

EFFECTIVE FARMER COMMUNICATION:

A critical component of achieving IPM

Part 1: The importance of understanding farmer behaviour to improve IPM and FAW control



8 June 2021



Time	Agenda Item
10:00	Introduction
10:05	Dr K L Heong, Distinguished Qiushi Chair Professor, Zhejiang University, Hangzhou, PR CHINA, Former Principal Scientist, International Rice Research Institute, Philippines Importance of policies, structural reforms and enhancing farmers' ecological literacy: experiences from rice.
10:25	Q & A Session
10:35	Dr Y Andi Trisyono, Professor, Universitas Gadjah Mada Understanding farmer needs towards FAW control
10:50	Q & A Session
11:00	Delisa Jiang, CropLife Asia Exploring behavioural science to drive farmer PPE uptake in India
11:15	Q & A Session
11:25	Dr Philippe Bujold, Rare Centre Understanding farmer behaviour and driving change- a behavioural science perspective
11:40	Q & A Session
11:50	Summary
11:55	Close



Photo by G. Goergen, IITA.

A recording of the webinar will be made and be distributed 1 week after this session

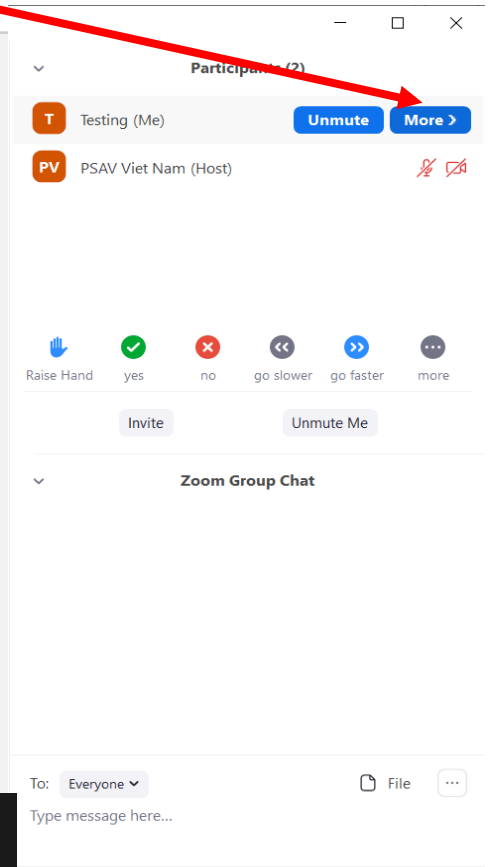
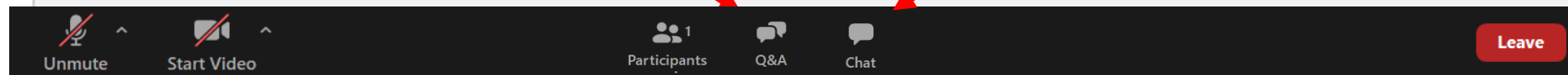
1. Technical issues:

- Try logging off and on
- Send a message to “Grow Asia” in the Chat

3. **Rename** yourself under “More” using the format “Name (Organization)”

2. Use the **Q&A box** to ask questions to the speakers

4. Use **Chat** if you want to just make a comment to everyone (e.g. thank a speaker, share a link, highlight an important point)



ASEAN Action Plan on FAW Farmer Communication Workshop Series

A four-part series to catalyse action on the development and design of more effective farmer communications on IPM and FAW control

- **Session 1:** Behaviour
- **Session 2:** Case-studies
- **Session 3:** Pesticide Use & Behaviour
- **Session 4:** Best Practice

Register at: <https://www.aseanfawaction.org/events>

Case-Studies: We want your case-studies and examples – contact us at faw@growasia.org

Interactive

Give us your feedback and questions in the farmer communication forum at:

<https://www.aseanfawaction.org/forum/farmer-communication>

(if you wish to have a certificate of participation you must subscribe to the farmer communication forum and either ask a question, share something interesting about farmer communication like an example of something you noticed that worked well, or note something you found useful in the workshop)



1. www.aseanfawaction.org

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2.

Blog

Forum

Research Organisations

Community

Join our community through our blog, interactive forum, or by sharing more about your organisation and activities.

3.



FORUM

This is your opportunity to ask questions, share ideas and experiences and talk about how to manage FAW in the region using integrated pest management approaches

Forum

Any problems email: faw@growasia.org

Once you have completed this step please email faw@growasia.org to request participation certificate and please say which sessions you need a certificate for.



Farmer communication

Following

42 8

How can we best communicate with farmers to ensure access to information on how to control FAW and improve IPM?

BIOLOGICAL CONTROL

**Enhancing farmers' ecological literacy through
communication and support policies
Experiences from rice.**



K.L. Heong 香广伦

Distinguished Qiushi Professor

Zhejiang University, Zijingang, Hangzhou, CHINA

Former Principal Scientist

International Rice Research Institute (IRRI)

PHILIPPINES

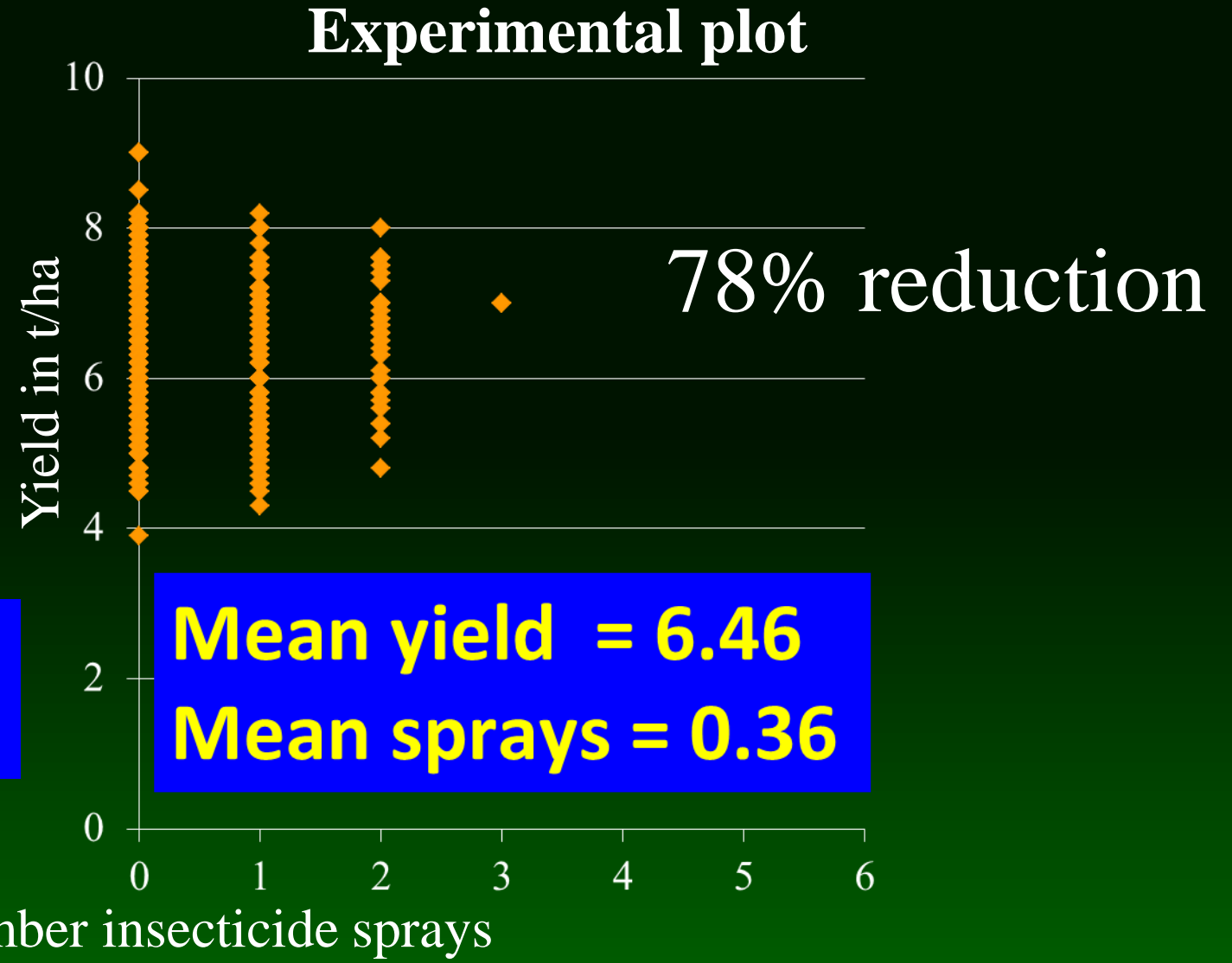
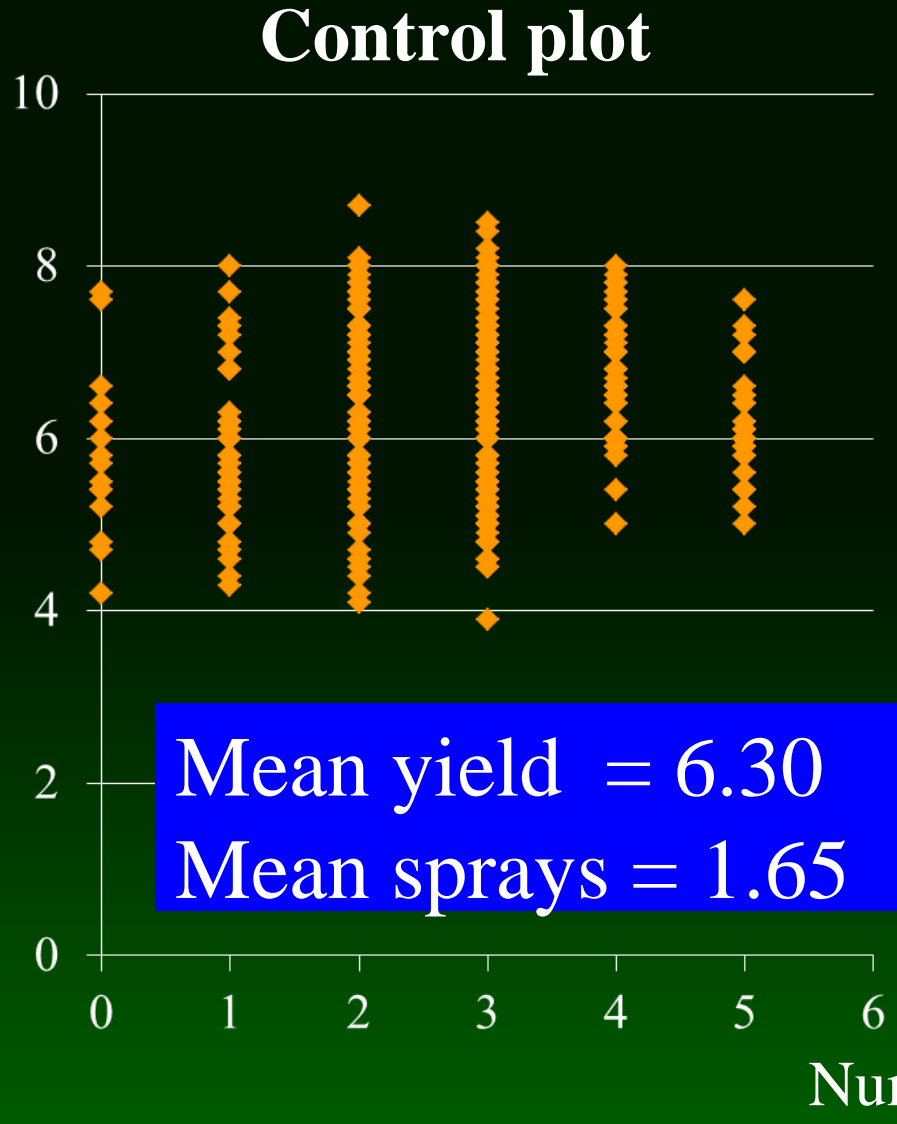
Insecticides and Rice

- Rice grown and feeding millions is a wonder crop
- It have few insect pests and those that are destructive are secondary problems induced by insecticides.
- Farmers have **little or no productivity gains from insecticide use.**
- More than 90% of famers' sprays are misuses
 - Wrong timing, wrong targets, wrong chemicals, wrong concentrations, bad sprayers.
- Farmers are much better off not using any insecticides

% benefits of insect management strategies Pingali et al 1997

Sites	Management strategies	# sprays	% Net benefits over no spray strategy
Laguna	Complete protection	6	-11.7%
	Farmers' strategy	2	-3.6%
	IPM	1	-5.0%
	No spray	0	--
Nueva Ecija	Complete protection	6	-4.65%
	Farmers' strategy	2	-3.11%
	IPM	1	-3.50%
	No spray	0	--

Farmers' paired plot experiments : Mekong Delta W-S season 2001/02
N=>900

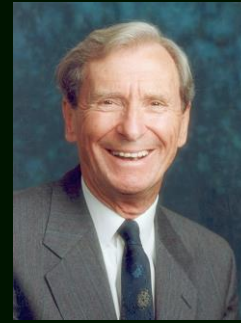


Insecticides and Rice

- Farmers' sprays also cause environmental pollution, exposing themselves to health risks and risking crop destruction by 2nd pests, like the Brown Plant Hopper (BPH).
- BPH outbreaks are induced by insecticides which release the pest from natural biological control.
- Rice IPM programs were established to teach farmers and help them rationalize, change their practices and reduce or stop insecticide use completely.

Insecticides are **NOT NEEDED** in most cases

- Way & Heong (1994)
 - “conclude that in tropical rice



insecticides are not needed

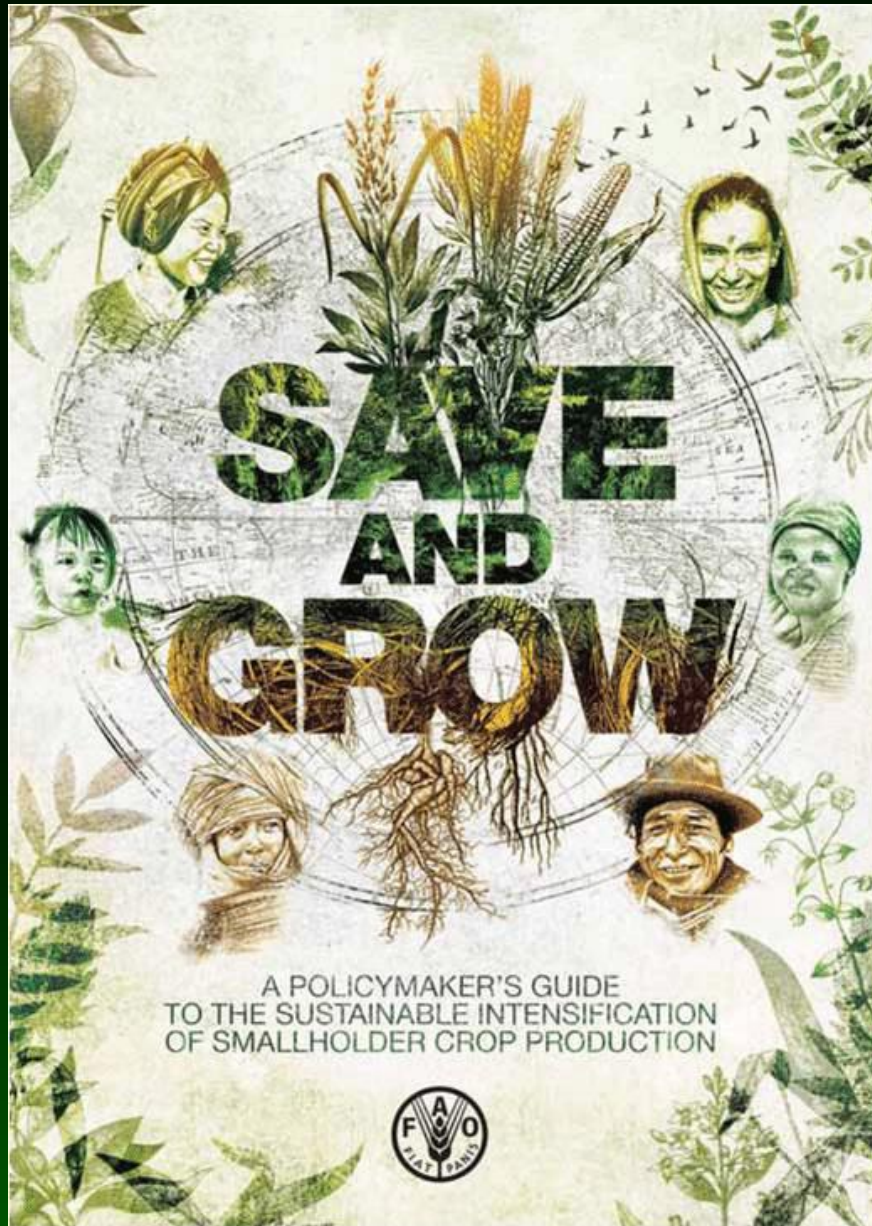
“pests” should be reassessed *before
insecticide use is contemplated*”

SCPI: Sustainable Crop Production
Intensification

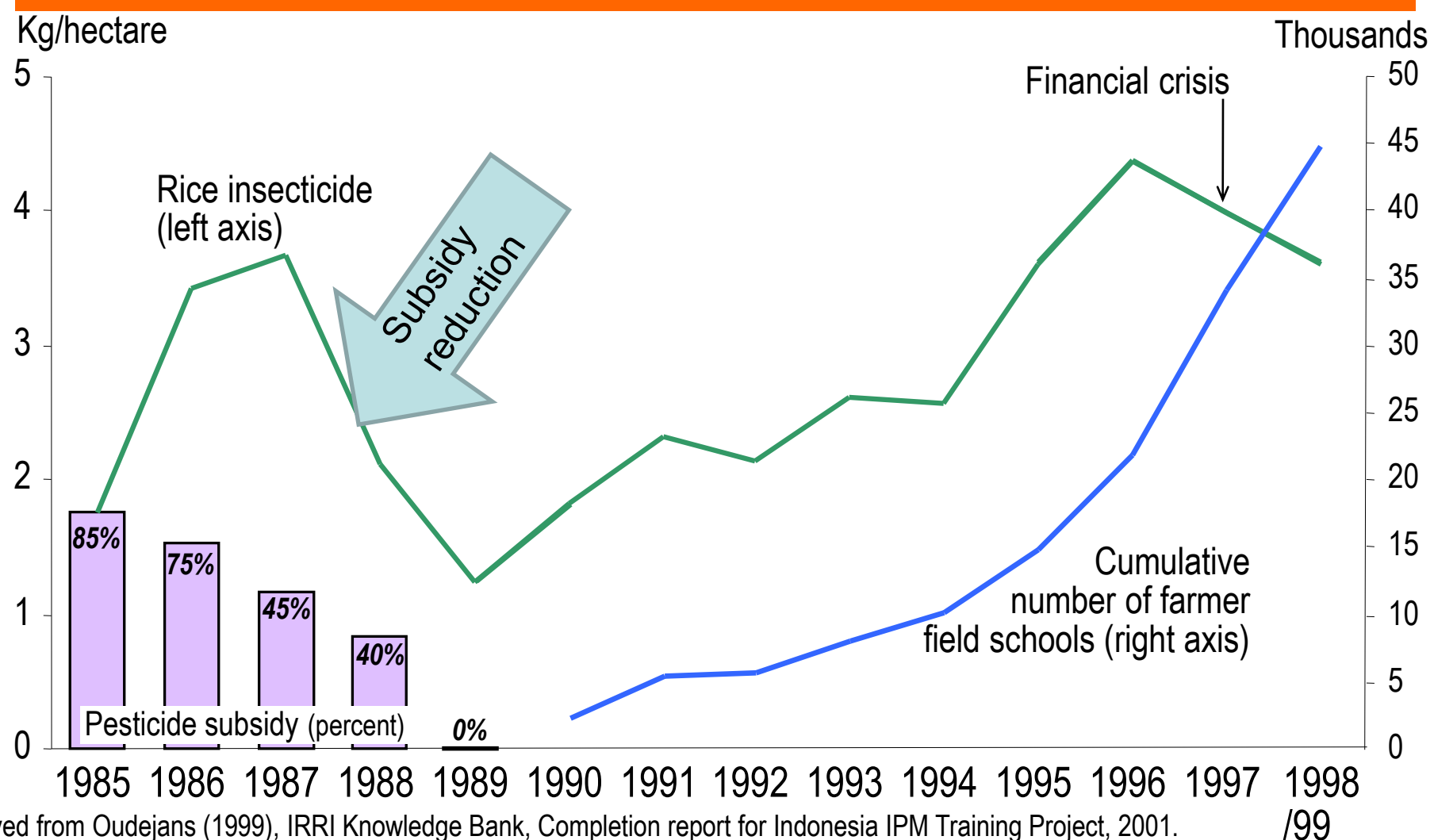
FAO 2012:
Most tropical
rice crops under
intensification
require

NO

insecticide use



Evolution of insecticide use in rice, pesticide subsidies, and farmer field school training in Indonesia, 1985-98/99

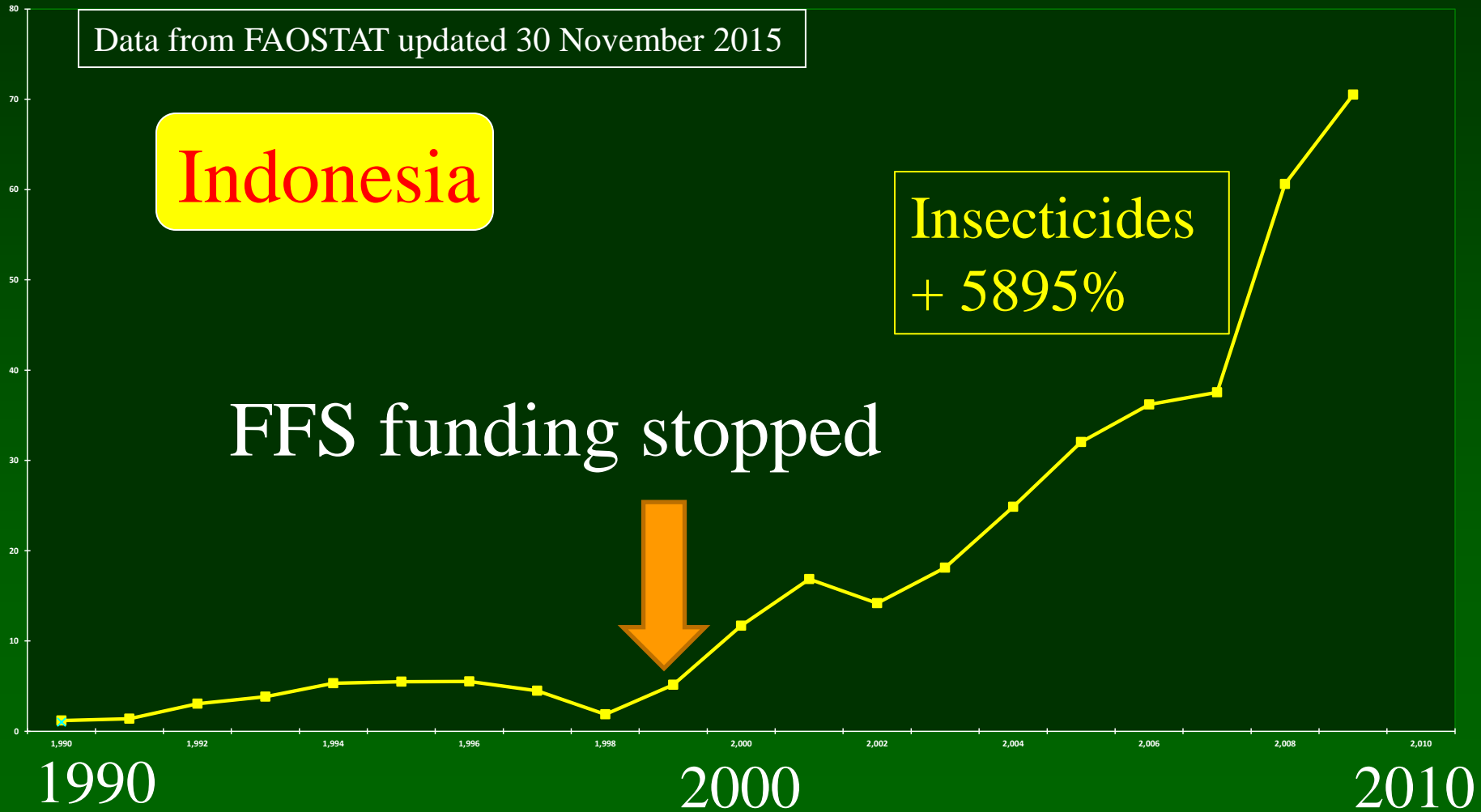


Note: Data derived from Oudejans (1999), IRRI Knowledge Bank, Completion report for Indonesia IPM Training Project, 2001.



