

Farmer demand, seed networks, & business models

Objective 4

Aiemnaka, Almekinders, Andersen, Burra, Chea, Cu, de Haan, Garrett, Gerlach, Halewood, Kang, Karssenber, Le, Malik, Minato, Newby, Oudthachit, Phirun, Pham, Por, Sok, Srean, Struik, Rojanaridpiched, Slavchevska, Tanthapone, Wannarat, Wyckhuys, Youabee

Erik Delaquis

Research Team Leader, Cassava seed systems

e.delaquis@cgiar.org

A big team effort



Institute for Sustainable Food Systems



RESEARCH PROGRAM ON
Roots, Tubers
and Bananas

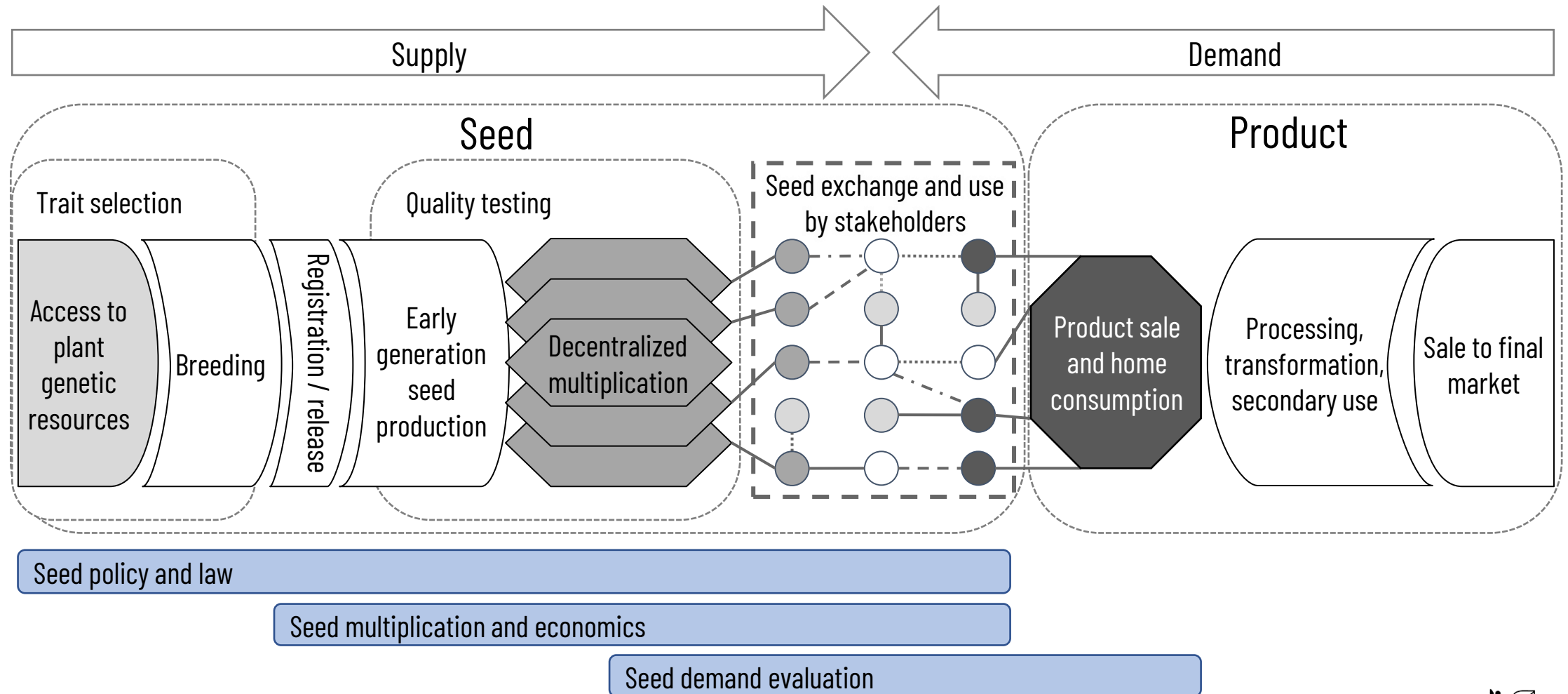


INITIATIVE ON
Seed Equal



Approach - interdisciplinarity

- Seed value chain model to guide research



Taking stock of farmer and trader exchange networks

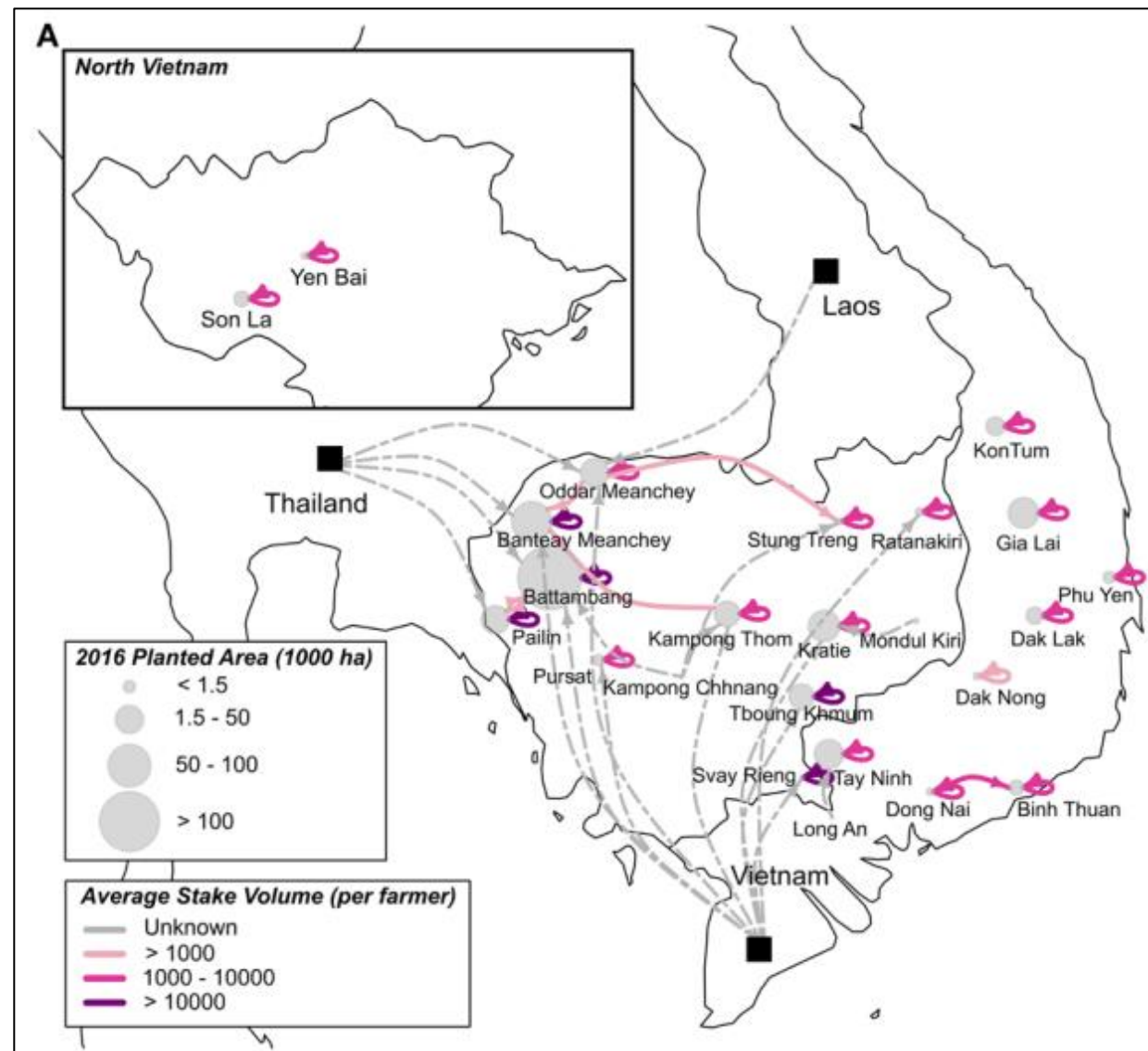
Delaquis, Andersen, Minato, et al., 2018. Raising the Stakes: Cassava Seed Networks at Multiple Scales in Cambodia and Vietnam. *Frontiers in Sustainable Food Systems* 2. <https://doi.org/10.3389/fsufs.2018.00073>

Andersen Onofre, Delaquis, Newby, et al. Decision support for managing an invasive pathogen through efficient clean seed systems: Cassava mosaic disease in Southeast Asia. Submitted 2023.

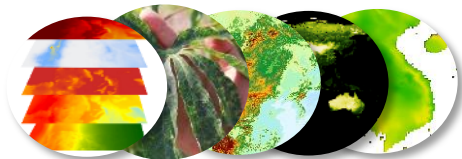
Delaquis, Por, Cu, & Almekinders. Bringing informal cassava seed traders into focus: case studies of large-scale seed trade along a major regional seed flow pathway in a period of epidemic-driven varietal change. In prep.

