TATA TRUSTS-TEL AVIV UNIVERSITY INDO-ISRAELI INNOVATION VILLAGES

ACTIVITY REPORT 2018-19

TATA TRUSTS

NITSAN
Sustainable Development Lab
Tel Aviv University

The Boris Mints Institute
for Strategic Policy Solutions to Global Challenges
The Gershon H. Gordon Faculty of Social Sciences
Tel Aviv University

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I. BACKGROUND

Tata Trusts has been a knowledge partner to the Government of Andhra Pradesh's Rural Prosperity Mission aimed at enabling 71 lakh SHG households to earn a net income of at least INR 10,000 per month. The initiative focuses on various segments including agriculture, horticulture, animal husbandry, fisheries, handlooms & handicrafts, digital livelihood and non-farm enterprises.

Further to this initiative, Tata Trusts has initiated a partnership with the Boris Mints Institute and the NITSAN Lab for Sustainable Development at Tel Aviv University (TAU) to increase farmers' net income through the diffusion of Israeli technologies and innovations in agriculture. This is intended to be achieved through a network of local innovation hubs - the "Indo-Israeli Innovation Villages" - initially in Andhra Pradesh and in the future throughout India, where innovative Israeli technologies in production and post-harvest of various produce (agriculture, horticulture, aquaculture, livestock) will be identified, adapted, localized, proven through pilots in field conditions and showcased, prior to their handover to other agencies for large-scale roll-out.

Vijayvahini Charitable Foundation (VCF) has been designated by Tata Trusts to be the nodal agency responsible for project implementation.

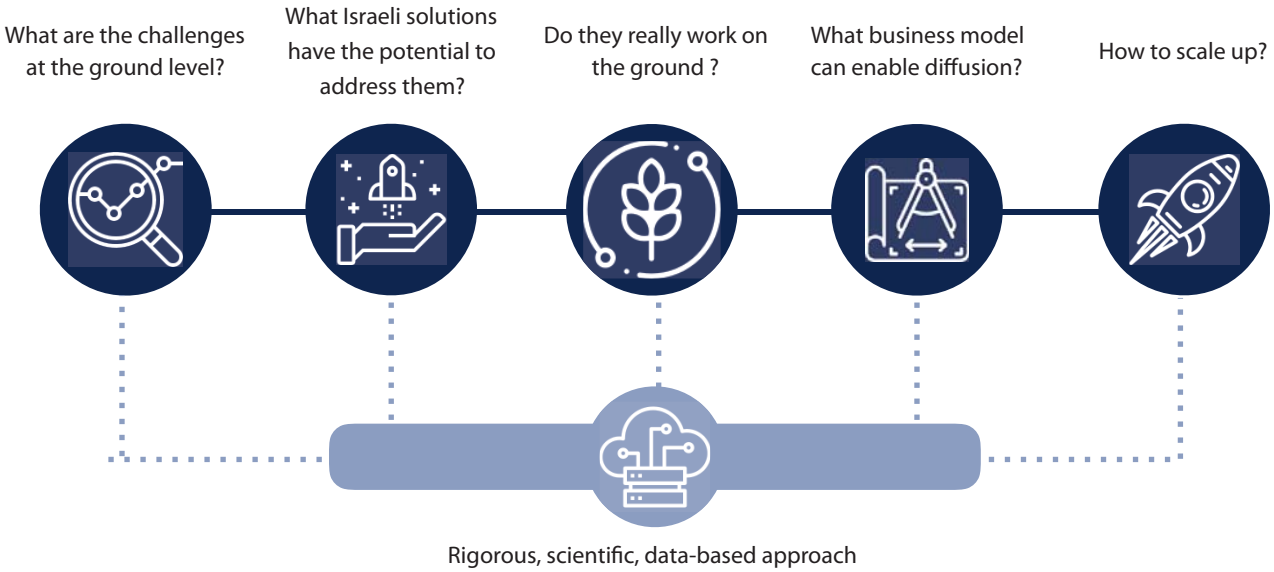
II. MODEL

The model of the IIVs is a bold and innovative model that stresses ground-based, data-driven experimentation and intensive engagement with farmers. To date, no partnership has attempted to translate high-level declarations of Indian and Israeli policy makers on the potential of Israeli ag-tech to help smallholder farmers into practical action at the level of the small farmer in a comparable way.

A critical component of this unique NGO-Academia-Public-Private partnership model is the involvement of Israeli Fellows (outstanding and pioneering graduate students from some of the most prestigious programs of TAU) through prolonged immersion in local field conditions. Guided by experienced faculty and technical experts, the Fellows develop a deep, data-based understanding of the needs of local farmers; identify, adapt, pilot and assess the potential impact of new Israeli technologies; develop and test business models for technologies successfully tested in the previous cycle.

Fellows are prepared for their fieldwork through a dedicated TAU course on applied Sustainability Science and trained in the operation of the selected technologies. In partnership with the Tata Trusts and VCF teams, and with a network of skilled, tech-oriented Extension Officers (EOs) specially recruited and trained for the purpose of the program, Fellows plan and manage the pilots, and implement a rigorous, data-driven monitoring and evaluation process that uses cutting edge ICT platforms. Every technology is accompanied throughout the entire process until its social and commercial merit is proven in the field.

Fig. 1: The Indo-Israeli Innovation Villages Model



III. PROGRAM TIMELINE

Sep 2017 – March 2018

TAU-CINI collaboration on "Mission 2020" in Jharkhand
Establishing a system for collection of high quality data to develop a deep, data based understanding of the needs of local farmers

Dec 2017

Israeli experts visit to Andhra Pradesh
Ten-day field study to identify opportunities for application of best-practices & technologies and to provide a base plan for setting up the first Indo-Israeli Innovation Village in AP

March 2018 – May 2018

Laying the ground for the first pilots
Initial farmers survey; monitoring protocol & farmers survey training to local team (2 TAU Fellows expeditions)

Aug 2018 – Jan 2019

First cohort of TAU Fellows
First prolonged immersion of TAU Fellows in the field; kickstarting the first experiments & technological pilots

IV. PROGRAM COMPONENTS

The IIVs model relies on four key components: agro-economic experiments undertaken in the farms; annual cohorts of Fellows (outstanding students from Tel Aviv University's most prestigious programs) who are immersed in the field for prolonged periods of time and are bridging the Israeli innovation ecosystem and the ground reality; a network of new-generation, data-oriented Extension Officers who ensure the transfer of knowledge and the execution & monitoring of the experiments; an integrated ICT platform for a fully data-driven program design and impact assessment.

AGRO-ECONOMIC EXPERIMENTS

Testing and adapting proven agronomic practices based on Israeli expertise, and piloting cutting-edge Israeli agri-technologies in real field conditions.

FELLOWS ENROLMENT

Bringing in Israeli Fellows for prolonged immersion in local field conditions, to bridge between the Israeli innovation ecosystem and the reality of Indian smallholder farmers.

EXTENSION 2.0

Recruiting & training a new generation of skilled, tech-oriented Extension Officers for the dissemination of knowledge and technologies, and for the execution & monitoring of the experiments.

DATA-DRIVEN PROGRAMMING

Using cutting edge digital information technology to scientifically characterise local needs and assess the agronomic & socio-economic impact of the experiments.

A. AGRO-ECONOMIC EXPERIMENTS

RATIONALE

Many Israeli technologies are thought to have the potential to improve the productivity and efficiency of Indian farms, but these assessments are based on evidence from performance in either Israeli farms or controlled conditions in experimental research stations. When implemented by real smallholder farmers in their own plots, the performance of these technologies can be markedly different because of a range of agronomic and human factors.

It is essential to test technologies in real farms in order to assess their real potential, and to better adapt them to the conditions of the Indian settings.

OBJECTIVES

- To test proven agronomic practices and innovative technologies in real field conditions, in a rigorous, scientific manner, while offering full protection to the farmers taking part in the experiments.

