

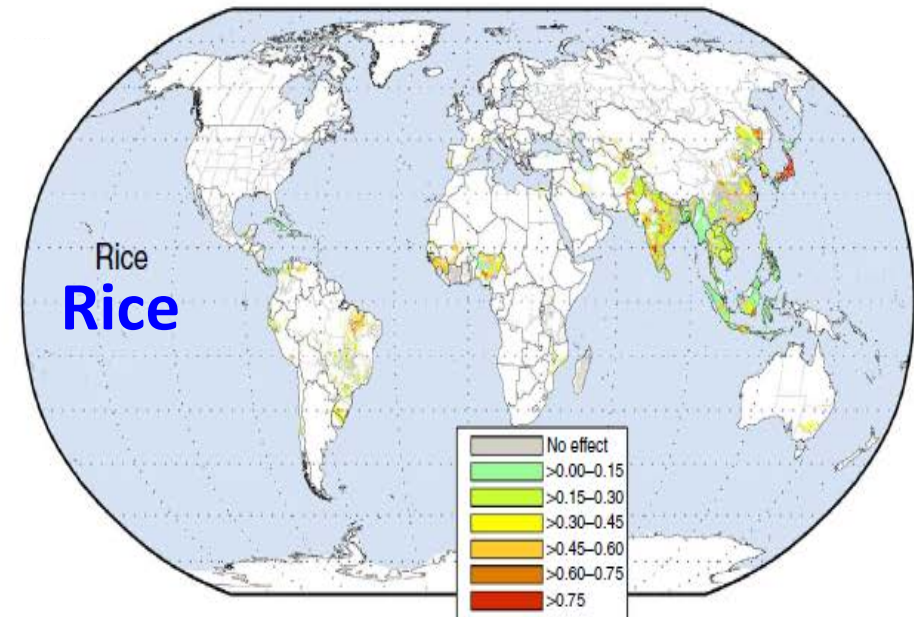
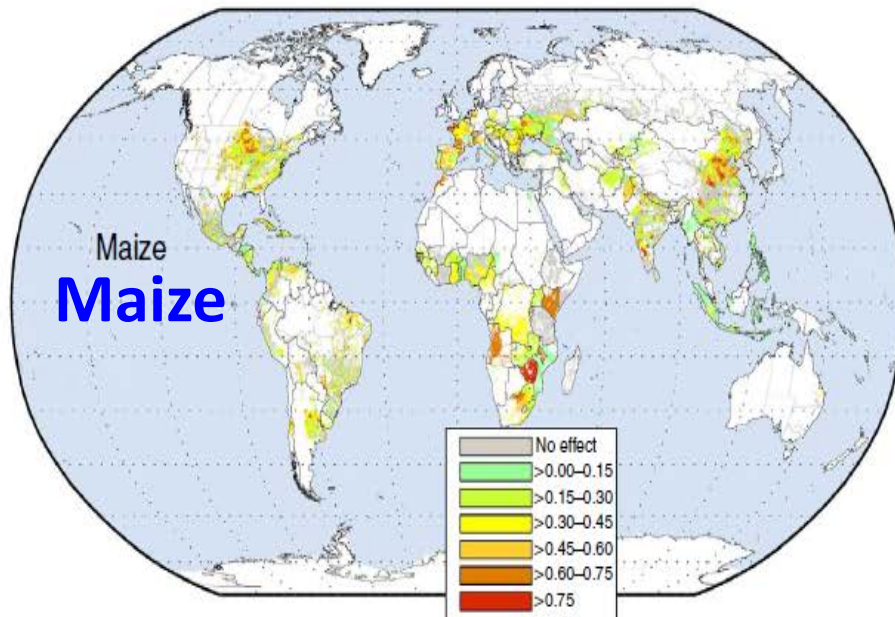
Improving Agricultural Resilience through Ensuring Data Availability and Enhancing Climate Services

Kwang-Hyung Kim
APEC Climate Center



Crop Yield Variability from Climate Variability

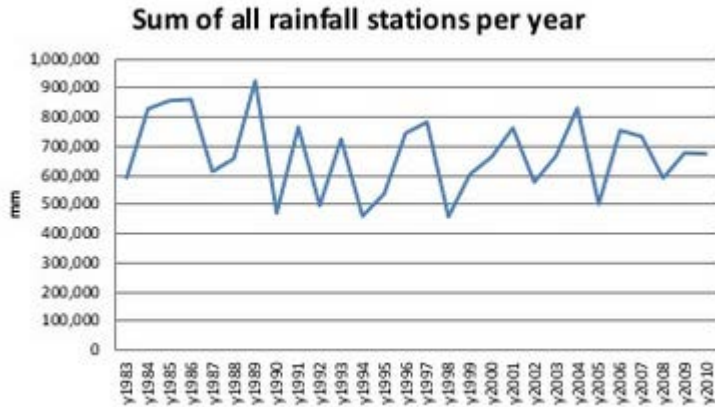
There will be consequences of future climate change as there were observed consequences of climate variability in the past.



Total crop yield variability explained due to climate variability over the last three decades

(from Ray et al., 2015 @ Nature Communication)

Adaptation Needs to Climate Variability



- Decision making needs to consider variable climate
- **Climate risk management**
 - Build adaptive capacity to climate variability
 - Maximize the positive and minimize the negative influences of climate

Identify areas in target countries or regions most vulnerable to climate variability

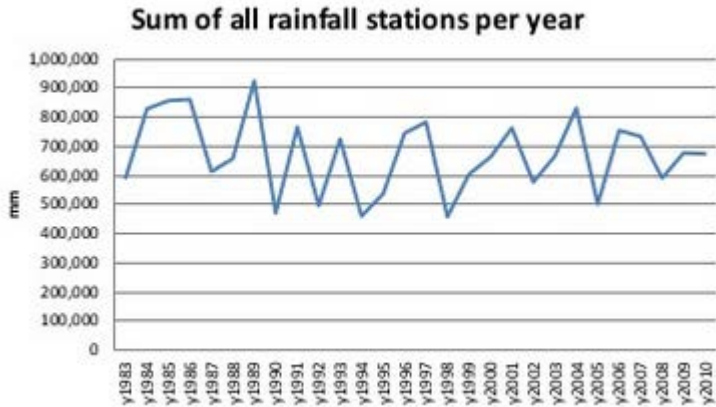
Provide tailored climate information to support decisions in identified areas

Identify technologies and practices that optimize results

Demonstrate the potential usefulness of climate information to support climate-related decisions

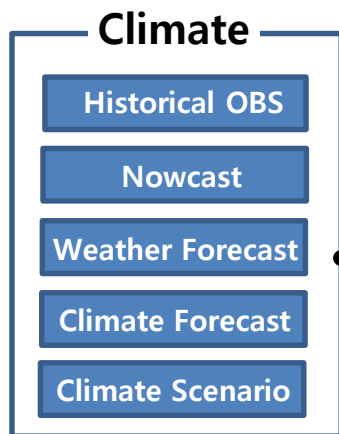
Look for training and capacity-building opportunities through out the process and across the groups involved, and mainstreaming validated strategies into national/regional planning

Adaptation Needs to Climate Variability

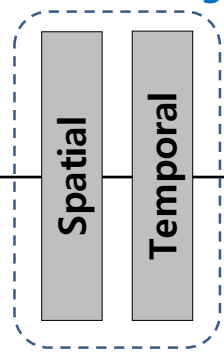


- Decision making needs to consider variable climate
- **Climate risk management**
 - Build adaptive capacity to climate variability
 - Maximize the positive and minimize the negative influences of climate

Climate Information



Downscaling



Agricultural Information

Agro-Climate Modeling

Crop
Pest
Water
Soil
Models

Decision Making

Short-term
Mid-term
Long-term
Agricultural
Tactics
Strategies

Desired Outcome

Increased Resilience
Reduced Vulnerability

Adaptation
to
Climate Variability
Climate Change



Climate Smart Agriculture ?