A regional seed system

... whether we like it or not



Delaquis et al., 2018

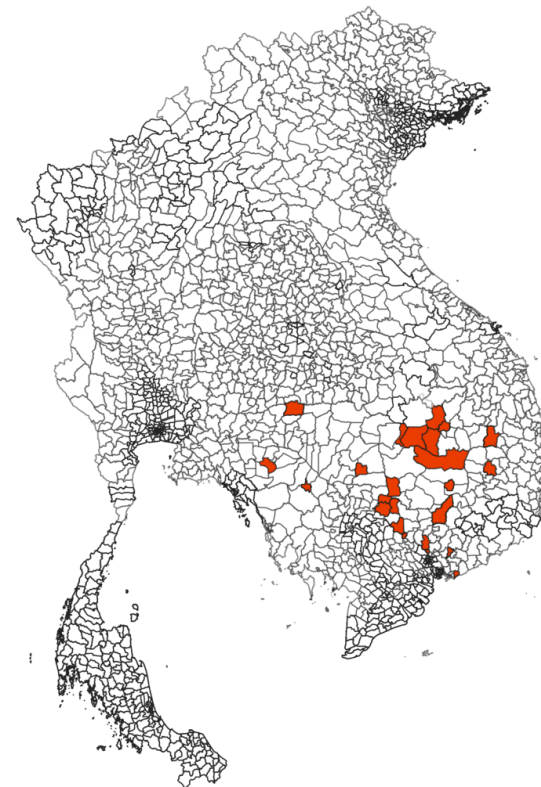
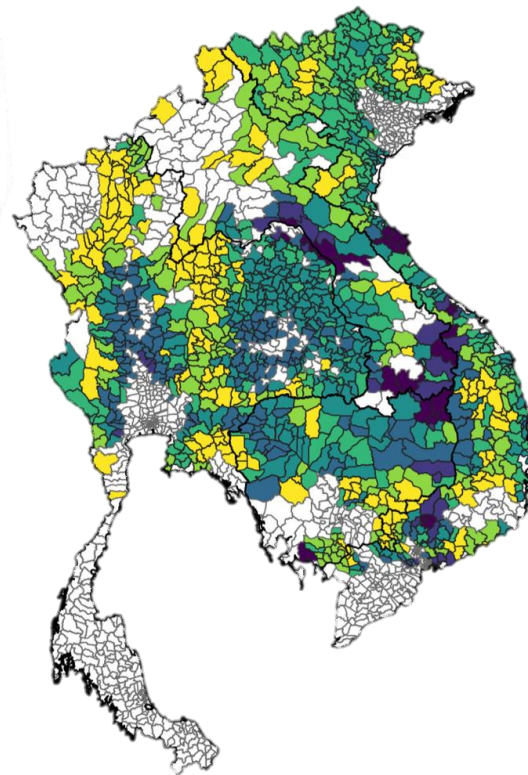
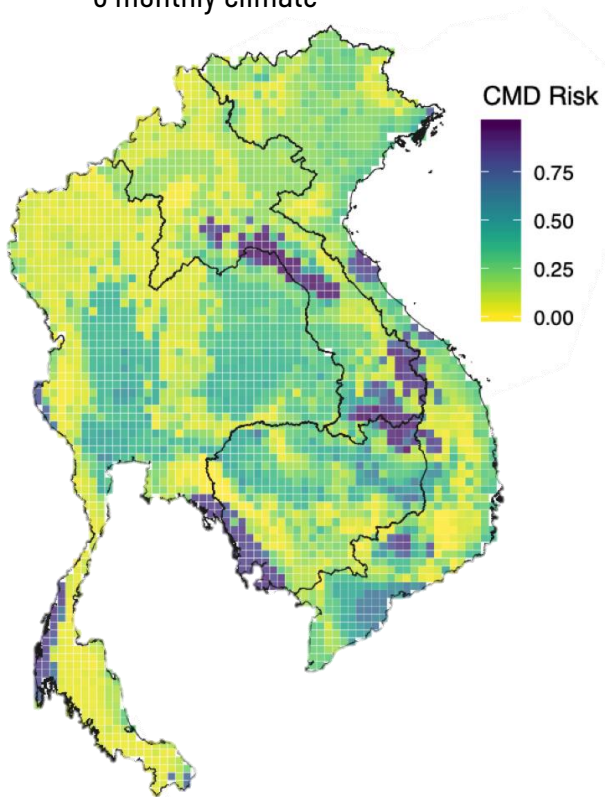
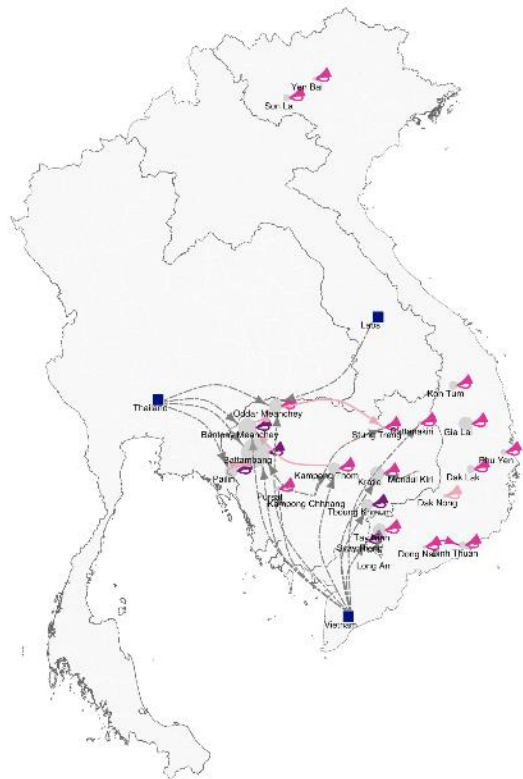


Seed exchange

19 bioclimatic variables
 CMD presence / absence
 Cassava Production (ha)
 6 monthly climate

Combined RF model

Scenario simulations

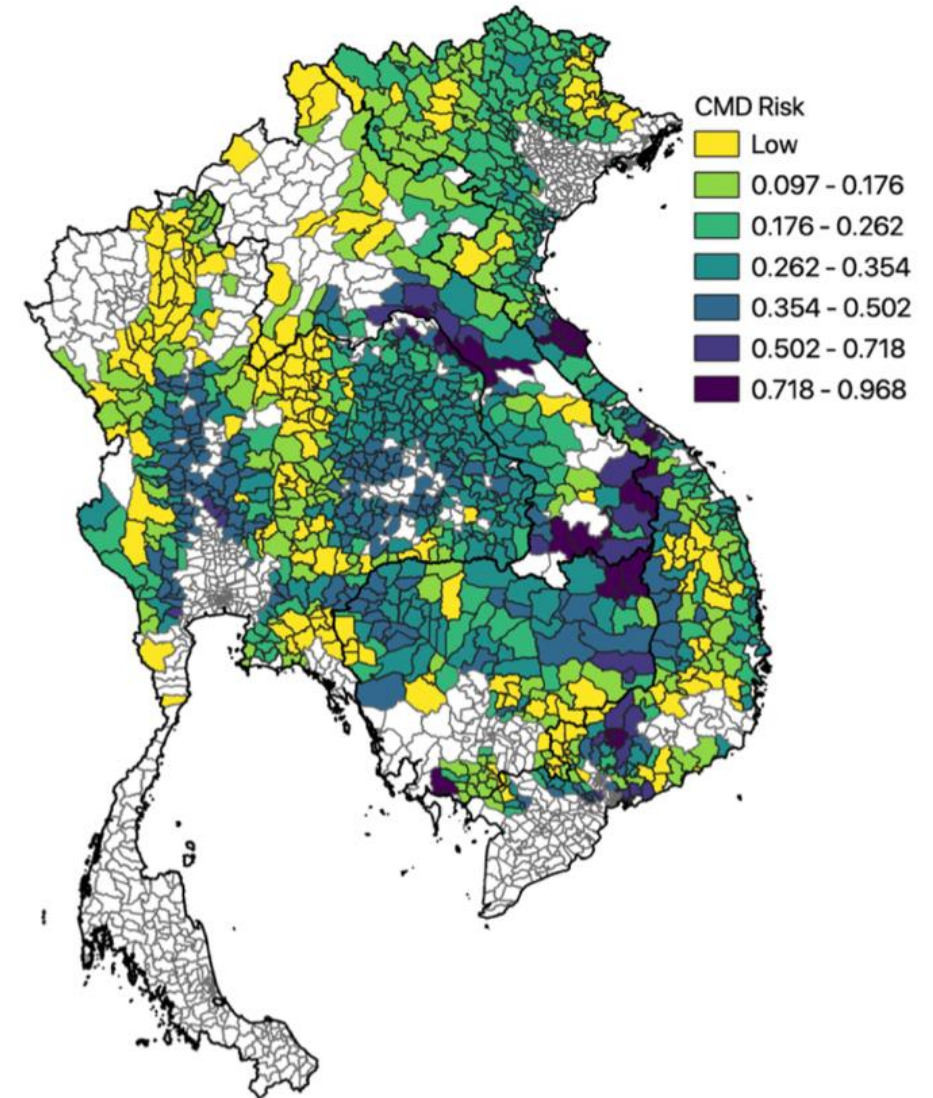
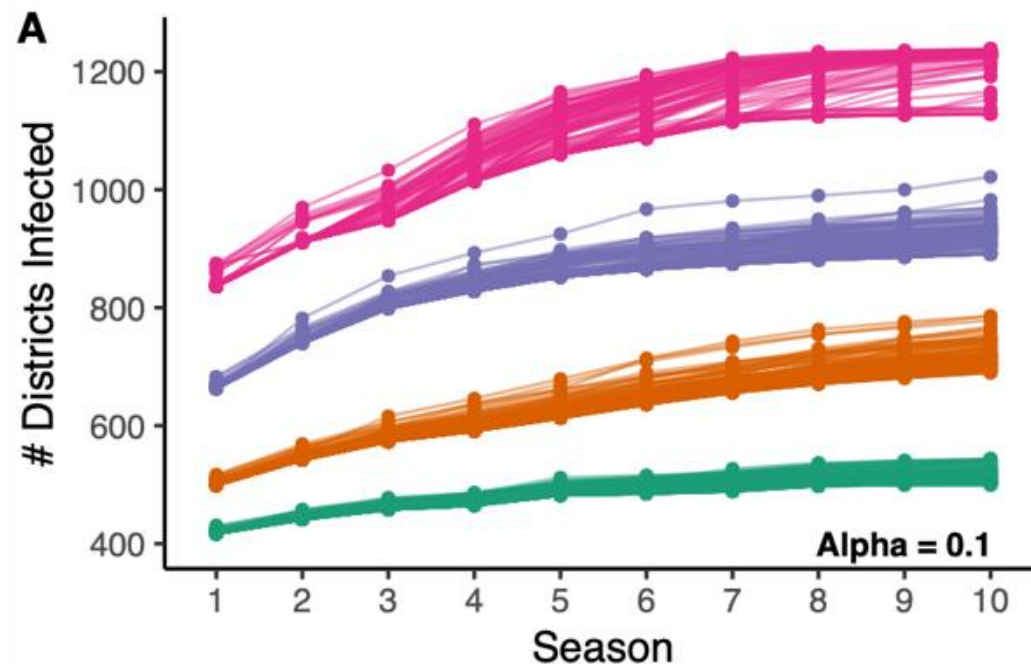


Data-based simulation of clean seed deployment:

- 1) Locations for surveillance
- 2) Effects of trade restrictions
- 3) Different clean seed deployment strategies

Takeaways

- Fixed dissemination performed better than adaptive
- Smaller volumes to a higher number of districts performed better than 'flooding' worst districts



Nhan Pham Thi
2h · 🌍

TMEB 419 on the farmer field in Tay Ninh. The owner of this field was the first person to agree to spend 500,000 VND to 1 million VND to buy a bundle of TMEB419 seedling stems. With 04 hectares after 6 months of planting, he earned more than 1 billion VND from selling seedlings.