KEY ACHIEVEMENTS

1. Testing & adapting proven agronomic practices

1.1. Developing a methodology for farm based experiments

- Development of contractual arrangement through which to involve farmers in experiments of new technologies and practices at no risk to farmers.
- Development of rigorous monitoring protocols for each technology to be implemented by EOs using specially developed mobile phone based apps.

1.2. Drip++ experiments

- Development of crop-specific "Packages of Practices" (PoP) for vegetable growers with the support of Israeli agriculture experts and VCF agronomist, including best practices for soil management, crop management, crop protection, risk mitigation, harvesting & transporting.
- "Drip++" experiments - testing the economic impact of drip irrigation combined with mulching, staking and application of recommended PoP with vegetable farmers in Krishna and Anantapur:
    - 4 experiments concluded - impact assessment impossible due to irregularity in data collection
    - 4 still ongoing - already showing encouraging results.
    - See Appendix 1 - Summary of the Drip++ Experiments & Initial Results.

1.3. Integrated Pest Management

- Development and submission of protocol for an oriental fly management pilot in mango by NITSAN Lab expert Opher Mendelsohn. The pilot aims to test the deployment of male annihilation technique (MAT) and sanitation practices against oriental flies infestation in mango orchards, in Anantapur and Chittoor.
- Pilot to start in March 2019, when the trees start bearing fruit, and to run until the end of the harvest season in June/July.

I. Shaib's okra field: left, treatment plot (yellow mulch & recommended PoP); right, control plot (drips & farmer's traditional practices).

P. Saroja's cauliflower field: left, control plot (farmer's traditional practices); right, treatment plot (drips & recommended PoP).

KEY ACHIEVEMENTS

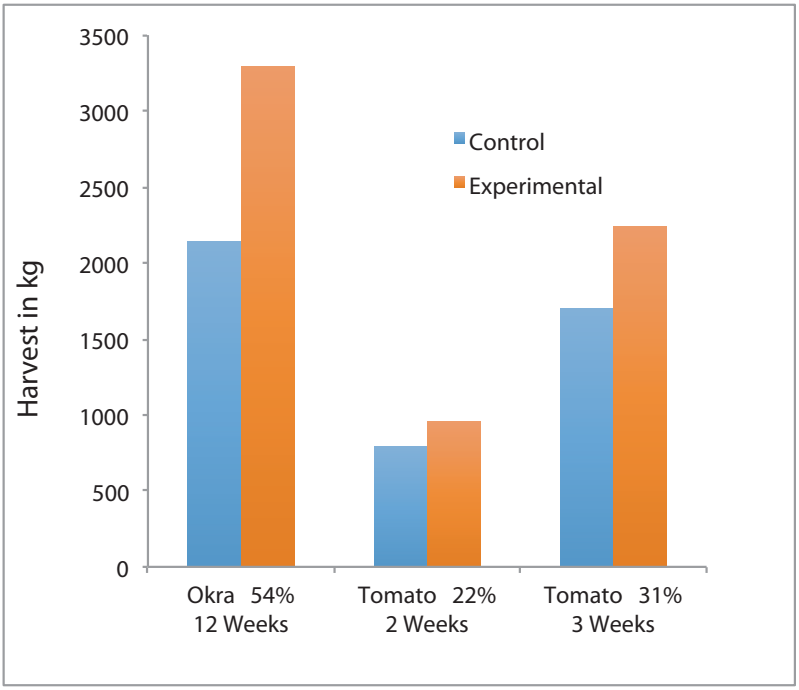
1.4. Dairy

- Signed a partnership agreement with Vishakha Dairy Corporation to conduct an evaluation of the effect of improved nutrition (Vishakha and AP government supplied cattle feed) on milk yields, with 1000 cows and 500 smallholder farmers in Srikakulam district.
- Finalised the monitoring protocol which was translated into Telugu and coded into the data-collection app.
- Baseline survey and pilot to start by mid-February 2019.

2. Piloting innovative technologies with Israeli startups

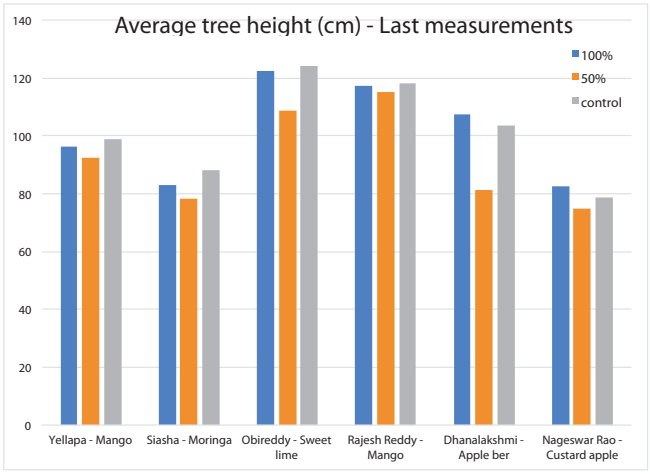
- Pilots initiated with 2 Israeli start-ups: Tal-Ya & Amaizz.
- Tal-Ya: a unique, patented polypropelyne tray that covers the plant's root system, directing water and fertilizer directly to the root, while protecting the earth around the root from weeds and extreme temperatures.
    - 8 pilots ongoing (5 in Anantapur, 3 in Krishna) with mango, custard apple, sweet lime, apple ber, moringa and tomato farmers.
    - Initial results presented in Fig. 2 below.
    - Final results expected by 2020/2021.
- Amaizz: post-harvest solution to minimize losses caused by crop spoilage and degradation throughout the handling, storage, and processing stages. Winner of the India-Israel Global Innovation Challenge 2018.
    - One fresh air dryer being piloted with chilli crop in Guntur.
    - Dryer installed in December 2018. First cycle of piloting completed mid-January 2019. Second cycle initiated early Feb.
    - Initial results expected by the end of the chilli season in March.

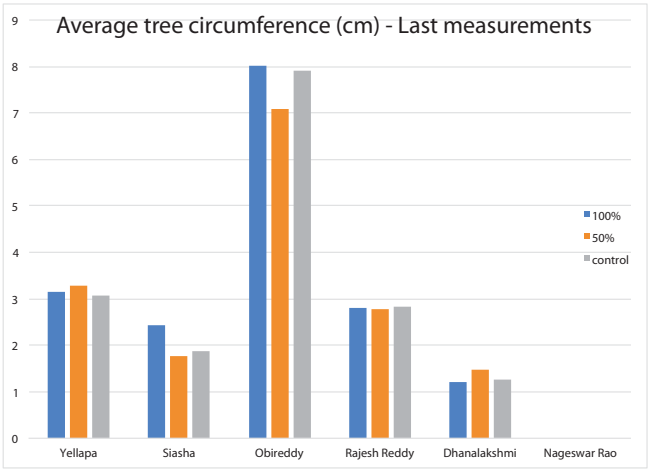
Fig. 2: Initial results of Drip++ experiments



Intallation of Tal-Ya trays

Fig. 3: Initial results for Tal-Ya pilot
The experiment is still in early stage. No significant differences have been yet detected between the three experimental groups: control / Tal-Ya with regular water supply / Tal-Ya with 50% of regular water supply.





Setting up the Amaizz dryer

B. FELLOWS ENROLMENT

RATIONALE

A yawning gulf lies between Israeli innovators and the farmers of the developing world. Israeli technologies are developed and tested in a drastically different human, economic and natural environment than that of developing countries.
In order to fill these gaps and bridge between the Israeli innovation ecosystem and the Indian farmers' needs, the IIVs model proposes to harness the resources of Israeli academia, and in particular, its vibrant and entrepreneurial student community. Immersed in the field for prolonged periods of time, cohorts of outstanding Fellows plan and manage the pilots in close coordination with the Israeli experts and startups, and implement a rigorous, data-driven monitoring and evaluation process in partnership with the local team.