What is CSA?

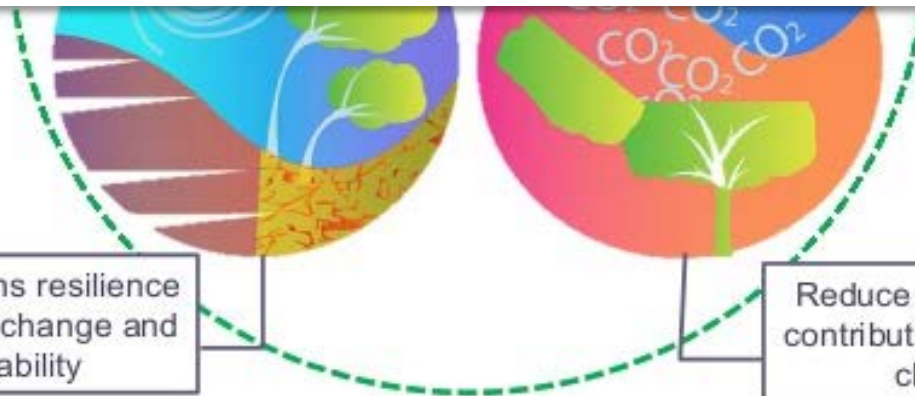


Sustainably increases productivity and income



The SMART USE of CLIMATE INFORMATION in CLIMATE-SENSITIVE DECISION MAKING by AGRICULTURAL STAKEHOLDER

Strengthens resilience to climate change and variability



Reduce agriculture's contribution to climate change

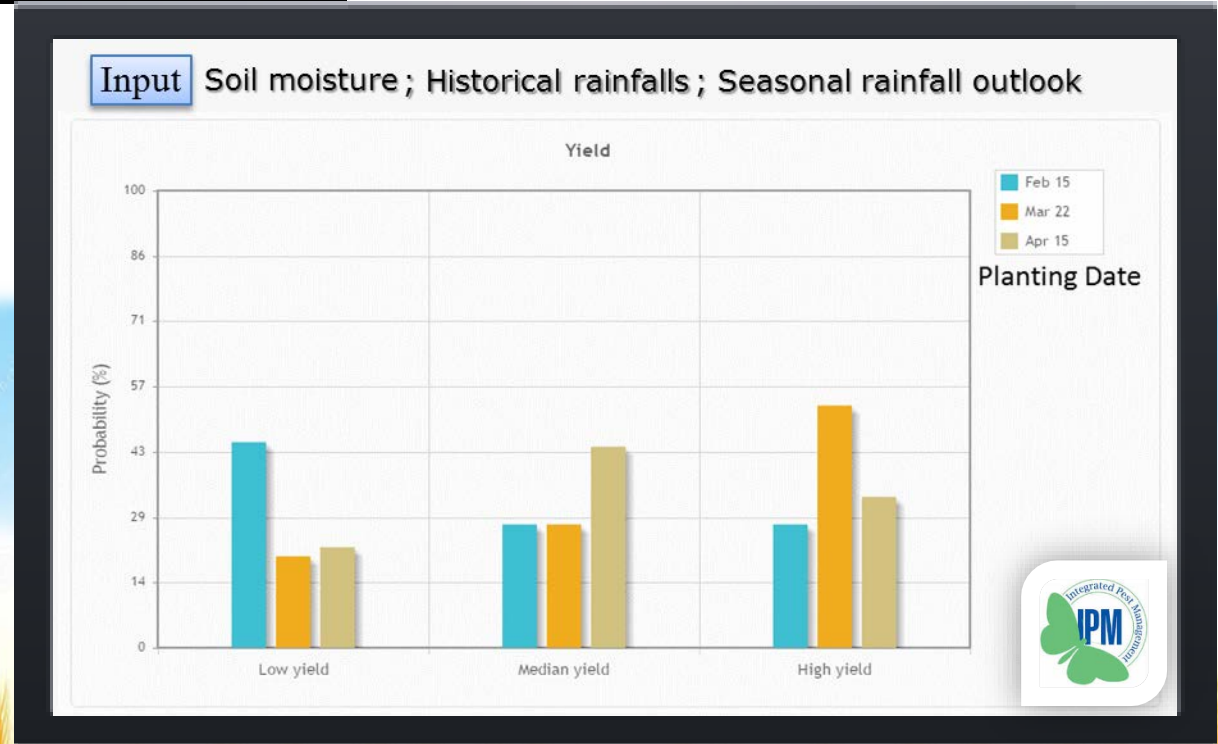




Farmer Smart



- El Nino advisory
- Drier than normal
- Decision-support tool : Planting date adjustment with yield estimation



Wheat



Farmer Smart

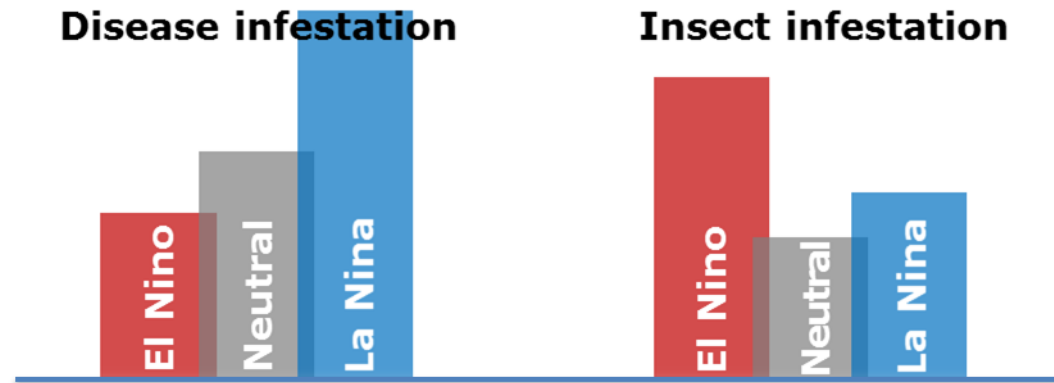


- El Niño advisory
- Drier than normal
- Decision-support tool : Planting date adjustment with yield estimation
- Insect infestation increases, thus cultivated *Underhill* for insect control

Pest infestation rate based on ENSO phases

Disease infestation

Insect infestation



Wheat

□ Managing ~~fit~~ damage

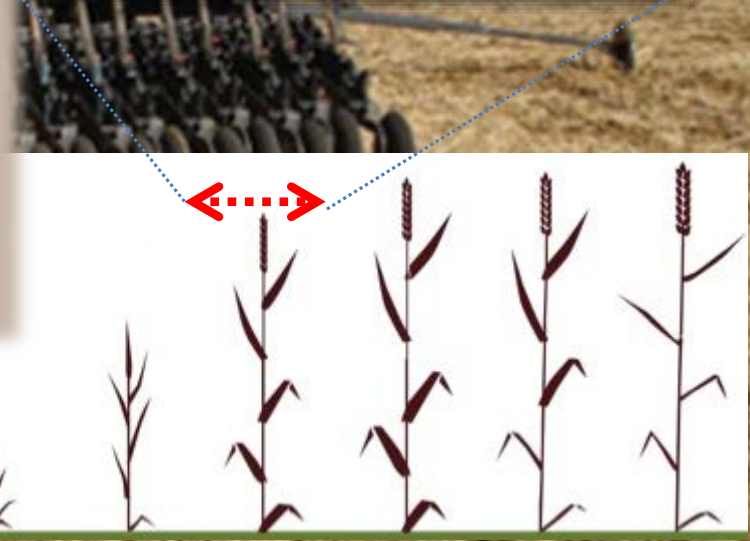
During El Nino, frost damage risk during flowering is higher than normal