Red stem 81 1000 trees 500 baht. Location Kalasin district. Kuchinarai 0619487462

[Hide Translation](#) · [Rate this translation](#)

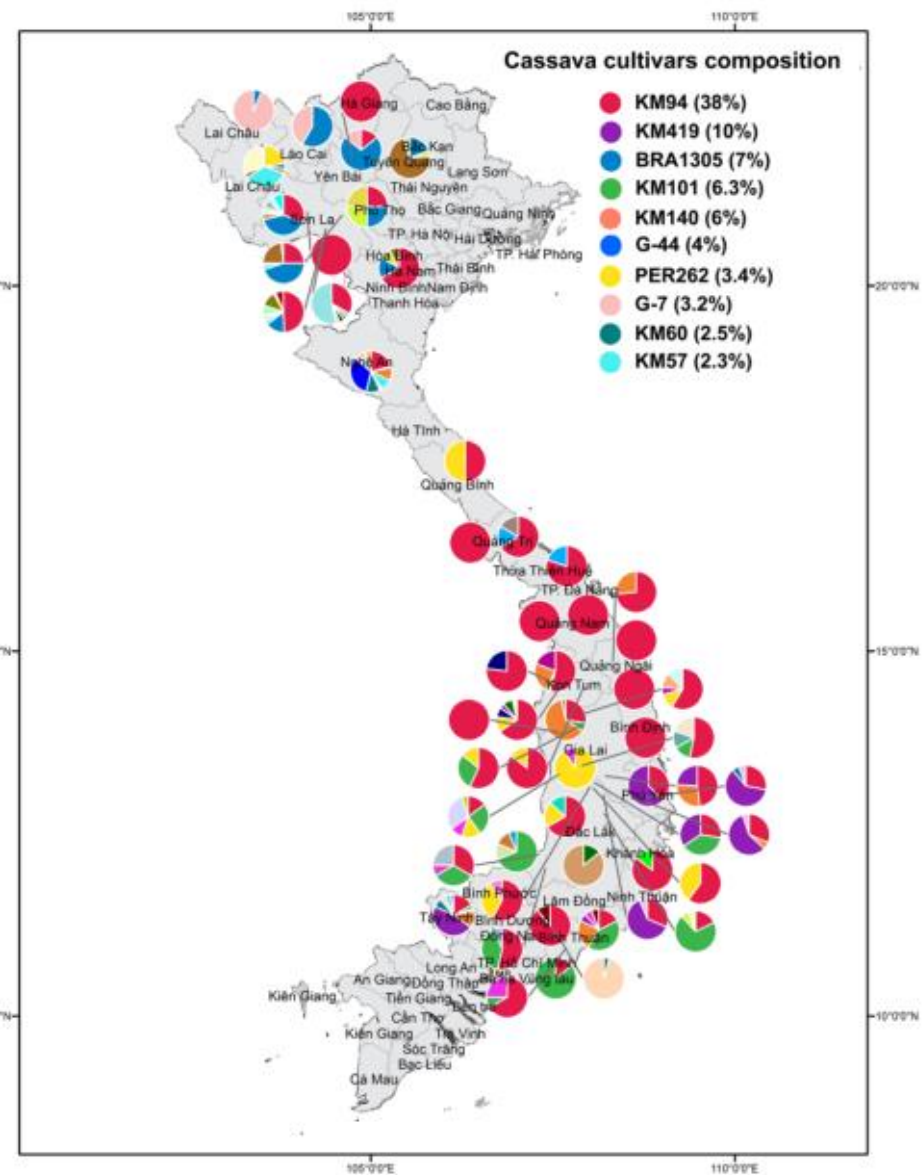
เกษตรกรทวง ต้นยาว ตัดสด 1มัด40ต้น
สอบถามราคาหักแช่หัดไ้ณะคะ มีเยอะ

See Translation



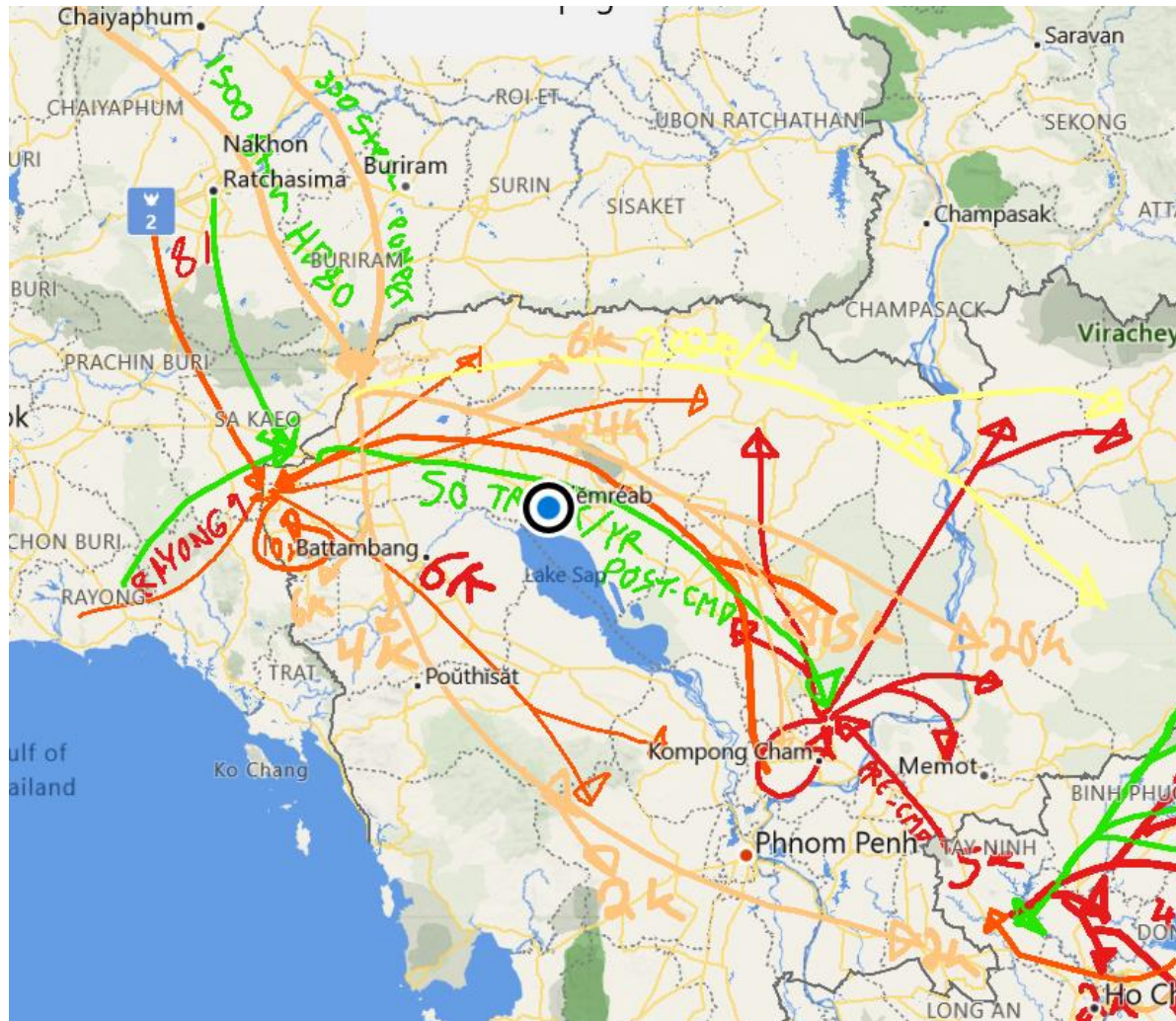
พวงเพชร ต้นสวยๆ ปลอดโรคใบด่าง
ต้นละ1บาท มัดละ 25 บาท มี 25 ส่า
อ.โนนสะอาด จ.อุดร 0649785271

See Translation

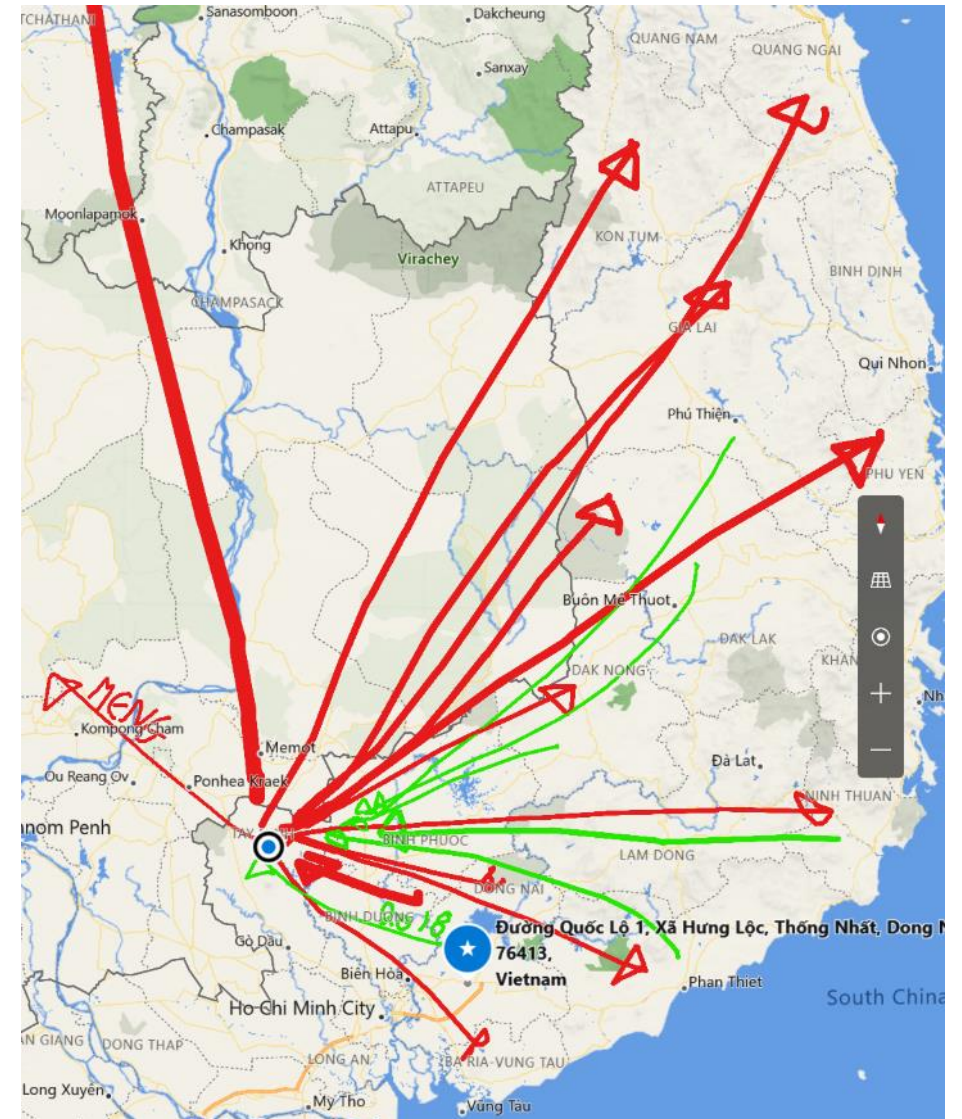


Ocampo et al., 2018

Trader networks



Improved variety exchange - 4 traders



CMD resistance - 13 provinces in 2 years

The background of the slide is a dark, monochromatic image of cassava leaves. The leaves are large and have a prominent, palmate venation pattern. They are arranged in a way that creates a sense of depth and texture, with some leaves in the foreground being sharper than others in the background. The overall tone is dark and naturalistic.