OBJECTIVES

- To bridge the gap between the Israeli innovation ecosystem and the reality of smallholder Indian farmers by immersing outstanding students from a variety of backgrounds in the field for several months.

KEY ACHIEVEMENTS

- 10 outstanding and pioneering Fellows from TAU's most prestigious programs have successfully completed a fellowship in India and led the groundwork in partnership with VCF team. See Appendix 2 - Details of 2018-19 Fellows.

C. EXTENSION 2.0

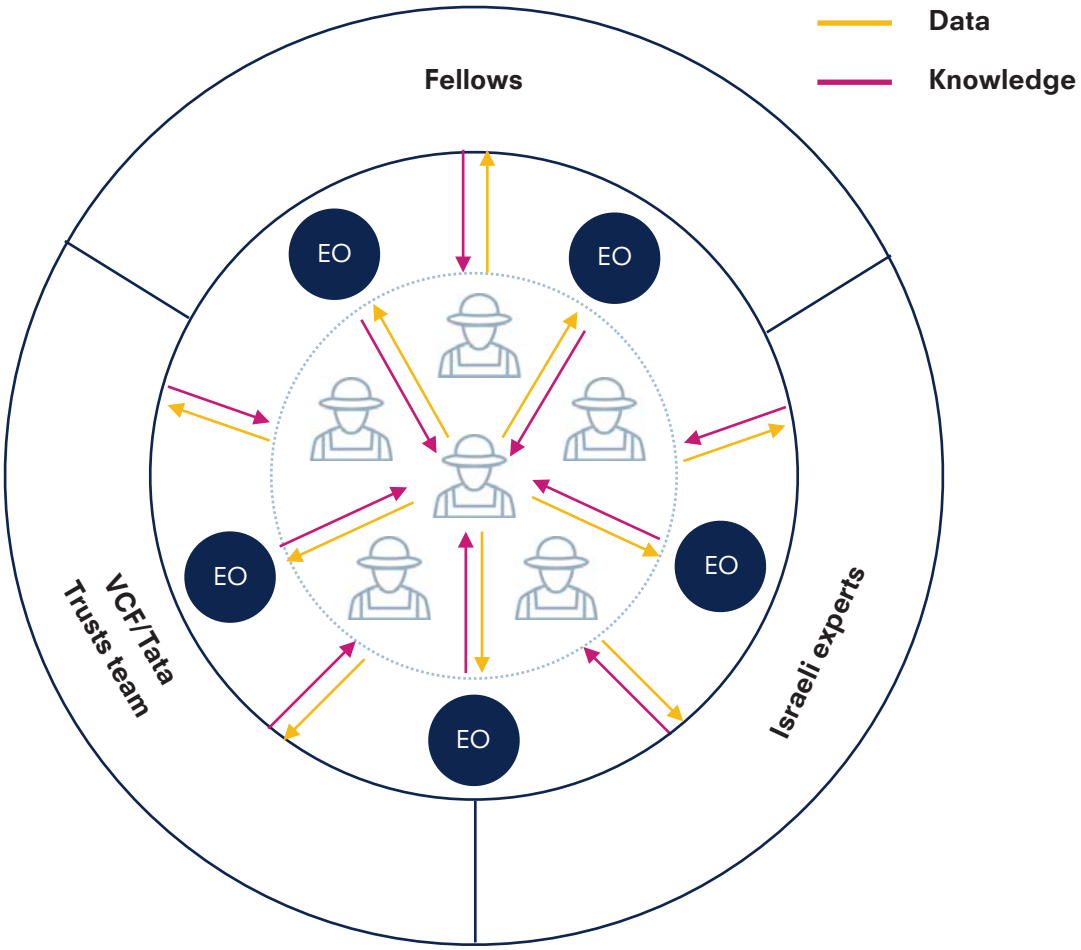
RATIONALE

No better agency at the ground level, other than agricultural extension services, can provide knowledge support to farmers and at the same time support program implementation and monitoring.

Strong field presence is critical to win the trust of the farmers and enrol them into the program; to bridge between the farmers, the project team (VCF and TAU Fellows) and the Israeli expertise; and to ensure a continuous flow of data and knowledge transfer for successful experiments.

Existing extension services are widely thought to be ineffective. A model should be developed that proves the possibility of an intensive and accountable extension force that developed a strong relationship with farmers through frequent interaction.

Fig. 5: EOs are the key to a continuous flow of data and knowledge



OBJECTIVES

- To recruit & train a new generation of skilled, dedicated, tech-oriented Extension Officers for the dissemination of knowledge and technologies, and for the execution & monitoring of the experiments

KEY ACHIEVEMENTS

- 9 skilled EOs recruited across AP to collect high-quality, reliable data; to support the high intensity farmers with extension services on a weekly basis; to disseminate knowledge, create exposure about our program and build a strong relationship with the local community, government representatives and FPOs.
- Training on monitoring protocol (March 2018) and Farmers Sorting Survey (May 2018) by TAU Fellows.
- 6-day theoretical and practical agronomy training delivered in August 2018 by Israeli agriculture and extensions services expert Omar Zeidan (former Director of Israel's Center for International Agricultural Development Cooperation), followed by 2-day training by TAU fellows on data collection and pilots/experiment management & monitoring.
- Daily connection between EOs, VCF agronomist, Israeli expert and TAU fellows for advice and trouble-shooting through WhatsApp and dedicated website.

EOs training by Omar Zeidan in August 2018

Training by TAU Fellows in March 2018

D. DATA-DRIVEN PROGRAMMING

RATIONALE

In spite of the wealth of data, in the form of censuses and household surveys, a comprehensive, systematic and standardised data set on the profile of smallholder farmers in India is still to be developed. Data is a driving force to enhance agricultural competitiveness. High-frequency and high quality data on all aspects of the local agricultural value chain, including for example soil moisture, crop stress, pest emergence, input use and market transactions are needed in order to understand the farmers' practices, constraints and needs, and to develop appropriate interventions to improve their productivity and increase their revenue.

In addition, a rigorous and scientific data-driven monitoring of the agro-economic and technological experiments undertaken in the farms is critical to enable an interactive process of adaptation, piloting and evaluation.

OBJECTIVES

- To use cutting edge digital information technology to capture in a scientific and systematic manner the financial and agronomic behavior of the farmers to understand their needs and identify suitable solutions.
- To scientifically and rigorously evaluate the performance and impact of experiments and pilots.
- To enable a novel form of continuous and in-depth interaction between Indian farms and Israeli innovators and experts.

KEY ACHIEVEMENTS

- Development of a scientific, randomised farmers sorting protocol to identify and select the sample of farmers taking part in the experiments, and to create control groups for impact evaluation.
  - Selected a sample of 250+ eligible farmers out of 50,000+ screened farmers.
  - Built a rigorous, data-driven monitoring protocol for understanding the needs of the local farmers and assessing the impact of the various pilots and experiments based on an innovative mobile data collection solution.
  - ~170 farmers being monitored across 17 villages in 3 districts (Krishna, Vizianagaram, Anantapur) since March 2018 to understand their agricultural practices and financial behavior. 34 of them are being monitored weekly ("high intensity farmers"); the rest is monitored at the beginning and at the end of the season ("low intensity farmers"). See Appendix 3 - Farmers Profile Summary.
  - Continuous, intensive monitoring of farmers taking part in the agro-economic experiments and in the tech pilots.
- Creation of a dedicated website where collected data is presented in an accessible manner for the usage of Tata Trusts professionals, Israeli agricultural experts, field team and others. See Appendix 4 - Overview of the ICT platform.
- In-depth data analysis by TAU Fellows for planning future interventions and assessing the impact of the experiments and pilots.