Insecticide imports 1990 - 2009

Mil US\$

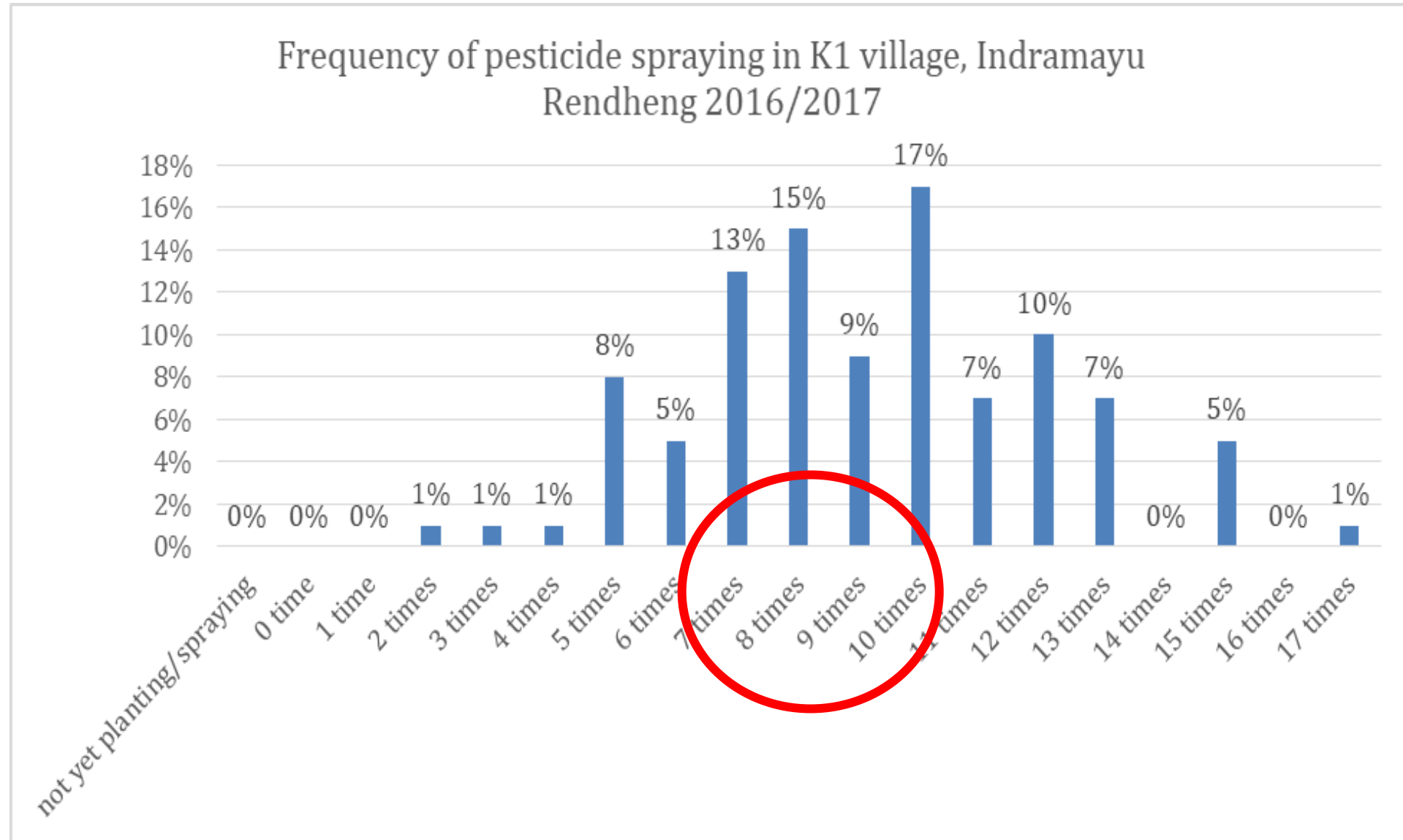


Why was rice IPM not sustainable

- In the 1980s and 2000s, WB, FAO and many donors spent > 200 million USD to provide intensive training to farmers – the Farmers Field Schools (FFS). And at least 5 million farmers were “FFS graduates”.
- But when the donor \$\$\$ stopped, FFS trained farmers returned to old practices of using calendar spraying.

Insecticide use today

After J.Fox and Y. Winarto 2021



WHY such a huge investment was not sustainable ?

- Lessons -

Training focused on knowledge with insufficient ecological content.
Farmers' knowledge increased but they had limited understanding

Governing systems not reformed to support the changes in practices

Governance Policies

Two main sets of policies

- Counter
 - These are existing policies that act counter to the new norms.
 - They need to be identified and mechanisms developed to handle them
- Enabling
 - These new laws, new policies to facilitate the smooth implementation of the new technologies.

Governance Policies

- Counter policies
- These policies and practices act against the new practices need adjustments and reforms
 - Poisons Act do not include pesticides
 - Pesticides are consumer products or FMCGs
 - Weak implementation (gaps) eg Malaysia under funded, understaffed.
 - Corruption eg Thailand, Vietnam
 - Implementers under threat from hired gangsters eg Vietnam, Malaysia

Governance of pesticide use in Vietnam

Pham Van Hoi, A Mol and P. Oosterveer 2013

- Despite advanced regulations and policies
- Govt. unable to regulate the pesticide market
- The main reasons
 - Weak governance structure
 - Large corruption
 - Too close relationships between government authorities and the pesticide industry
 - Information distortion through sales promotions
 - Weak legal system
- Restructuring current pesticide market is the top priority

WHY
is insecticide overuse
so rampant??

*What are the drivers and
root causes?*

FMCG 快速消费品

- Fast Moving Consumer Goods

Insecticide use based on IPM	Insecticide use based on FMCG
Driven by rational decision-making skills.	Driven by product packaging, brand names, attractiveness, recalls.
Maximize value of knowledge	Maximize value of sales Knowledge unimportant
Based on economic rationale	Based on emotions viz status, desire, fear, perceptions, attitudes, sense of power, price.

Use of fake news and information to increase sales

- Fake information
 - “Insecticides ALWAYS increase yields”
 - “Only stupid farmers don’t use insecticides, allow insects to eat their crops”
 - “Crops must have “medicine” to keep healthy”
 - Climate change – new pests will come
- Abundance of advertisements
 - Posters, Radio and TV, newspapers
 - Free gifts, huge sales incentives

Enable Policies

- Korean Environment Friendly Act (EFA) 1999
- Incentivising sustainable technologies in farming
- New Department established, new staffs, new building.
- Provides Certified EFA platform

Environment Friendly Agriculture Act (EFA)

- Top sustainable and eco-friendly farming practices
 - Permaculture. - A food production system which mimics how vegetables and plants grow in nature.
 - Aquaponics & Hydroponics.
 - Crop Rotation & Polycultures.
 - Trees and non crop vegetation around crops. - Ecological Engineering
 - Pesticide reduction programs and Use of eco friendly pest management methods.

EFA

- Eco-friendly Agricultural Products
 - means either not using or minimizing the use of synthetic pesticides, chemical fertilizers.
 - Developing certification, labeling and pricing system
 - A certification body conducts on-site inspections to ensure compliance.
 - Non compliance may be fined.

Agricultural landscapes diversified

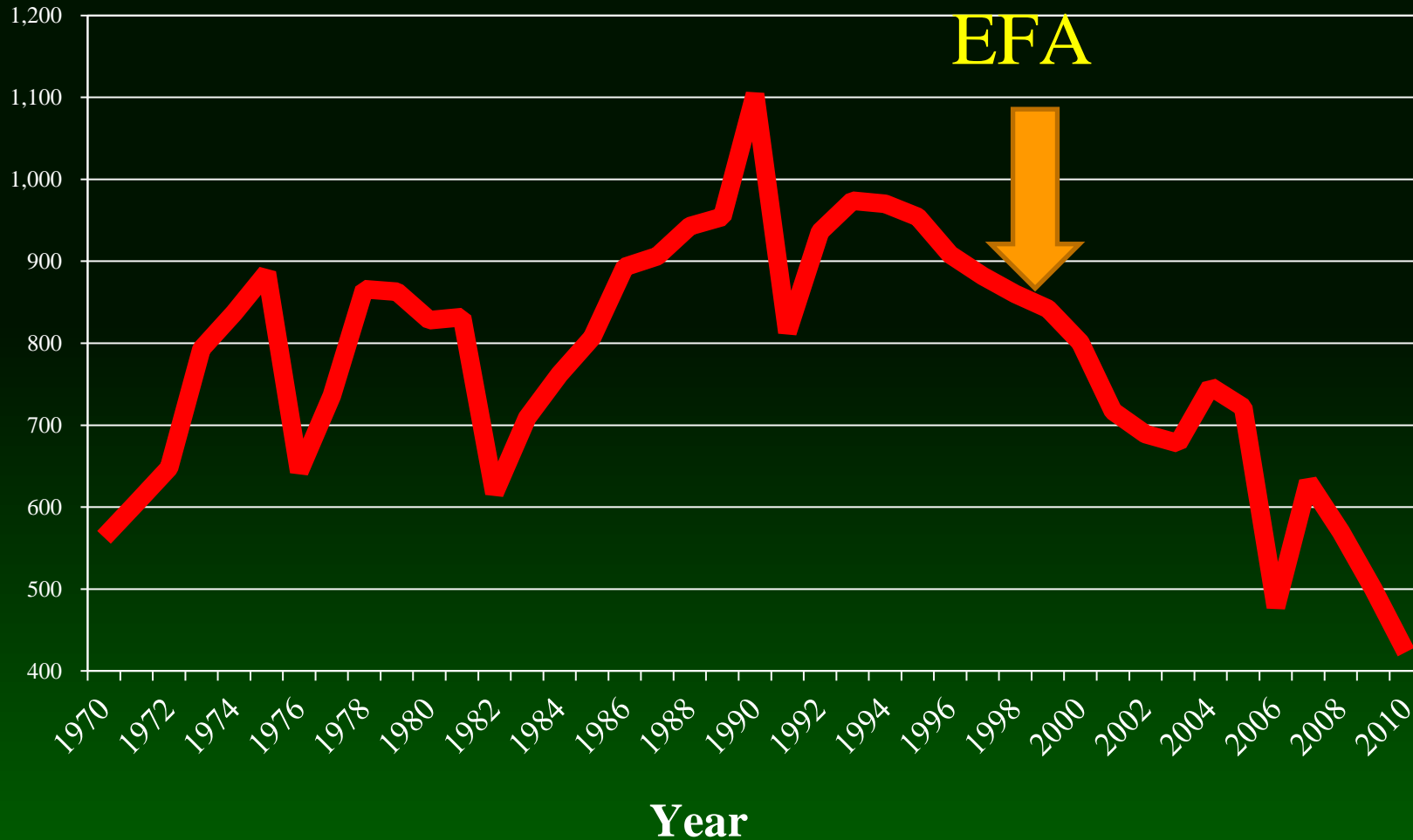


Agricultural landscapes diversified



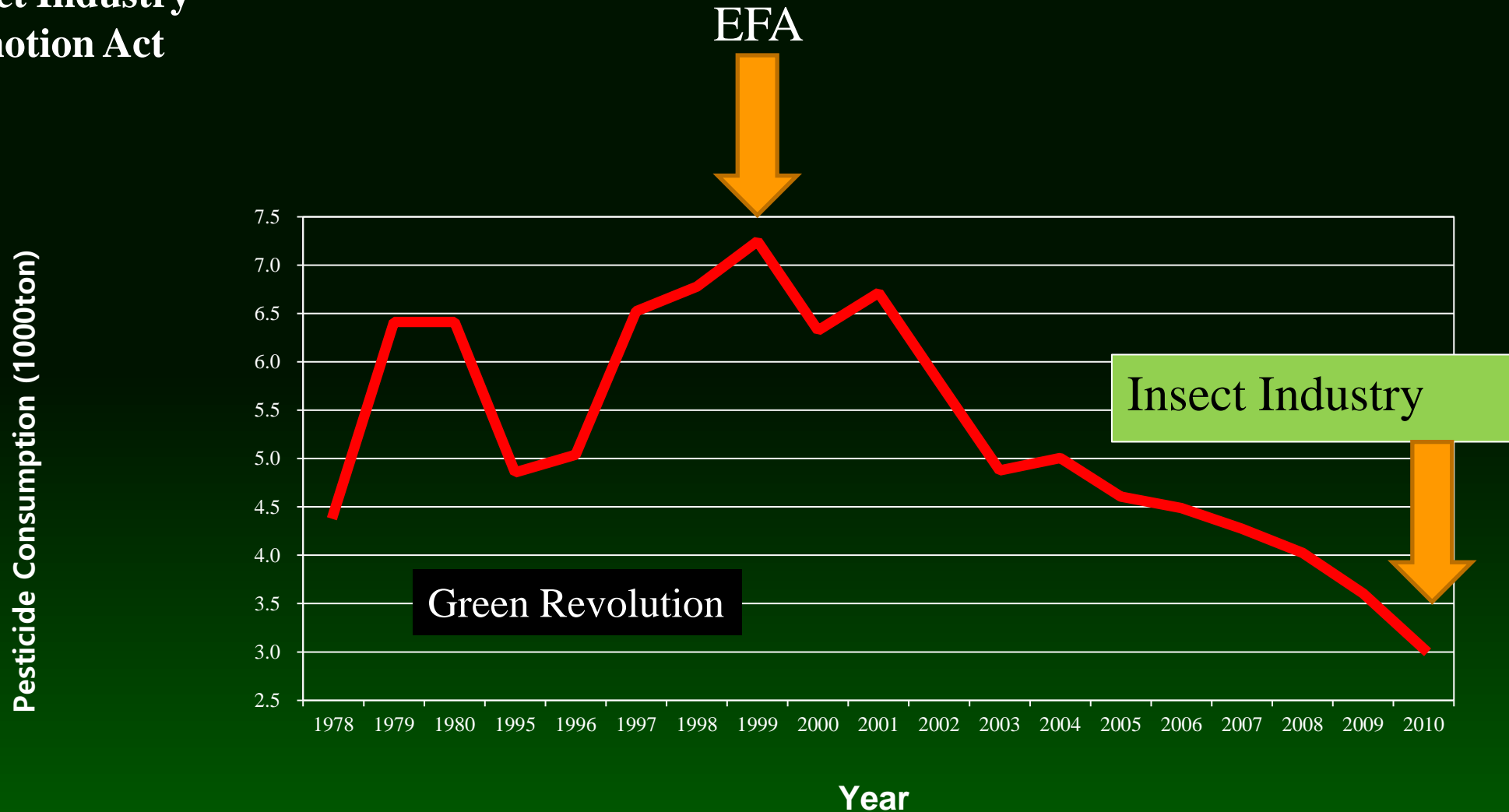
Fertilizer Consumption in Korea

Fertilizer Consumption (1000t)



1980-Green Revolution
1999-EFA Promotion Act
2010-Insect Industry
Promotion Act

Pesticide use in rice in Korea



Environmental Research Letters




CrossMark

TOPICAL REVIEW

Ecological illiteracy can deepen farmers' pesticide dependency

OPEN ACCESS

K A G Wyckhuys^{1,2,3,4} , K L Heong¹, F Sanchez-Bayo⁵, F J J A Bianchi⁶, J G Lundgren⁷ and J W Bentley⁸

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Activate Windows

Go to Settings to activate Windows.

In 2019 we published a paper in Environmental Research Letters to examine...

Why farmers do not favor biological control practices

Farmers' ecological illiteracy

- Farmer training programs focus on improving farmers' knowledge and skills.
- However, may not necessarily translate into improving farmers' understanding, decisions and practices.
- In many cases temporary changes in farmers' practices occur but do not sustain and they quickly revert back to using pesticides as before.
- Most farmers could recognize spiders but did not understand biological control dynamics



Tools to understand farmers

Ethno-science

- Study of folk knowledge, concepts, classifications and understanding
- How farmers see their world
- Discover the languages or words farmers use
- Discover their attitudes towards pest losses
 - Farmers are **Loss Averse** not risk averse
- The main purpose is to develop innovations to improve our communication with farmers

Tools to understand farmers

Focus Group Discussions and KAP surveys

- FGDs are conducted in small groups in farm settings where we can explore the how, why, what and where from farmers.
- These findings are then developed into belief questions to measure belief attitudes.
- The KAP surveys are to discover how extensive particular attitudes and beliefs in an area.
- Results are used to develop communication approaches.

How people make decisions?

- Satisficing rather than optimizing (Simon, 1957)
—
- Simplicity & frugality rather than rationality & optimality (Gigerenzer & Todd, 1999).
- People rely on simple “rules of thumb” or *heuristics* (Kahneman & Tversky, 1974)

Distillation of research information into heuristics



- Heuristics are rules that people use to simplify information processing and decision making.
- Developed from experience and perceptions.
- Can be error-prone and biases.
- Interventions to understand farmers' rules and develop innovative ways to modify their heuristics to improve decision making

Distill scientific information

Distillation guidelines

- Develop a different level of information relevant to farmers
- Distill, tailor & communicate information
 - meaningful for farmers
 - consistent with how farmers see the world
 - something he/she can act on

Communication innovations

- Use principles of psychology to create games, analogies and farmer experiments to enhance learning using experiential learning methods.
- Communicate these rules and games extensively through media strategies, such multi-media campaigns, entertainment education programs on radio and TV to upscale and reached millions.

Cognitive dissonance technique

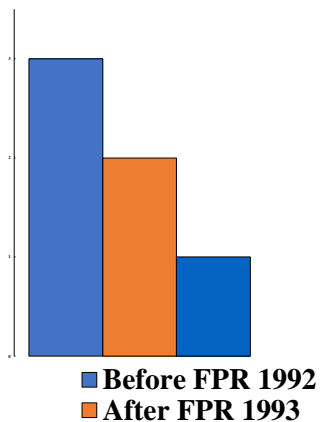
- Many rice farmers in Asia spray their crops early in the season thinking that these sprays would protect their fields from insects, especially the leaf feeders.
- Ecological research showed that these sprays are unnecessary, wasteful and even more damaging to production.
- At the early crop stages, a huge diversity of predators would migrate into the crop from neighboring habitats.
- Spraying would be counter- productive as they destroy millions of naturally occurring biological control agents.

Cognitive dissonance technique

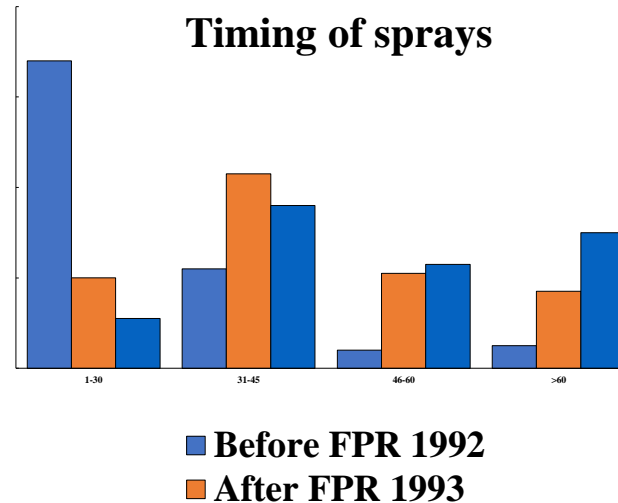
- Because of **plant compensation** abilities, leaf damages at the early crop stages have no yield consequences.
- These ecological concepts were “distilled” into a “simple rule” - **“Spraying in the first 40 days of the crop is NOT necessary”**.
- Farmers when presented with this rule which is in complete conflict with their normal beliefs are in **cognitive dissonance**.
- To help farmers **resolve their dissonance** they were invited to experiment by leaving half their fields that would not receive sprays in the first 40 days of the crop and the other half their normal practices.