Evaluating demand for elite CMD tolerant varieties and clean seed

Delaquis, Slavchevska, Almekinders, et al. Increased farmer willingness to pay for quality cassava (*Manihot esculenta* Crantz) planting materials: evidence from experimental auctions in Cambodia and Lao PDR. Submitted 2023

WTP stem auctions



1. Farmer seed

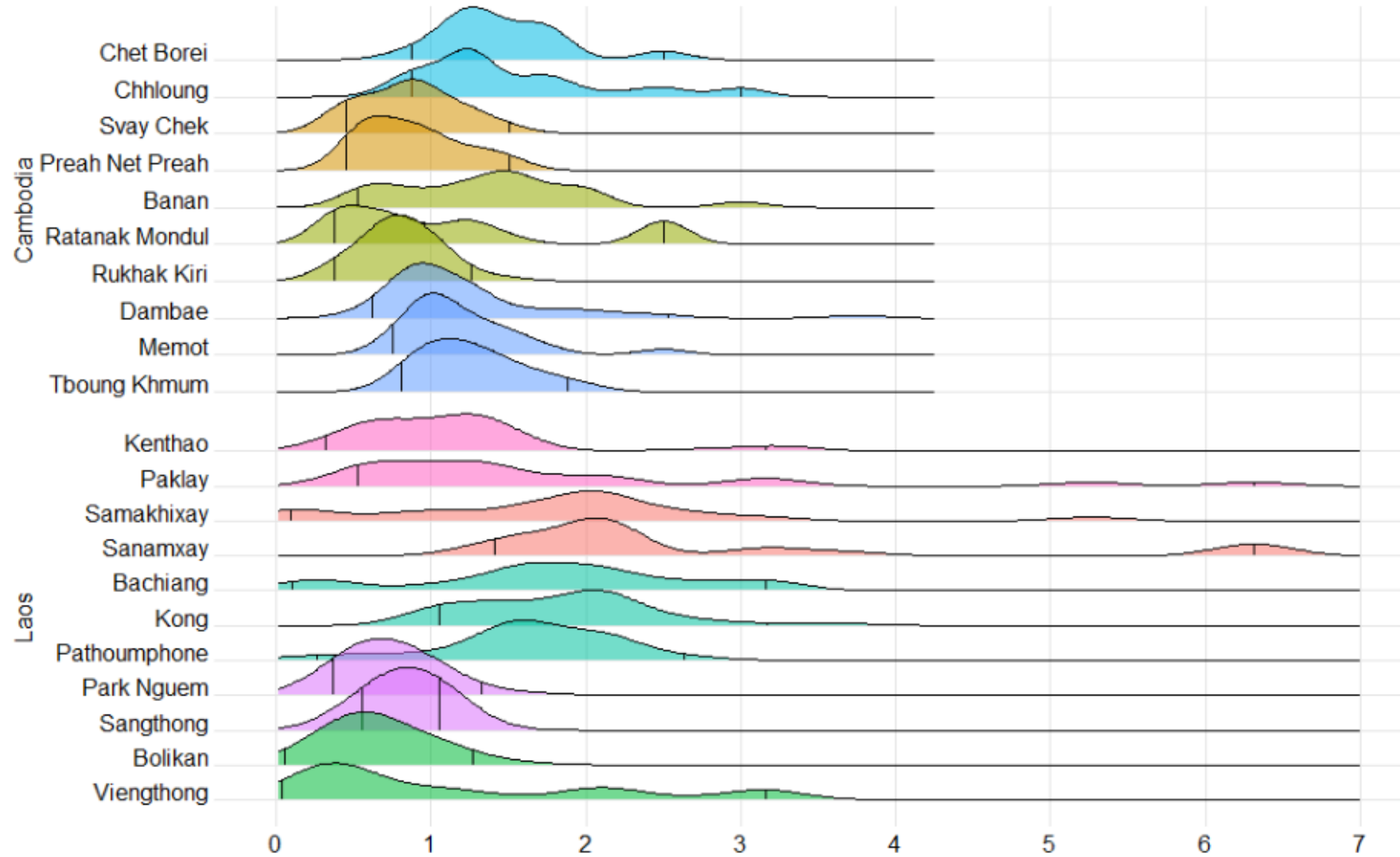
2. KU 50

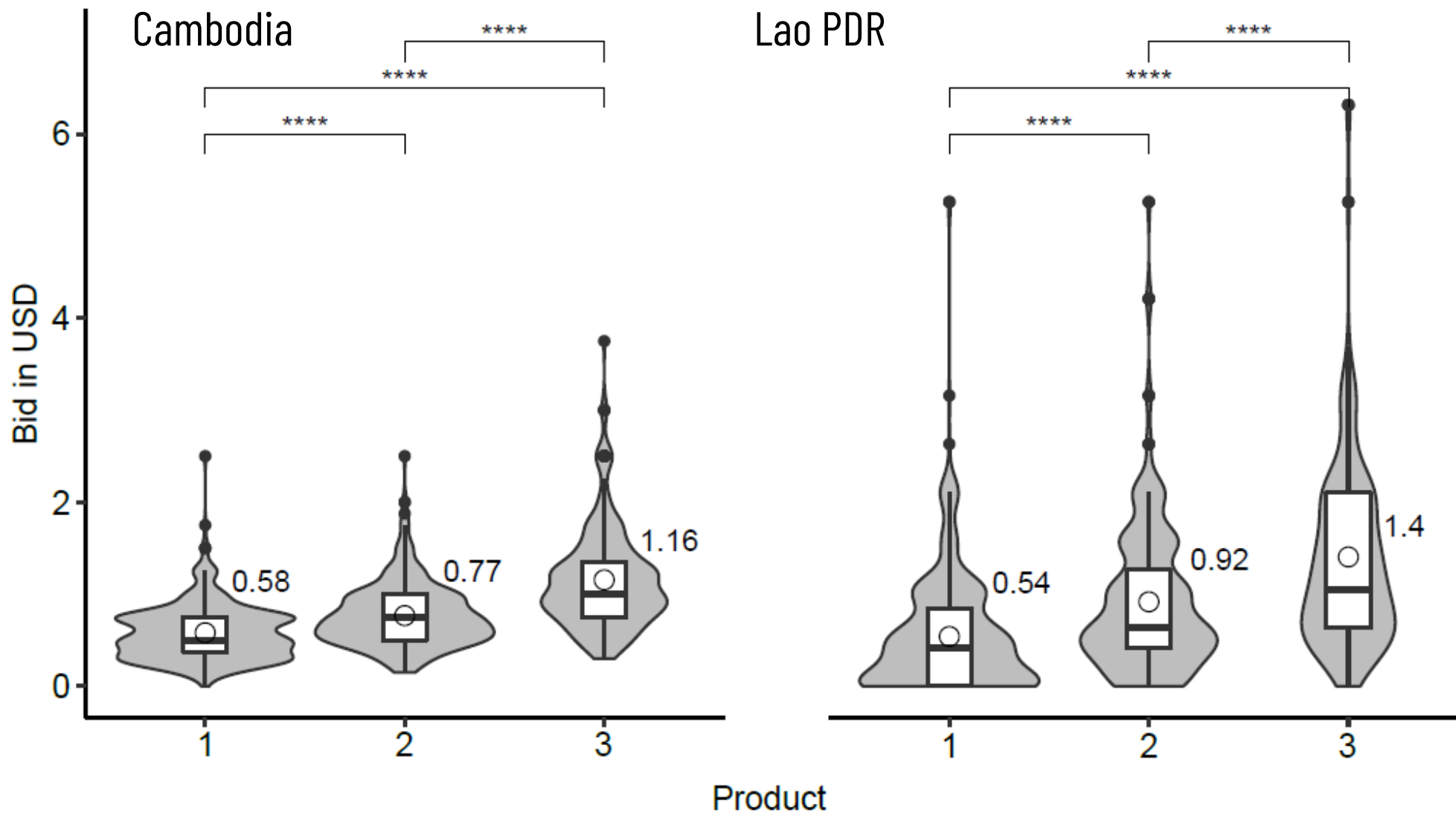
3. KU 50 – clean seed

WTP stem auctions

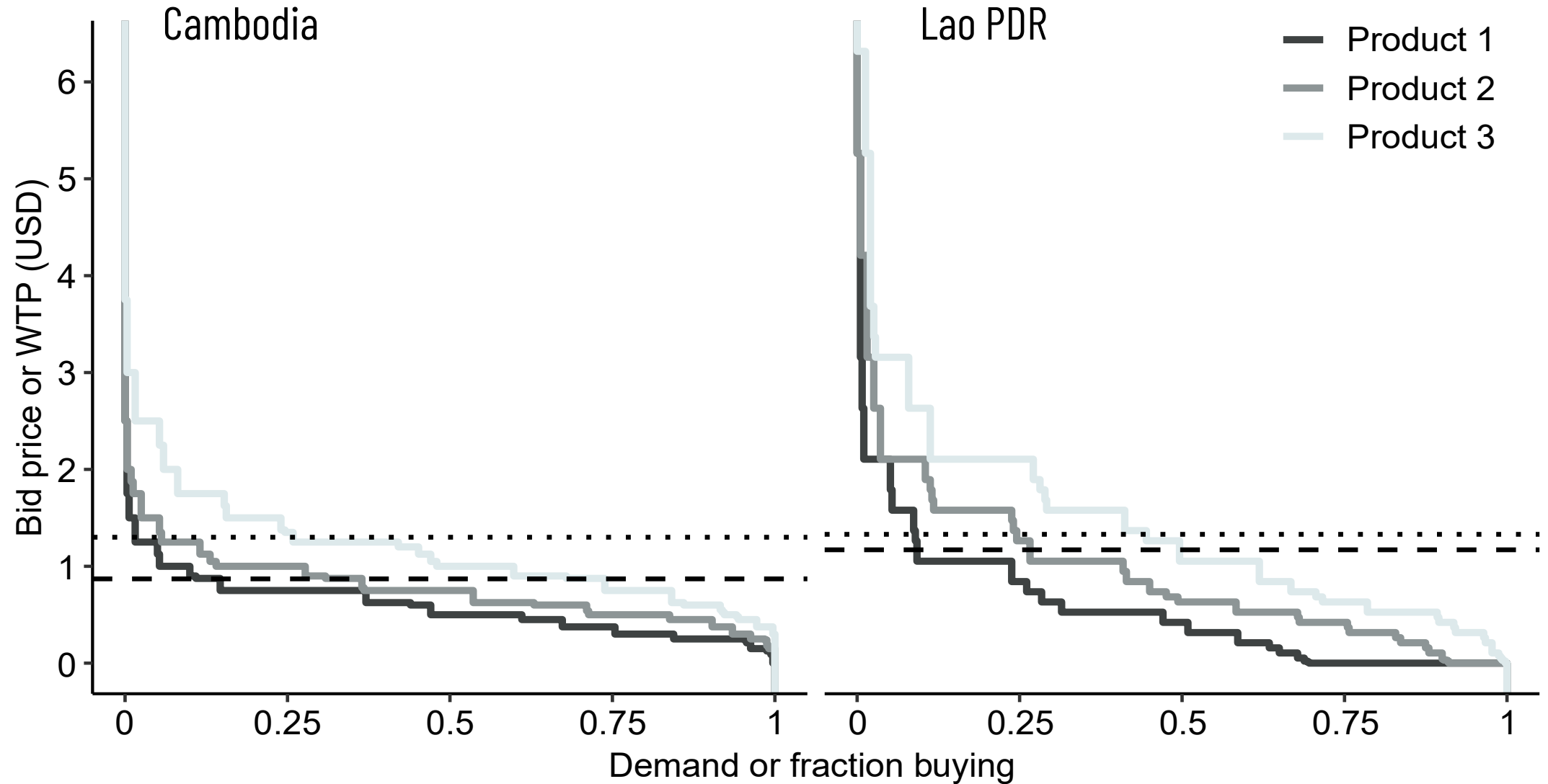
Bid density functions by district

Results from experimental auctions in 2020-2022 harvest seasons





Understanding demand



Understanding demand

- Province location – strongest effect
- In Lao PDR – ethnicity matters
- In both, gender matters
- # years growing, share dedicated

Table 5.7. Determinants of willingness to pay for three cassava planting material products in Cambodia. Variables prefaced with 'P' represent auction provinces.