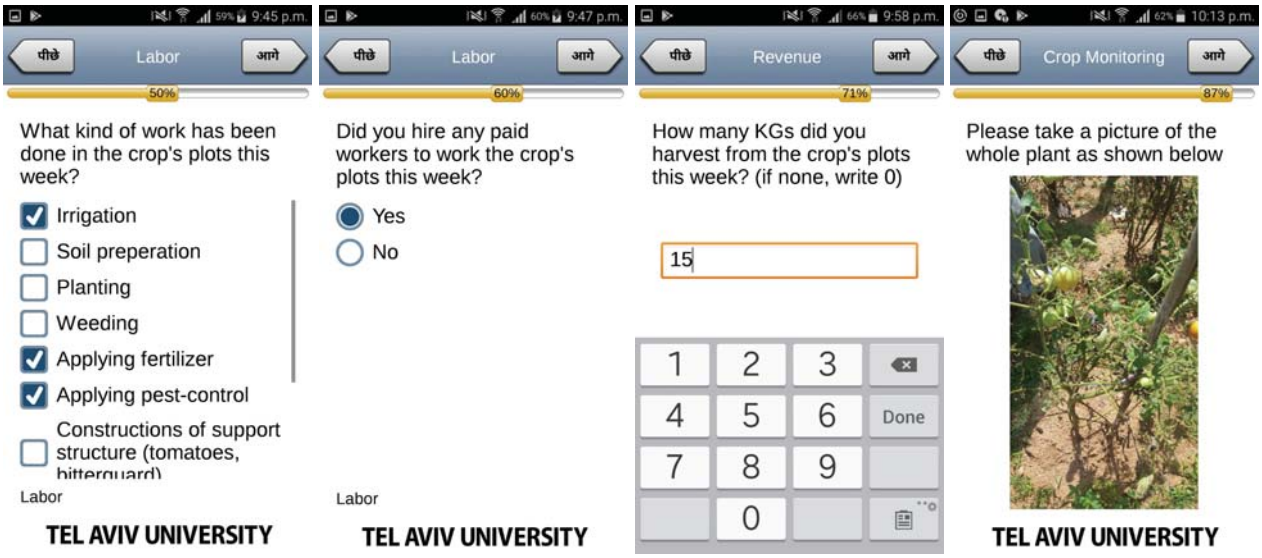
Current status of farmers monitoring

District	EO	High intensity	Low Intensity	Total
Krishna (G.Konduru)	Bhargava Krishna	9	49	58
Krishna (Jaggayyapeta)	Charan Reddy	9	19	28
Vizianagram (Kottaki)	Pratap	7	22	29
Anantapur (Singanamala)	Puroshotham	9	44	53
Total		34	134	168

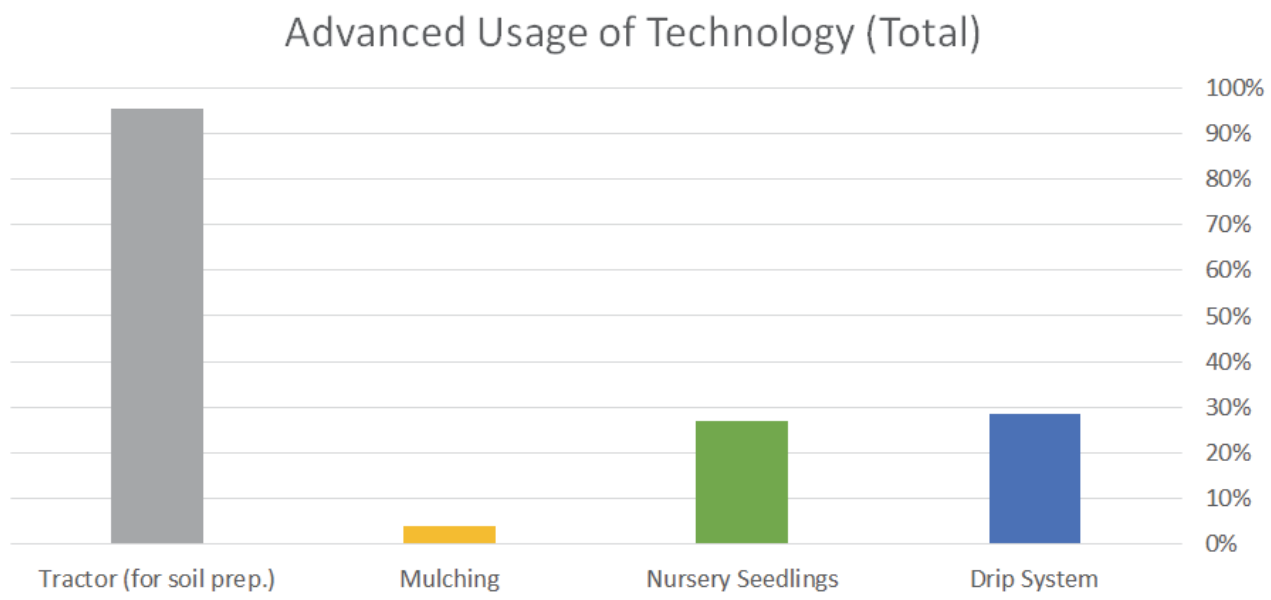
Fellows and EOs conducting farmers survey