Farmer Smart



- El Nino advisory
- Drier than normal
- Decision-support tool : Planting date adjustment with yield estimation
- Insect infestation increases, thus cultivated *Underhill* for insect control
- Minimum tillage to protect stored soil moisture
- Planted half wheat 0.5 month earlier, rest was planted in the normal period



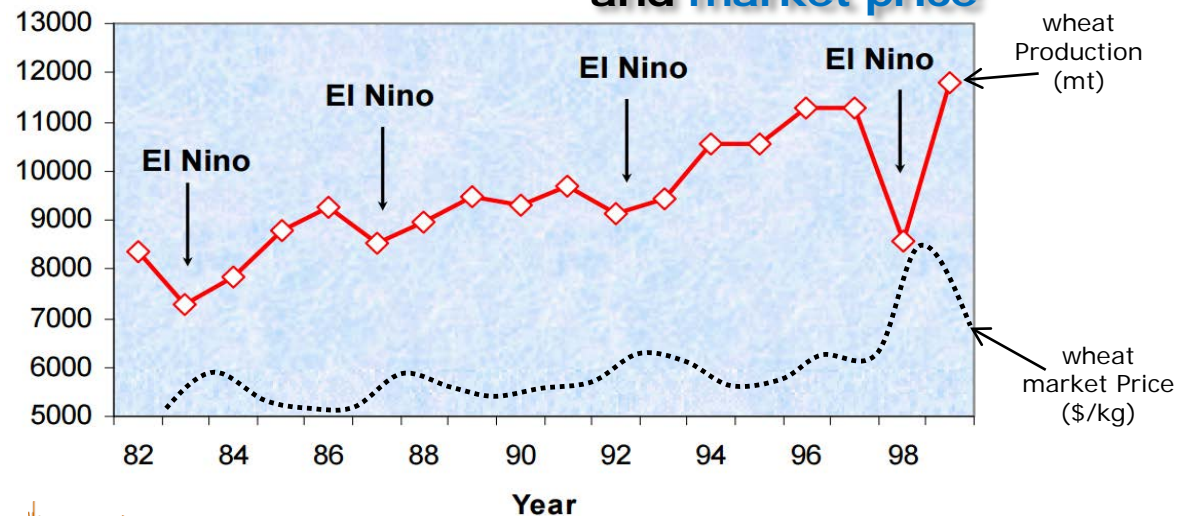


Farmer Smart



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- Planted half wheat 0.5 month earlier, rest was planted in the normal period
- Did NOT forward sell hay, decided to harvest the actual wheat

Relation between climate and wheat production and market price



Market

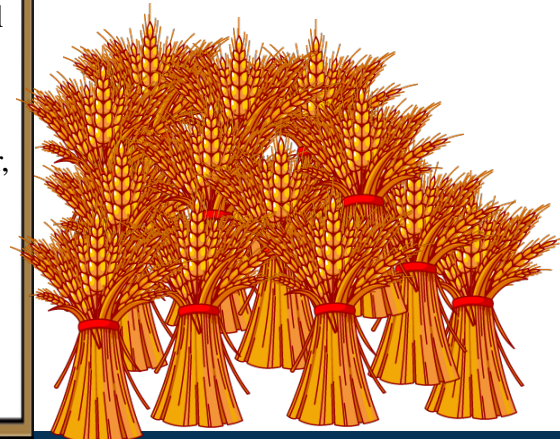
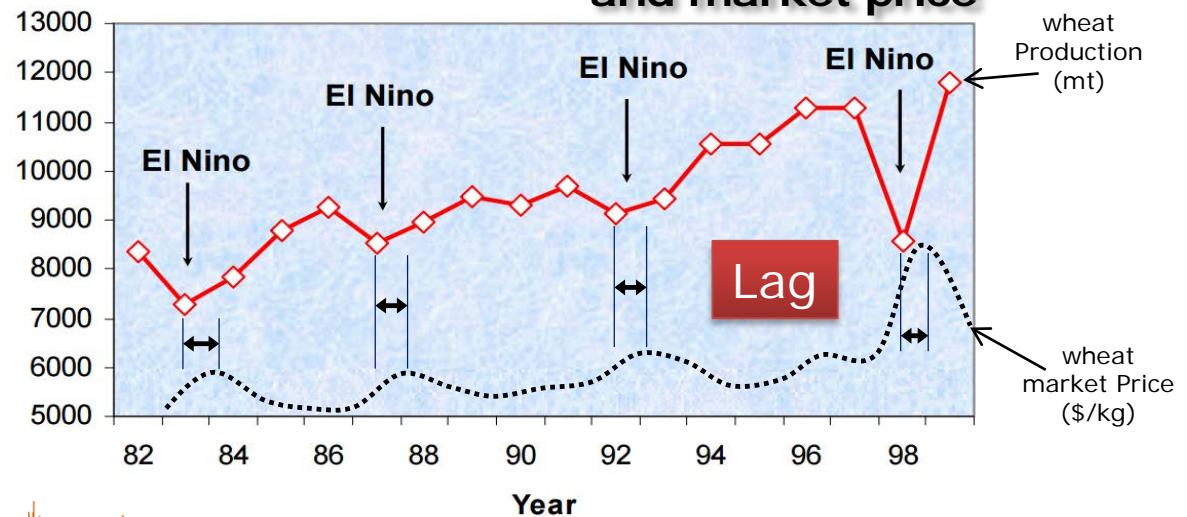


Farmer Smart



- El Niño advisory
- Drier than normal
- Decision-support tool : Planting date adjustment with yield estimation
- Insect infestation increases, thus cultivated *Underhill* for insect control
- Minimum tillage to protect stored soil moisture
- Planted half wheat 0.5 month earlier, rest was planted in the normal period
- Did NOT forward sell hay, decided to harvest the actual wheat
- Sold a little for cash, but stored quite amount for the next market