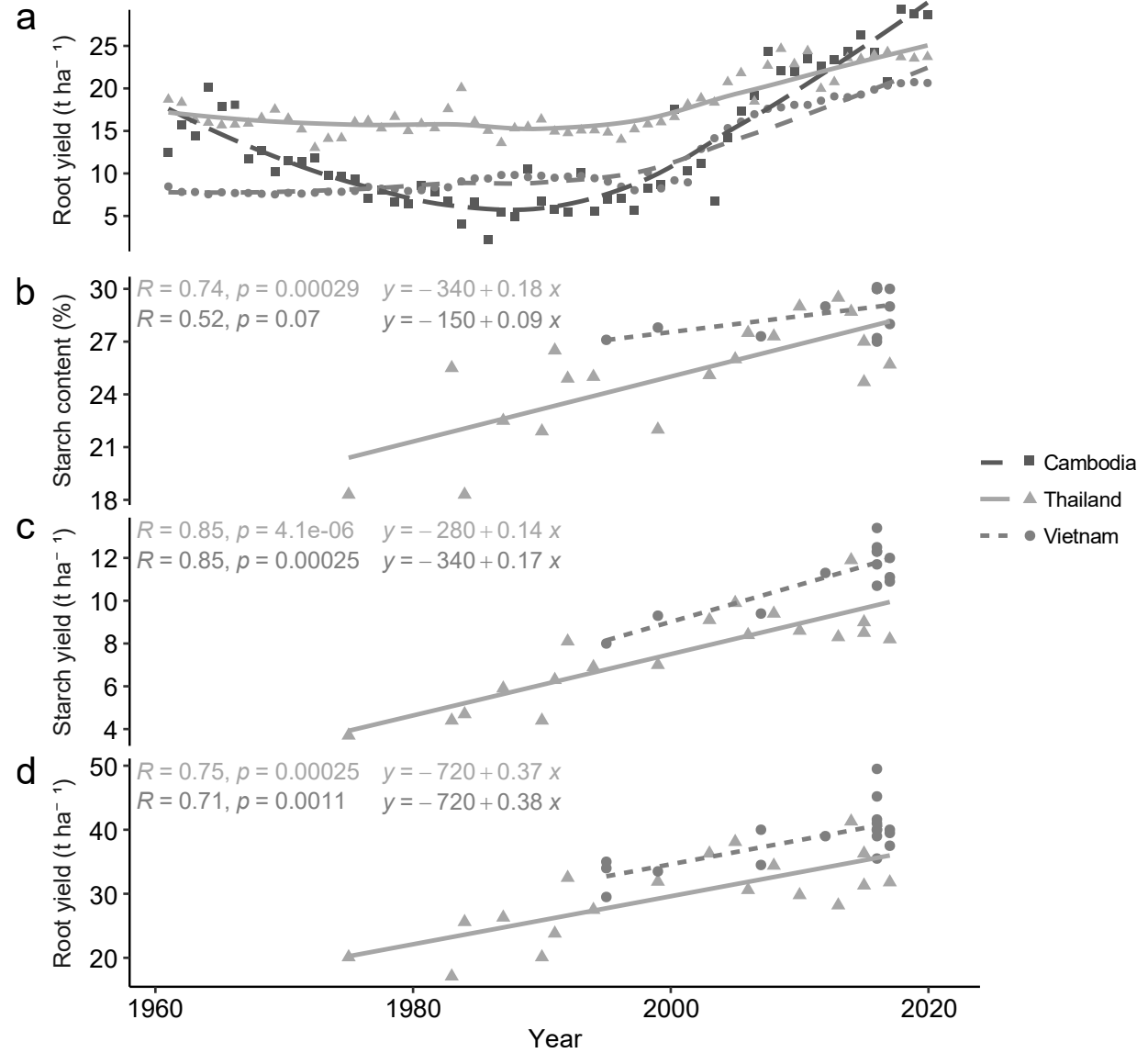
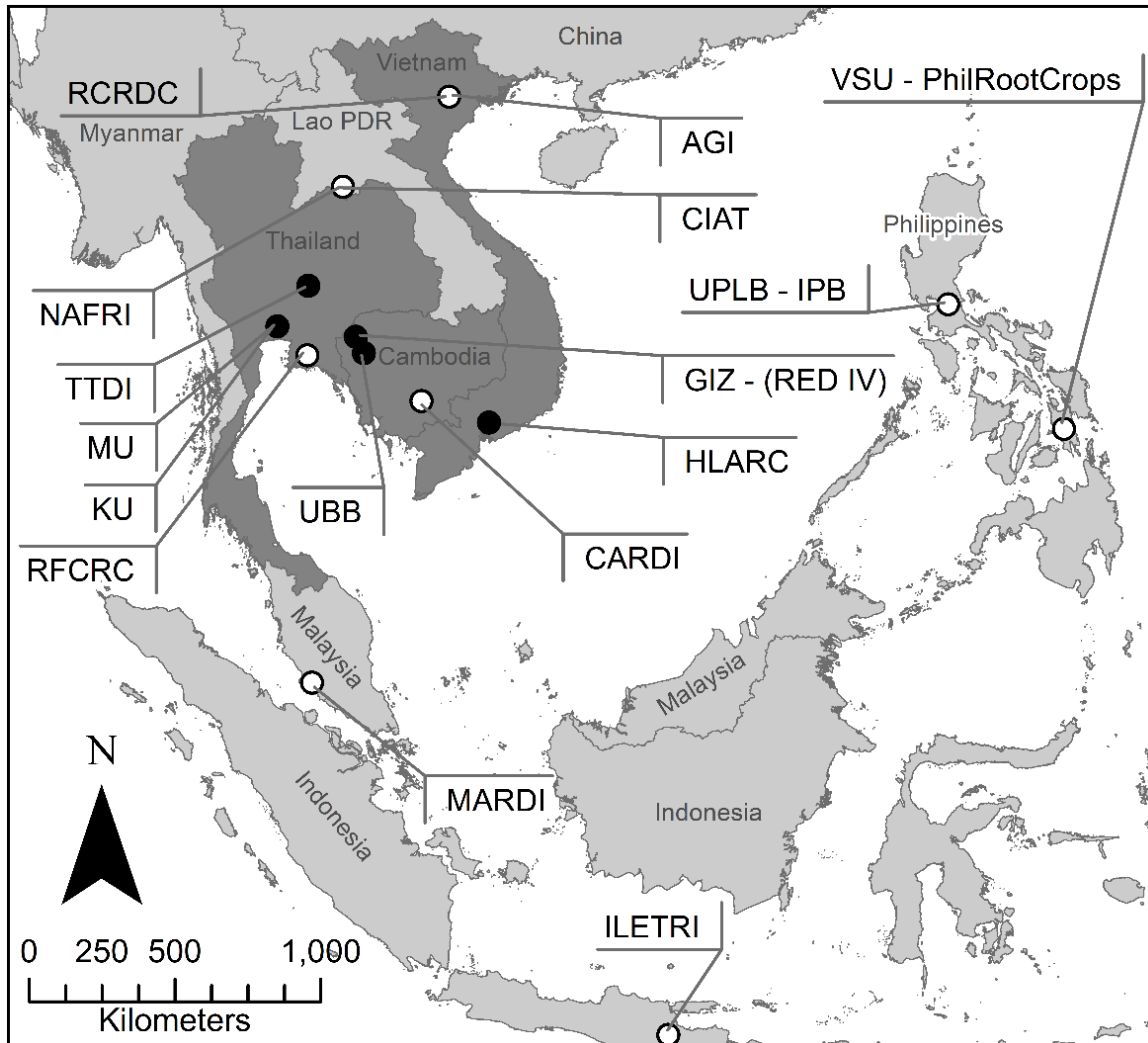
Variable	Product					
	1	SE	2	SE	3	SE
age	0.00238*	0.00139	0.00212	0.00165	0.000224	0.00256
resp_fem	-0.0157	0.0446	-0.0423	0.0528	-0.0633	0.0822
resp_head	-0.0200	0.0435	0.00979	0.0515	-0.00947	0.0803
n_yrs_edu	-0.000997	0.00491	0.00393	0.00581	0.0216**	0.00905
eth_min	-	-	-	-	-	-
hh_size	-0.0156*	0.00928	-0.0188*	0.011	-0.00718	0.0171
n_child_5	0.0318	0.0227	0.0106	0.0268	0.0317	0.0418
n_yrs_village	-0.000515	0.00113	0.000179	0.00134	0.00506**	0.00208
gr_member	-0.0352	0.0346	0.0130	0.041	0.0776	0.0638
n_soc_net	0.000537	0.0289	0.0454	0.0342	0.00500	0.0533
inc_agr_w	0.0246	0.0329	-0.0154	0.0389	-0.0214	0.0606
inc_non-ag	-0.0177	0.0427	-0.0656	0.0506	-0.0524	0.0788
inc_non-ag-self	-0.0451	0.0673	-0.0737	0.0797	0.136	0.124
inc_other	-0.0786*	0.0434	-0.0541	0.0514	0.00763	0.08
tot_inc_000	0.000779	0.00411	-0.00141	0.00487	0.00714	0.00759
credit_ins	0.0960**	0.0475	0.00507	0.0562	0.0128	0.0876
n_yrs_cass	-0.00291	0.00266	-0.00311	0.00315	0.00254	0.00491
train_cass	0.00974	0.0332	0.0105	0.0393	0.0395	0.0612
used_com	0.0328	0.0327	-0.0371	0.0387	-0.0560	0.0603
land_cult_ha	-0.00130	0.00264	-0.000814	0.00313	-0.00617	0.00487
sh_land_cass	-0.0262	0.0616	-0.0598	0.0729	-0.315***	0.114
N_var	0.00502	0.0219	0.0108	0.026	0.0702*	0.0405
P: Tboung Khmum	-	-	-	-	-	-
P: Banteay Meanchey	-0.333***	0.0481	-0.286***	0.057	-0.229***	0.0887
P: Battambang	-0.325***	0.0497	-0.254***	0.0588	-0.00523	0.0916
P: Kratie	0.0341	0.0496	0.133**	0.0587	0.451***	0.0914
Constant	0.767***	0.116	0.940***	0.138	1.013***	0.215
R-squared	0.340	-	0.275	-	0.280	-