Fellow and EOs monitoring the Tal-Ya pilot

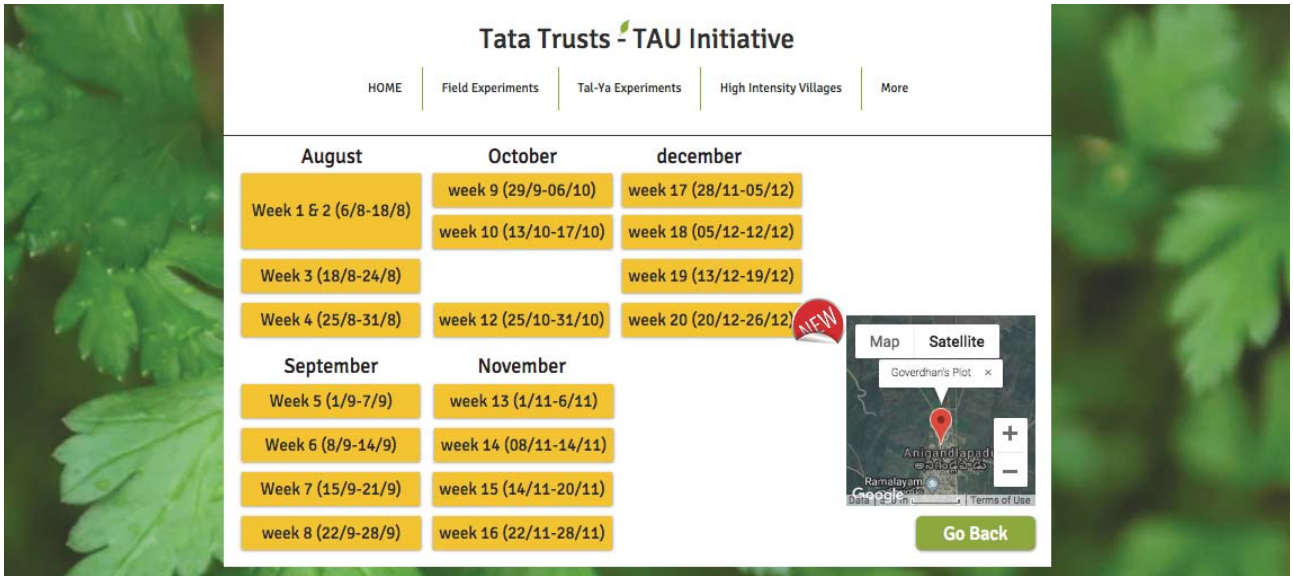
Data collection app

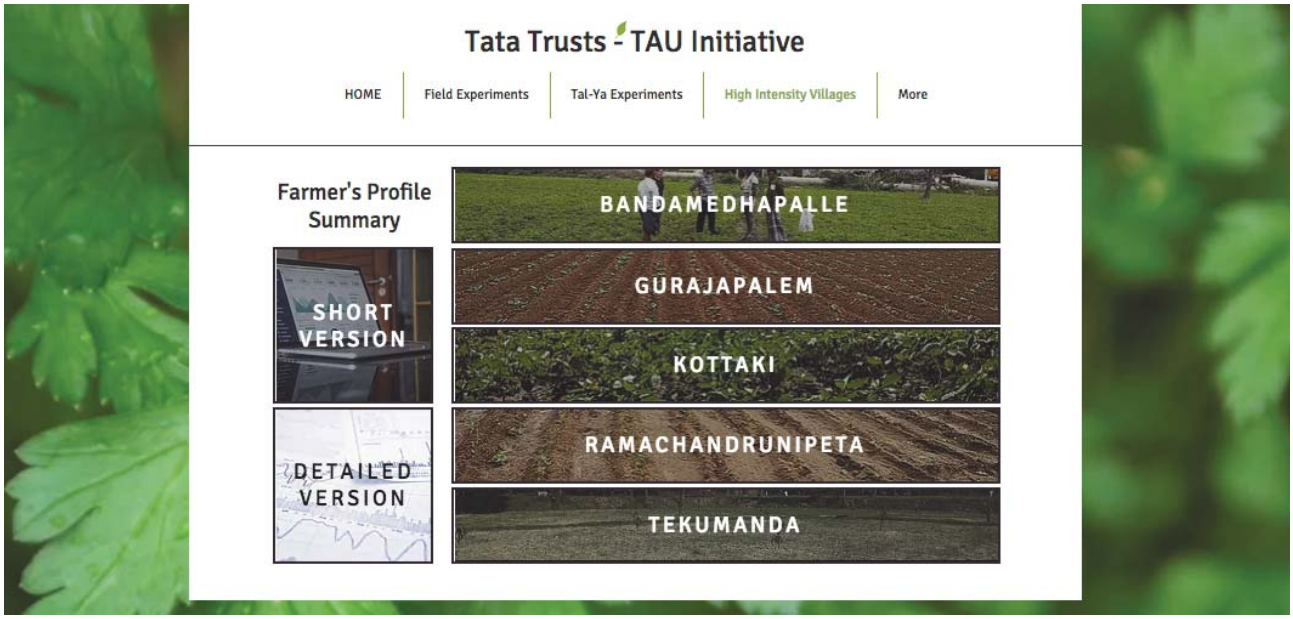


Example of initial findings from the Farmers Survey: Usage percentage for advanced technologies among farmers in AP



Website created for the presentation of collected & analysed data





Appendix 1 - Summary of the Drip++ Experiments & Initial Results

Farmer	Location	Crop	Details of experiment (per plot)	Status	Start date	End date
P. Saroja	Linganapalli (Krishna)	Cauliflower	A – Control: farmer's traditional practices B– Drips + recommended PoP	Ongoing	Dec 2018	-
I. Shaib	Anjaneyapuram (Krishna)	Okra	A – Control: farmer's traditional practices (farmer installed Drips 2 weeks into the experiment) B– Drips, yellow mulching + recommended PoP	Ongoing	Sep 2018	-
Venkatara mana	Bandameedapa lli (Anantapur)	Tomato	A – Control: Drips + farmer's traditional practices B– Drips + recommended PoP	Ongoing	Nov 2018	-
Nagesswar ao	Chandhapuram (Krishna)	Tomato	A – Control: farmer's traditional practices B– Drips + recommended PoP + one row of Tal-Ya	Ongoing	Oct 2018	-
Saide (1)	Anumanchipalli (Krishna)	Okra	A – Control: farmer's traditional practices B – Recommended PoP no drips C1 – Drips + Recommended PoP C2 – Drips no Recommended PoP	Concluded	March 2018	July 2018
Shenkar	Krishna Raopalem (Krishna	Eggplant	A – Control: farmer's traditional practices B – Recommended PoP no drips C1 – Drips and Recommended PoP C2 – Drips no Recommended PoP	Concluded	March 2018	Nov 2018
Saide (2)	Anumanchipalli (Krishna)	Cauliflower	A – Control: farmer's traditional practices (farmer installed Drips 3 weeks into the experiment) B– Drips + recommended PoP	Concluded	July 2018	Dec 2018
Goverdhan	Anigandlapadu (Krishna)	Tomato	A – Control: farmer's traditional practices B– Drips no Recommended PoP C– Drips + Recommended PoP	Concluded	Aug 2018	Dec 2018

I. Shaib – Okra (Ongoing)

Farmer's Details

Name: I. Shaib

District: Krishna

Mandal: Tiruvuru

Village: Anjaneyapuram

EO: Bhargava Krishna

Experiment details

Crop: Okra

Season: Rabbi

Start date: 21.9.18

End date: (ongoing)

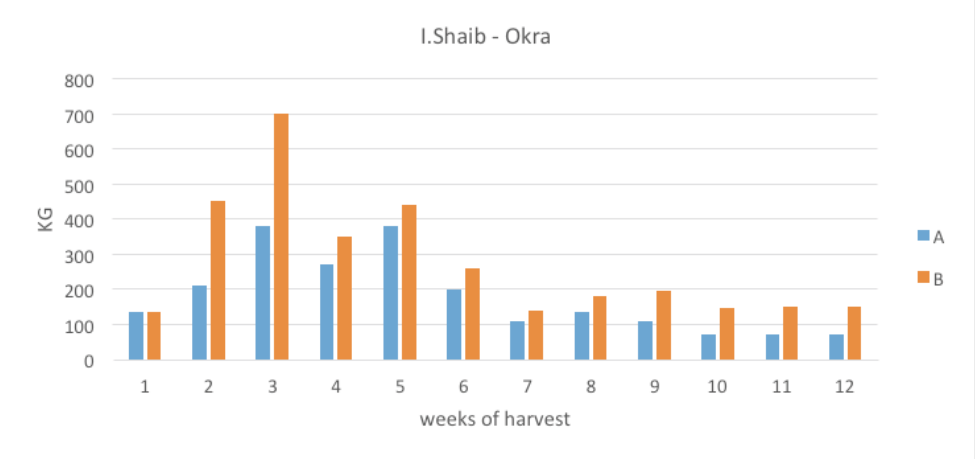
	Plot A	Plot B
Description	Farmer's traditional practices (farmer installed Drips 2 weeks into the experiment)	Drips, Yellow malchin and recommended PoP
Method of irrigation	Drips	Drips
Total harvest	2139	3296

Pictures of the plots:

Plot A

Plot B

Difference in yield from the different plots:



Venkataramana – Tomato (Ongoing)

Farmer's Details

Name: Venkataramana

District: Anantapur

Mandal: Singanamala

Village: Bandameedapalli

EO: Purushotham

Experiment details

Crop: Tomato

Season: Rabbi

Start date: 8.11.18

End date: (ongoing)

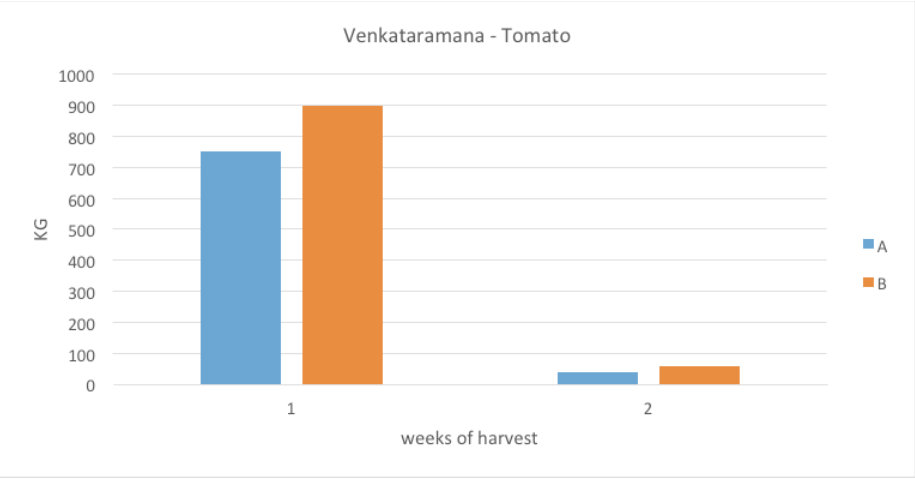
	Plot A	Plot B
Description	Drips and farmer's traditional practices	Drips and recommended PoP
Method of irrigation	Drips	Drips
Total Harvest (KG)	790	960