Farmer participatory experiment to resolve cognitive dissonance

Spray number



Timing of sprays

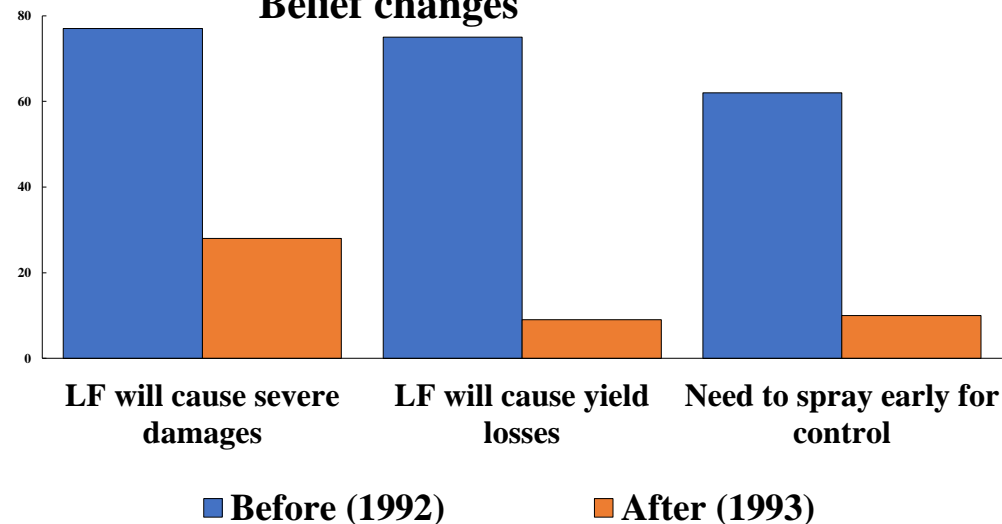


- Farmers reduced their sprays from 3 to 2 and then to 1.
- Farmers spraying in the early crop stages reduced from 68% to 20% and then to 11%.
- Beliefs changed:

Leaf feeding insects

can cause severe damage	77% to 28%
can cause yield loss	74% to 9%
had to be sprayed early	62% to 10%

Belief changes



Multimedia campaigns to communicate extensively

To motivate rice farmers in the Mekong Delta to modify their beliefs and pest management practices together with seed and fertilizer inputs.

Locally named 'Ba Giam Ba Tang' or 'Three Reductions, Three Gains', (a Brand name). the campaigns using leaflets, posters, billboards and radio were launched.

Farmers' practices changed significantly.

3 Reductions, 3 Gains



CÁC BƯỚC THỰC HIỆN	HIỆU QUẢ	Chương Trình 3 Giảm 3 Tăng
<p>1- Trên ruộng của mình đắp bờ dành riêng khoảng 1 công làm thử biện pháp "3 giảm".</p> <p>2- Phần ruộng còn lại làm theo cách nông dân vẫn thường làm.</p> <p>3- Ruộng làm thử nghiệm áp dụng 3 biện pháp kỹ thuật mới, còn tất cả các biện pháp khác như: diệt cỏ, giữ nước, phòng trị bệnh đều được áp dụng như nhau ở cả 2 ruộng.</p> <p>4- Khi thu hoạch, so sánh năng suất, chỉ phí đầu tư (giống, phân bón, thuốc trừ sâu) giữa 2 ruộng, tính hiệu quả kinh tế.</p>	<p>✓ Tăng năng suất</p> <p>✓ Tăng chất lượng gạo</p> <p>✓ Tăng lợi nhuận</p> <p>Kính mời bà con tham gia chương trình "3 giảm 3 tăng" để tăng lợi nhà ích nước, bảo vệ môi trường trong lành, bảo vệ sức khỏe mọi người.</p> <p>Hãy liên hệ các địa chỉ sau đây để được hướng dẫn thực hiện:</p> <ul style="list-style-type: none"> - Cán bộ Khuyến Nông xã. - Hội Nông Dân xã. - Trạm Bảo Vệ Thực Vật huyện. - Trạm Khuyến Nông huyện. - Trung Tâm Khuyến Nông tỉnh Cần Thơ. Số 04 Ngõ Hữu Hạnh - TP. Cần Thơ. ĐT: 820783 - Chi Cục Bảo Vệ Thực Vật tỉnh Cần Thơ Số 5E Đường 30 tháng 4 - TP. Cần Thơ. ĐT: 825787 <p>Chúc Bà con Tăng mùa Tăng giá</p>	<p>Giảm </p> <p>Giảm </p> <p>Giảm </p> <p>SỞ NÔNG NGHIỆP & PTNT CẦN THƠ - 2003 -</p>

GIẢM LƯỢNG LÚA GIỐNG	GIẢM LƯỢNG PHÂN ĐẠM	GIẢM PHUN THUỐC TRỪ SÂU
<p>1- Sử dụng hạt giống lúa tốt.</p> <p>2- Loại bỏ hạt lép lửng: dùng nước muối 15% (pha 1,5 Kg muối trong 10 lít nước) cho giống vào, vớt bỏ ngay hạt lép, lửng nổi trên mặt nước; sau đó xả lại nước là và ngâm bình thường.</p> <p>3- Gieo sạ với lượng giống thích hợp:</p> <p>Có thể sạ bằng phương pháp:</p> <ul style="list-style-type: none"> * Dung cụ sạ hàng: 70 - 100 kg/ha. * Sạ lan thưa :100 - 120 kg/ha. 	<p>1- Sử dụng bảng so màu lá lúa để bón phân đạm cho lúa vào 2 thời điểm là 20 đến 25 ngày sau sạ và 40 đến 45 ngày sau sạ</p> <p></p> <p>2- Điều chỉnh lượng phân đạm để giữ màu sắc lá lúa luôn ở khung màu số 4.</p> <p>3- Bón cân đối phân Lân và phân Kali theo lượng khuyến cáo (từ bón phân kèm theo).</p>	<p>Không phun thuốc trừ sâu cuốn lá trong giai đoạn từ 0 đến 40 ngày sau sạ. Vì trong giai đoạn này cây lúa có khả năng tự bù đắp những thiệt hại do sâu gây ra.</p> <p></p> <p>Lợi ích của việc giảm thuốc trừ sâu</p> <ul style="list-style-type: none"> ☞ Bảo vệ côn trùng và động vật có ích, hạn chế sự bùng phát của nhiều sâu hại khác. ☞ Giảm ô nhiễm môi trường. ☞ Giảm chi phí. <p></p>

Billboard



Changes in farmer practices and yields

All means significantly different between pre and post

Provinces	Cantho		Tiengiang	
	Pre	Post	Pre	Post
Seed rate kg/ha	234	208	189	170
Nitrogen rate kg/ha	100	92	106	100
Insecticide sprays/season	1.2	0.8	2.0	1.6
Yields kg/ha	4.6	5.6	4.5	5.0

Multimedia campaigns

Their insecticide sprays reduced by 13– 33% while their seed rates dropped 10% and nitrogen rates, 7% .

These practices were supported by modifications in belief attitudes that favored high inputs. Farmers also changed their perception of yield loss and reduce their loss aversion.

The Ministry of Agriculture and Rural Development to provide additional resources to reproduce the materials and campaign process to scale up and eventually reached more than 3 million farmers in south and central Vietnam.

Ecological Engineering techniques

```
graph TD; A[Ecological Engineering techniques] --> B[Restore Biodiversity]; A --> C[Conserve Biodiversity]; B --> D[Species Biodiversity]; C --> D; D --> E[Ecosystem functions]; E --> F[Ecosystem Services];
```

Restore Biodiversity

Planting nectar flowers on bunds
Crop diversification
Increase diversity of varieties

Conserve Biodiversity

Stop early season (first 40 days) insecticide use
Avoid using insecticides toxic to bees and hymenoptera

Species Biodiversity

Parasitoids, Predators, decomposers

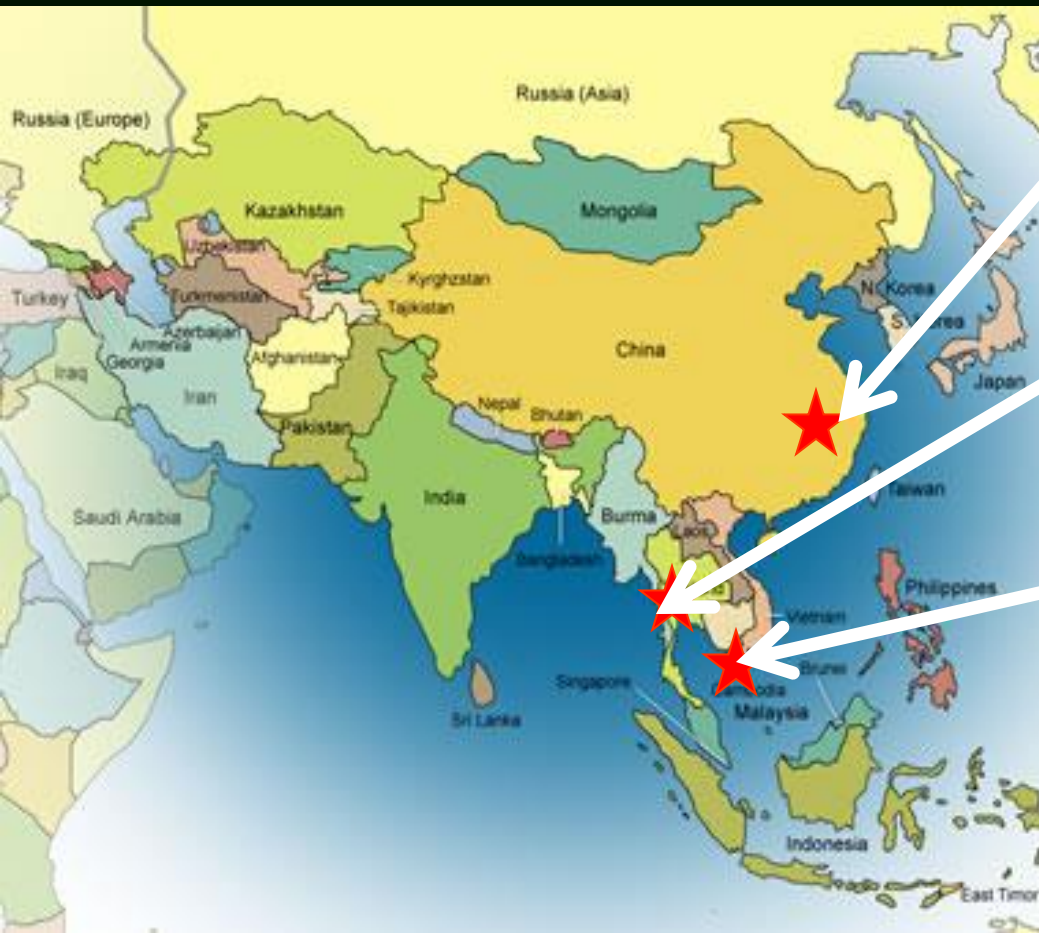
Ecosystem functions

Pollination, parasitism, predation

Ecosystem Services

Pest invasion resistance,
Pest and disease regulation
Pollination

Multi-country, Multi year evidence



Jin Hua China

Chai Nat Thailand

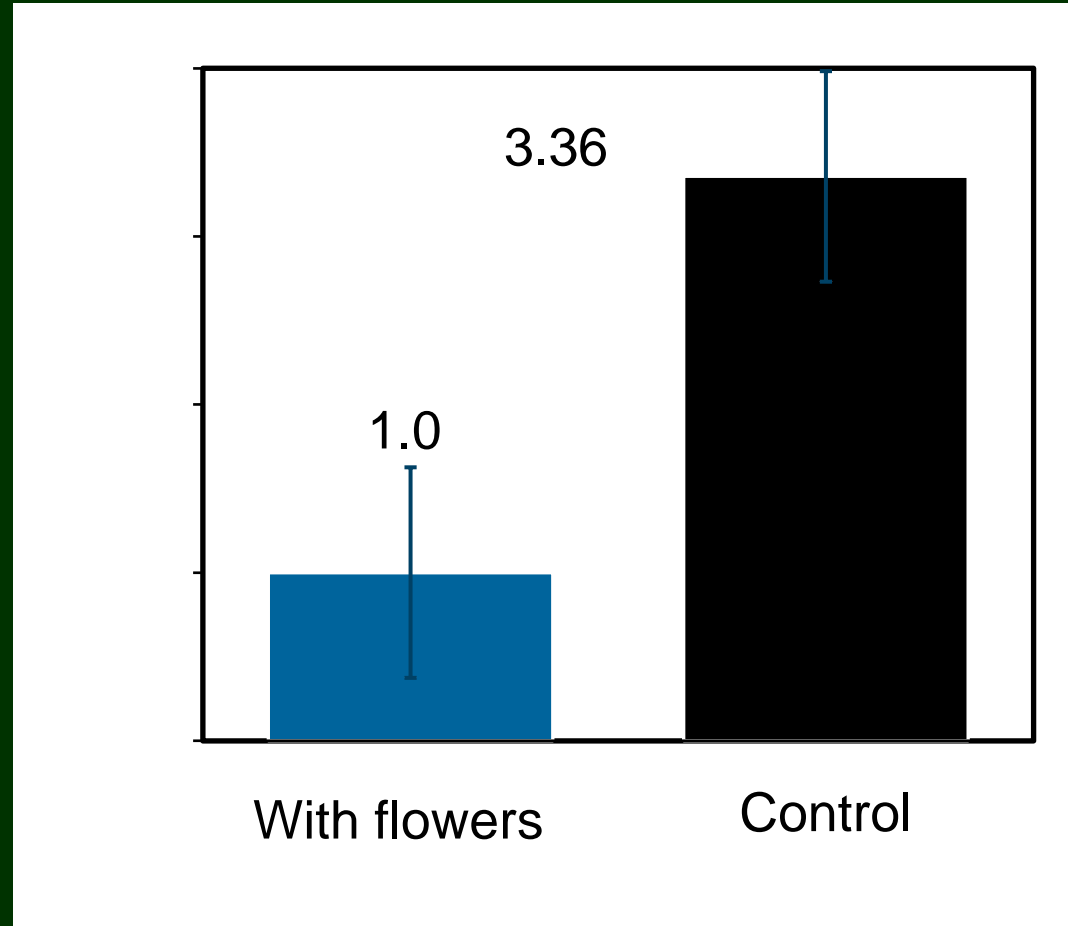
– Central Plains

Tien Giang Vietnam

– Mekong Delta

Cultivating flowering plants to increase biodiversity

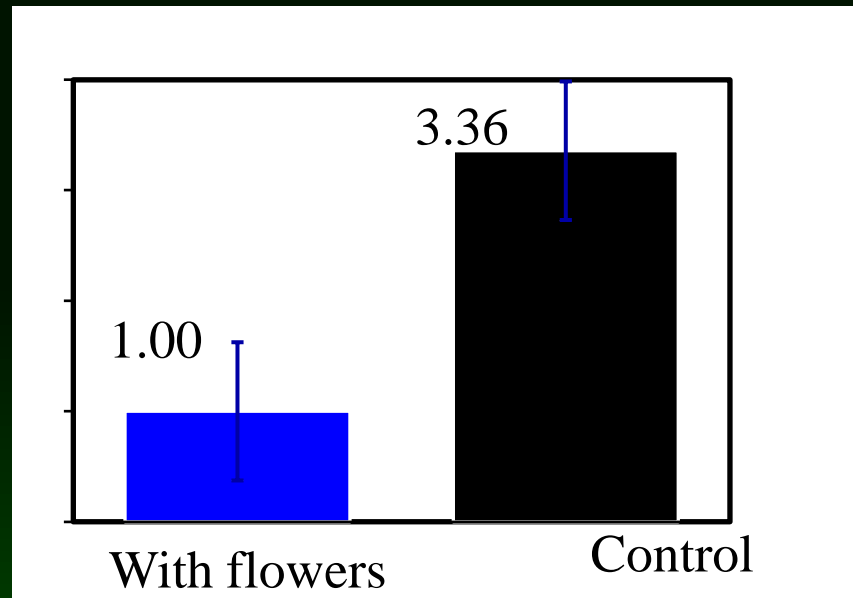
Number of insecticide sprays reduced by **70%**



with flowers

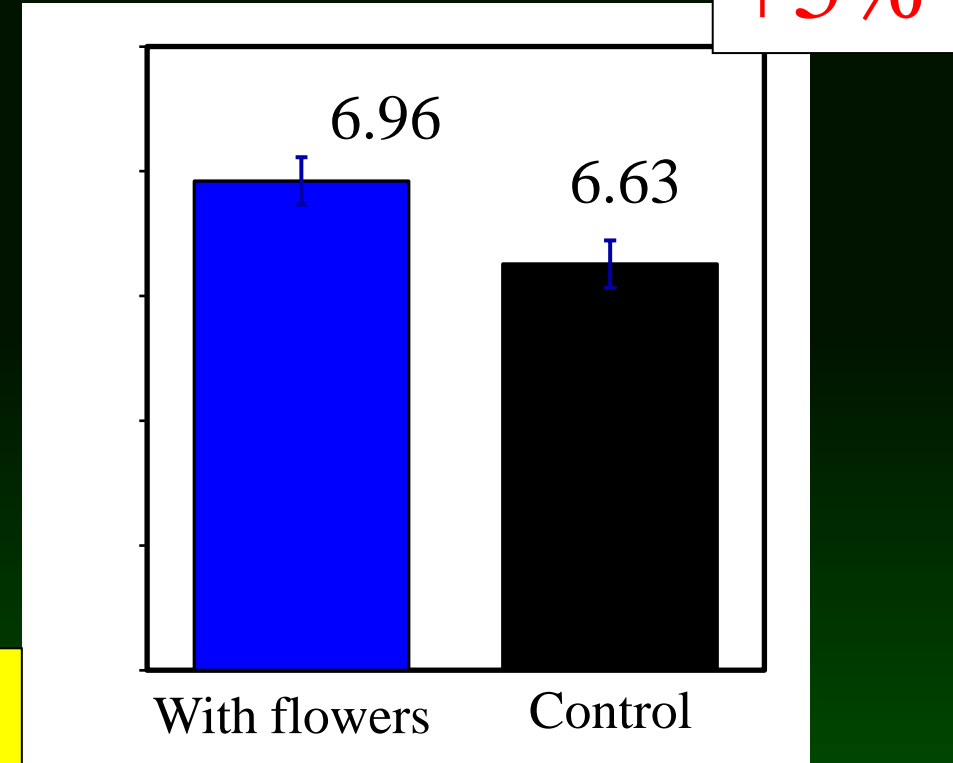
Cultivating flowering plants

Number of insecticide sprays
reduced



- 70%

Yields increased



+5%

Factoring labor and materials costs in
Ecological Engineering had
a **7.5%** increase in profits

Ecological engineering village in Vietnam



Enhance honey production



Landscape transformation in many Vietnam provinces



Ecological engineering TV series



Entertainment - Education



E-E is the process of designing and implementing a program (example a TV series)



to both **entertain** and **educate** so as to increase audience members' knowledge, **create favorable attitudes**, shift norms and change behavior



Enabling farmers to appreciate parasitoids



- Bees are bigger, easier to observe and also well known.
- Farmers are taught to observe the bee populations as indicators of parasitism.
- Parasitism concept little known in rural folks
- Created the name “small bees” for parasitoids

Simple rule cluster

- Flowers on the bunds provide food to attract bees and “small bee” relatives.
- The bees and small bees will help me control the hopper invading my fields, so I don’t need insecticides.
- If I apply insecticides, it will kill the bees and small bees.

TV series - Comparison of viewers and non viewers

Farmers' input practices and yields	Viewers	Non viewers	% Diff	F
Sample size	361	242		
Seed rates (kg/ha)	167.4	186.7	- 11.5%	18.3**
Nitrogen rates (kg/ha)	88.9	94.3	- 6.1%	4.1*
Mean number of insecticide sprays	2.1	2.6	- 23.8 %	21.1**
% farmers who did not spray	8.0%	4.1%		
Yields (t/ha)	6.1	5.9	+3.3%	4.6*

Conclusion



It is important to:

- To promote and practice biological control
- To develop in parallel ecological training of farmers who ultimately are the real implementers. This is to build their confidence.
- For researchers to learn the constraints of farmers, their beliefs, perceptions and practices.
- To develop new innovative ways to communicate to the millions and help them appreciate and practice biological control. The mass media can be a powerful platform to communicate to farmers and cultivate new norms.
- To initiate in parallel - policy and structural reforms or new policies to accommodate new practices. Without reforms the new sustainable norms will not be sustainable as seen in the IPM FFS programs.
- To identify opportunities for new policies and as well as to make adjustments to current policies to be able to implement sustainable agriculture.

Questions and Answers

Dr KL Heong

Please use the Q & A Box to ask
questions to our speakers





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UNDERSTANDING THE FARMER NEEDS TOWARDS FAW CONTROL

Y. Andi Trisyono

**Department of Plant Protection, Faculty of Agriculture
Universitas Gadjah Mada ; Yogyakarta 55281, Indonesia**

Webinar; Grow Asia, June 8, 2021



Subjects of discussion

- Experiences with rice farmers
- What about corn farmers?