*** p < 0.01, ** p < 0.05, * p < 0.1, SE = Standard Error

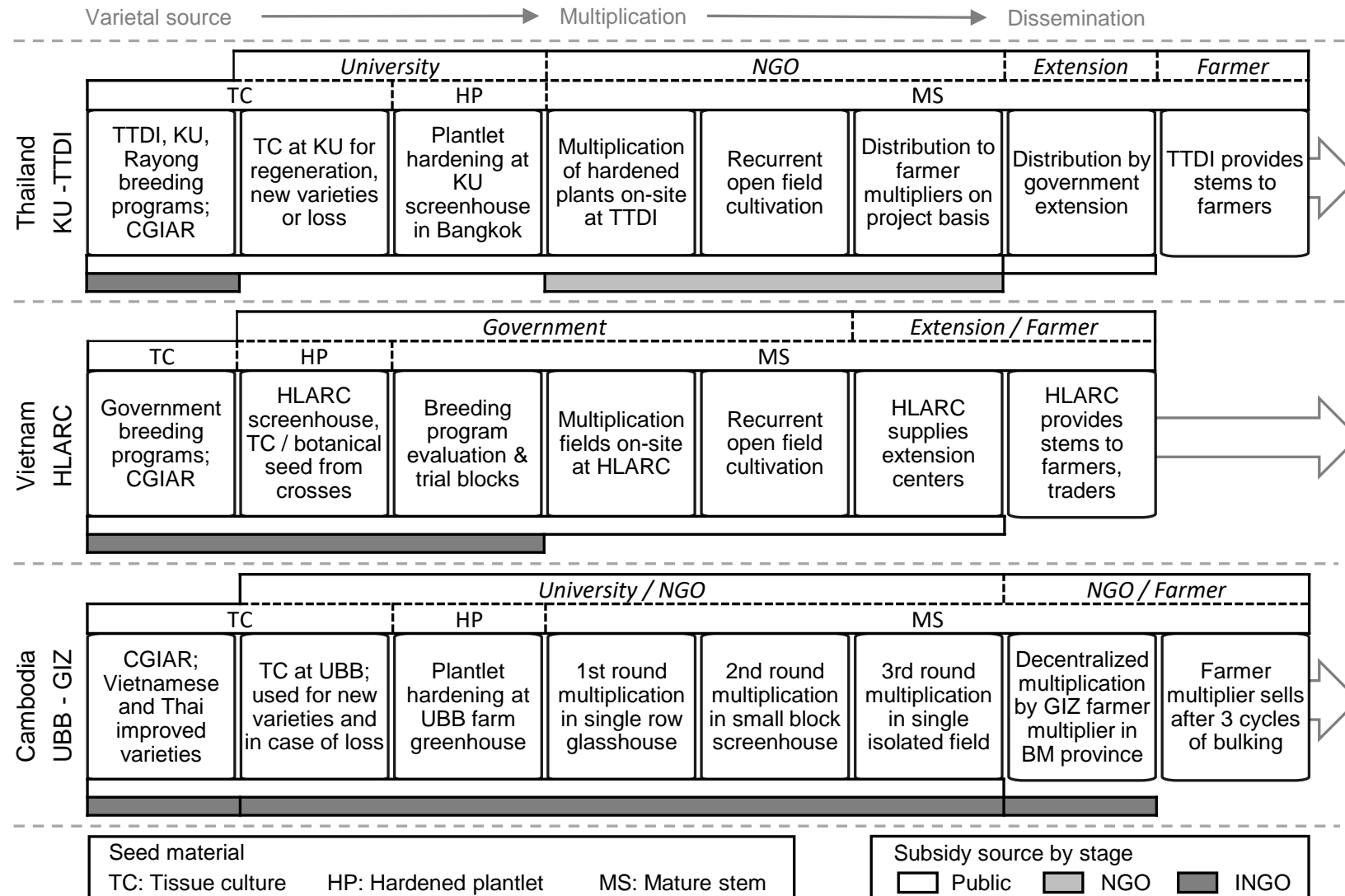


Institutional models

Institutional arrangements for cassava (*Manihot esculenta* Crantz) early generation seed production in Southeast Asia.
Delaquis, Almekinders, de Haan, et al. Submitted 2023 and under review.



Southeast Asian models for seed multiplication



Cost by stage



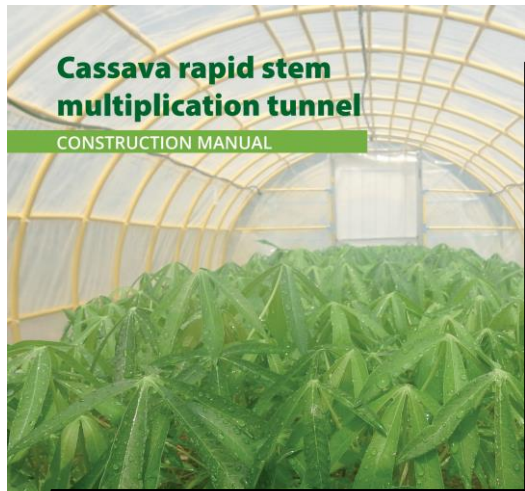
Table 4.4. Summary of open field production costs experienced by the three case studies in 2017–2019 in USD per hectare equivalent (List of acronyms provided in the introduction.; see Supplementary Materials Table 4.8Table 4.9Table 4.10 for detailed budgets).

Activity totals	TTDI waxy 2017–2018	HLARC 2018–2019	GIZ farmer 2018–2019
Planting & growing costs	546	711	844
Harvest & processing costs	298	123	232
Land and administrative costs	983	390	160
Inspection/testing costs			866
Total production costs	1827	1224	2101
Income from root sales	2342	2635	2668
Income from stems produced	0	922	2497
Net income	515	2333	3064
Percentage total costs by category (%)			
Labor & transport	26	55	25
Inputs	17	13	26
Admin/depreciation and land	57	32	8
PCR CMD detection costs			41

Filling a gap – tunnel multiplication

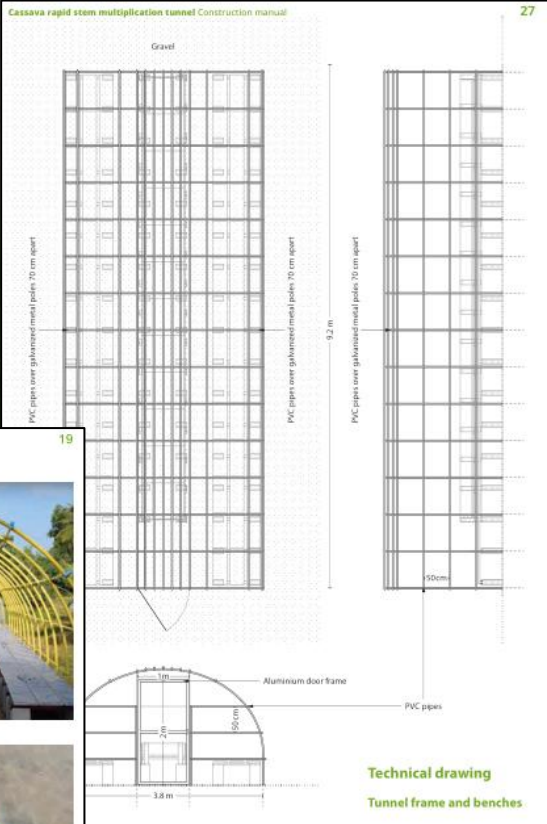
Delaquis, Newby, Malik, et al. 2023. Cassava rapid stem multiplication tunnel: Construction manual.

Delaquis, Malik, Newby, Escobar, et al. 2023. Cassava rapid stem multiplication tunnel: Operations manual.



Cassava rapid stem multiplication tunnel

CONSTRUCTION MANUAL



ການສ້າງເຮືອນຊີ້ນາງເຮືອນຫຍາຍລ່າມັນຕົ້ນແບບປວ ດູນີການສ້າງເຮືອນຊີ້ນາງ

ໃນຮູບແມ່ນະທາດຂອງໂຄງສ້າງທີ່ເຮັດແລ້ວ. ເຊິ່ງຢູ່ທີ່ຂອງ PVC ແມ່ນໄຊ້ຂັດກັບເຮັດໃຫ້ໂຄງຕົວເຂົ້າກັນດີ.



ການເຮັດປະຕູທາງເຂົ້າປະຕູທາງເຂົ້າແມ່ນນໍາໃຊ້ເຜິ້ກເສັ້ນແລະ ທໍ່ PVC ສ້າງໂຄງປະຕູຢູ່ທັງສອງດ້ານຂອງເຮືອນຊີ້ນາງ ເພື່ອເປັນປ່ອນເຂົ້າອອກ. ໃຊ້ເຜິ້ກເສັ້ນ 2 ເສັ້ນເຮັດທັງສອງດ້ານຂອງຂອບປະຕູແລະ ເຊື່ອມດໍາໃສ່ກັບທໍ່ດ້ານຂ້າງໂດຍ ໃຊ້ຂັດ 3 ຕາ ແລະ ຂັດຕໍ່.



Cassava rapid stem multiplication tunnel

OPERATIONS MANUAL



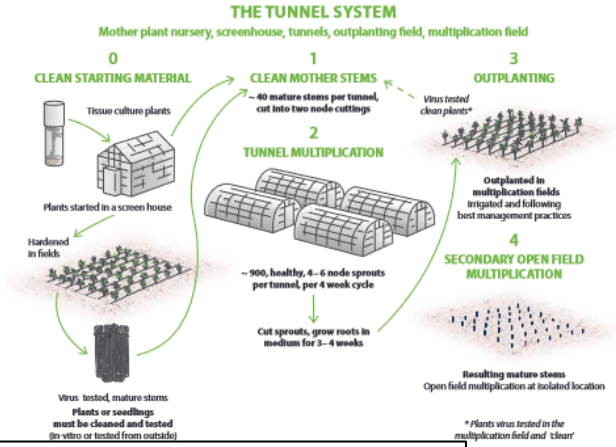
I. Overview of the tunnel system

What it is

The tunnel system is composed of several parts. Besides the tunnels themselves, there are supporting facilities to prepare the mature stems going into the tunnels, and to manage the seedlings coming out of the tunnels.

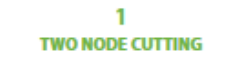
The illustration below, shows an overview of the system, beginning with a source of clean starting material, multiplying it quickly using the tunnel system, and taking care of the seedlings in multiplication fields. Depending on the context and circumstances, tunnel managers may only choose to do some of the stages shown, with partners or other institutions taking responsibility for the other stages.

Most tunnel users will not receive in vitro plants, or go through the stages of outgrowing and hardening themselves (0 below). Instead, most users will start by getting clean, tested starting materials from a government, university, NGO, or private sector organization.



HARVESTING SPROUTS FROM TWO NODE CUTTINGS

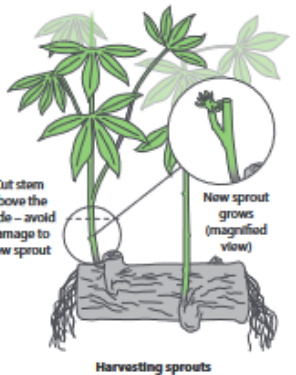
Growth stages and correct method for harvesting sprouts



Cut two node cuttings, leaving space between the ends and buds / nodes.