Relation between climate and wheat production and market price



Market

Farmer Smart

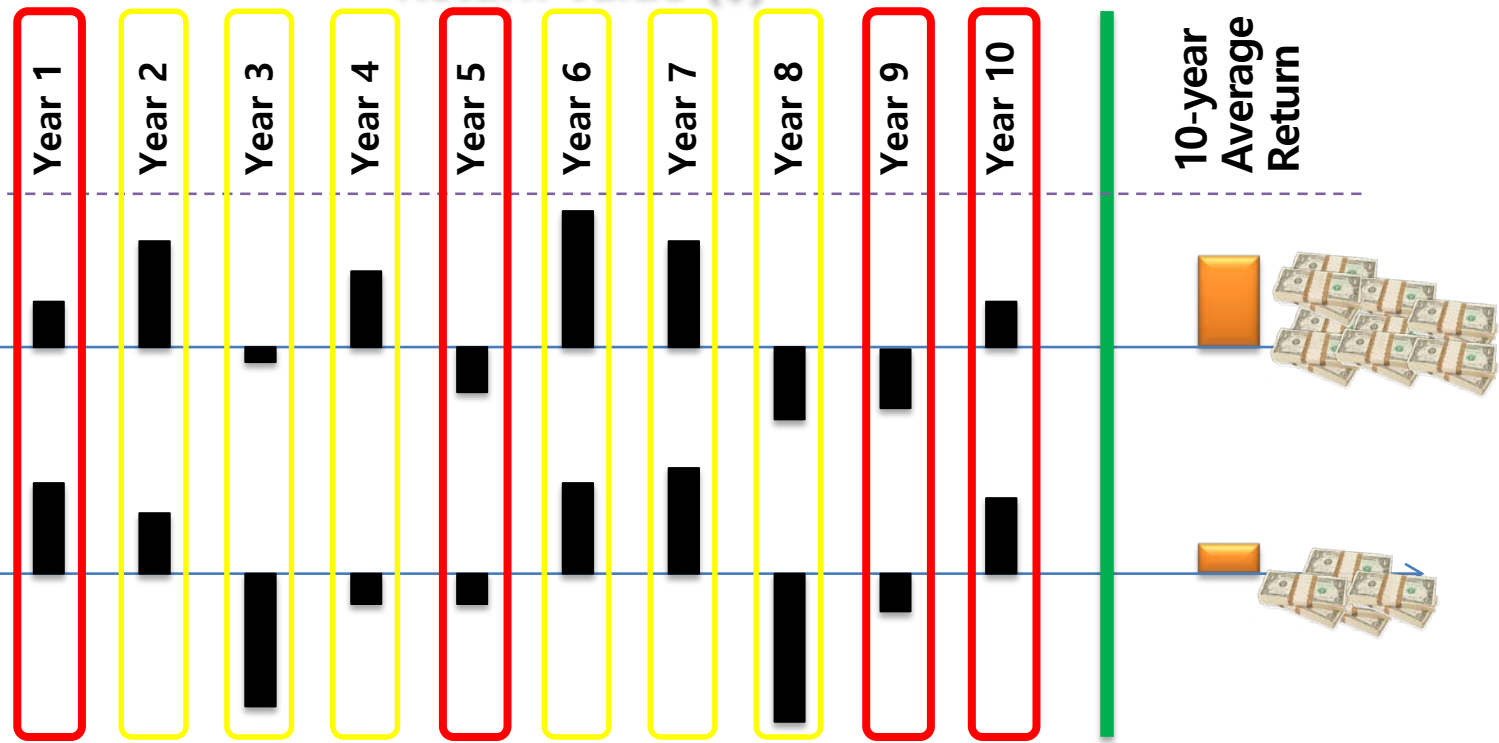


Smart



Tom (control)

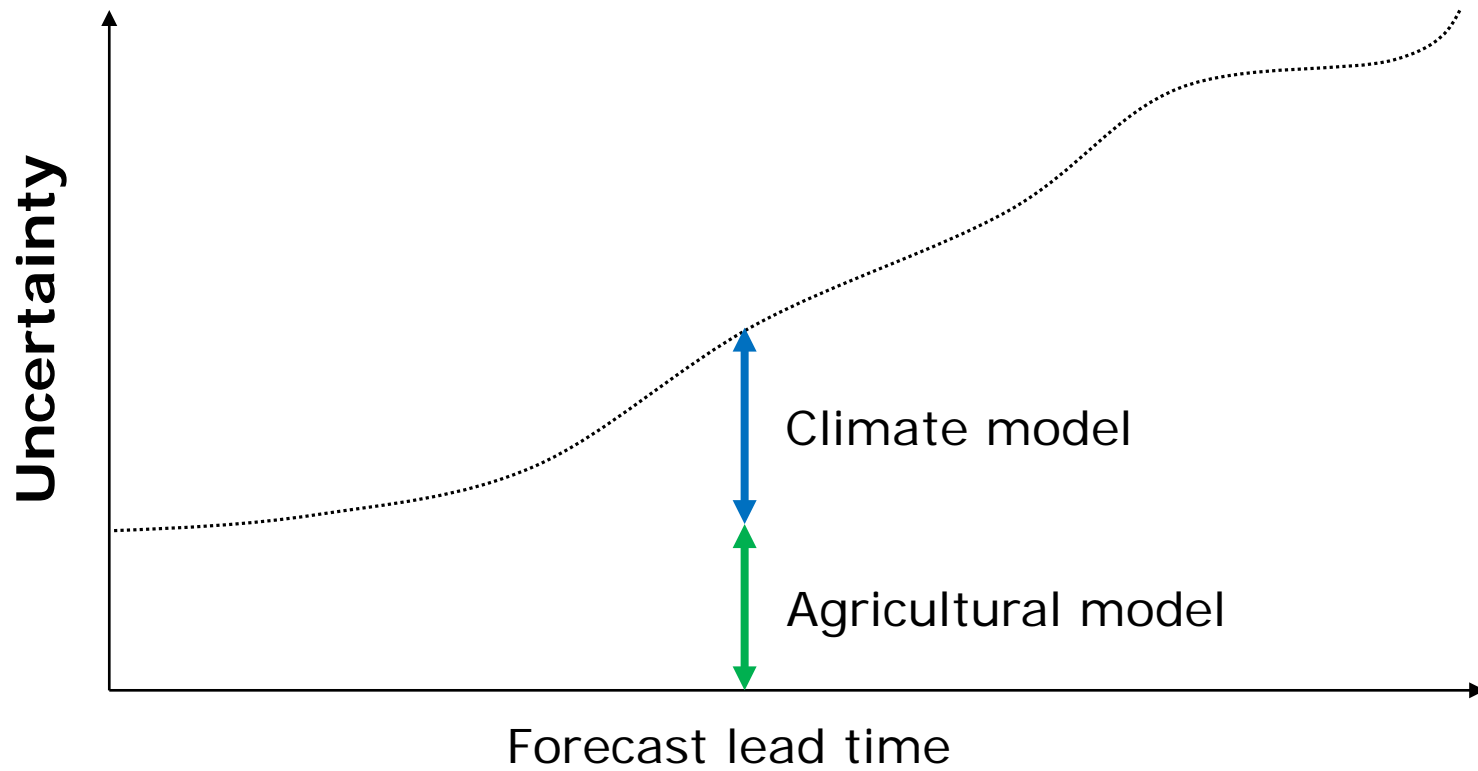
Return value (\$)



Because Climate Information is Probability-Based !



Uncertainty matters...