Outbreak of BPH in 2011 (Juwiran, Central Java)

No harvest during the last four rice seasons

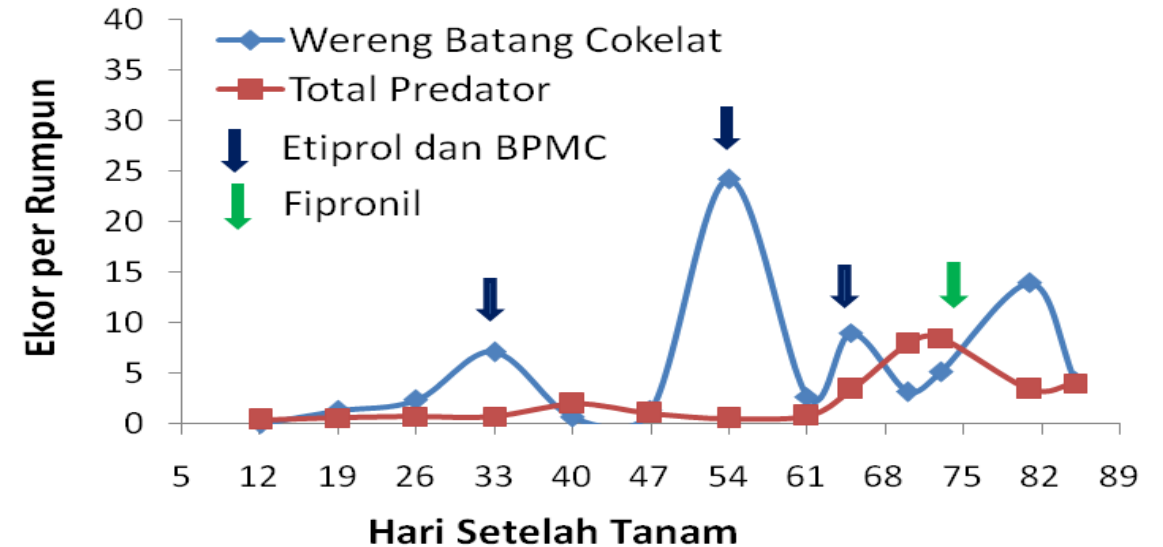


Need: controlling BPH and gaining yield



Delivering clear and simple messages to set the tone

Research Action: Monitoring and insecticide applications



Results: Pesticides reduction from >20 to 4 and yield (75%)

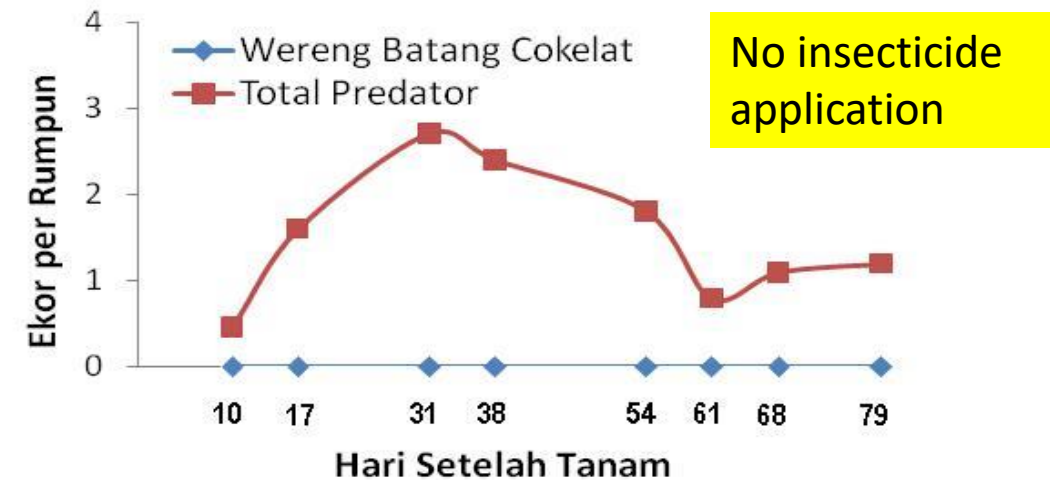


Working together with farmers

Committing to continue the collaborative learning process



Juwiran, Klaten Agustus - Oktober 2011



Recognizing and believing the role of natural enemies.

Strengthening and revitalizing the implementation of rice IPM in Indonesia (FAOID and Ministry of Agriculture): Landscape IPM

Spreading the words of successes



Unmanaged field serves as the source of BPH. It starts from a small population!!!!

Controlling pests by planting flowering plants as refuge

Using biocontrol agents as cheap and environmentally sound control measures

1/1

Ilmu & Teknologi

SENIN, 20 AGUSTUS 2014 | KORAN TEMPO | 12

Membasmi Hama dengan Sistem Refugia

Kelompok tani di Banyumas berhasil menekan hama wereng cokelat berkat rekayasa ekosistem refugia. Tanpa pestisida, hasil produksi jauh meningkat.

Ada pada agen hayati rizobakteri yang mengikat pada pertumbuhan rizobakteri. Jenis agen hayati ini dijual dengan harga Rp. 20 ribu per liter. Menikah, memproduksi pupuk organik berbasis rizobakteri yang mengandung senyawa kalsium dan kalsium yang diendapkan dalam biji sebelum ditanam di sawah.

Sistem yang diperkenalkan FAO ini juga hemat biaya tanam (menambah hasil produksi) dengan menggunakan P. pada 2011-2012 hasil produksi mencapai 7,43 ton per hektare. Jumlah hasil produksi meningkat pada musim tanam selanjutnya yakni 7,67 ton dan 7,83 ton per hektare.

Menurut Sucipto, biaya kuantitas beras D Pili yang bertambah karena juga ikut meningkat. "Karena pengguna pupuk dan pestisida ini berkurang drastis," katanya.

Tri Arining Putri
di artikel tempo.co.id

BANYUMAS — Sucipto, Ketua Kelompok Tani Sumber Rejeki II, beranggapan saja ketika salah seorang anggotanya melapor ada wereng cokelat di sawah. Ia lantas mendiskusikan hama yang terjadi, mana petani lalu itu dalam diskusi mingguan. Ini diskusi, semua anggota sepakat tak menyemprotkan pestisida. "Kami sepakat dikit saja dulu supaya berdiskusi," kata Sucipto, Selasa lalu.

Sepekan kemudian, Sucipto mendapat kabar baik. Petak padi yang rebah itu

kecil petak sawah merupakan rekayasa ekosistem yang disebut refugia, yakni intervensi ekosistem dengan menyediakan rumah untuk pemangsa hama. Penanamannya segera dilakukan setelah padi ditanam.

Tanaman yang berfungsi sebagai refugia bisa bermacam-macam, antara lain bunga pakis, rumput, bunga kenikir, dan bunga matahari. Tanaman tersebut bisa menjadi rumah bagi musuh alami, kupu-kupu, laba-laba, dan lain-lain.

Food and Agriculture Organization (FAO) mempromosikan rekayasa ekosistem dengan refugia sejak Oktober 2014 dalam

agen hayati. Rekayasa sosial dilakukan dengan sistem penanaman serempak, yaitu menanam padi dalam waktu bersamaan. Sistem ini mempermudah petani membasmi hama. Sebab, pasokan makanan bagi hama terbatas.

Program PHT langkah 25 hektare juga mengedukasi petani akan pentingnya pengamatan. Kelompok Tani Sumber Rejeki II terdiri atas 25 orang. Setiap 5 orang bertanggung jawab mengamati 5 hektare setiap pekan. "Kami langsung berdiskusi setelah pengamatan," kata Sucipto.

Dalam diskusi, setiap kelompok mempresentasikan

Pliken, Contoh Keberhasilan Rekayasa Ekosistem Kolaborasi Petani dan FAO Pakai Agen Hayati yang Murah dan Ramah Lingkungan

Dengan menanam benteng alami seperti bunga matahari dan kenikir, hama berkurang drastis dan panen meningkat. Jadi tak lagi bergantung pada pestisida.

LUNIA ARIMINGTYAS, Banyumas

AHMAD Sukarno menyodorkan kedua tangannya. Ada gabah yang tertutupi serupuh jaringnya yang melingkupi. "Dahulu panennya minus seribu (cuma negatif, Red). Sedikit sekali," katanya dalam forum Banyumasan.

Siang agak terik pada Selasa pekan lalu (22/3) itu. Sukarno dengan Pliken, Banyumas, melakukan pengamatan organisme pengganggu tanaman (OPG).

REKAYASA HIJAU: Zabidin (kanan) dan anggota kelompok tani Sumber Rejeki II, Dena Pliken, Banyumas, melakukan pengamatan organisme pengganggu tanaman (OPG).

ditemani empat petani lain mengajik Jember Pili berkilang area persawahan Desa Pili, Kabupaten Banyumas, Jawa Tengah. "Tapi, itu dulu. Kini sudah banyak," kata petani anggota Kelompok Tani Sumber Rejeki II itu, lalu terangnya lebih lanjut.

Pliken memang contoh keberhasilan refugia alias rekayasa ekosistem kerja sama dengan FAO (Food and Agriculture Organization/Organisasi Pangan dan Pertanian). Dimulai pada 2014, rekayasa itu bertujuan menanggulangi hama dengan cara selamiah mungkin. Hasilnya, panen meningkat. Pada 2010 alias masa pra-refugia, contohnya, petani sempat kesulitan mendapatkan panen gabah sebanyak 5,5 ton per hektare.

• BACA PAKAL... Hal 11



Three Main Approaches

- Sociological engineering: pests migrate and do not recognize the land ownership; farmers in a farm should work together
- Ecological engineering: to improve the ecosystem services (biological control agents, flowering plants as refuge, compost)
- Farmer field school as the delivery system



Educational Processes

Farmer Field School
The role of women



Elementary students: from damaging to contributing





Supports from different stakeholders

Finding the same goals

The village leader
and his wife

Farmer leader
and extension
agents



The representatives from UGM, Faculty of
Agriculture, FAO, Department of Agriculture,
and the expert team





Key points of learning

- Identify and work on the top priority goal to gain immediate results: pesticide reduction vs IPM
- Working with the local leaders (village government, farmer leader, and extension agent), and including men and women in the group
- “Hit and run program” will not work for delivering the IPM program---need continuous efforts



Several facts about FAW?

Infestation of FAW in Indonesia: 2019-2020

(Source: Directorate of Food Crop Protection, MOA)

**2019: 31,856 ha
(23 out of 34 provinces)**

**2020: 113,143 ha
(28 out of 34 provinces)**

In irrigated areas, most rice farmers are corn farmers

Knowledge Gap

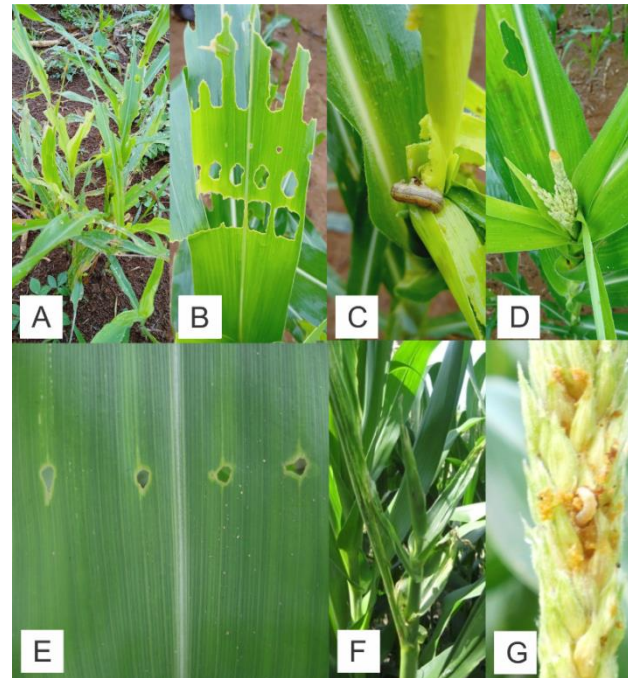


UNIVERSITAS GADJAH MADA

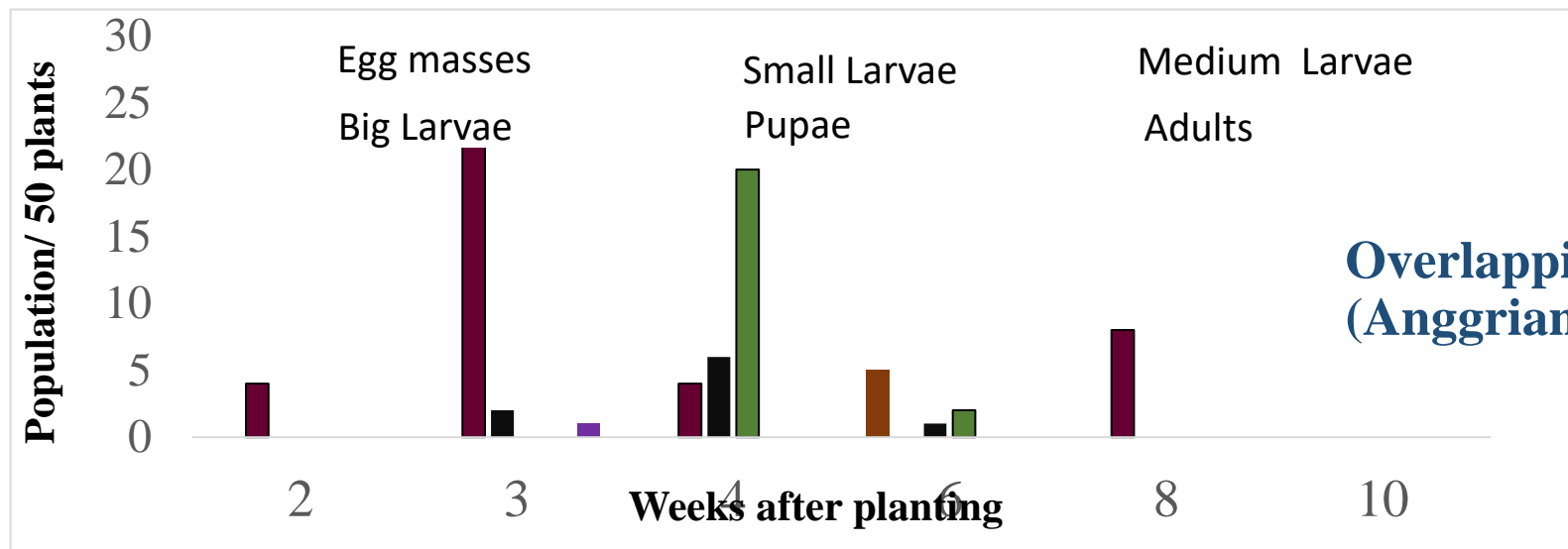
Has been sprayed 3 times
and the corn plants
remained heavily damage

South Lampung, August 1, 2019

Different planting times with different level of damage due to FAW



Two major insect pests:
FAW (damaging the first month) and ACB (the following month)



Overlapping stadia of FAW, Klaten 2019
(Anggriani 2019)



Needs

- Immediate results
- Simple and workable programs
- Medium term of assistance
- Fostering self-reliance

Questions and Answers

Y. Andi Trisyono

Please use the Q & A Box to ask questions to our speakers





Exploring behavioural science to drive farmer PPE uptake in India

*By Delisa Jiang,
Director for Sustainability and Advocacy, CropLife Asia*

June 8, 2021

Today's presentation

- How have we been communicating to farmers?
- What is behavioral science?
- Behavioral science around the world
- Case study in India on farmer PPE uptake
- Lessons for farmer communication



How have we been communicating to farmers?





Yet, concerns over mis-use or lack of safe practices in pesticide application continue to persist

Our traditional stewardship training approach

There are many factors besides knowledge that influence the way we behave

Exercise is good for you



Smoking is bad for health

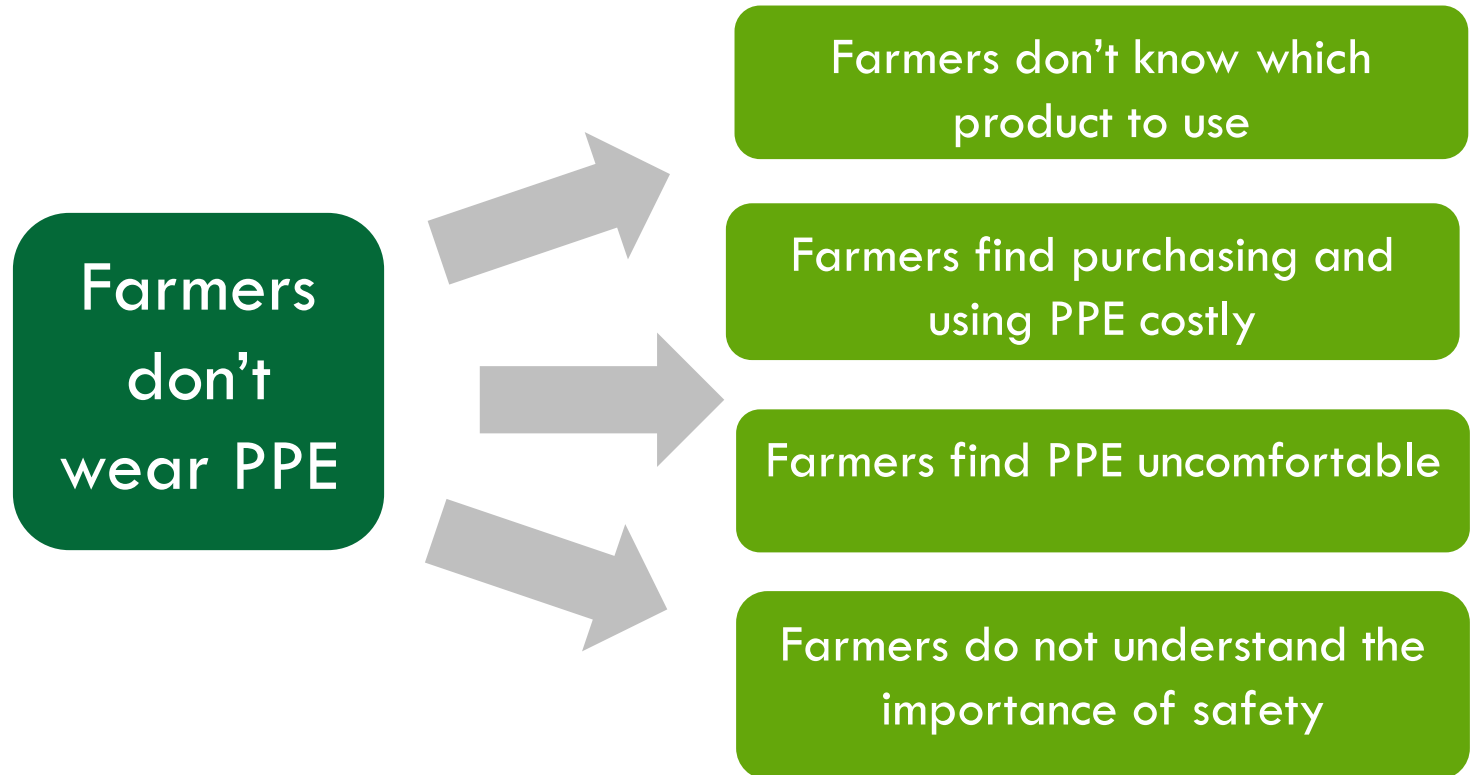


Over-use of pesticides is bad



Our traditional stewardship training approach

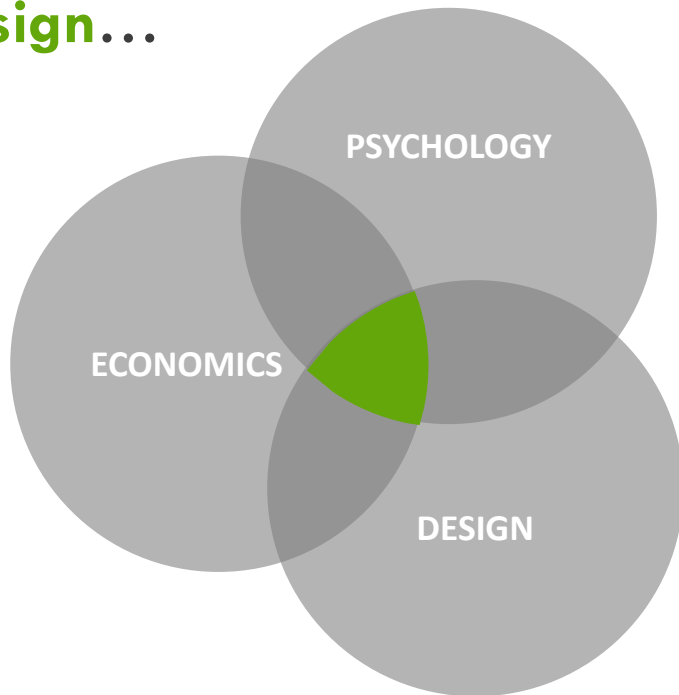
How can we ensure we identify the right problem so we can increase our return on investment?



What is behavioral science?

What is behavioral science?

A field at the intersection of **psychology, economics and design**...



...We use our understanding of **decision making and context** to design solutions for social impact.



What is behavioral science?



VS



What is behavioral science?