3 HARVESTING SPROUTS FOR ROOTING



Cassava rapid multiplication tunnels in Asia (Sep. 2023)

Other infrastructure

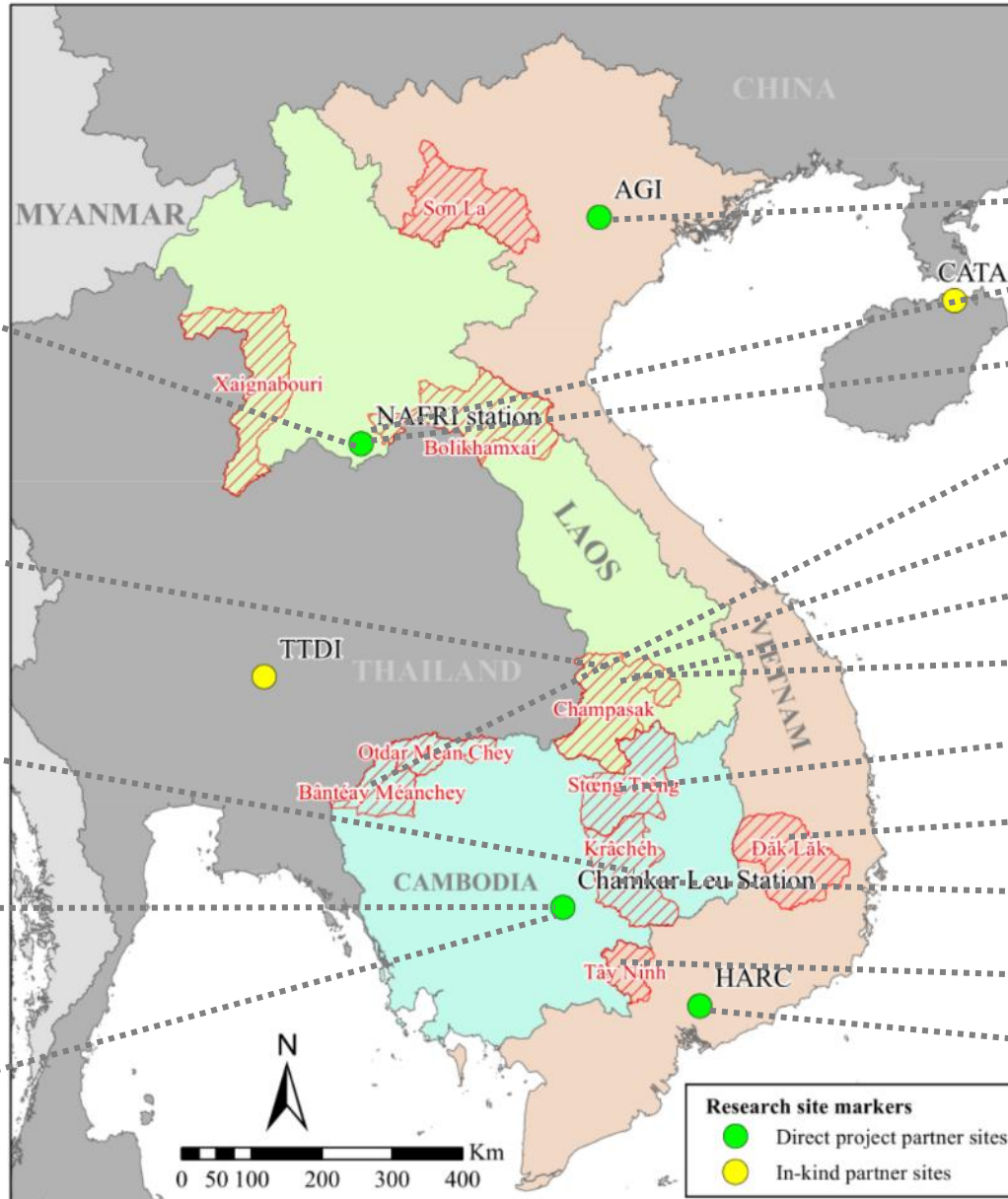
Screenhouse - Future Stems
(Vientiane)

Fibercell - LCA
(Laongarm)

Screenhouse - GDA
(Chamkar Leu)

Fibercell - CARDI
(Phnom Penh)

Screenhouse (2) - CARDI
(Phnom Penh)



Tunnels constructed

#	Name	Place	Funder
1	Hanoi Nat. Uni.	Hanoi	Public
4	Private traders	Vientiane	Private/Winrock/USDA
6	NAFRI	Vientiane	Public
4	PDAFF	Banteay Meanchey	Public
10	Khounsub	Paksong	Private
6	LCA	Laongarm	Winrock/USDA
3	Skyvision	Thateng	Private
4	PDAFF	Stung Treng	Public
4	Company	Dak Lak	Private
4	GDA	Chamkar Leu	Public
4	Private traders	Tay Ninh	Private
4	HLARC	Hung Loc	Public