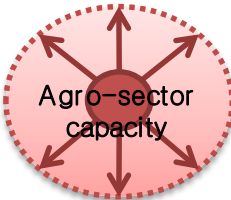
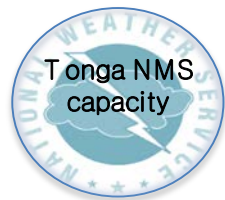




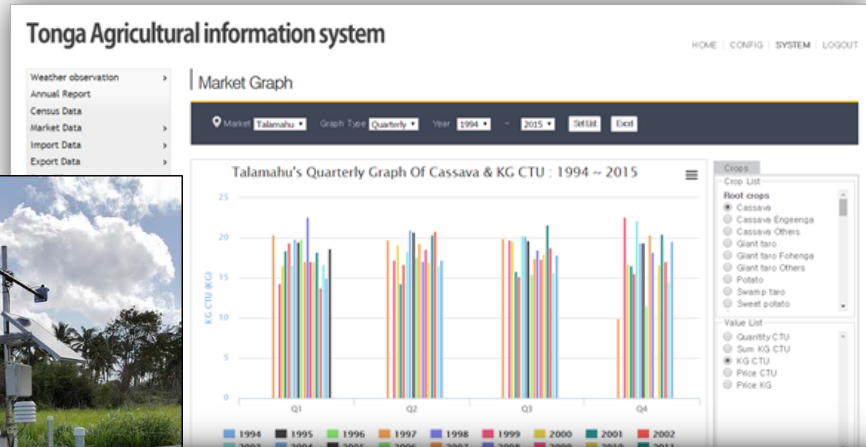
Climate Smart Agriculture

FIRST with Ensuring Data Availability

“Tonga AgroMet Project”



① AGRO-SECTOR CAPACITY BUILDING



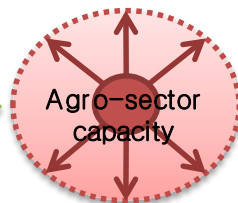
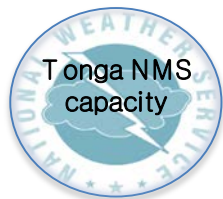
- Development of an agriculture data system
- Generation of agro-met information



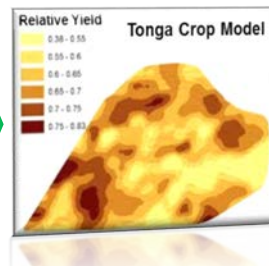
Climate Smart Agriculture

SECOND with Enhancing Climate Service

“Tonga AgroMet Project”

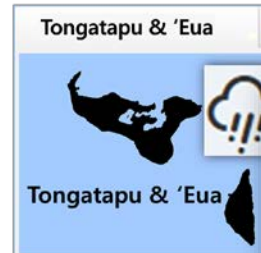
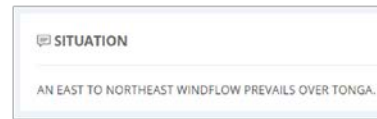


① AGRO-SECTOR CAPACITY BUILDING

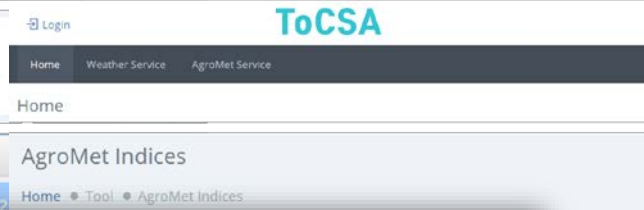


② CLIMATE SERVICES FOR AGRICULTURE

- Research on the core relationship between climate and agriculture through modelling
- Development of climate services



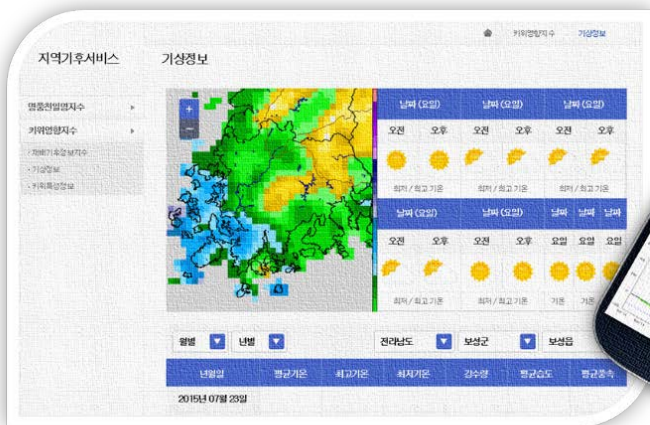
DAY	DESCRIPTION
TONIGHT AUG 1	Thunderstorms
TUE AUG 2	Thunderstorms
WED AUG 3	Thundershowers
THU AUG 4	Scattered Thunderstorms
FRI AUG 5	Scattered Thunderstorms
SAT AUG 6	AM Clouds/PM



Climate Smart Agriculture

SECOND with Enhancing Climate Service

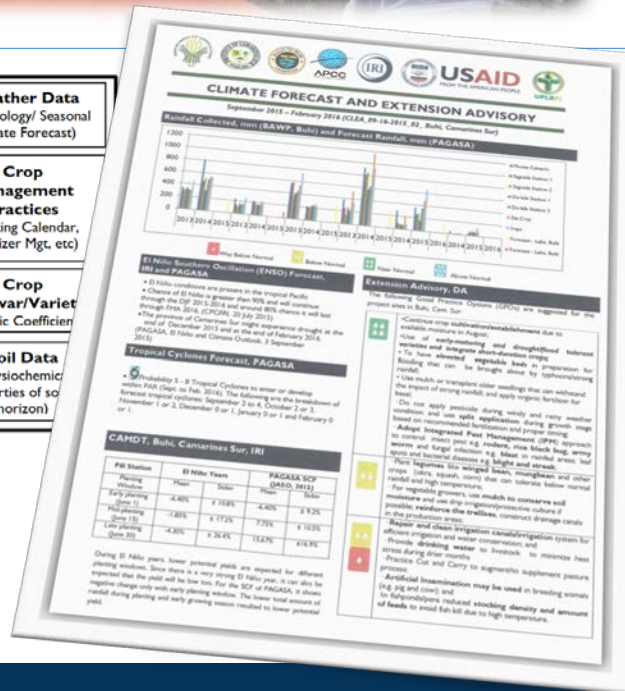
“Climate Service for Kiwifruit Growers”



“Rice Disease Early Warning in the Philippines”



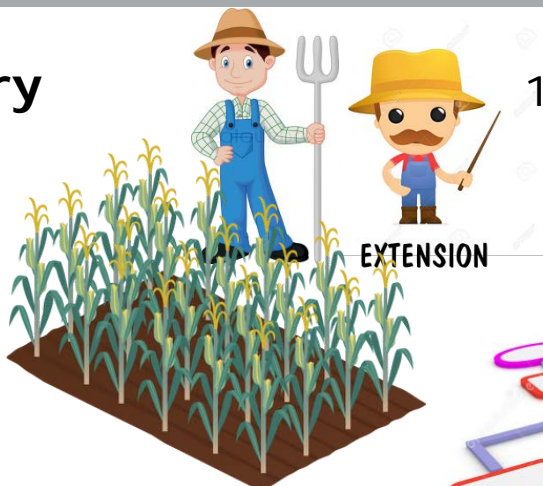
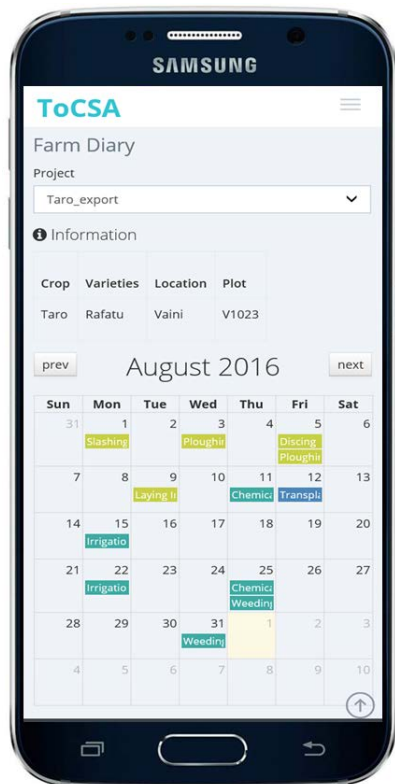
- Weather Data**
(Climatology/ Seasonal Climate Forecast)
- Crop Management Practices**
(Planting Calendar, Fertilizer Mgt. etc)
- Crop Cultivar/Variety**
(Genetic Coefficient)
- Soil Data**
(Physiochemical properties of soil horizon)