\$30



\$50

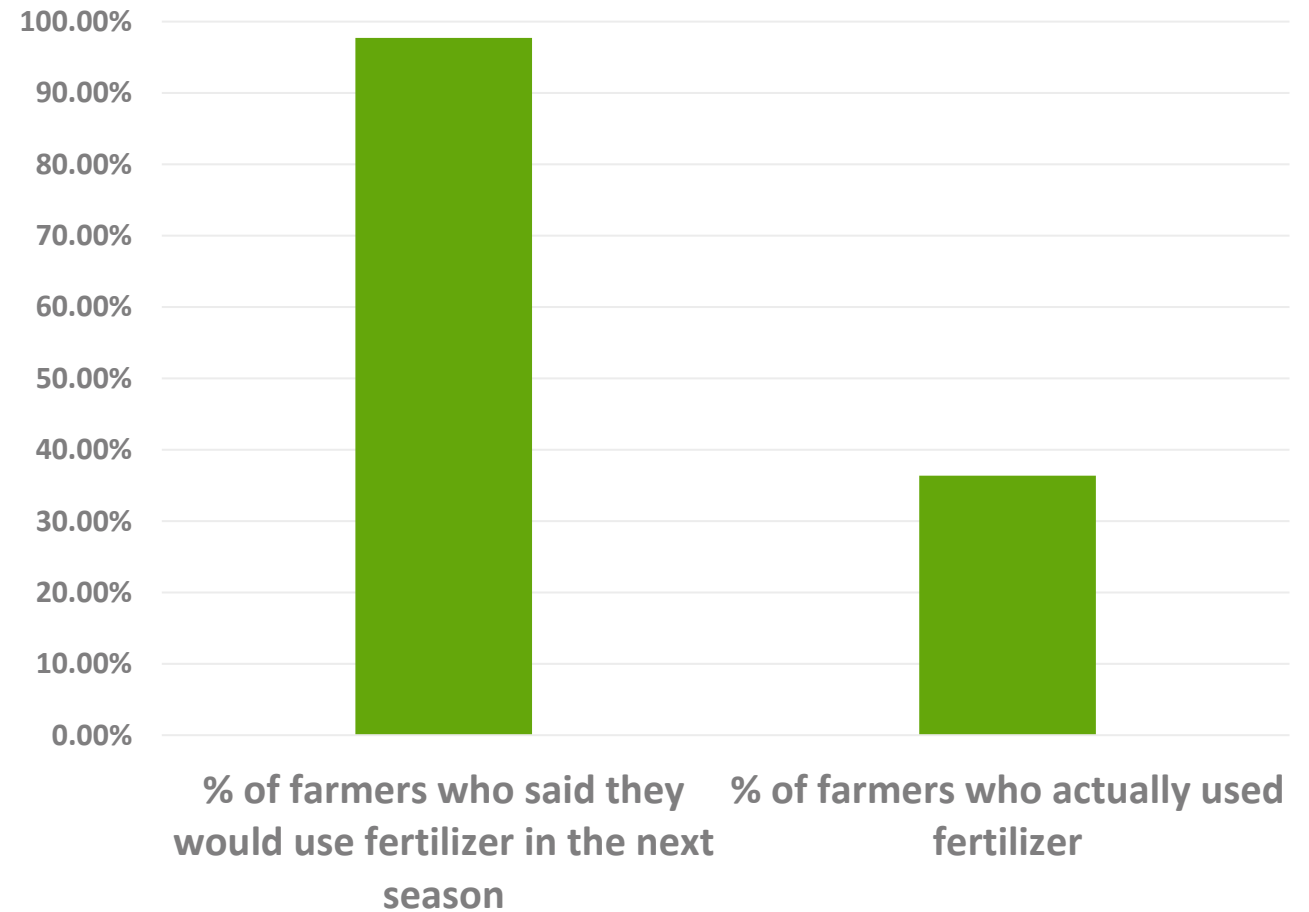


\$150



1. We are money-conscious
2. We want the best value-for-money

FARMERS INTEND TO USE FERTILIZERS, BUT FEW DO SO



FERTILIZER PURCHASE PRE-COMMITMENT AND HOME DELIVERY

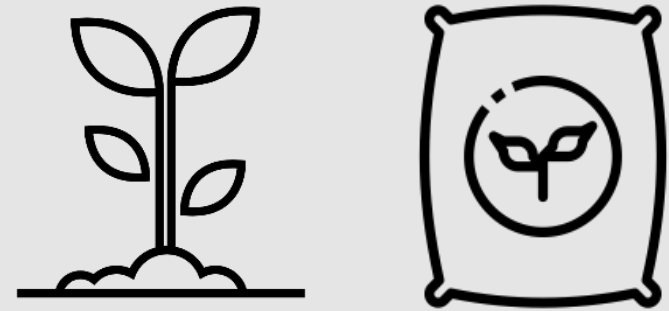
At Harvest :



**Option to pre purchase fertilizer
when flush with cash**

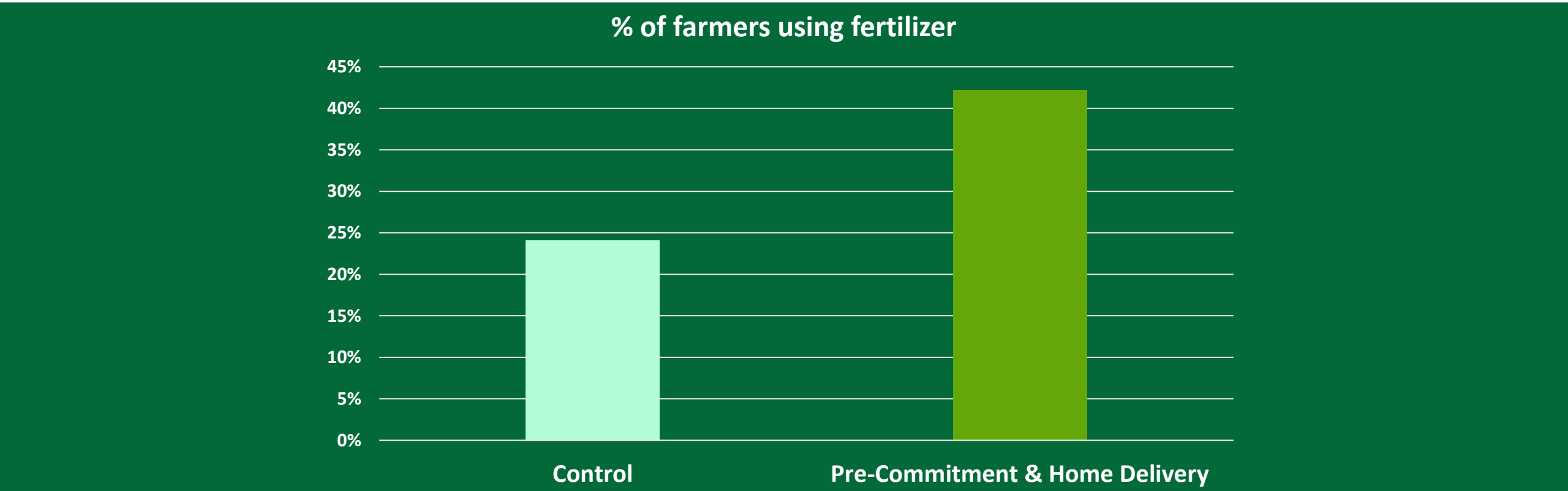


At Planting Time :



**Fertilizer delivered to farm
exactly when needed**

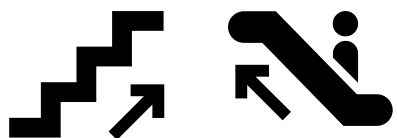
COMMITMENT DEVICES INCREASED FERTILIZER USAGE



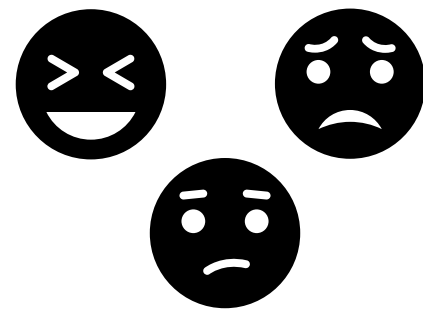
Duflo, Esther, Michael Kremer, and Jonathan Robinson. 2011. "Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya." *American Economic Review*,

Context MATTERS

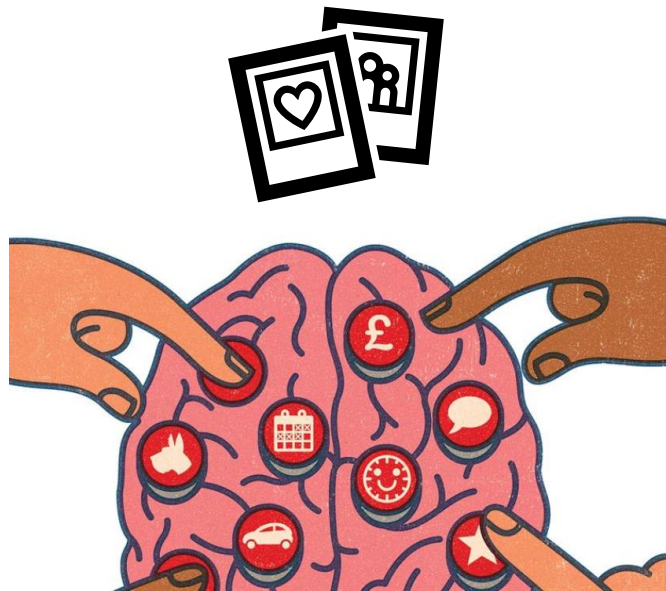
Physical Environment



Mood/Affect



Social context



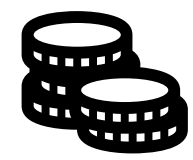
Time



Choice Set/Presentation



Chronic Scarcity



Psychological factors



Social Norms

Our perception of others' behavior impacts our own



Hassle Factors

Inconveniences and/or obstacles that impede the desired behavior.



Limited Attention

We selectively concentrate on certain aspects of our environment, ignoring other features around us



Present bias

The tendency to favor immediate rewards at the expense of our long-term goals

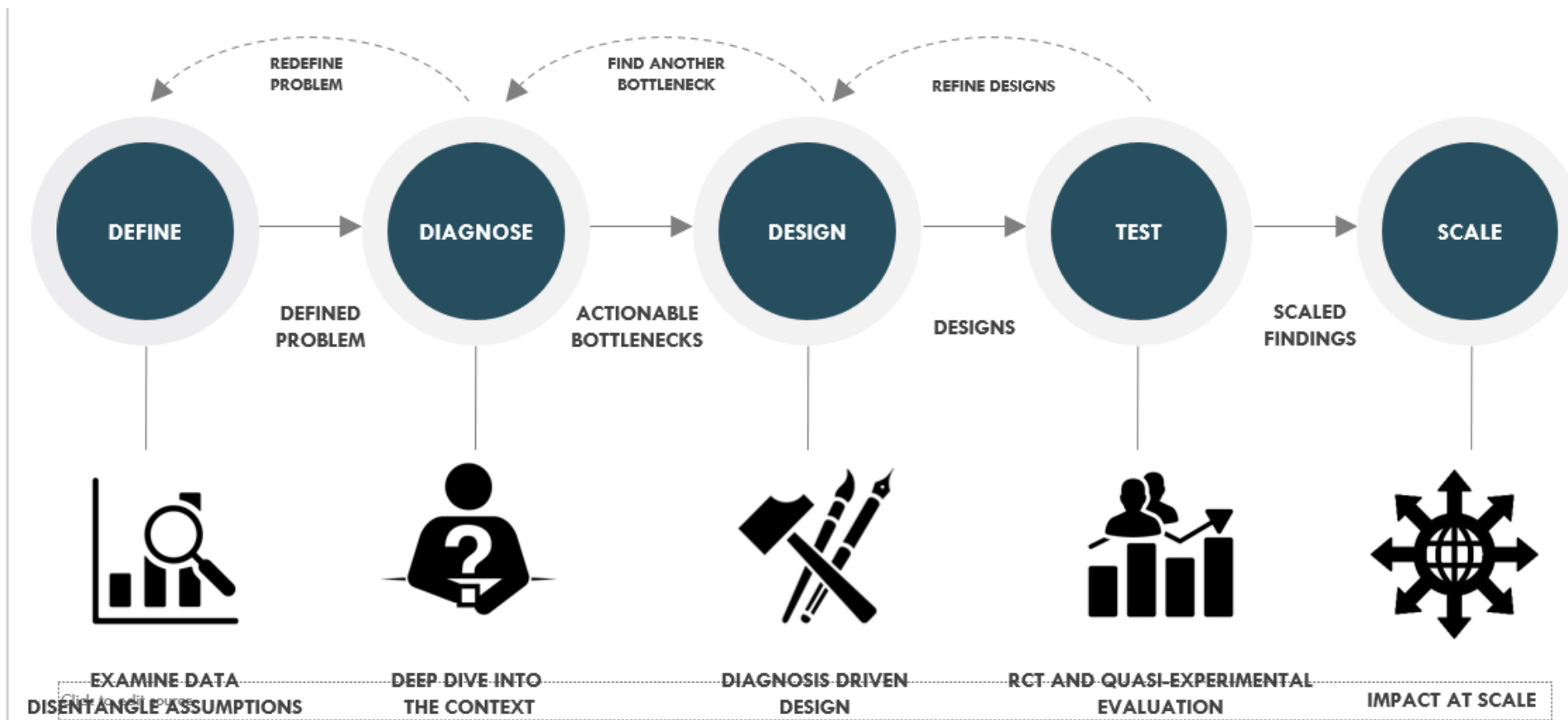


Tunneling

The brain's tendency to focus on the most urgent or pressing unmet needs in situations of scarcity

Behaviour science is data-driven

ideas 42



<https://www.oecd.org/gov/regulatory-policy/1%20Overview%20PDF.pdf>

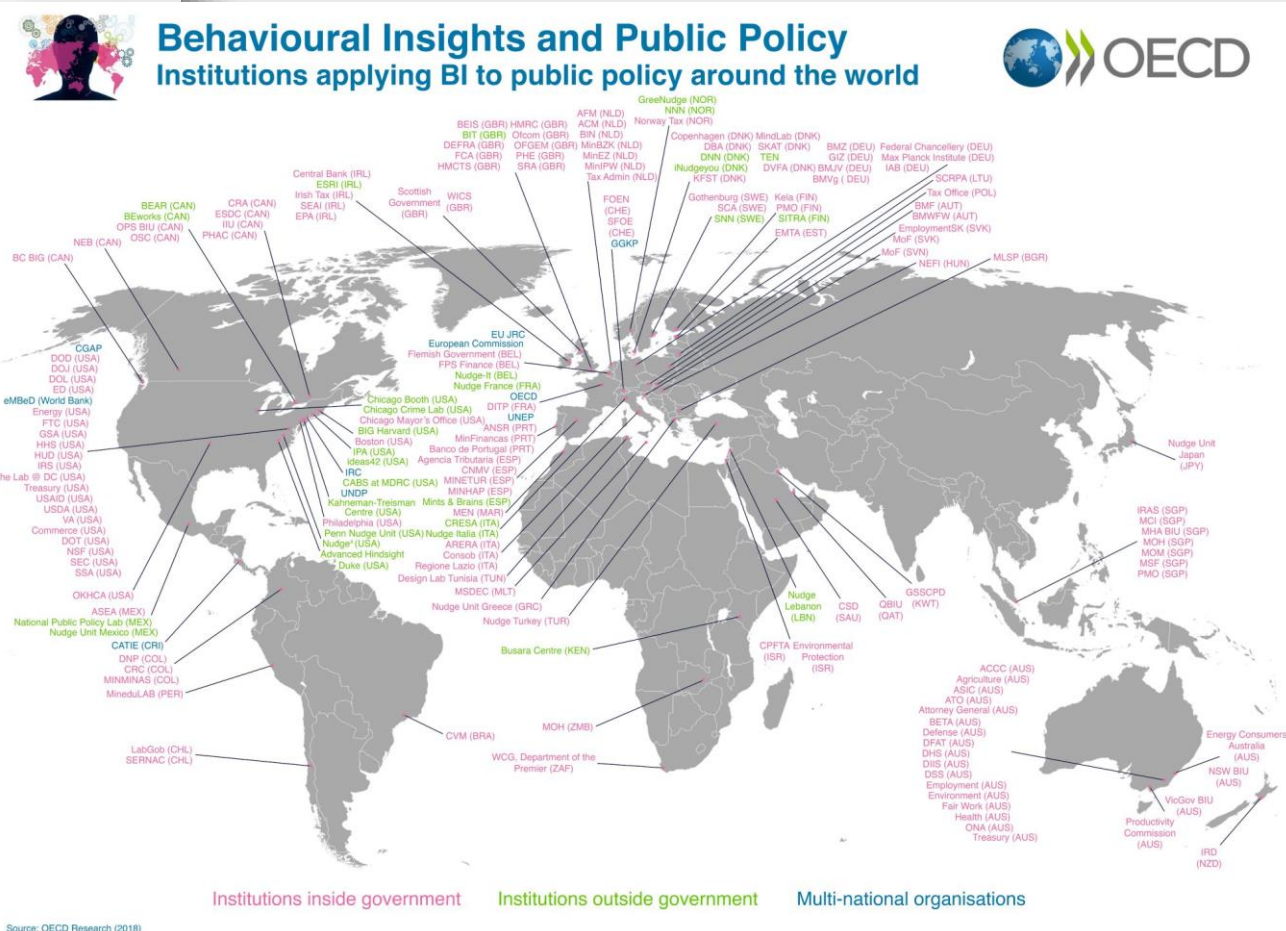
Behavioral science applications around the world

Behavioral science in public policy: Future of government?

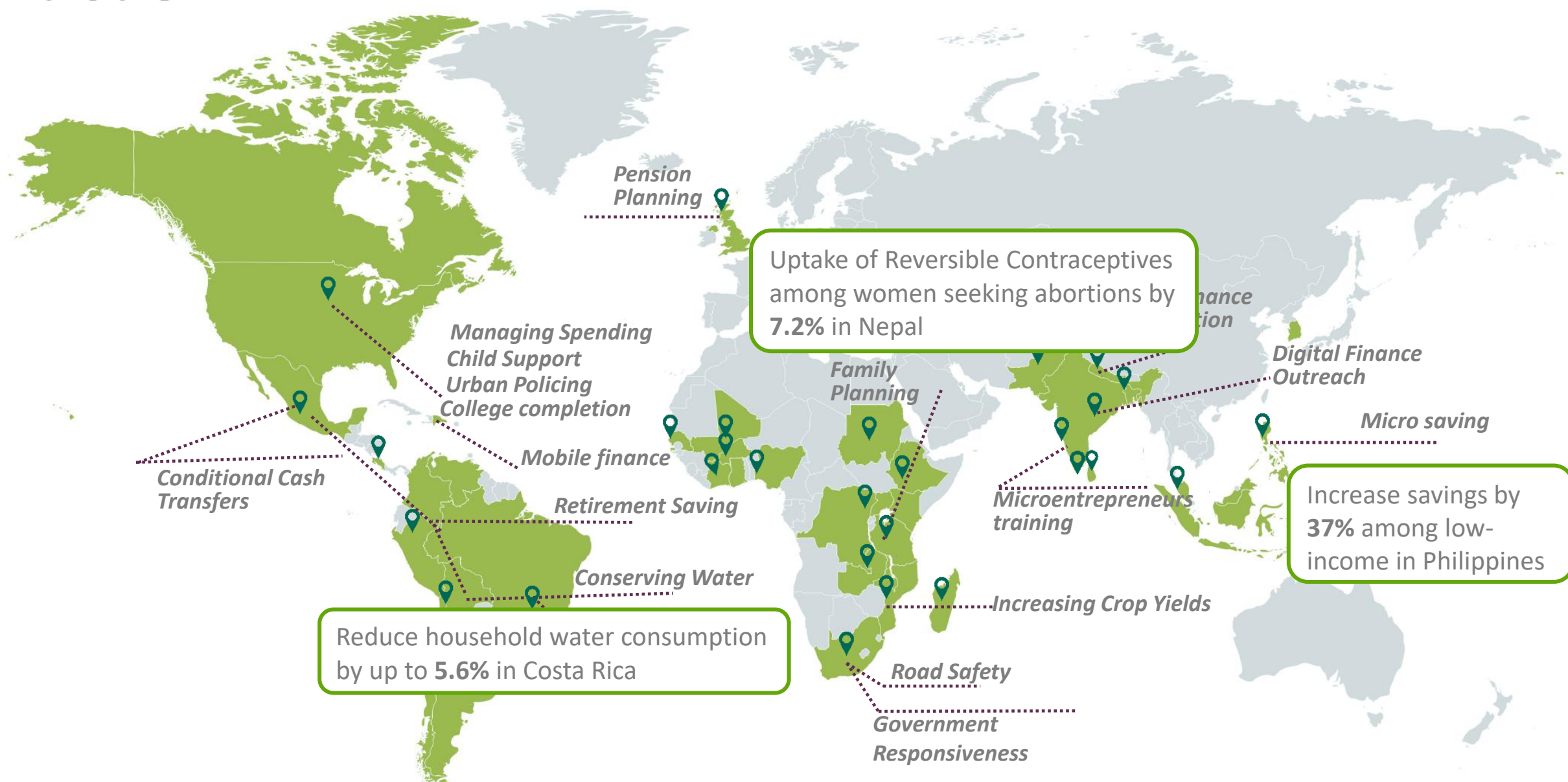
CAROLINA SÁNCHEZ-PÁRAMO, RENOS VAKIS & ZEINA AFIF | APRIL 25, 2019

This page in: English | Español | Français

It is impressive to see that there are more than 202 public entities applying behavioral insights to their policies today. In 2015, the World Bank became one such entity that began to explore the relevance and potential benefit of behavioral insights to development policy with the publication of our World Development Report on *Mind, Society, and Behavior*. Since then, we have joined other countries and development agencies in establishing the *Mind, Behavior, and Development Unit (eMBeD)*, a team to support our projects and guide government entities on how to integrate behavioral science in their policy work.



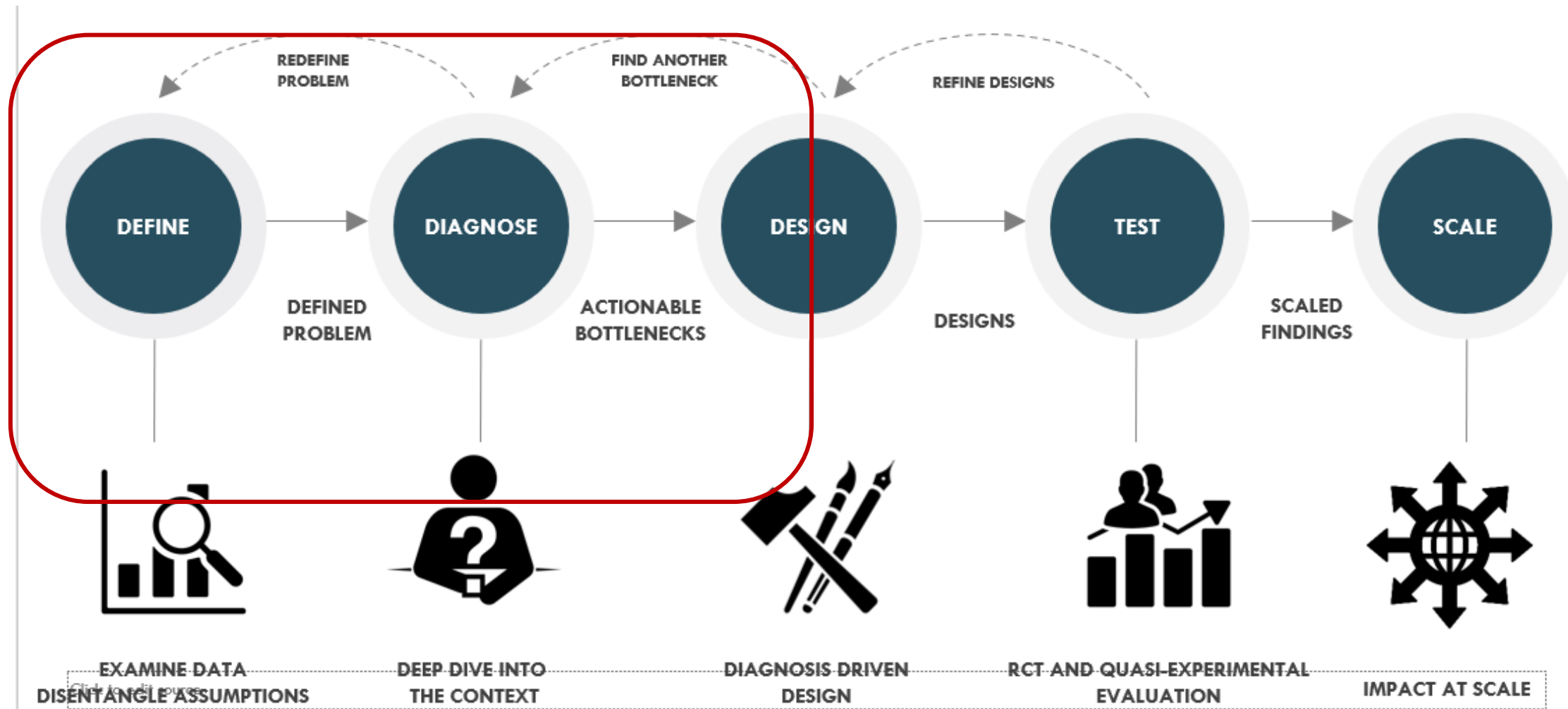
<https://bsp.ucd.ie/applications-of-behavioural-economics/>



Case study in India on farmer PPE uptake



Project status in India



SUMMARY OF BEHAVIORAL BARRIERS

PRIMARY BARRIERS

- A. Farmers use incorrect rules of thumb to decide when PPE is needed
- B. Farmers hold faulty mental models around PPE components and use
- C. Farmers' perceptions of pesticide exposure are inaccurate
- D. Farmers are present-biased when making PPE-related decisions

SECONDARY BARRIERS

There are hassles involved in PPE use, which deter continued utilization

Farmers expect and seek out product-related information, rather than safety information, from company staff and retailers. Hence, product information is most salient

What our assumptions were

ideas 42

WEAK BARRIERS (NO SUPPORTING EVIDENCE)

These barriers were raised in initial conversations with member companies, but we found no or very little supporting evidence

PPE cost is prohibitive for farmers

- No supporting evidence. Cost was not mentioned as a deterrent to use or purchase.