54 + 4 screenhouses

Research site markers
 ● Direct project partner sites
 ● In-kind partner sites

Learning from doing – modifications and exchanges



Laos
Vientiane, Champassak, Salavan



Vietnam
Dong Nai, Dak Lak



Cambodia
Banteay Meanchey, CARDI, GDA



Exchanges & Training



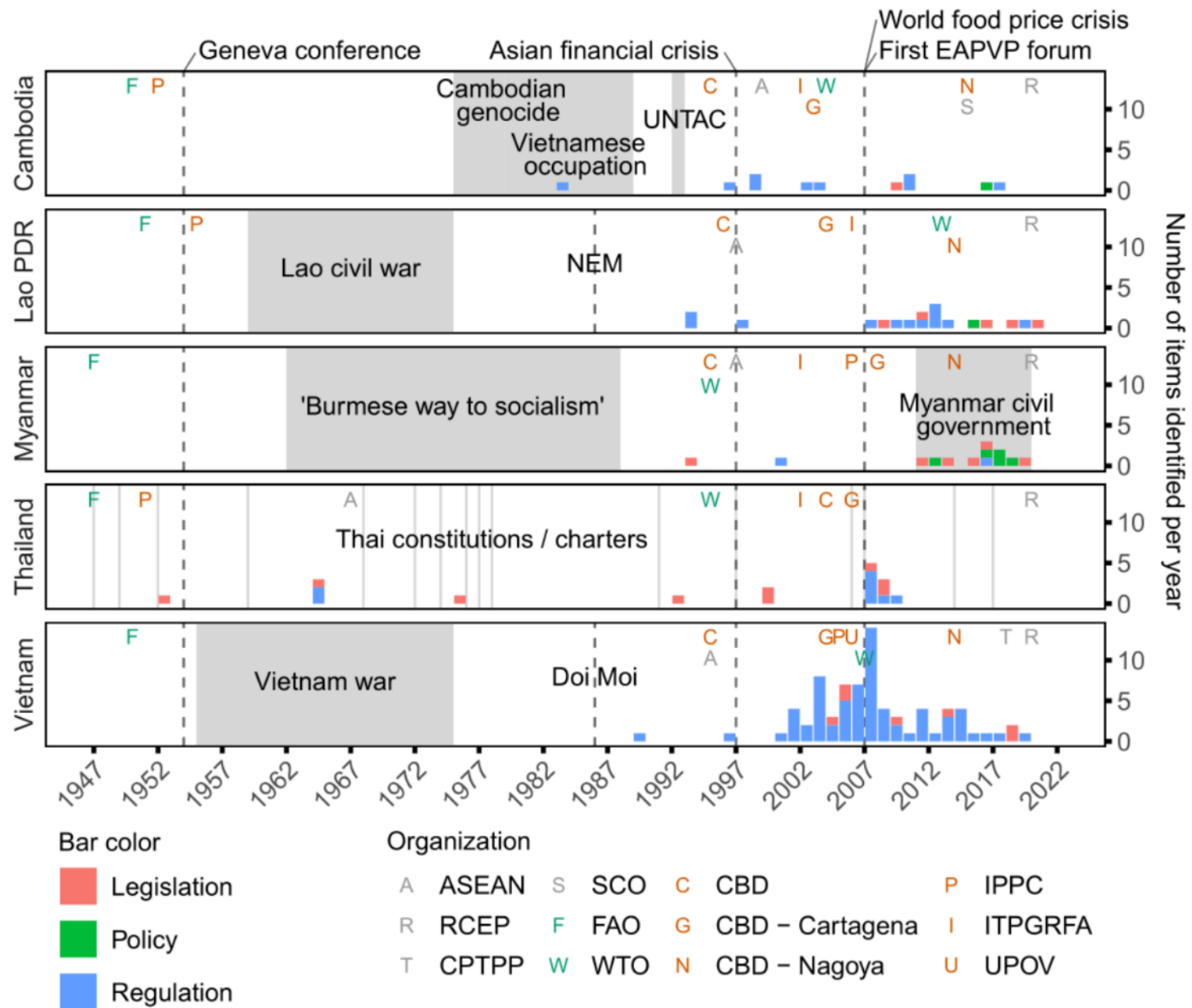


The seed law and policy landscape

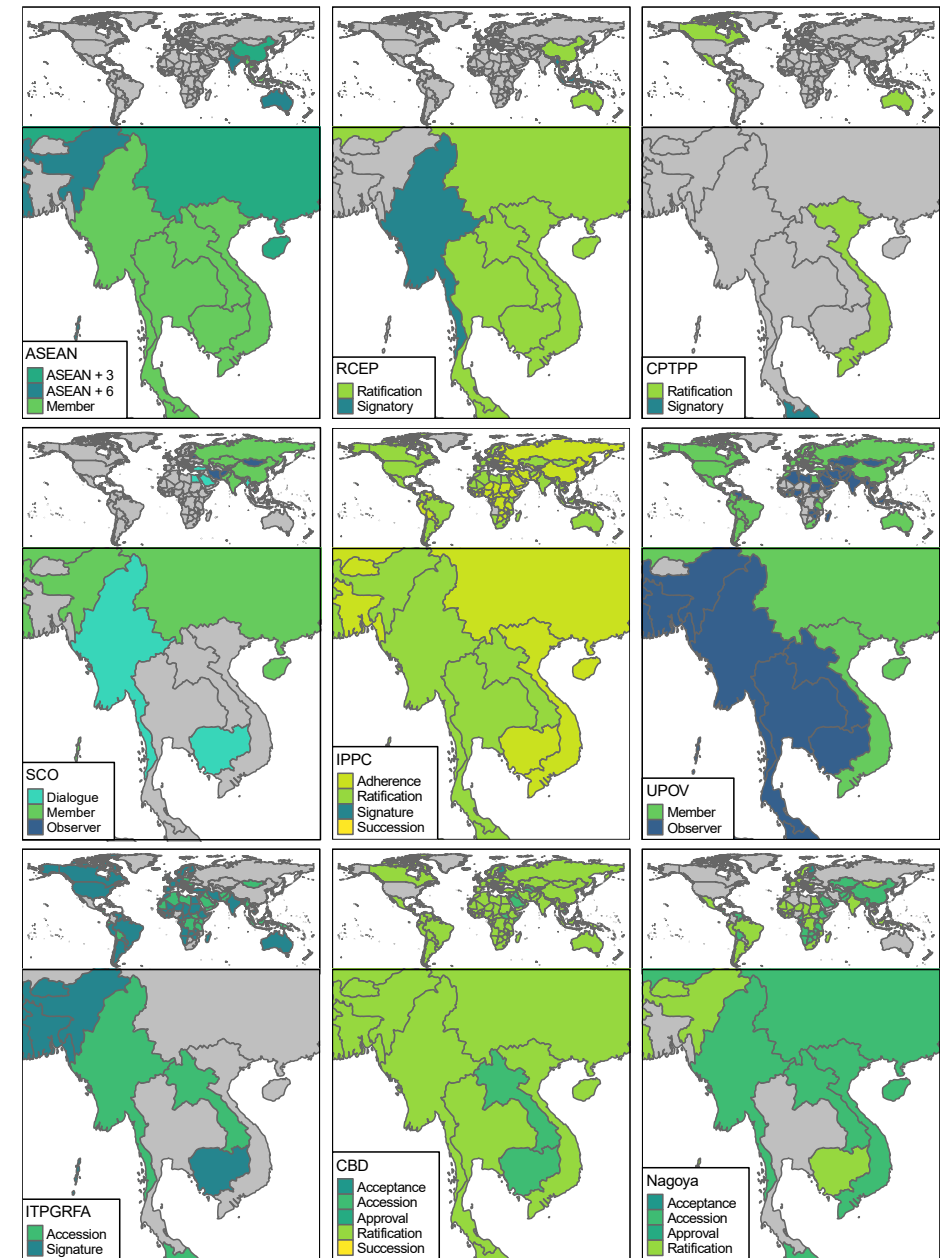
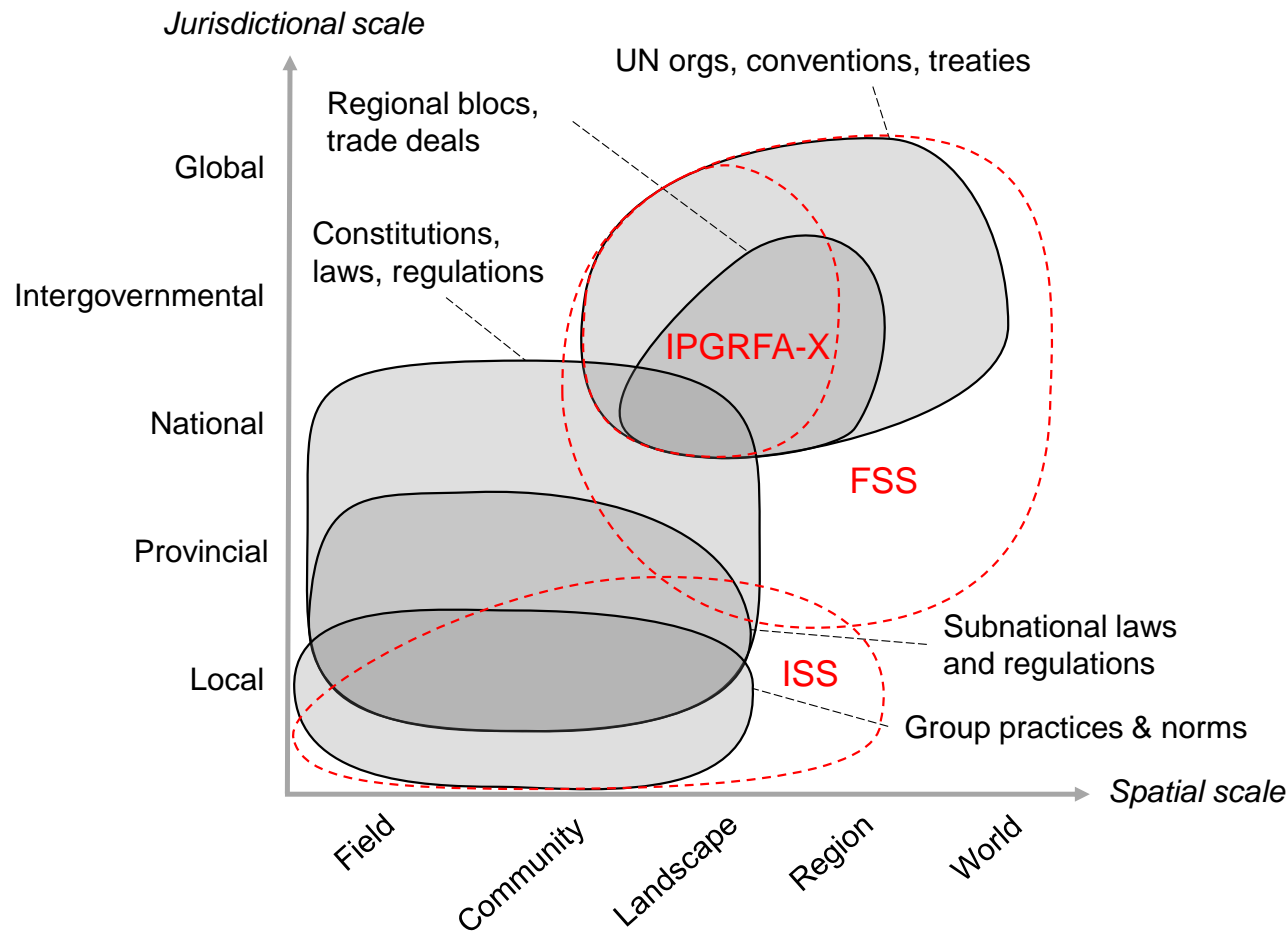
Delaquis, Halewood, Gerlach, et al. Regulation of Southeast Asia's seed commons: a local to global chronological analysis. Submitted 2023.

Seed regulatory landscape

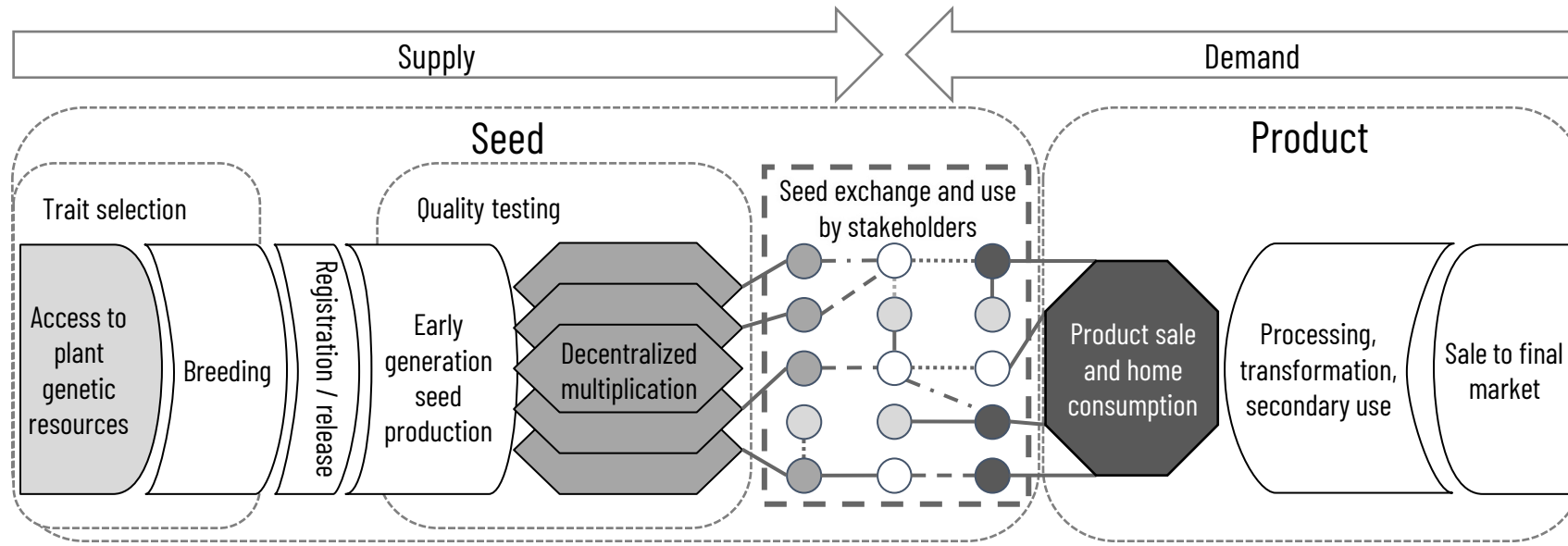
- Systematic search of 5 databases
- Heterogeneous at country level
- Increasing regulatory scrutiny of farmer seed systems
- Regulation at multiple scales
- Participation in trade areas



Seed regulatory landscape

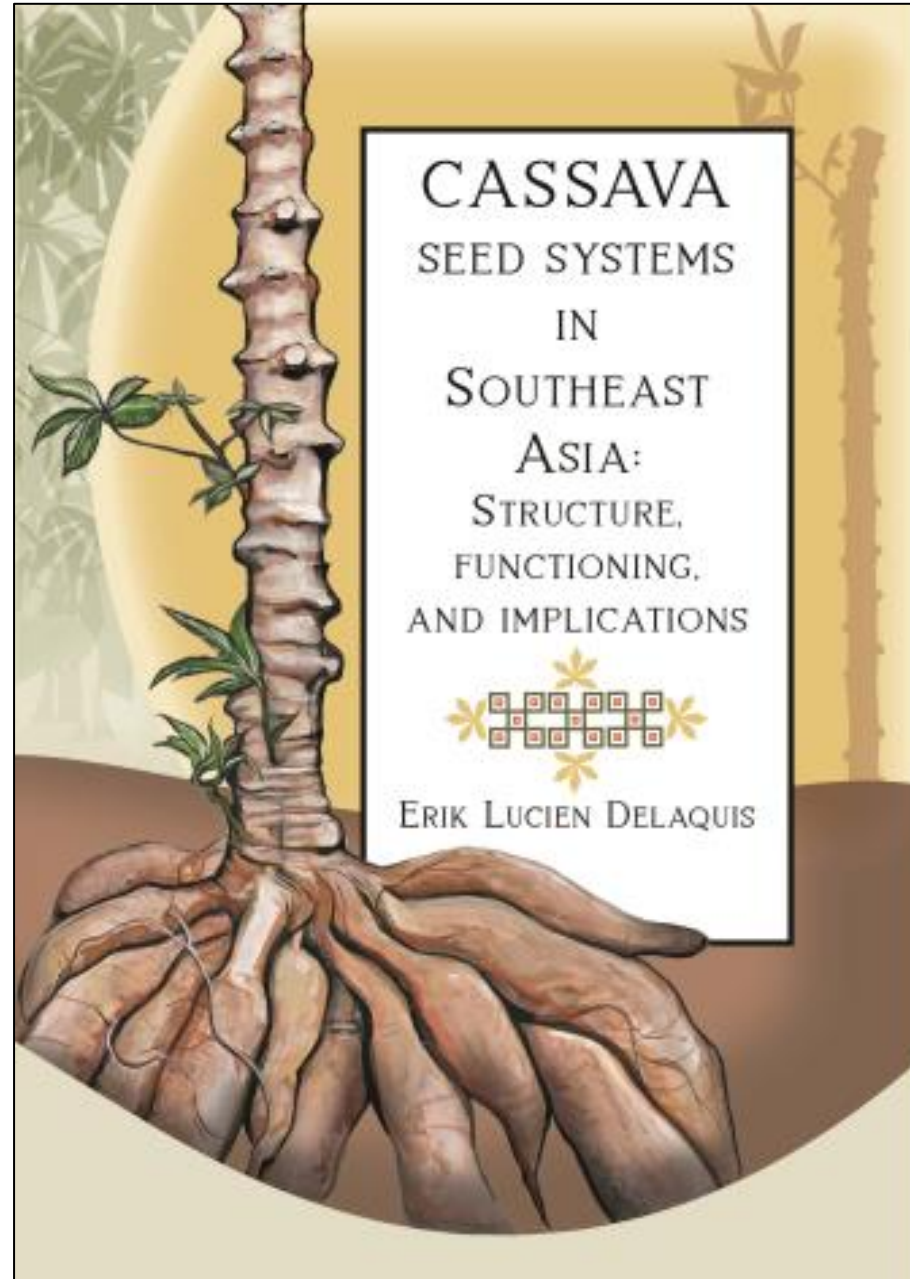


Putting it all together



PhD thesis

2 WUR MSc





Thanks!

Contact: Jonathan Newby – j.newby@cgiar.org