- STAKEHOLDER DECISION**
- Analyze specific crop variety to plant and farming logistics and inputs to use
- Develop cropping schedule and identify ideal time for planting crops
- Introduce interventions to minimize crop loss

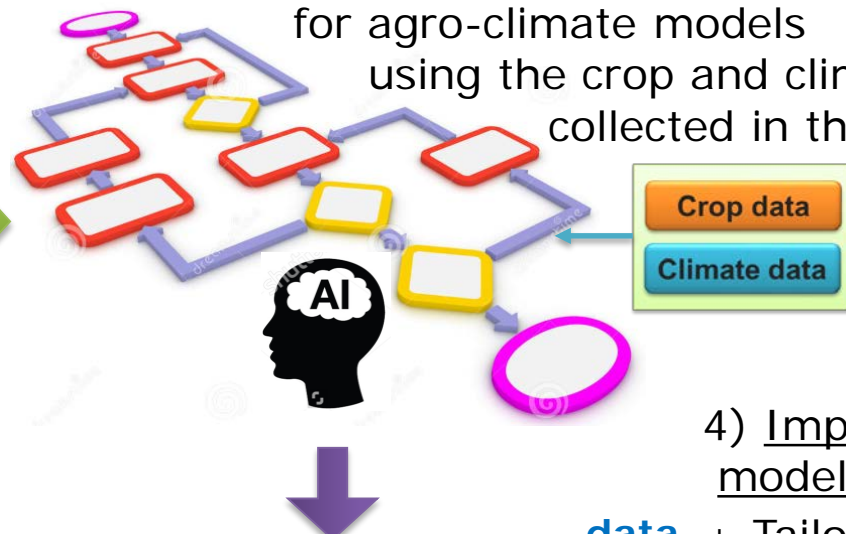
Enhanced Climate Services through Ensuring Data Availability

Crop-Clim Diary



1) Farmers and extension officers input crop phenology and yield info into diary

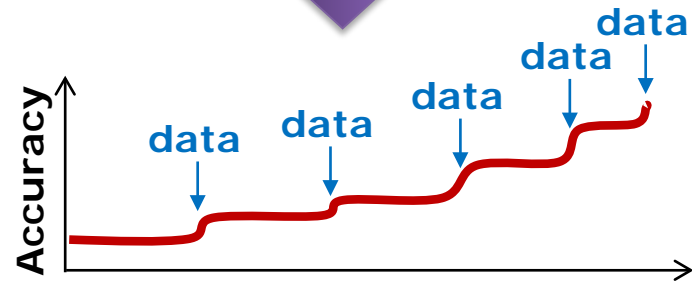
3) Algorithms calculate best parameters for agro-climate models using the crop and climate data collected in the diary



Tmax
Tmin
Rain
Srad
Sunshine



2) Crop-Clim Diary automatically gathers climate info from weather stations or weather-monitoring DB

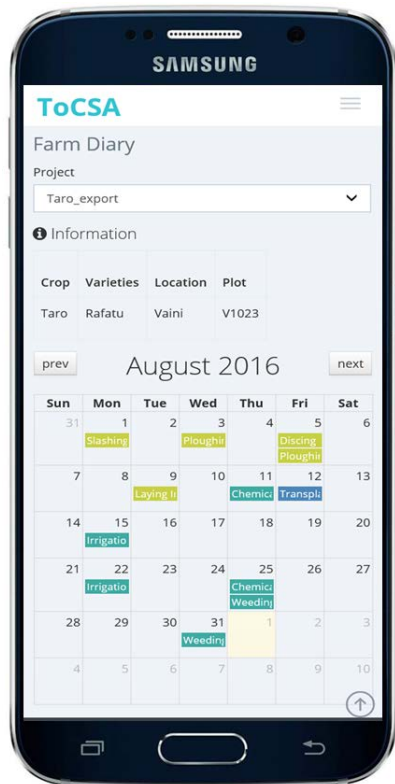


4) Improved model accuracy
+ Tailored decision support
= **Enhanced Agricultural Resilience**



Enhanced Climate Services through Ensuring Data Availability

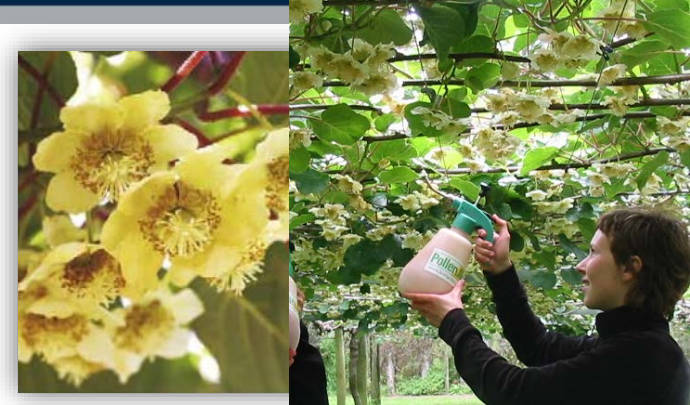
Crop-Clim Diary



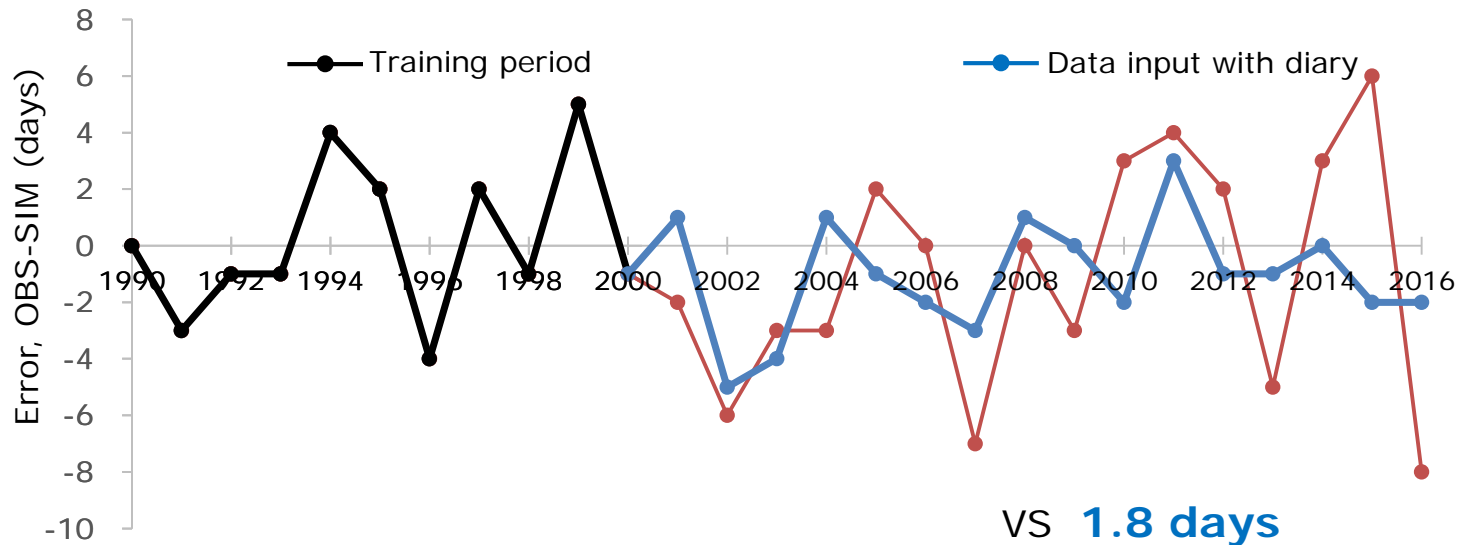
CASE I

Artificial Pollination Support for kiwifruit growers

→ Estimate flowering date to prepare pollen and labor



Flowering Date Simulation with a Kiwifruit Phenology Model





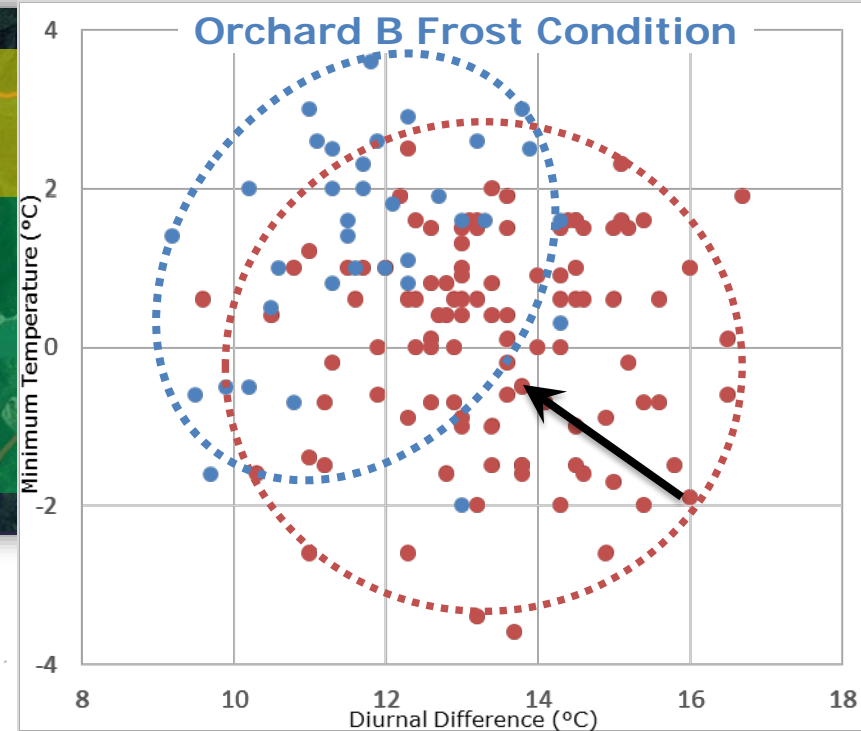
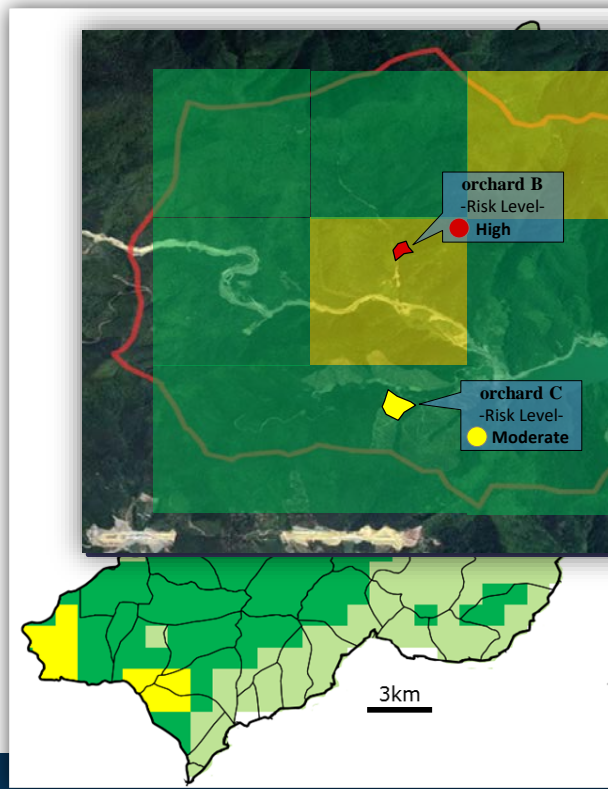
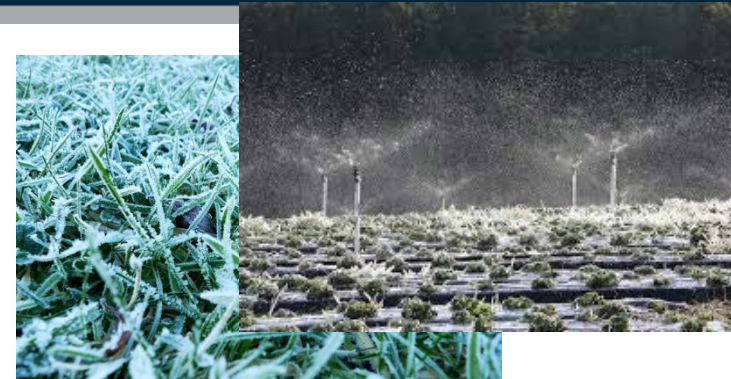
Enhanced Climate Services through Ensuring Data Availability

Crop-Clim Diary



CASE II

Tailored Frost Early Warning for kiwifruit growers
→ Different frost algorithms applied for each orchard

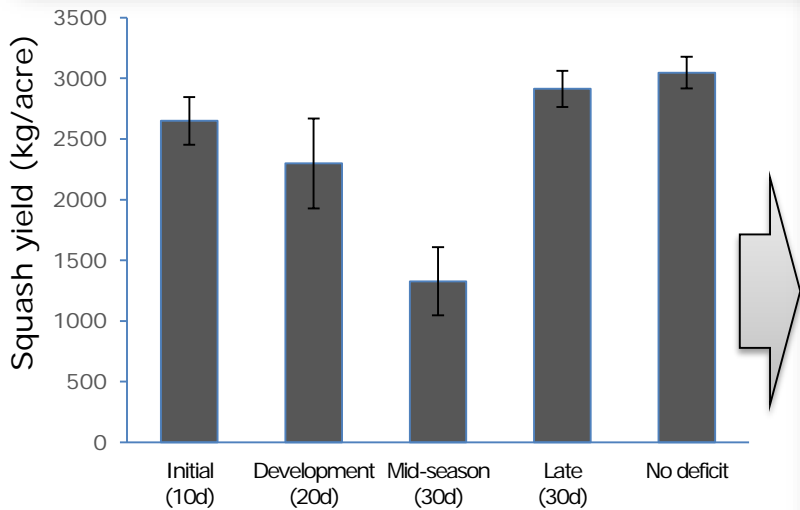
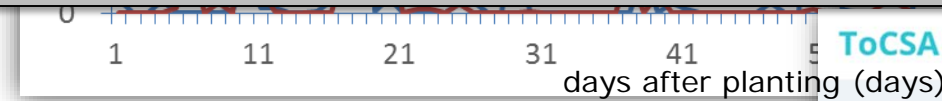


Enhance

Rainfall (mm)

— 2013 squash → 3,005 kg/acre
 — 2014 squash → 945 kg/acre

“Many policies fail because experts believe that better science will automatically lead to better decisions without fully understanding the specific situation and the institutional context within which the climate information is to be used”
 (Lugon, 2010)