Farmers expect that companies will provide PPE for free

- Free distributions are relatively infrequent. Most farmers who did receive PPE kits for free, did not end up using.

Farmers choose not to wear PPE because they don't want their peers to view them as weak

- No evidence of stigma attached to PPE usage.

SUMMARY OF BEHAVIORAL BARRIERS

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SECONDARY BARRIERS

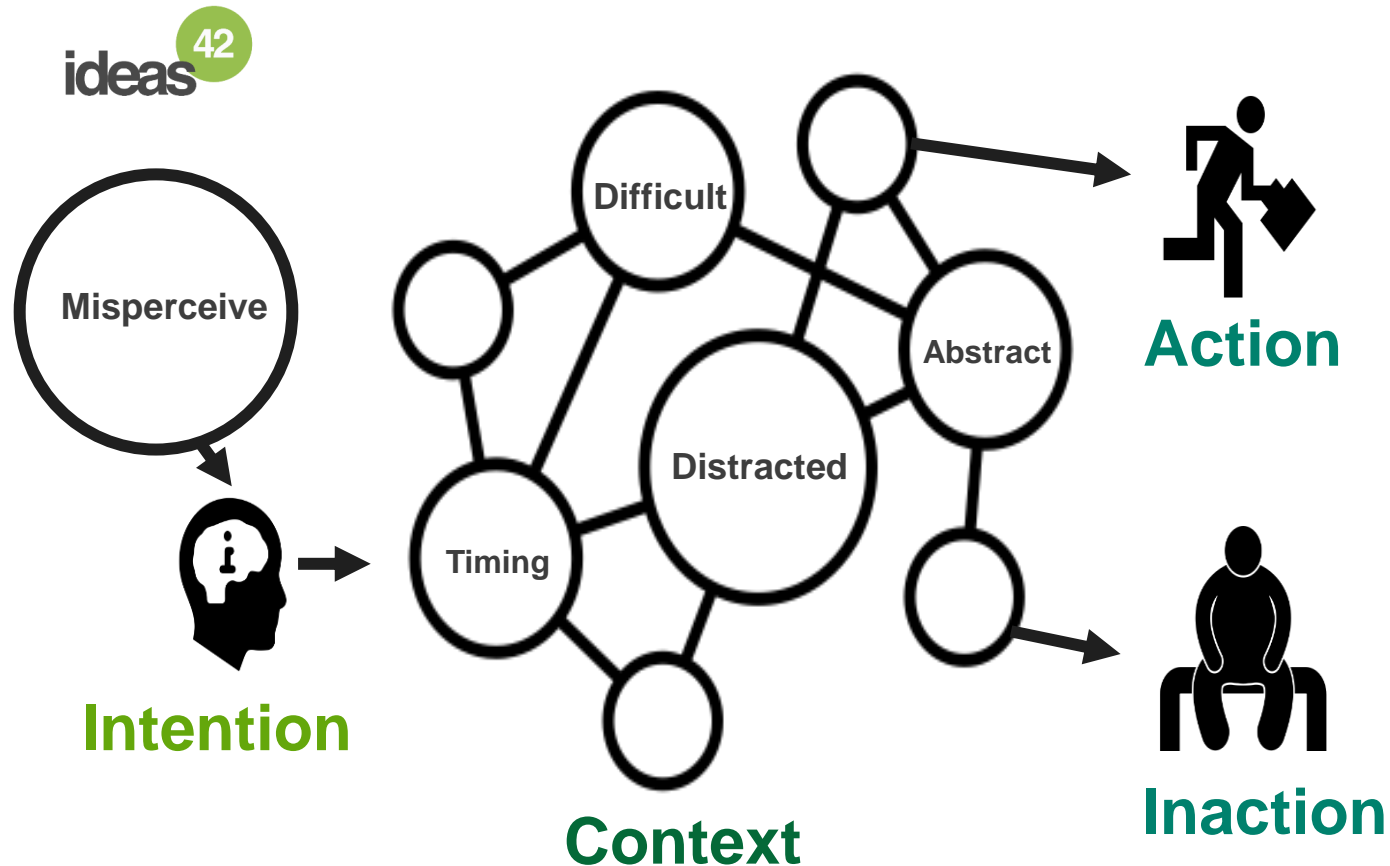
There are hassles involved in PPE use, which deter continued utilization

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Sample designs

Design Objective	Sample Design Concepts	Behavioral Barriers Addressed
Correct faulty rules of thumb for PPE usage	- Physical re-design of PPE kit/components, to a one-piece item	<i>Faulty heuristics</i>
Correct inaccurate understanding of chronic pesticide exposure effects	- Simulate health/appearance in old age with and without chronic exposure (e.g. the ageing app)	<i>Optimism bias, Misperception of dangerous exposure</i>
Increase salience of actual pesticide exposure	- Spraying demonstrations using water + food coloring/glitter to show where pesticide residues land - Daily health log on spraying/non-spraying days	<i>Overconfidence, Fundamental attribution error/Misattribution</i>
Introduce commitment devices	- “Buddy system” to remind/check whether wearing full PPE and wearing it every time	<i>Hassles, Present bias</i>

Lessons from behaviour science for farmer communication



We are using behaviour science to:

- 1) Use a scientific, data-driven and measurable method to identify the correct contextual factors that drive action or inaction
- 2) Based on these factors, design more accurate and effective training to change farmer behaviours
- 3) Research insights can be applied at low cost to improve outcomes with high returns

[illegible]

a 20 Malacca Street #06-00 Malacca Center Singapore 048979

Questions and Answers

Delisa Jiang

Please use the Q & A Box to ask questions to our speakers



Understanding Farmer Behavior and Driving Change:

A behavioral science perspective



**CENTER FOR
BEHAVIOR & THE
ENVIRONMENT**

**Environmental problems are behavioral problems,
so their solutions must also be behavioral...**

CONVENTIONAL EFFORTS TO CHANGE BEHAVIOR ARE FAILING

Material incentives:

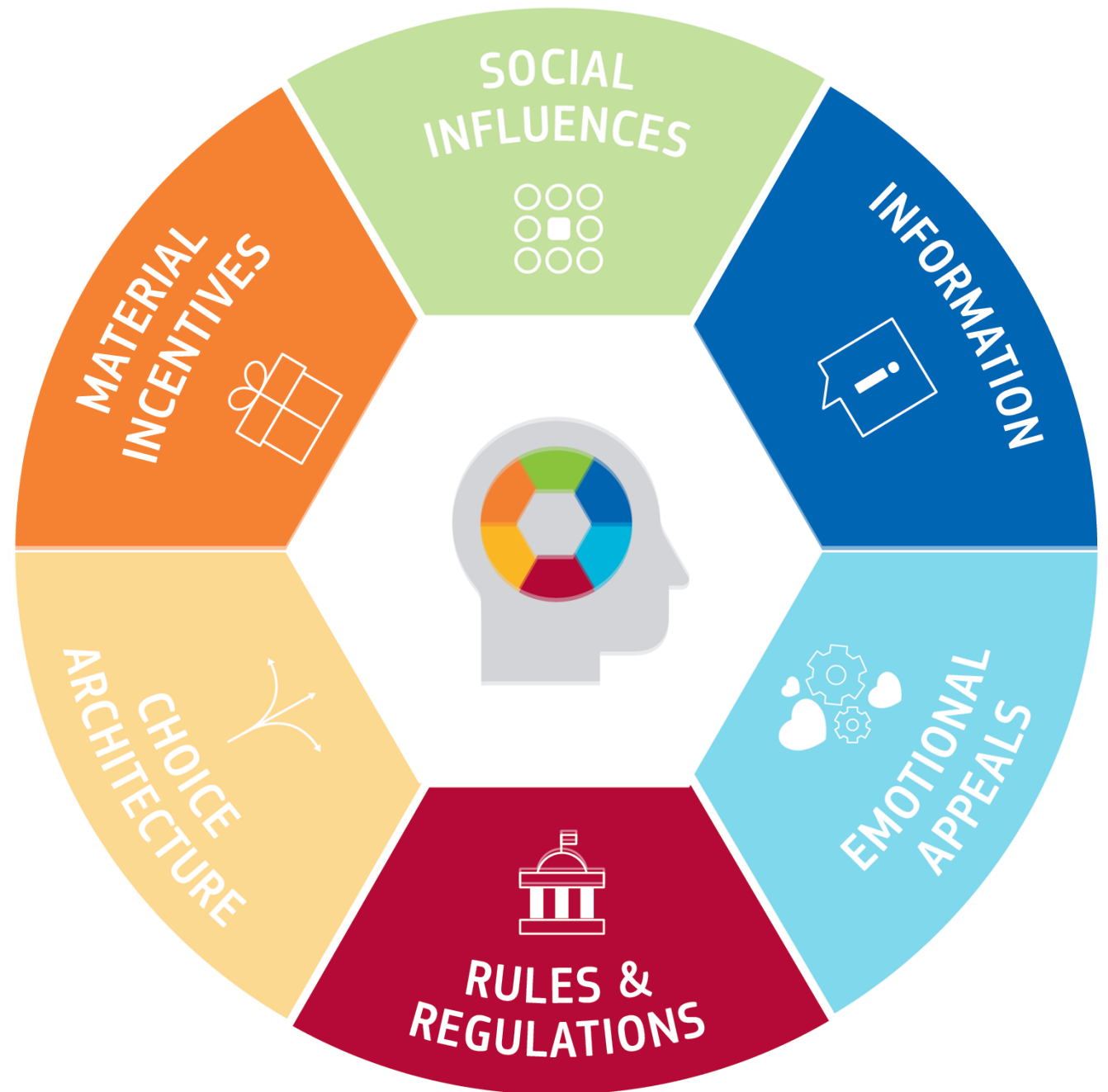
- Increasing or decreasing the costs, time, or effort for doing a behavior.

Rules and regulations:

- Laws or guidelines that encourage or restrict a behavior.

Information provision:

- Explaining what the desired behavior is, why it is important, and how to engage in it.



BEHAVIORAL SCIENCE PROVIDES ALTERNATE LEVERS OF CHANGE

Choice architecture:

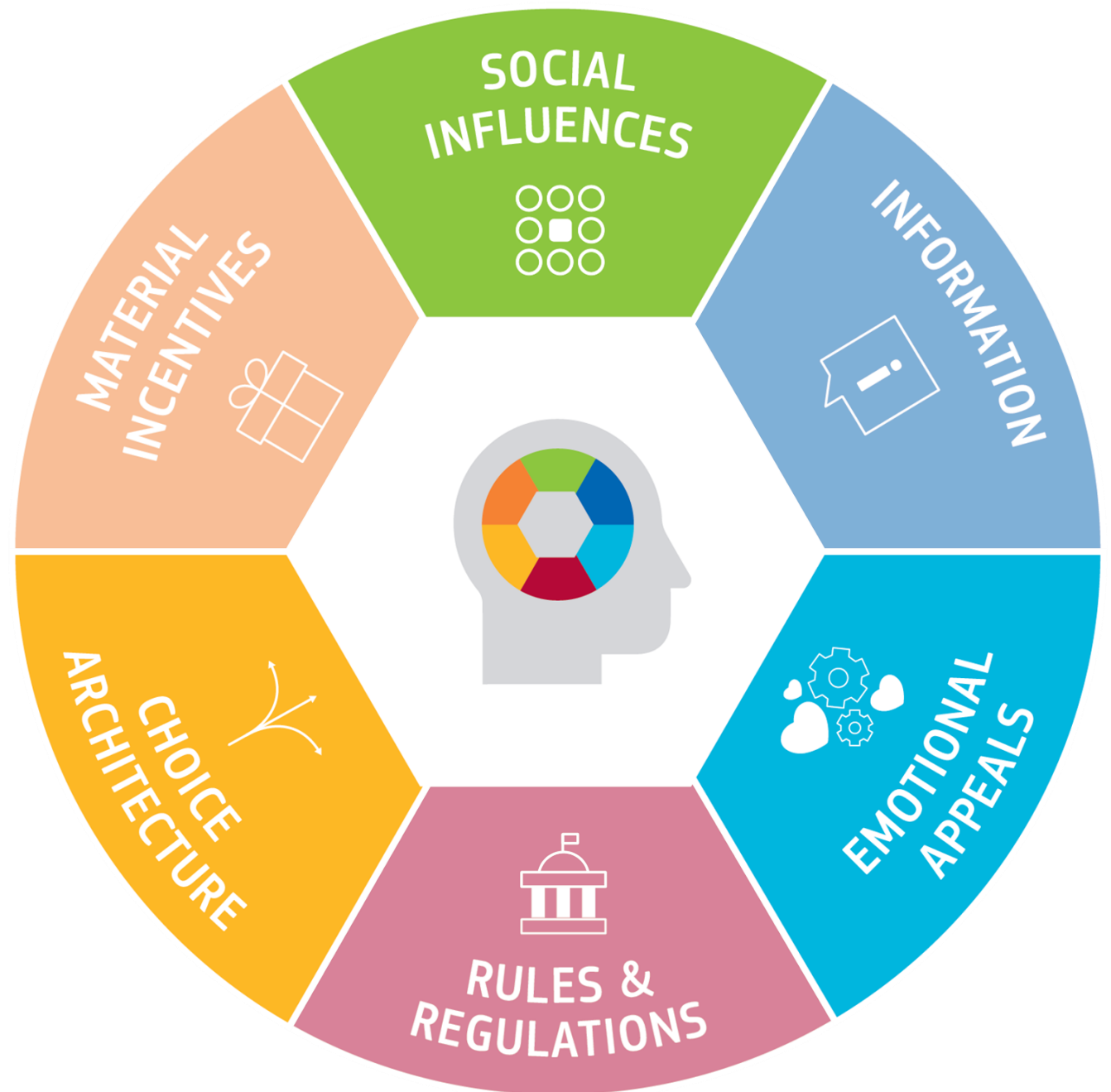
- Constructing an actor's choice environment without changing the value of said actor's underlying options.

Social influences

- Leveraging an actor's social networks and influences.

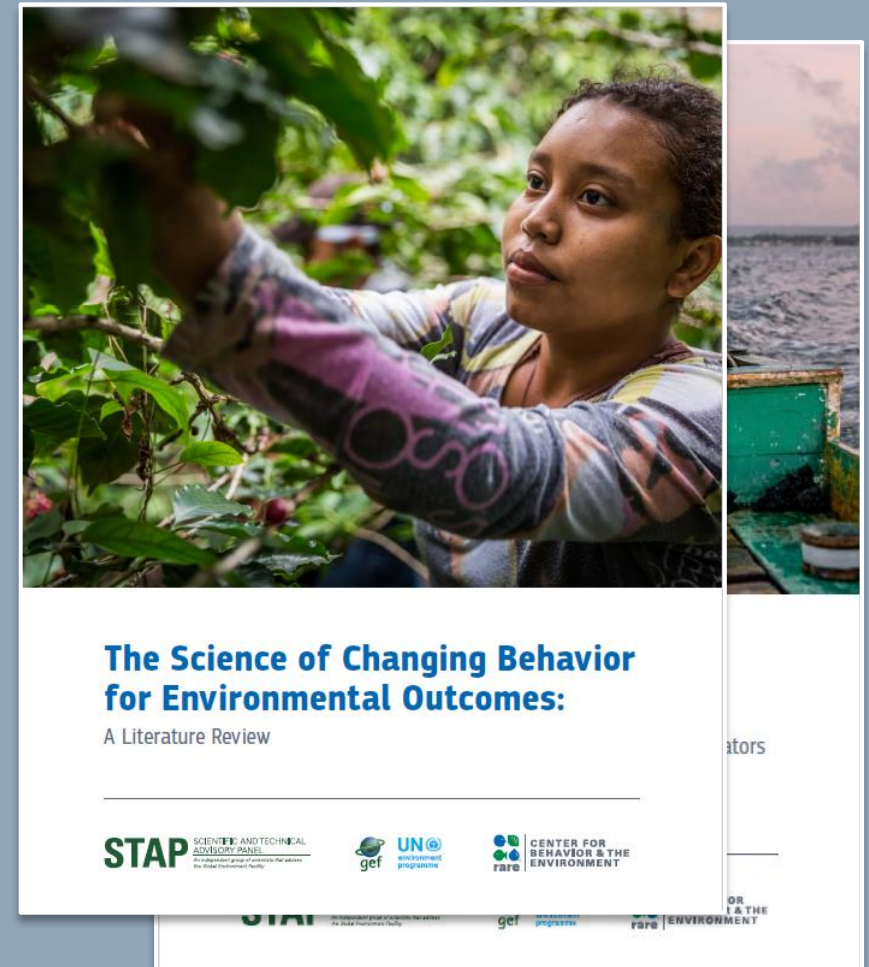
Emotional Appeals:

- Changing how an actor feels about a set of options.



WHAT ARE THE BEHAVIORAL INSIGHTS MOST RELEVANT FOR BEHAVIOR CHANGE EFFORTS IN AGRICULTURE?

- We have limited/bound cognitive resources:
 - We tend to focus on what is salient in the moment, and often rely on habits.
- We are *social* beings:
 - We inherently seek to conform to the norms we observe.
- We are *uncertainty averse*:
 - We avoid choices that feel risky or ambiguous.





Lands for Life

Designing a Behavioral Science-based Program

Current Behaviors

- Overuse of chemical fertilizers
- Overirrigation
- Use of raw manure on fields

Target Behaviors

- Fertilizing based on need
- Irrigate based on need
- Enrich the soil with compost



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Key Barriers

- **Ambiguity Aversion**, farmers feel uncertain about new or different practices.
- **Confirmation Bias**, farmers overlook information in a way that supports their viewpoint
- Time + financial investment **feels like a loss** at the start of the harvest season.
- Intensive agriculture, not sustainable, is the **norm**.

Current Behaviors

- Overuse of chemical fertilizers
- Overirrigation
- Use of raw manure on fields

Target Behaviors

- Fertilizing based on need
- Irrigate based on need
- Enrich the soil with compost



When in doubt, farmers
stick to what they know!



Farmers differ in their
“resistance to ambiguity”
(how much certainty they need)



Low resistance farmers (LRFs):

Farmers that require minimal evidence of results to adopt new practices.

Farmers differ in their
“resistance to ambiguity”
(how much certainty they need)



Low resistance farmers (LRFs):

Farmers that require minimal evidence of results to adopt new practices.



Moderate resistance farmers (MRFs):

Farmers that require evidence of results and **social proof** to adopt new practices.

Farmers differ in their
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Low resistance farmers (LRFs):

Farmers that require minimal evidence of results to adopt new practices.



Moderate resistance farmers (MRFs):

Farmers that require evidence of results and social proof to adopt new practices.



High resistance farmers (HRFs):

Farmers that require evidence of results, social proof, and **social pressure** to adopt new practices.

How do we reach these different people?