Pictures of the plots:

Plot A

Plot B

Difference in yield from the different plots:



Nageswarao – Tomato (Ongoing)

Farmer's Details

Name: Nagesswarao

District: Krishna

Mandal: Nandigama

Village: Chandhapuram

EO: Charan Reddy

Experiment details

Crop: Tomato

Season: Rabbi

Start date: 1.10.18

End date: (ongoing)

	Plot A	Plot B
Description	farmer's traditional practices	Drips and recommended PoP + one row of Tal-Ya
Method of irrigation	Flooding	Drips
Total harvest (KG)	1703	2330

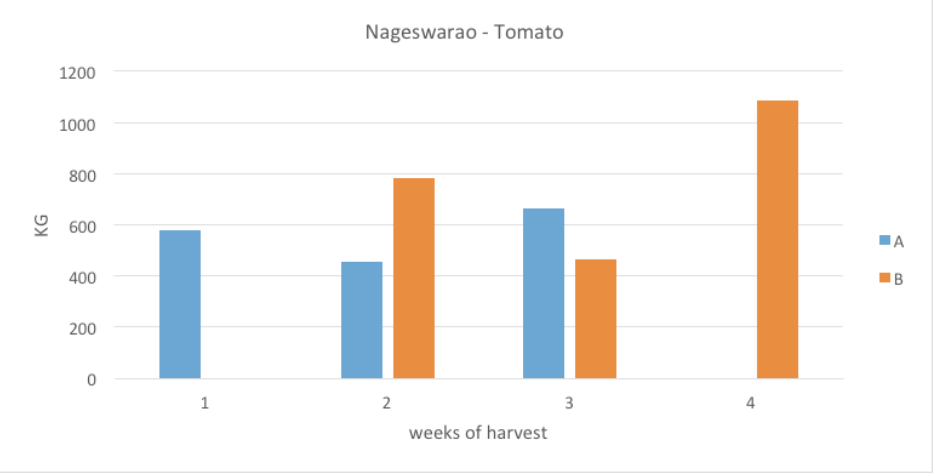
Pictures of the plots:

Plot A

Plot B

Plot B (Tal-Ya row)

Difference in yield from the different plots:



P. Saroja – Cauliflower (Ongoing)

Farmer's Details

Name: P. Saroja

District: Krishna

Mandal: Nandigama

Village: Linganapalli

EO: Charan Reddy

Experiment details

Crop: Cauliflower

Season: Rabbi

Start date: 10.12.18

End date: (ongoing)

Harvest start: 17.1.18 (week 5)

Weeks of harvest: 3

	Plot A	Plot B
Description	Farmer's traditional practices	Drips, mulching and Recommended PoP
Method of irrigation	Flooding	Drips
Total harvest (KG)	N/A	N/A

*Incomplete and inaccurate data collection.

Pictures of the plots:

Plot A

Plot B

Saide (first experiment) – Okra (concluded)

Farmer's Details

Name: Saide

District: Krishna

Mandal: Jaggayyapeta

Village: Anumanchipalli

EO: Balu/ Soresh

Experiment details

Crop: Okra

Season: Summer

Start date: 17.3. 18

End date: 6.7.18

Harvest start: 30.4.18 (week 6)

Weeks of harvest: 10

	Plot A	Plot B	Plot C1	Plot C2
Description	Control	Recommended PoP no drips	Drips and Recommended PoP	Drips no Recommended PoP
Method of irrigation	Flooding	Flooding	Drips	Drips
Total harvest (KG)	N/A*	N/A	N/A	N/A

*Incomplete data collection.

Pictures of the plots:

Plot A

Plot B

Plot C1

Plot C2

Shenkar – Eggplant (concluded)

Farmer's Details

Name: Shenkar

District: Krishna

Mandal: A Kondur

Village: Krishna Rao palem

EO: Vishnu/ Suresh/ Bhargava Krishna

Experiment details

Crop: Eggplant

Season: Summer + Kharif

Start date: 16.3.18

End date: 2.11.18

Harvest start: 15.8.18 (week 22)

Weeks of harvest: 11

	Plot A	Plot B	Plot C1	Plot C2
Description	Control	Recommended PoP no drips	Drips and Recommended PoP	Drips no Recommended PoP
Method of irrigation	Flooding	Flooding	Drips	Drips
Total harvest (KG)	N/A*	N/A	N/A	N/A

*Incomplete data collection.

Pictures of the plots:

Plot A

Plot B

Plot C1

Plot C2

Saide (Second experiment) – Cauliflower (concluded)

Farmer's Details

Name: Saide

District: Krishna

Mandal: Jaggayyapeta

Village: Anumanchipalli

EO: Balu/ Soresh

Experiment details

Crop: Cauliflower

Season: Kharif

Start date: 30.7. 18

End date: 19.12.18

Harvest start: 10.10.18 (week 10)

Weeks of harvest: 9

	Plot A	Plot B
Description	Farmer's traditional practices (farmer installed Drips 3 weeks into the experiment)	Drips and recommended PoP
Method of irrigation	Drips	Drips
Total harvest (KG)	N/A*	N/A

*Incomplete data collection.

Pictures of the plots:

Plot A

Plot B

Goverdhan – Tomato (concluded)

Farmer's Details

Name: Goverdhan

District: Krishna

Mandal: Penuganchiprolu

Village: Anigandlapadu

EO: Charan Reddy

Experiment details

Crop: Tomato

Season: Kharif

Start date: 6.8.18

End date: 26.12.18

Harvest start: 13.10.18 (week 9)

Weeks of harvest: 9

	Plot A	Plot B	Plot C
Description	farmer's traditional practices	Drips no Recommended PoP	Drips and Recommended PoP
Method of irrigation	Flooding	Drips	Drips
Total harvest (KG)	N/A*	N/A	N/A

*Incomplete data collection.

Pictures of the plots:

Plot A

Plot B

Plot C

Appendix 2 - Details of 2018-19 Fellows

David Shurman
32 years old
Master student in Public Policy at TAU
Student at the Adi Lautman Interdisciplinary Program for Outstanding Students
Summer* + First Semester Fellowship**

Karel Finkelstein
31 years old
Master student in Public Policy at TAU
Architect & graduate of Bezalel Academy of Art and Design in Jerusalem
Summer + First Semester Fellowship

Yalon Perelman
29 years old
Master student in Public Policy at TAU
Summer + First Semester Fellowship

Deborah Talor
26 years old
Undergraduate student in Political Science at TAU
Summer Fellowship

Shai Gilat
25 years old
2nd year student in the Adi Lautman Interdisciplinary Program for Outstanding Students at TAU
Summer Fellowship

Oren Kaplun
29 years old
Undergraduate student in the selective Philosophy, Political Science, Economics (PPE) program at TAU
Summer Fellowship

Itay Manes
29 years old
Master student in Statistics and Data Science at TAU
Summer Fellowship