* Effect of below normal rainfall during each stage on the final squash yield is automatically calculated using the crop and climate data collected in the

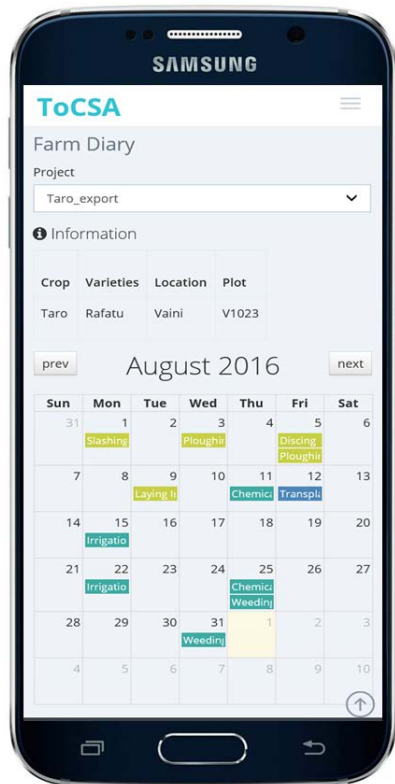


Enhanced Climate Services through Ensuring Data Availability

Crop-Clim Diary

CASE IV

Export documentation for the compliance requirement for the each country-specific regulation
 → Print preloaded document form based on diary info



○ format1 ● format2 ○ format3 02/19/2016 ~ 02/21/2016

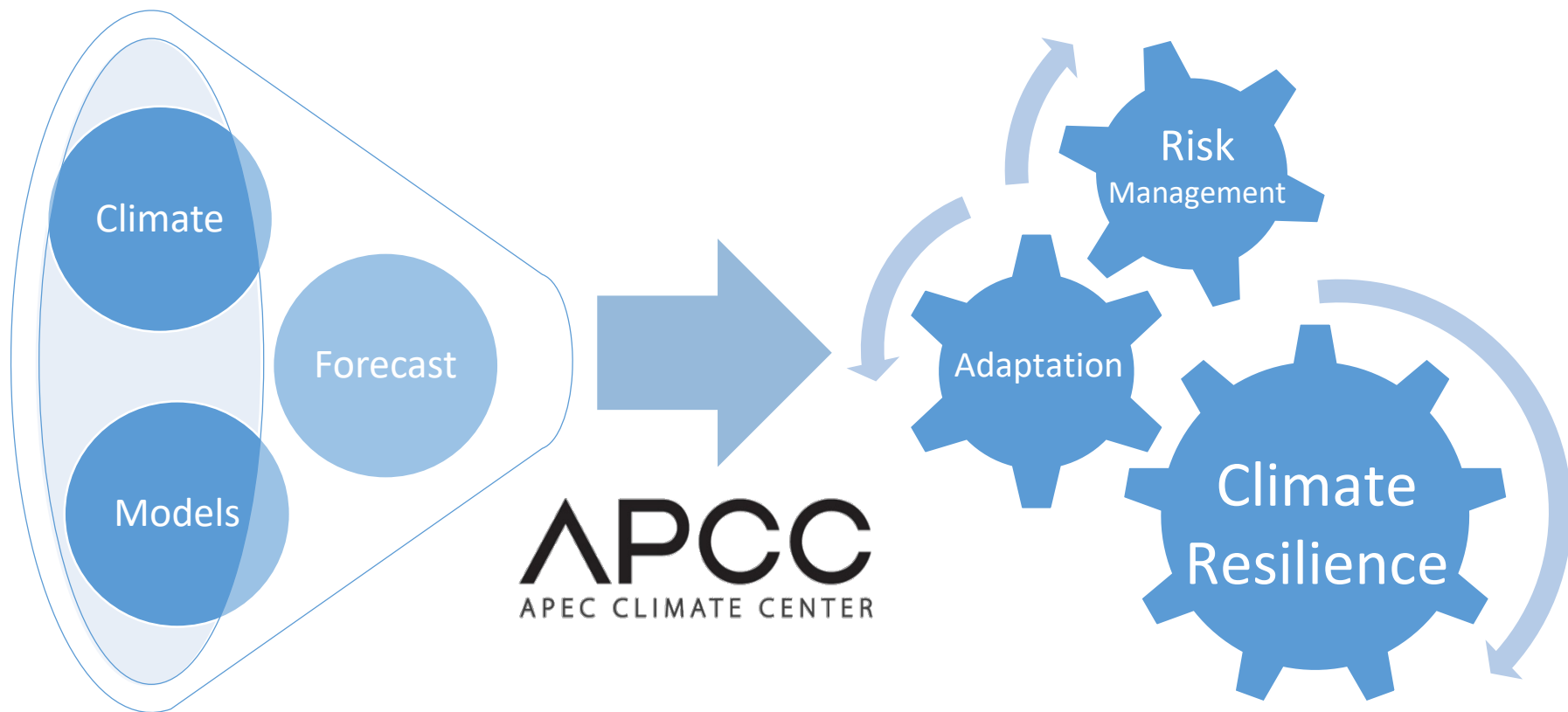
Name/Grower NO	Minoru Mishi /	Village	Utolau	Telephone	43 - 091
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Crop	BuHernut	Variety	Linusi	Seed Used	22680	NPK Used	30 * 40 Kg
Plant Date	7-8/05/2015	CAN Used	NIL	Emergence Date	11-12/05/2015	Harvest Date	01/09/2015
Flowering Date		Harvest Bins					

Date Applied	Chemical Used	Brandname	Application Rate	Tanks Used	Comments
01/06/2015	Fungieple	Copper	600gm	200L water	spray
04/06/2015		Plosma	2.7L	200L water	mistblower
25/06/2015	Fungieple	Niglolo	6Kg	2300L water	Boom spray





닫기 출력

We make climate information useful !



APCC's Activities

The mission of APCC is to enhance socio-economic prosperity in the APEC region by utilizing up-to-date scientific knowledge and innovative prediction techniques on climate through:

 Climate Prediction	 Application Studies	 Climate Info. Services	 Capacity Building
<p>APCC produces value-added, reliable, and timely climate prediction information, and provides it to the APEC member economies.</p>	<p>APCC leads developing interdisciplinary research and application techniques in the climate-environment-society nexus.</p>	<p>APCC serves as a key climate database center to distribute climate data, prediction information, and related tools.</p>	<p>APCC assists developing countries from the APEC region in building their own capacity to produce reliable climate prediction information.</p>

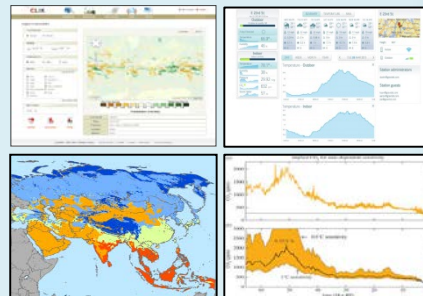
- 3 & 6 month forecasts
- ENSO, IOD forecasts
- S2S BSISO forecasts
- Downscaled climate change scenarios



- APCC-CRIEPI Project
- APCC-NCDR Project
- APCC-CARDI Project
- APCC-IRI Project
- APN Project
- Tonga AgroMet Project
- ROK-PI CLIPS Project
- ROK-ASEAN Project



- Climate Information Tool kit (CLIK)
- ADSS
- TRACE
- Open API



- APEC Climate Symposium
- APCC Training Programs
- Young Scientists Support Program



THANK YOU!