LRFs



minimal evidence

MRFs



social proof

HRFs



social pressure

Recruitment-type Interventions

LRFs



minimal evidence

MRFs



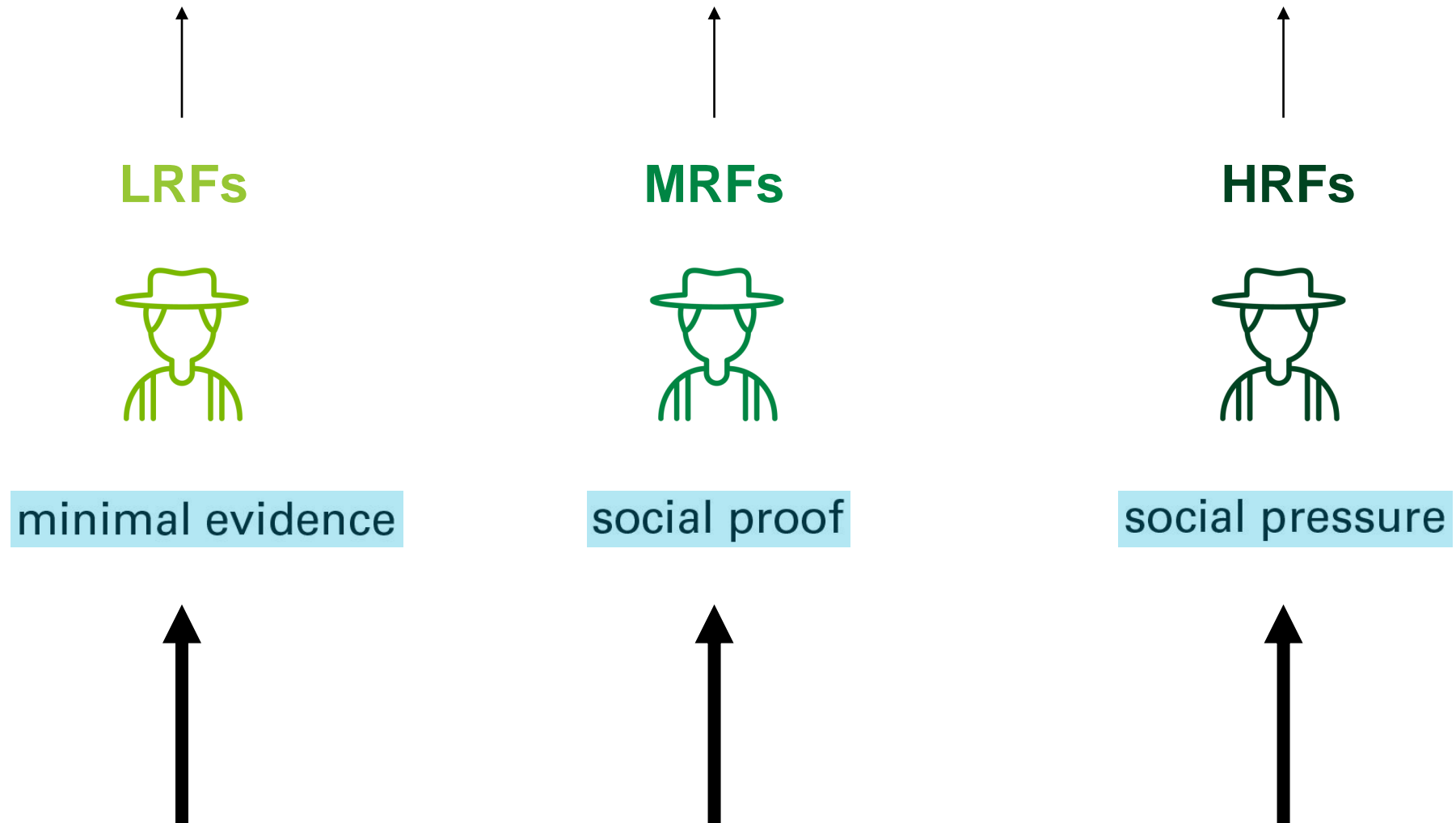
social proof

HRFs



social pressure

Blanket-type Interventions



How do we reach these different people?

LRFs



minimal evidence

MRFs



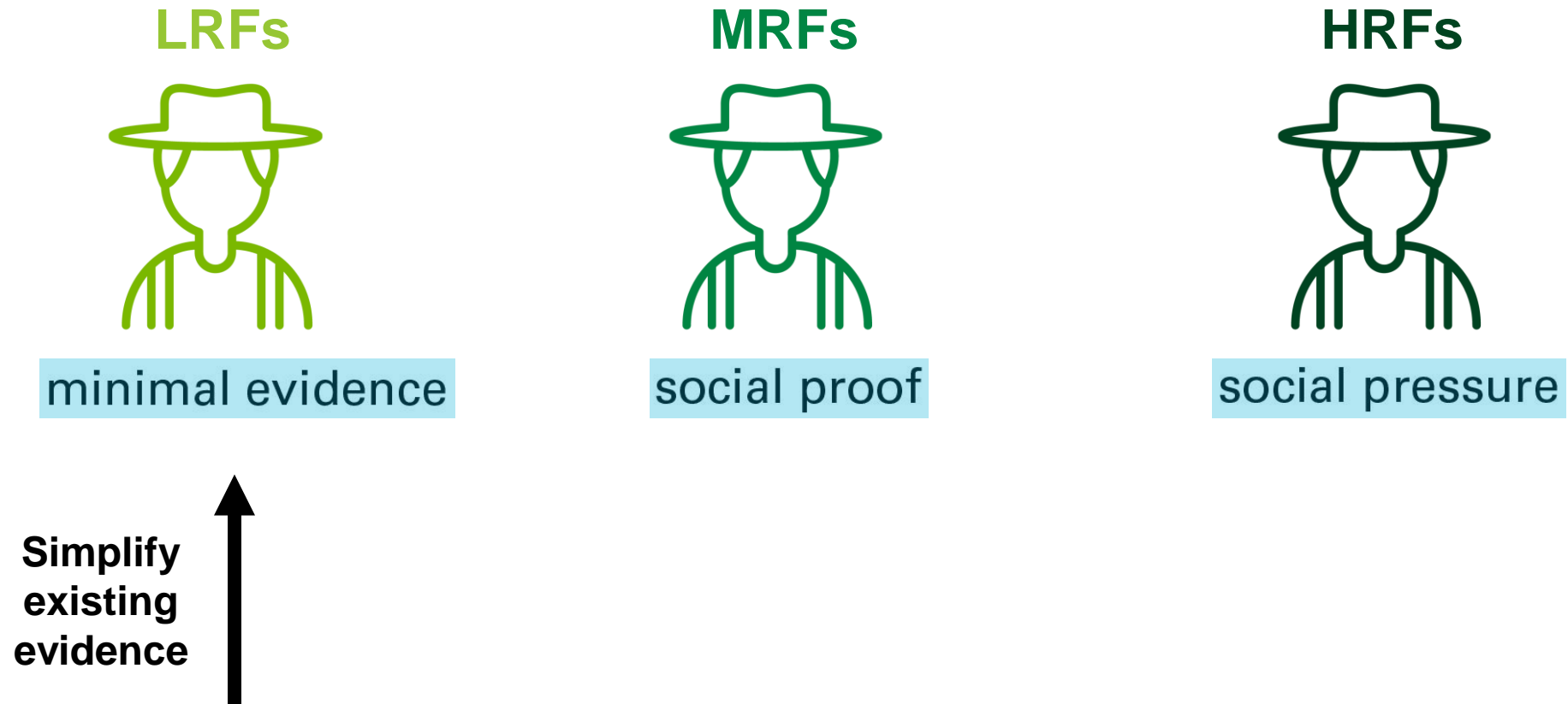
social proof

HRFs

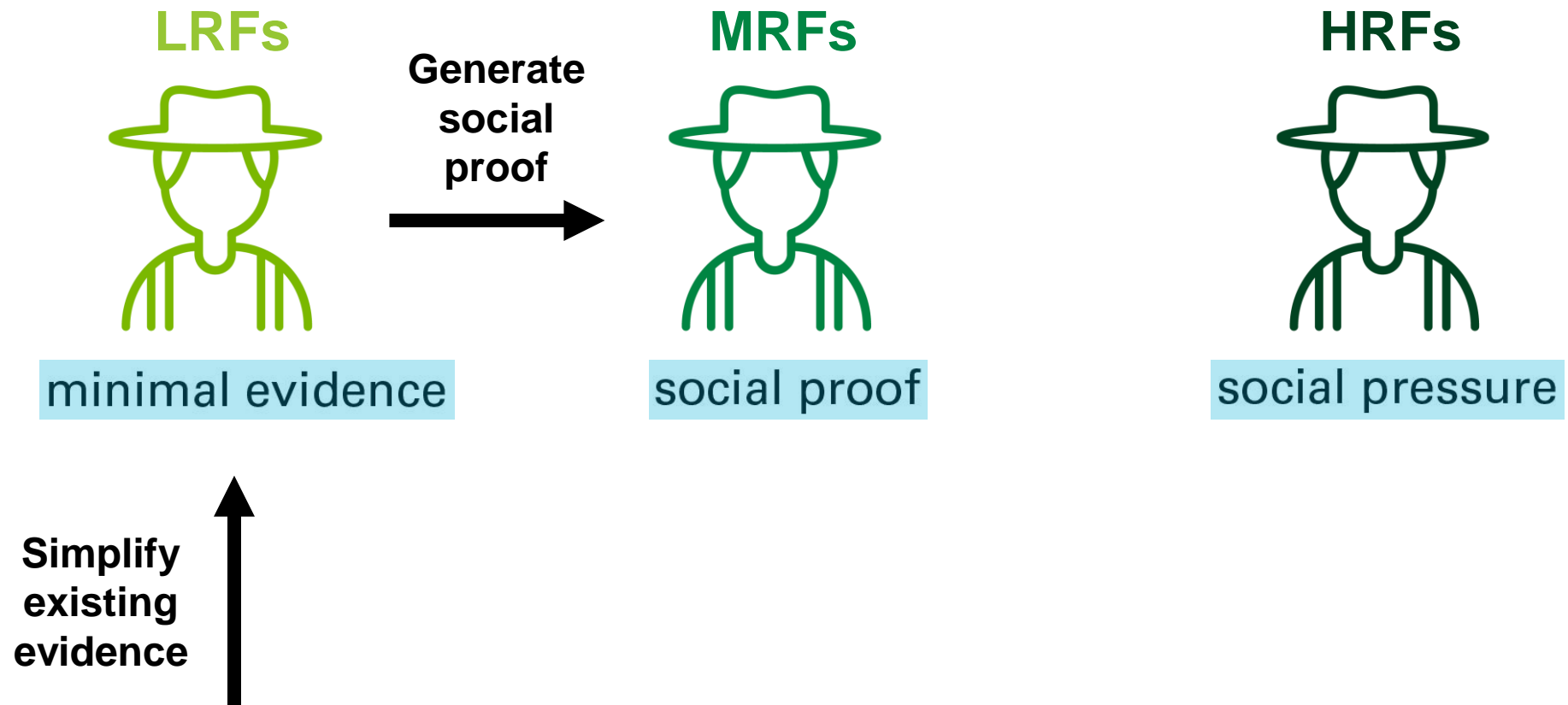


social pressure

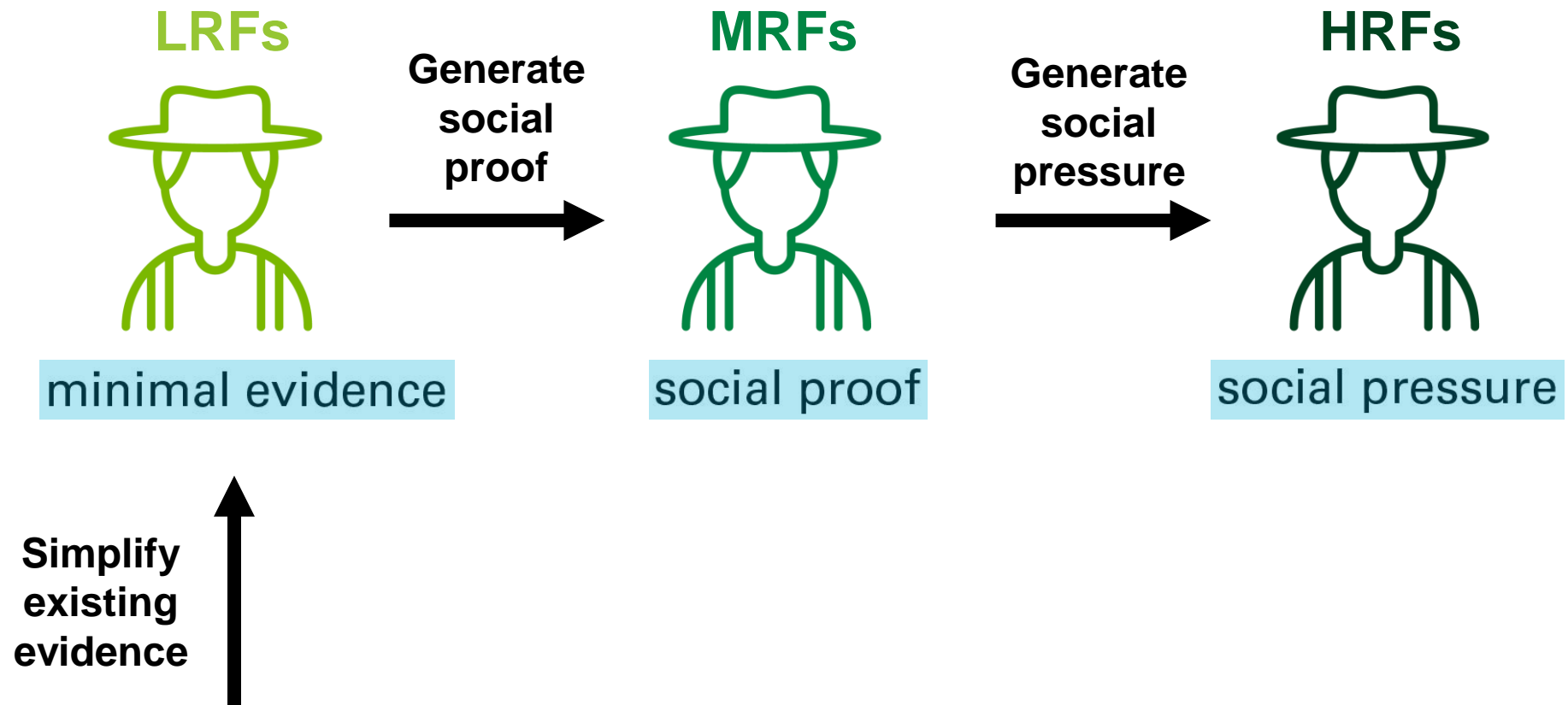
Achieving both QUALITY and QUANTITY



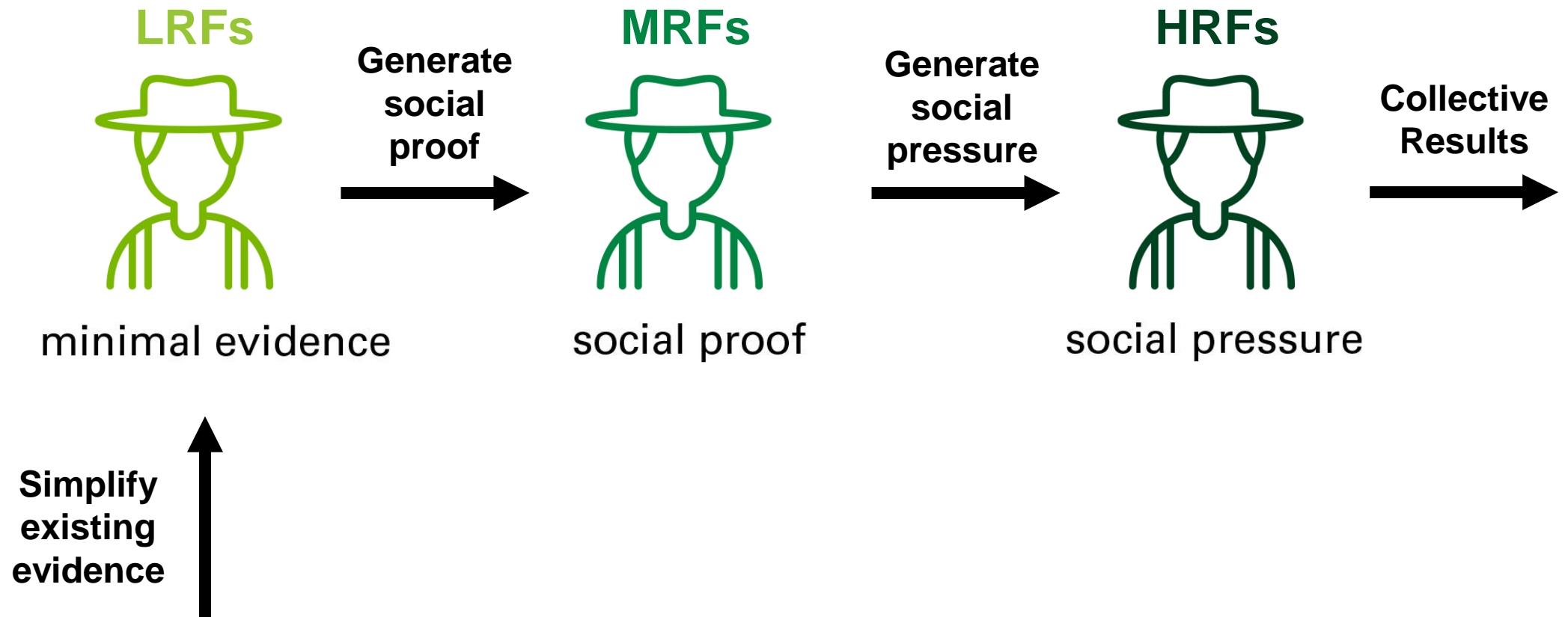
Achieving both QUALITY and QUANTITY



Achieving both QUALITY and QUANTITY

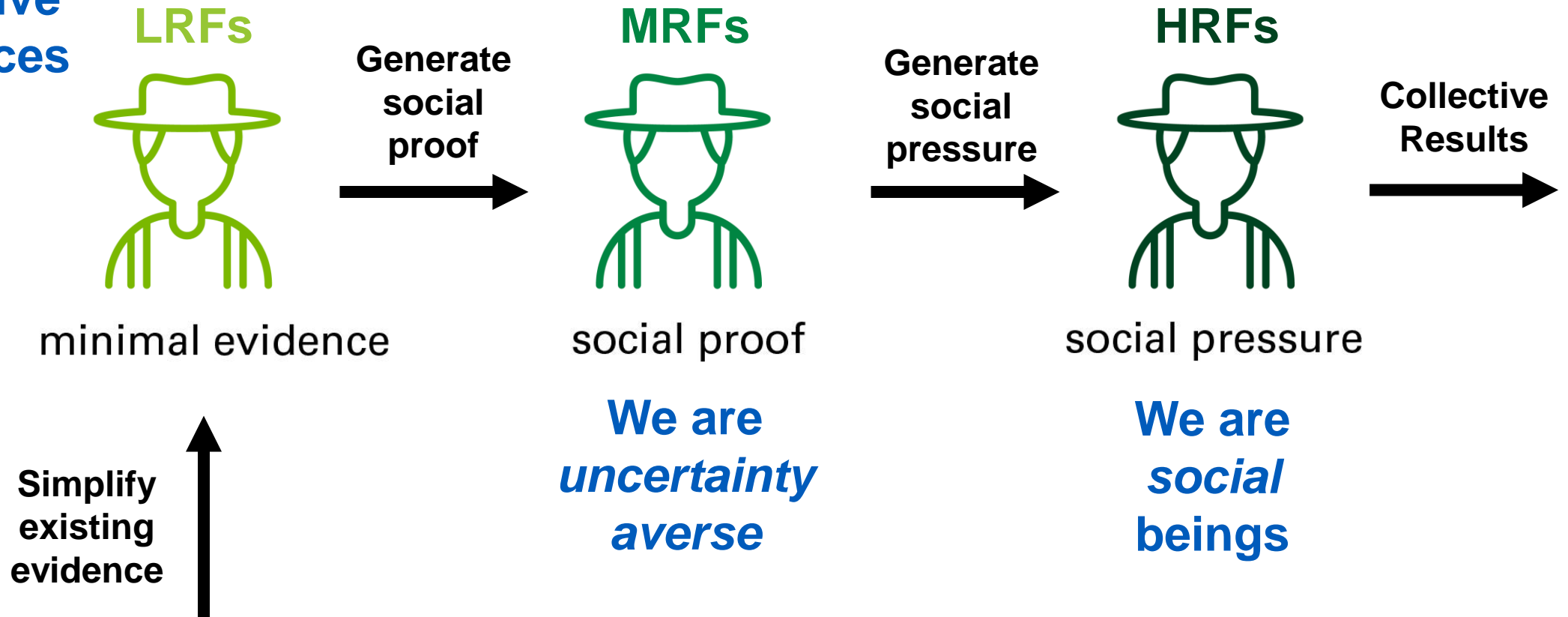


Achieving both QUALITY and QUANTITY



Achieving both QUALITY and QUANTITY

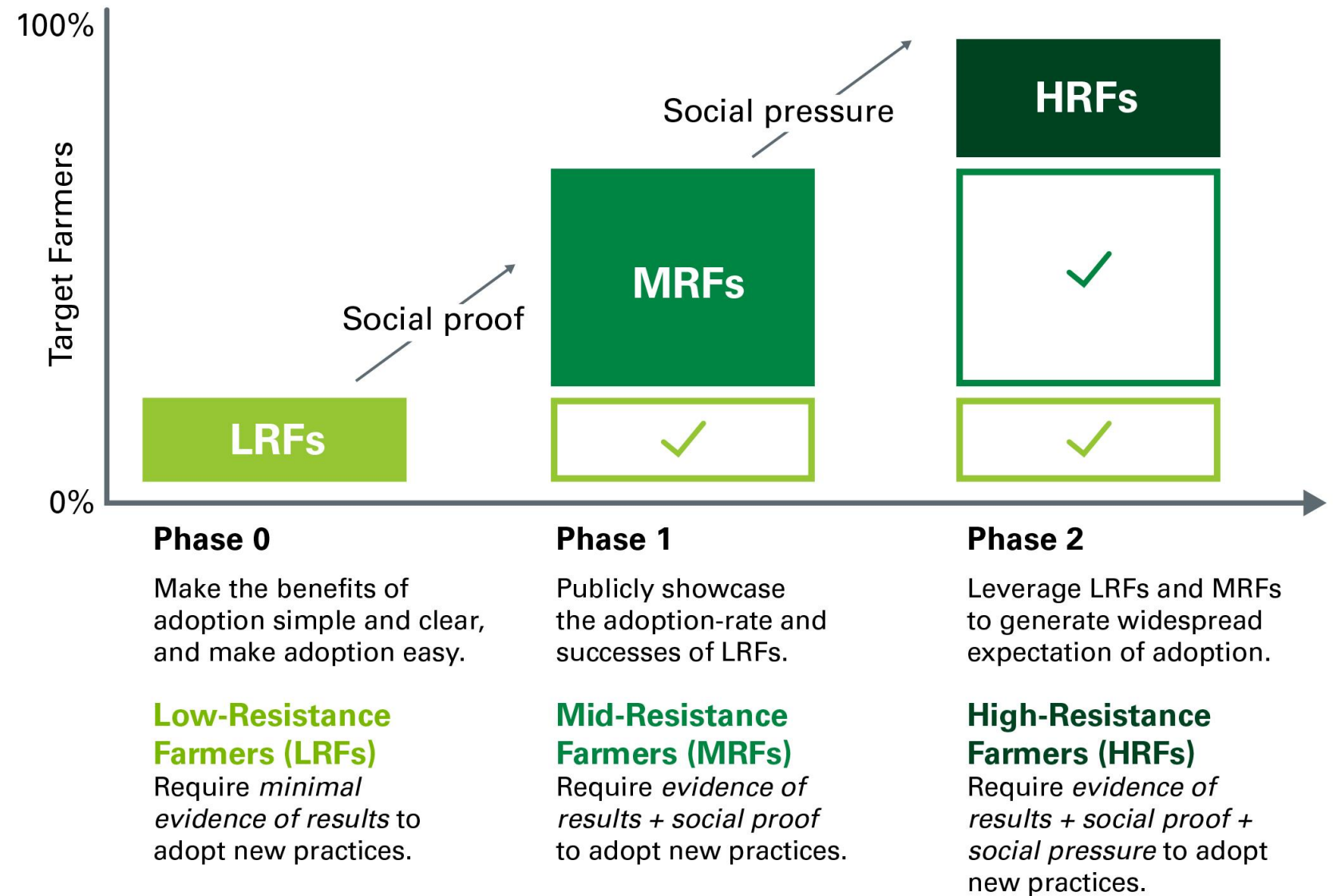
We have
limited/bound
cognitive
resources



PHASE 0:
Generates tangible evidence of adoption ease and relevant, local success.