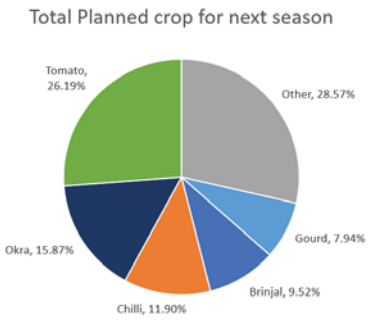
Yotam Burstein
30 years old
Master student in Sociology & Anthropology at TAU
Graduate of the Adi Lautman Interdisciplinary Program for Outstanding Students
Summer Fellowship

*August to October
** October to January

Vegetables

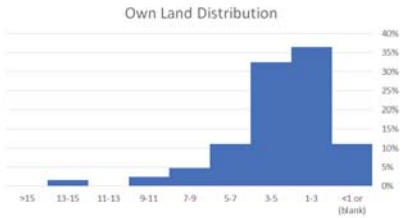
These pie-charts can tell us in what crop we can focus on each mandal.
We can then make data-based decisions, such as:

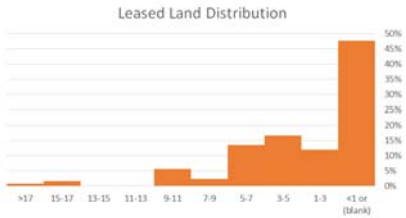
- What is the most popular crop in each area - and start opening market opportunity for it. (for each mandal pie-chart, you can use the detailed summary).
- What is the potential for crop-specific intervention, such bring a crop expert for it.



Land Ownership

- Total Land: we can see that most of the farmers are indeed small-holder farmers, with not more than 7 acres. Notice that the the average is biased, due to few observation of farmers with more than 15 acres.
- Leased and Owned land: we can see that most of the farmers hold some land of their own, but it's size is low (until 5 acres). Regarding leased land, we can see that almost half of the farmers don't lease any land, but when they do, it's most likely that it will be more than 3 acres.





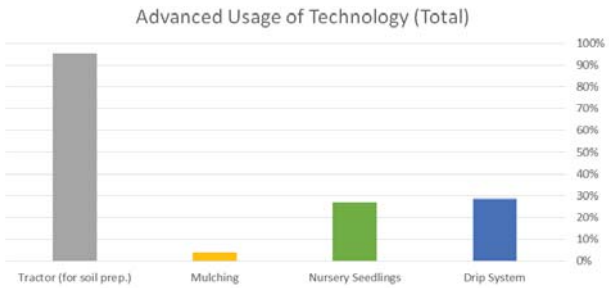
	Total Land	Own Land	Leased Land
Avg.	5.85	3.22	2.63
StdDv.	4.48	2.53	3.81
N	126	126	126

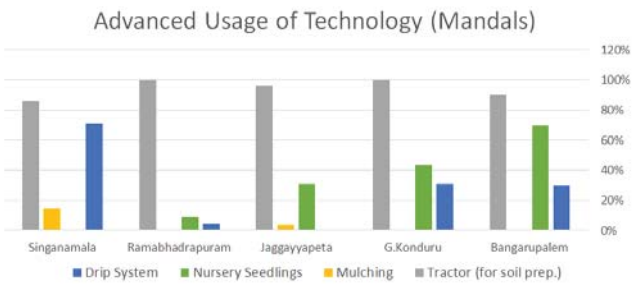
Technology

Modern technology

Here we can find usage percentage for advanced technologies, planned to be used in the Rabi season:

- Mulching usage is very rare, all over AP
- Although 95% of the farmers reported that they are going to use tractor for the land preparation, many of them stated they will also use bulls.
- We can see that nursery saplings and drips system aren't distributed equally between the mandals.



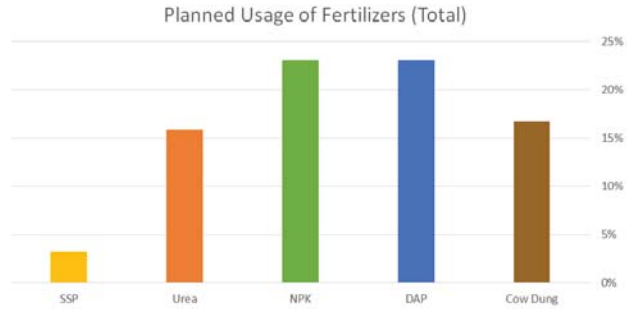


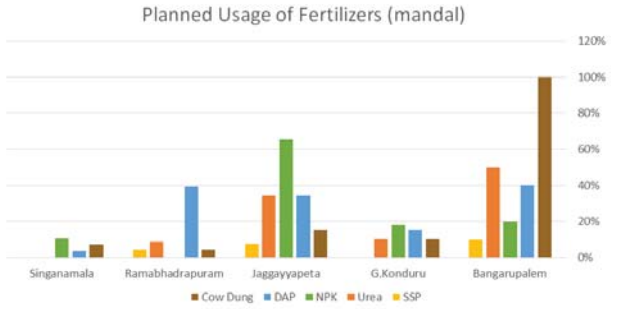
Usage of fertilizers

These graphs shows small percentage of usage for the different fertilizers. We highly believe that the real percentage is much higher. That difference is caused by the way the way that the question is build - the farmer needs to specify what kind of inputs he is planning to use the upcoming season, and in a lot of the cases, the farmer doesn’t specify them all, if at all.

Few notes:

- The NPK bar represent all the different kinds of NPK (20-20-20, 19-19-19, etc.)
- We believe that differences between mandals are due to the EO ability to push the farmer to give accurate answer, and not due to real differences - **but we have to check this assumption**.

