dairy industry of Andhra Pradesh, as a first step for designing our own intervention. Lastly, we managed to bring Omar Zaidan, one of Israel's top agricultural experts, to conduct a week of intensive agricultural training to our local extension officers, hired for this project only.
It is worth mentioning, that in every step of our work we are consulting with top experts for every aspect of our work, both academic (Volcani, TAU) and professional (various agricultural and technological experts).

After one year of operation, a group of 8 students from various disciplinary backgrounds – economy, public-policy, physic, statistics, architecture and anthropology - stayed in the different districts of Andhra Pradesh for prolonged periods of time, during which they personally engaged dozens of small holder farmers and visited remote rural areas. This was the first full cycle of the project. In this visit, out of a list of 52,282 potential farmers, a little more than 500 farmers were chosen for baseline surveys (they were filtered by criteria first, and then chosen randomly). 274 of them were found eligible for an intervention, out of which 50 were randomly chosen for high intensity monitoring and experimentation, while the others were chosen as a control group. Within this group of fifty, some were chosen for an experiment, and some were chosen for high intensity monitoring.
8 agro-economic experiment where completed and analyzed, designed to measure the economic an agronomic impact of basic technologies such as drip irrigation and yellow mulching, together with ongoing agronomical advice and PoP (Package of Practice) given by Israelis and Indian experts. These experiments included dividing the farmer's land into two plots - intervention and control - and were monitored weekly. From these experiments and the sample selections process designed specifically for this experiment, we gained many insights that were taken into consideration during the preparation for the 2019 - 2020 cycle. For a detailed report of each of the experiment, see the link below.
On the Water conservation front, 2 years tech-pilot with 'Tal-Ya agricultural solutions' (an Israeli upcoming Agritech company) was initiated, offering multi-use soil cover that protects the plant's root system, directing water and fertilizer straight to the root, while protecting the earth around the root from weeds and extreme temperatures. The pilot is currently ongoing and is expected to be concluded by 2020. It was initially focused on orchards, and involves 6 farmers living in Anantapur district, one of the driest areas in India. The pilot is monitored regularly, and though it is too early

to determine whether it is successful, we can say that as of now it seems promising. Additionally, one experiment was conducted with a tomato growing farmer in Krishna district, and was concluded with great success. It was aimed to test the Tal-Ya tray in comparison with mulch (common method of soil cover using single-use polyethylene sheets) and the farmer's traditional practices. The resulted were overwhelming, and showed that the plants from the Tal-Ya plot yielded significantly more than the other plots (more than 3 times the yield per plant in the control plot). Consequently, we expended the experimentation with vegetables under this technology to 20 more farmers in the cycle of 2019.

Furthermore, we recently concluded our first post-harvest tech-pilot. Since we first started mapping the challenges faced by the Indian farmer in 2017, we've noticed that much of the damages suffered by a crop before it is sold are occurring after harvesting is taking place. Hence, we approached the Israeli Agritech company Amaizz, which claims to provide a chip post-harvest solution to minimize losses caused by crop spoilage and degradation throughout the handling, storage, and processing stage. During this pilot we've encountered many difficulties, caused mainly (but not exclusively) by a poor performance of the product and company. It was closely monitored and rigorously analyzed, and was deemed unsuccessful in most aspects. A full report concluding this pilot can be found here.

On the dairy front, a large baseline survey was completed. This intervention is aimed to help increase the productivity of smallholder farmer's cattle. This will potentially provide better food security as well as potential source of income. As a first step, a baseline survey was designed, applied and concluded. The survey Included 414 observations (1015 animals). A report summarizing the survey's results can be found here.

The second cycle of the project was assembled during the spring of 2019 and is comprised of 17 students from different disciplinary backgrounds - earth sciences, law, mechanical, water and electric engineering, public policy, economics, sociology and anthropology. 11 members of this group were assigned to further develop, renew and continue the collaboration with Tata Trusts in Andhra Pradesh, and 6 were assigned to pursue a new collaboration with Amrita University in Kerala, focusing on water management, sanitation and conservation technologies.

Over the summer we conducted an intensive training program for the new cycle of students in order to prepare them for field research and prolonged stay in the field. The program was 6 week long and was comprised of lectures and field visits and was supported by experts from deferent disciplines and fields. This program was developed over several months and was the result of a long learning process in which we aimed to define and frame the student's activity and requirements for field research. The program included background lectures on India, sustainable development and research methodology, meetings with the companies piloted and field visits in

order to familiarize the students with the Israeli Agritech and innovation community and agricultural practices.

During this cycle there was continues presence of fellows in India from August till January. While taking the Tal-ya pilot to its second and third stages - including 20 more experiments with vegetable farmers and the design of a new economic model for scaling up - the group also initiated 3 more tech pilots with more than 120 smallholders.

Two of the pilots are focused on water and input conservation as well as productivity enhancement, and are based on accurate data driven irrigation and fertigation recommendations from Netafim (for vegetables) and SupPlant (for mango). The third pilot addressed the problem of soil salinity in the coastal areas of Andhra Pradesh. SaliCrop offers seed treatment that assists crops cultivated in salinity soils or when irrigated with brackish water. The technology was piloted in Krishna district, where saline soil is prevalent and was focused on rice, an important staple.

Together, in addition to the practical value of the program, we are using the data collected in the process to gain new academic insights into smallholder economics and barriers to technology adoption.

For more information, please see the full reports:

Agro-economic experiments, concluding reports

Link:

https://paper.dropbox.com/doc/Summary-Field-Experiment-Venkataramudu-Tomato--AcJQLvw6CZ2MwvLBCV4f_869Ag-EkcB5uI6cdFpppieFc382

https://paper.dropbox.com/doc/Summary-Field-Experiment-Ramesh-Tomato--Ab~1j1iZqv2MEGq974Dvj94KAg-EzBWcCbK3lVePSzVmarSV

https://paper.dropbox.com/doc/Summary-Field-Experiment-P-Babu-Cauliflower--Abo7_WwIK0xHd6pAN_p5RvJNAg-SB4fZsJIYJEk4fnqcLom8

https://paper.dropbox.com/doc/Summary-Field-Experiment-Immam-Shaeb-Okra--AbdFIT~VZNjjtUIfWv4dYJHkAg-4osEnFEQVHFmNHDvDiNJq

Amaizz pilot concluding report

Link: https://drive.google.com/file/d/14GYa5zm4pYPHFKYKY0eXQKx6n1bU9072/view?usp=sharing

Tal-Ya report (ongoing)

Link: https://drive.google.com/open?id=1UyexyqpGoheIg4i0fMPFrnWtSaT5MBiU

Dairy baseline analysis

Link: https://drive.google.com/file/d/1kPKqIIkpNvSN1NNjbqBQIp7ZC8ADH8Jf/view?usp=sharing

Analysis of monitoring protocol; Agricultural Practices of Vegetable Growers in Andhra Pradesh

Link: https://drive.google.com/file/d/1ND8ZfiKpEZgWRulvAG7TJXnwvT_BN62l/view?usp=sharing