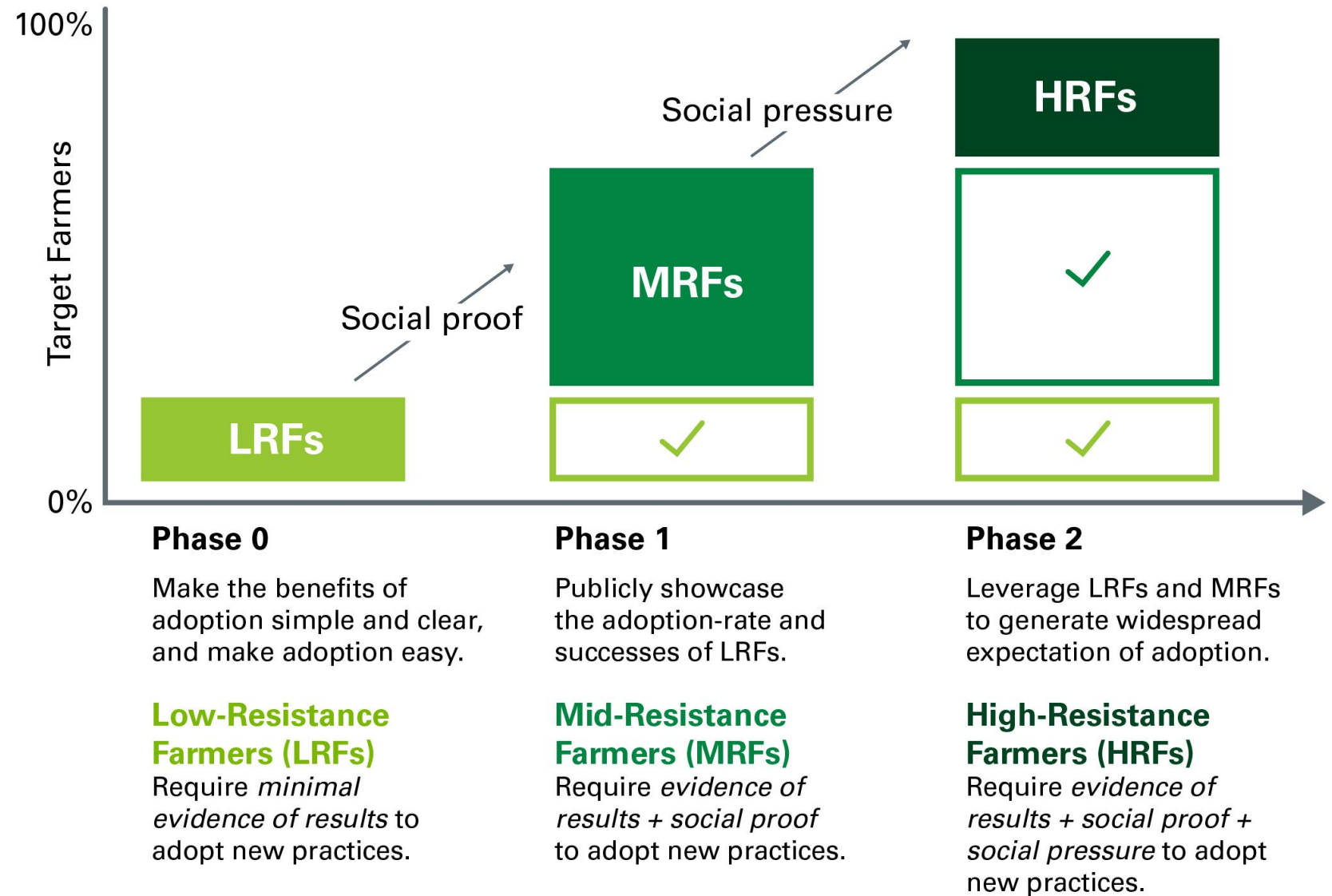
(Crentsil et al., 2020;
Ross et al., 2012;
Warnick et al., 2011).

Snowballing Social Proof into Social Pressure



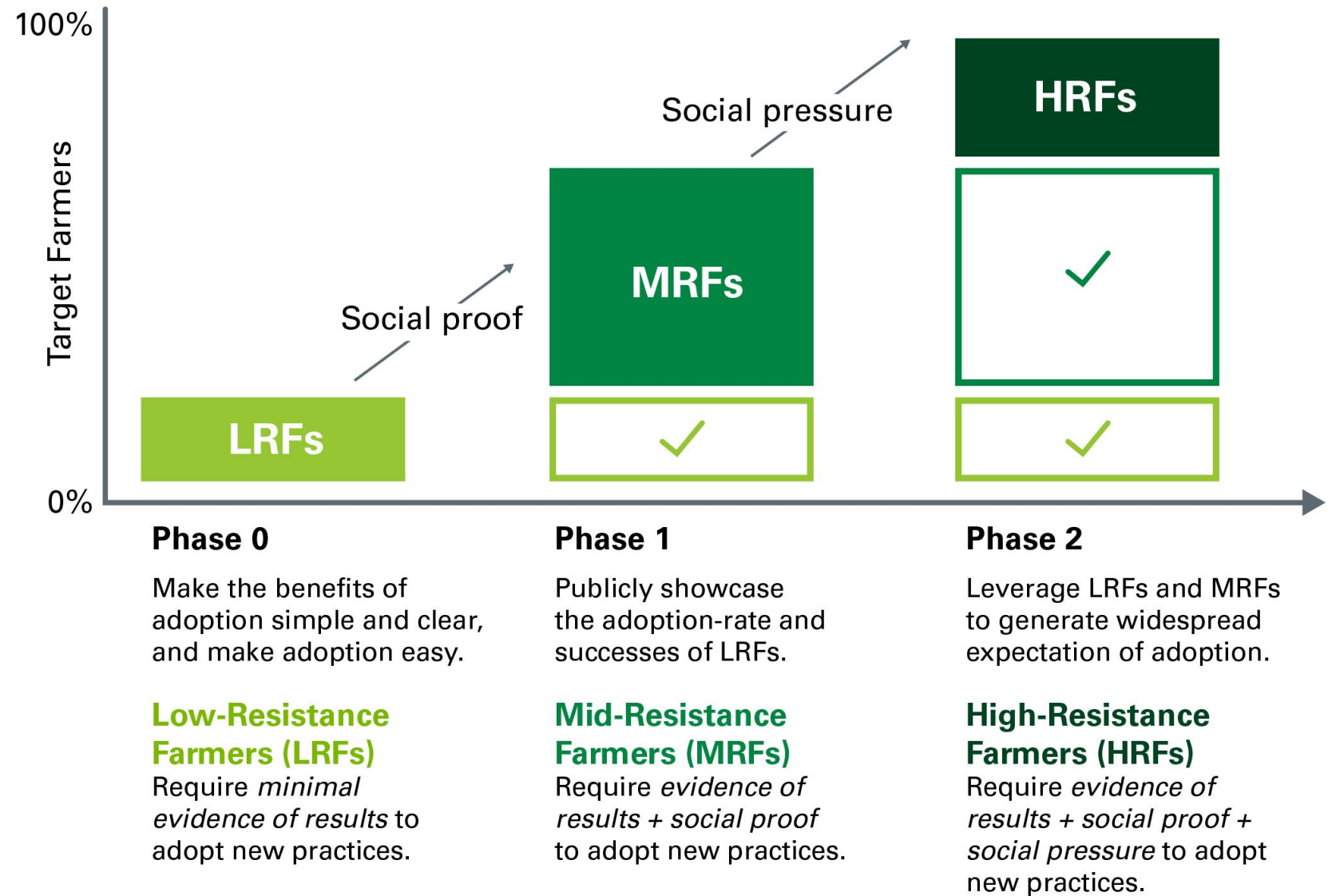
PHASE 1:
Publicly showcases the increasing number of farmers that are adopting and benefiting from sustainable practices.

Snowballing Social Proof into Social Pressure



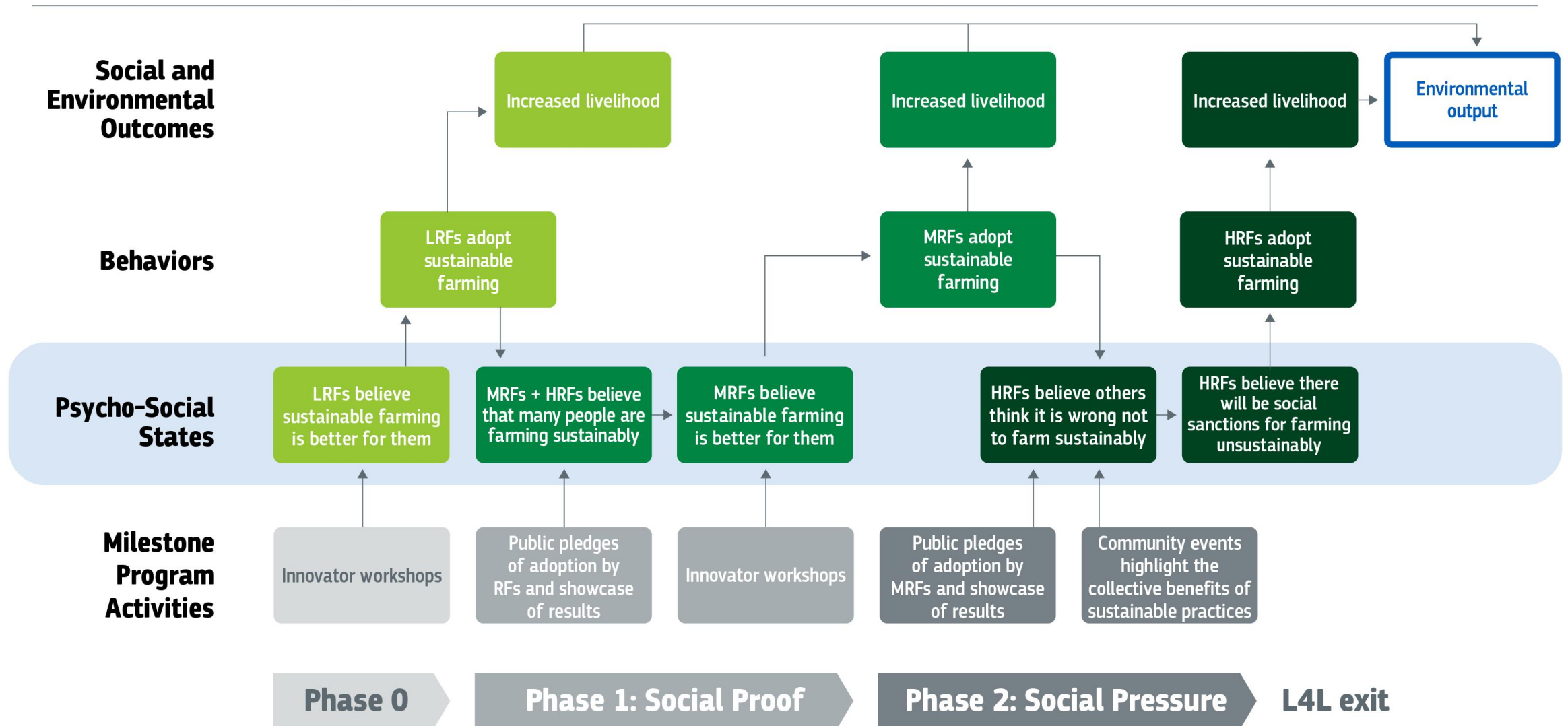
PHASE 2:
Generates a community-wide understanding that everyone (but particularly farmers) benefits from *all* farmers farming sustainably.

Snowballing Social Proof into Social Pressure



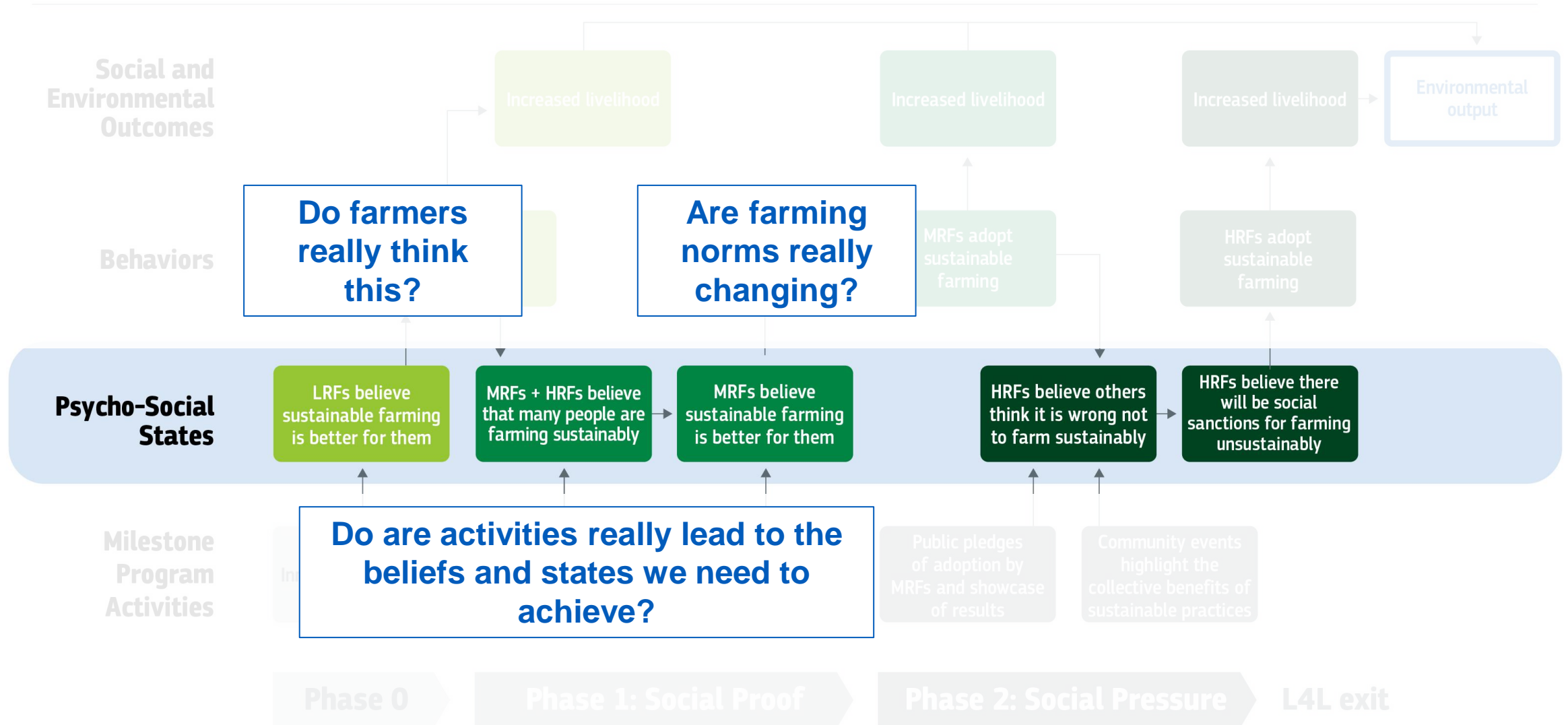
Psycho-Social Theory of Change

Rare's Lands for Life Program



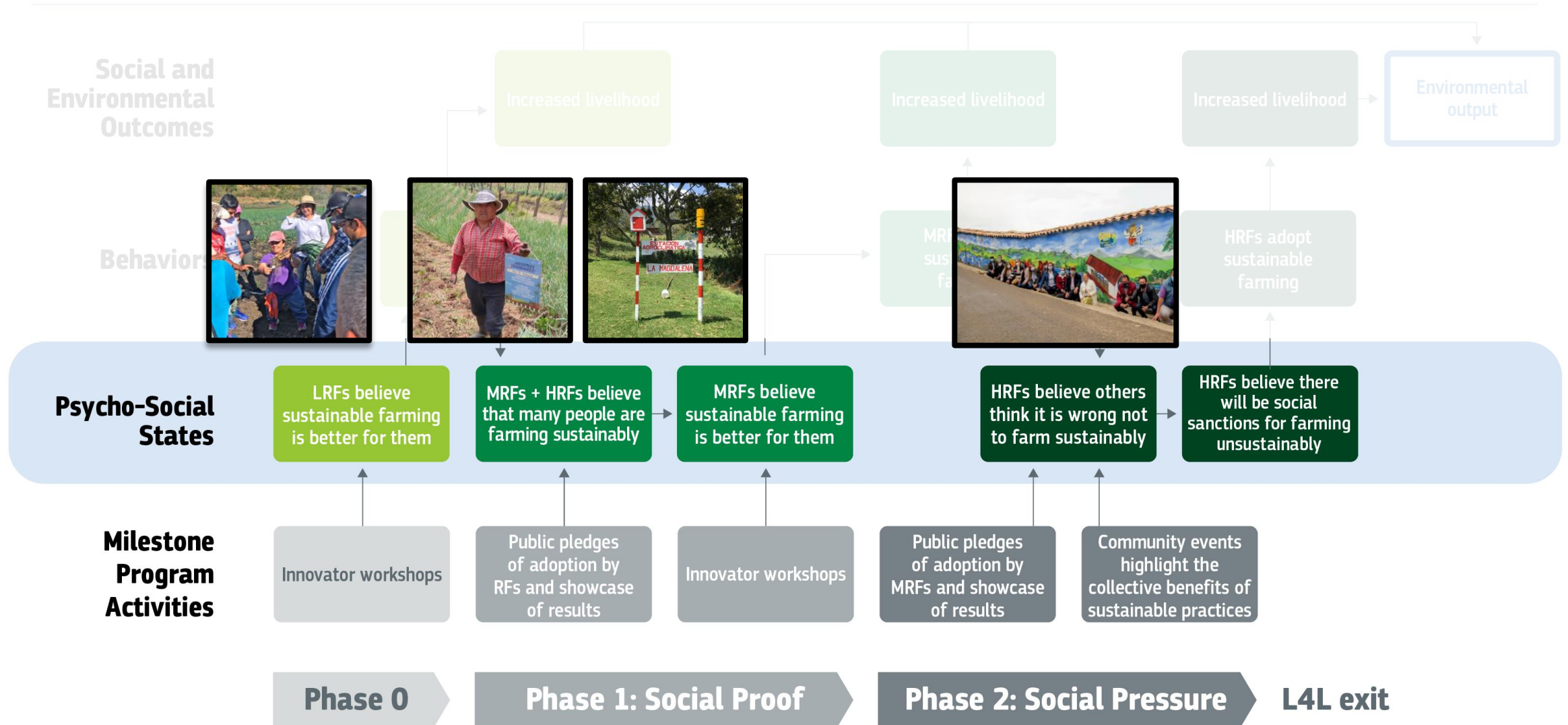
Psycho-Social Theory of Change

Rare's Lands for Life Program



Psycho-Social Theory of Change

Rare's Lands for Life Program



BEHAVIORAL INSIGHTS CAN INFORM BEHAVIOR CHANGE EFFORTS IN AGRICULTURE:

- We have limited/bound cognitive resources:
 - Salient and simplified information – delivered when most relevant - can help align intentions with actions.
- We are *social* beings:
 - Social norms are a powerful, cost-effective tool in getting people to align their behavior towards a target (and stick to it).
- We are *uncertainty averse*:
 - The outcome of novel practices feels less uncertain if producers know others have trialed and succeeded in adopting.

Learn. Design. Connect.

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ENVIRONMENT

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Behavior Change Interventions in Practice:

A synthesis of criteria, approaches, case studies & indicators

STAP SCIENTIFIC AND TECHNICAL ADHOCORY PANEL
The Science Panel for the Sustainable Development Goals

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The Science of Changing Behavior for Environmental Outcomes:

A Literature Review

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Questions and Answers

Philippe Bujold

Please use the Q & A Box to ask questions to our speakers



Summary:

Build confidence of farmers through in-field training but all by increasing ecological literacy

Understand better the constraints of farmers, their beliefs, perceptions and practices. Consider smallholder farmers as “loss averse not risk averse”.

Develop new innovative ways to communicate to farmers

Initiate in parallel - policy and structural reforms or new policies to accommodate new practices.

Consider holistic multi-purpose solutions/communication for farmers with the aim to build more resilience to all threats to farmer livelihoods.

Understand the behaviour of farmers and what drives farmer decision-making before designing communication and interventions – your perceptions of the problem may be very different than farmer perceptions!

Consider... We have limited/bound cognitive resources: We tend to focus on what is salient in the moment, and often rely on habits. We are *social* beings. We inherently seek to conform to the norms we observe. And, we are *uncertainty averse*: We avoid choices that feel risky or ambiguous.



ASEAN Action Plan on FAW Farmer Communication Workshop Series

A four-part series to catalyse action on the development and design of more effective farmer communications on IPM and FAW control.

Session 1: Behaviour

Session 2: Case studies of Farmer Communication

Tuesday 27 July 2021

Session 3: The Behaviour of Pesticide Purchasing and Use

Tuesday 7 September 2021

Session 4: Guidance for Communication – Top Tips for Effective Farmer Outreach

Tuesday 23 November

Register at: <https://www.aseanfawaction.org/events>

Case-Studies: We want your case-studies and examples – contact us at faw@growasia.org



EFFECTIVE FARMER COMMUNICATION:

A critical component of achieving IPM

CLOSE

Part 1: The importance of understanding farmer behaviour to improve IPM and FAW control



8 June 2021