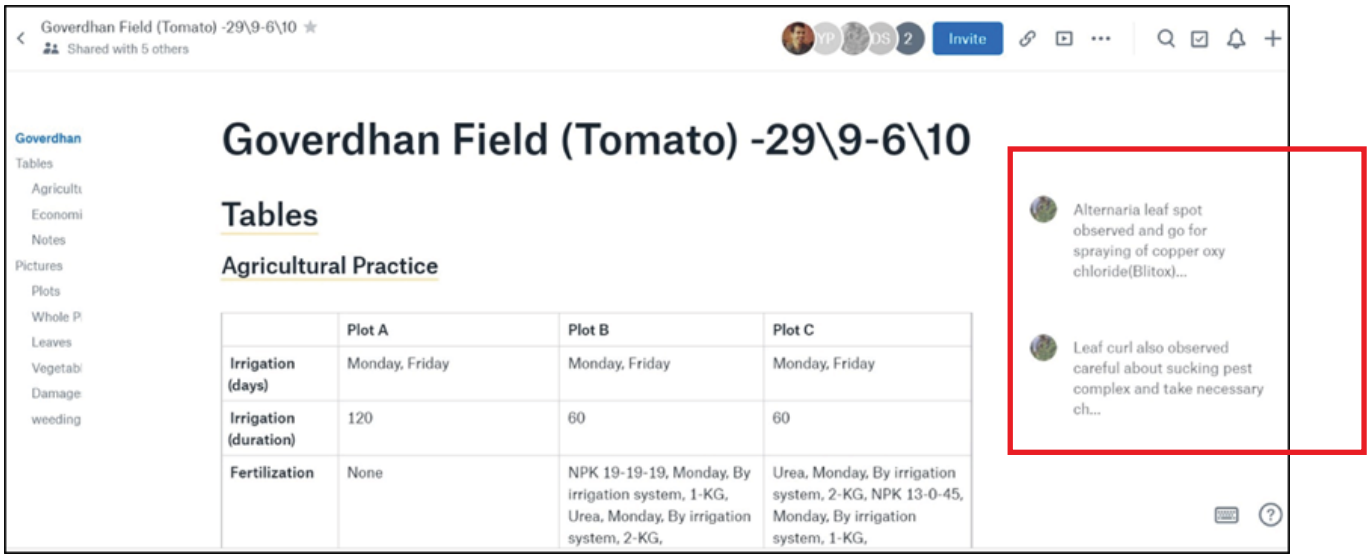




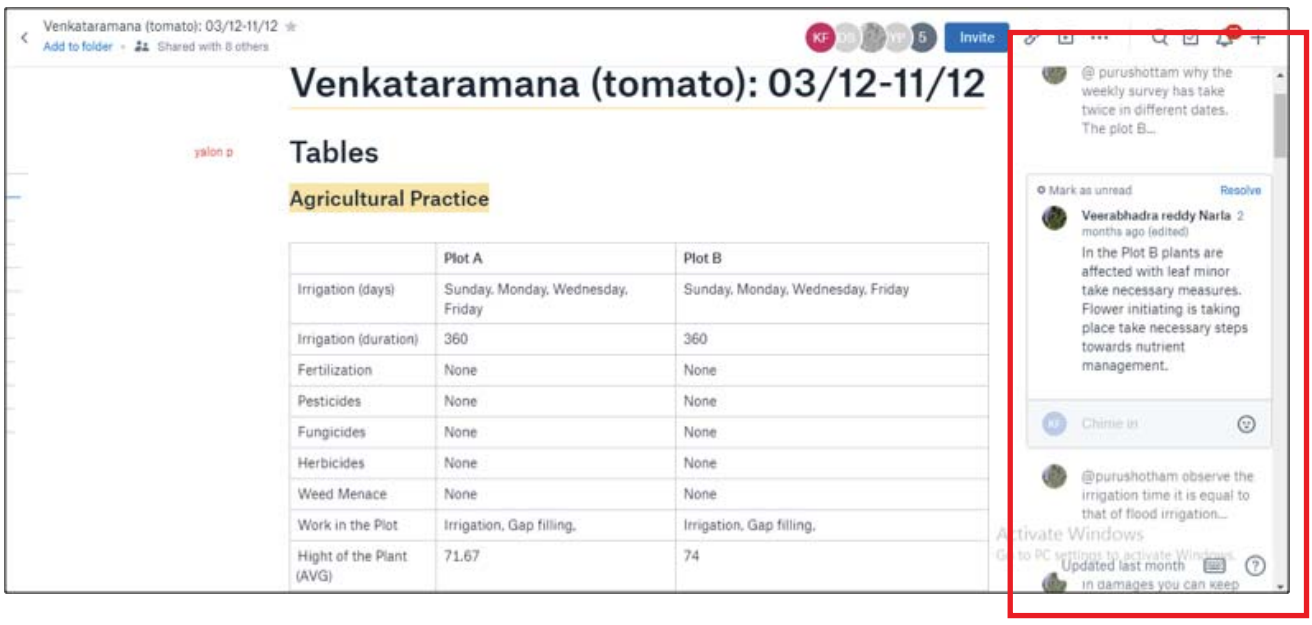
Appendix 4 - Overview of the ICT platform

The reports uploaded to the website on weekly basis serve as a platform for discussion and support to the EO.

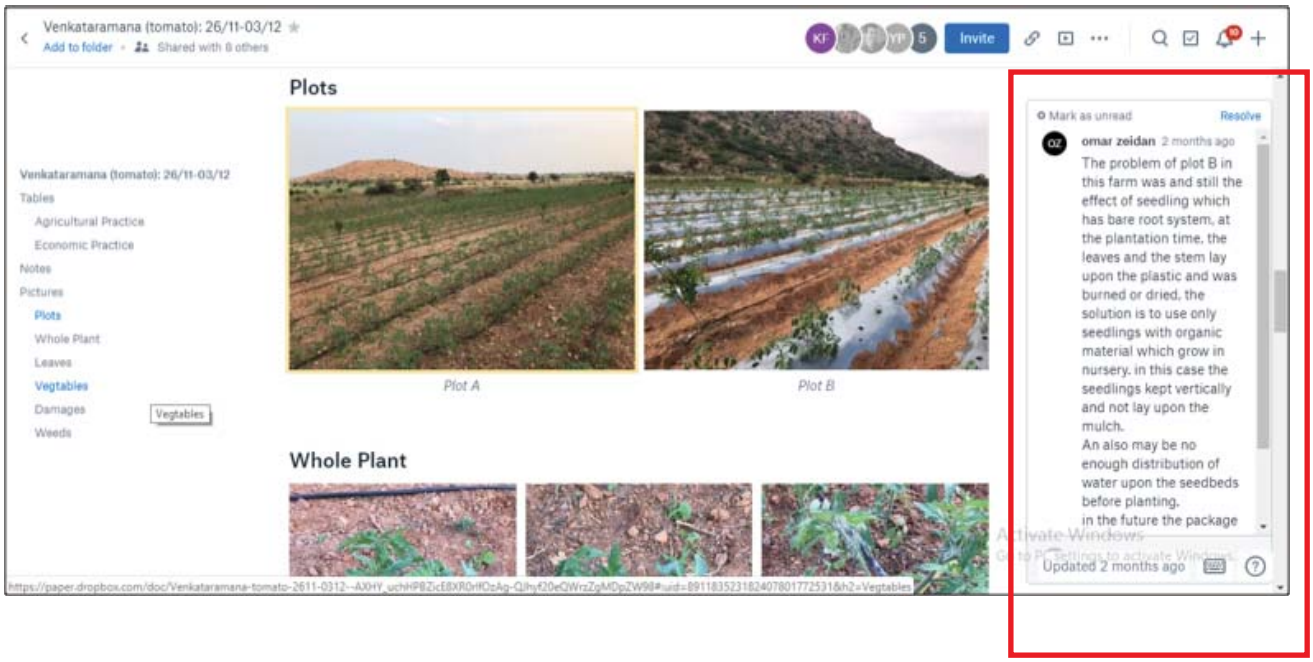
- Example (below): report based on data collected for 29/9/18-6/10/18 (Goverdhan). Comments from Veera on a report (seen by the EO, Omar, VCF team and fellows), agronomic support for the EO:



- Example (below): report based on data collected for 03/12/18-11/12/18 (Venkataramana). Comments from Veera on a report (seen by the EO, Omar, VCF team and fellows), agronomic support to the EO and comments on data collected:



- Example (below): report based on data collected for 26/11/18-03/12/18 (Venkataramana). Comments from Omar zaidan on a report (seen by the EO, Omar, VCF team and fellows), agronomic support to the EO:

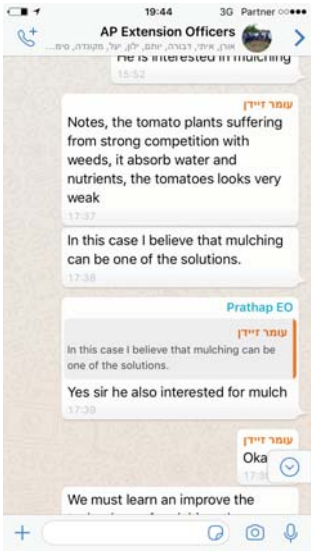


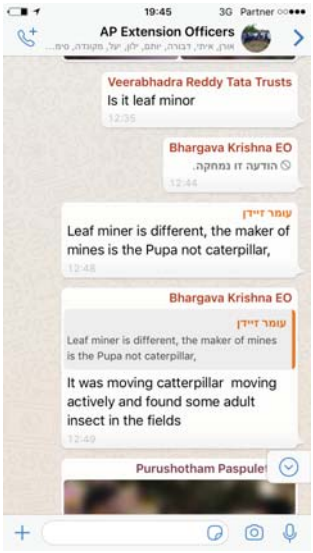
The reports also enable us to see the data collected and comment if the data is not accurate in real time.

- Example (bellow): report based on data collected for 29/9/18-6/10/18. Comments by the fellows on the data collected - pictures (seen by the EO, Omar, VCF team and fellows):

WhatsApp group serve as a platform for discussion and support to the EO.

- Example (below): direct correspondence between EOs and Omar.





Survey app

- Recording and discussing damages detected in the field, and presenting in the app: