Patterns and Determinants of Farmers' Adoption of Horticultural Crops in Indonesia

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International Convention of Asia Scholars (ICAS)
Adelaide, 8 July 2015

Overview

- Background
- Horticulture in Indonesia
- Objectives
- Data: Farmer Survey
- Findings
- Conclusions

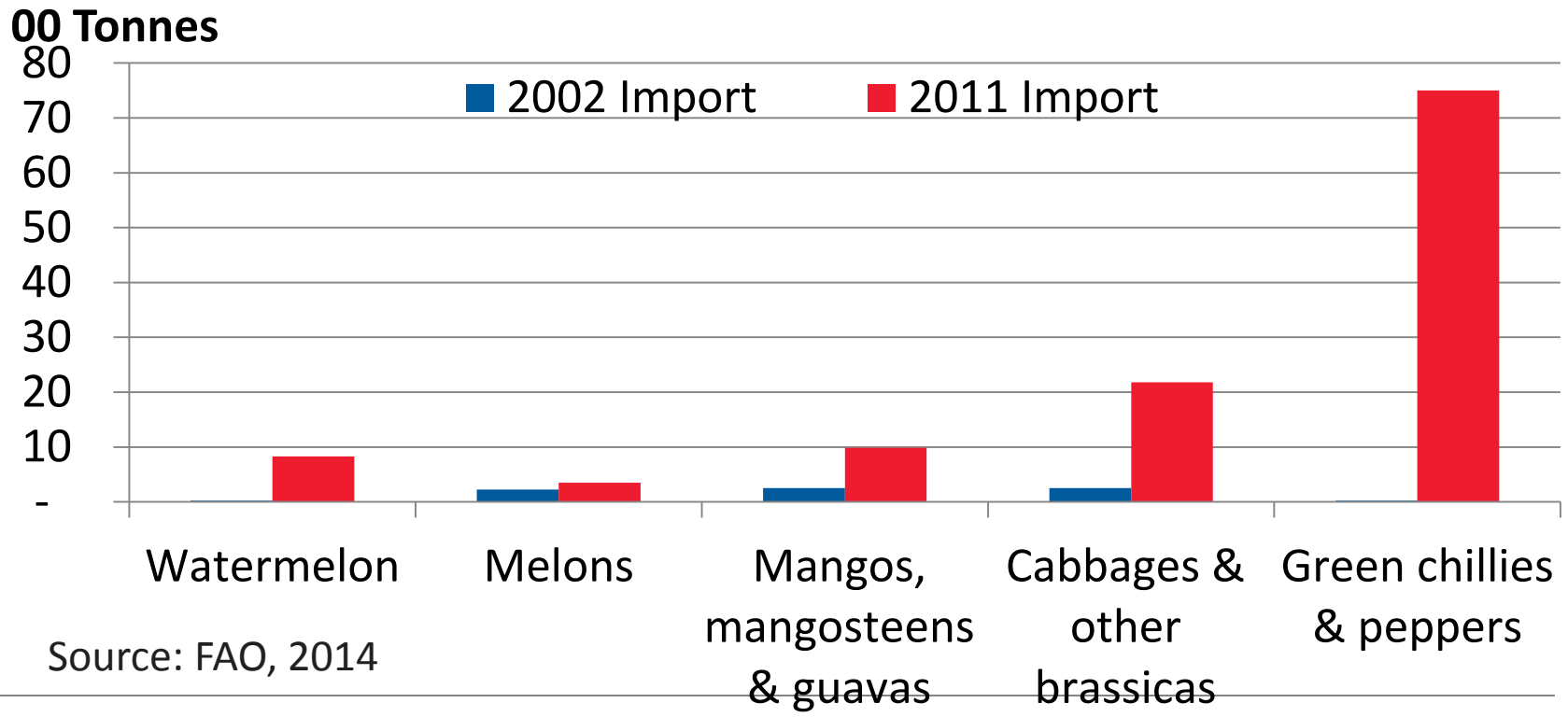
Background

- Agri-food market transformation in Indonesia toward modern **high-value commodities**
  - Indonesian consumers' diets are becoming **more diversified**, and consumers are **demanding more** livestock products (dairy, eggs and meat) and fruits and vegetables (Reardon et al., 2014)

- **Potential benefits** for farmers to produce (adopt) high-value horticultural crops (e.g. Sahara et al., 2013)
  - Why participation rate **still low**?

Horticulture in Indonesia

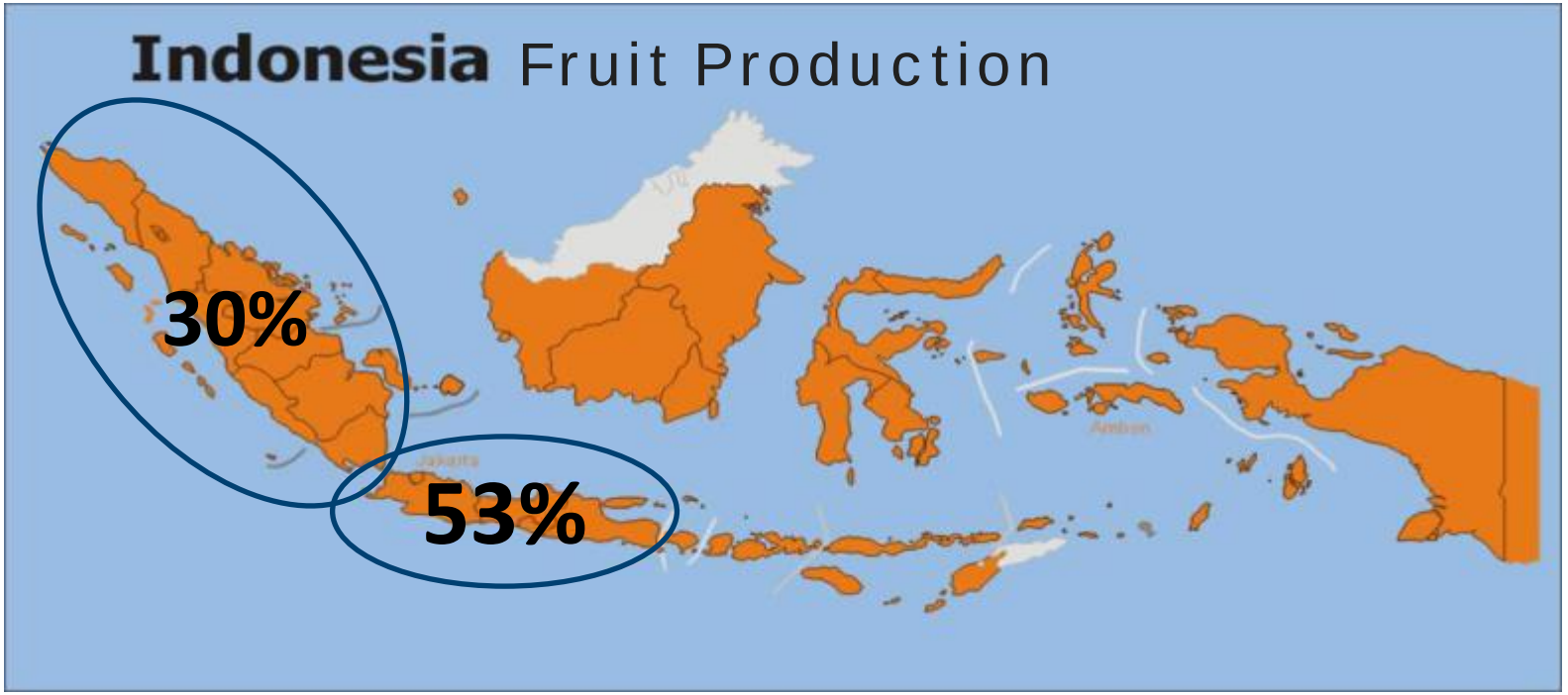
- Domestic production capacity is still under domestic demand
  - Top imports: garlic, apples, oranges & mandarines, potatoes, onions & shallots
  - Other commodities:



Source: FAO, 2014

Horticulture in Indonesia

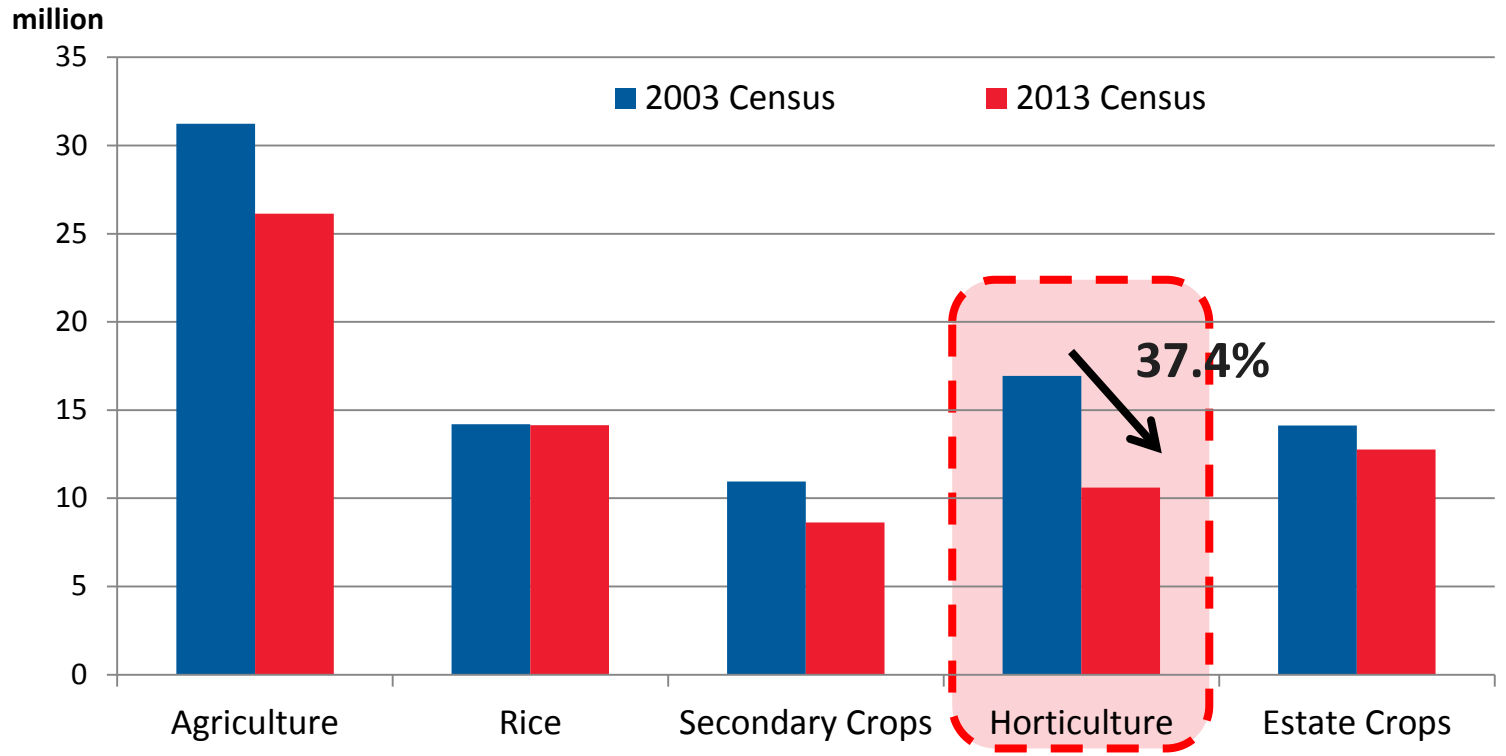
- Domestic production is **mainly concentrated** in Java and Sumatera islands



Source: BPS, 2014

Horticulture in Indonesia

- Number of horticulture farmer households decrease



Note: A farmer households can grow more than one crops
Source: BPS, 2013 Census of Agriculture

Horticulture in Indonesia

Horticulture Development Approach:

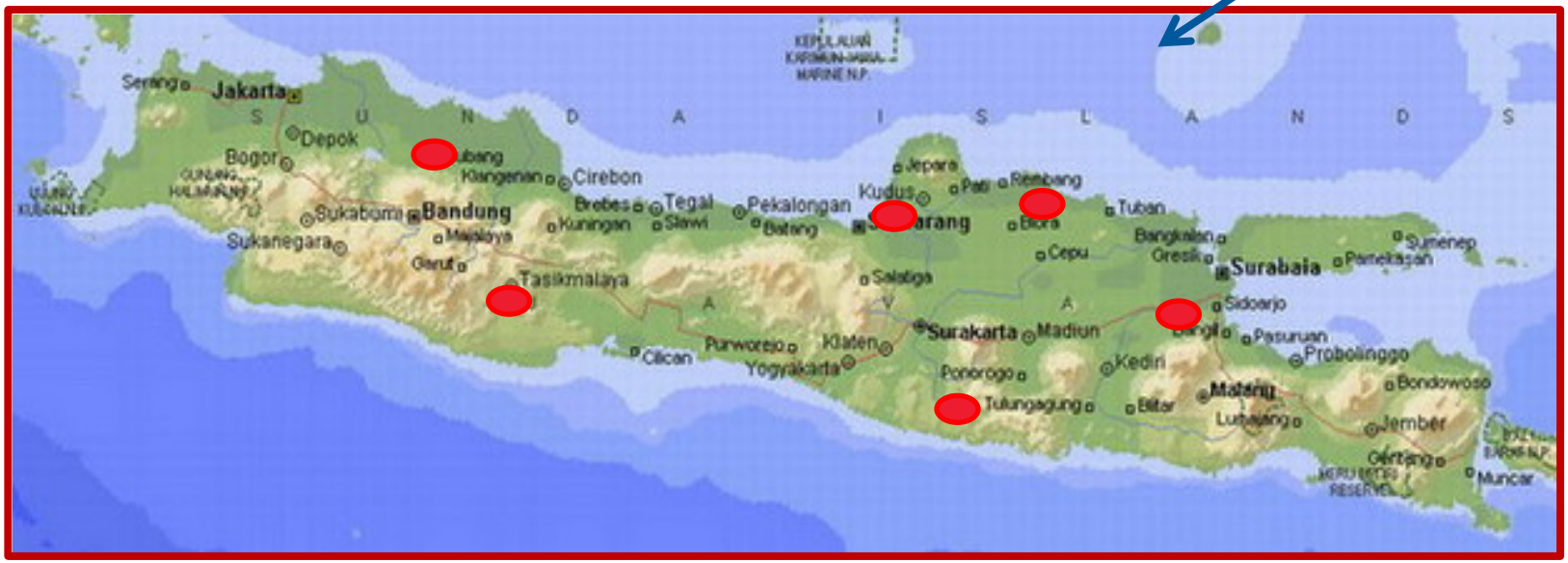
- Horticulture Agribusiness Development Area (PKAH)
- Superior Commodities Development *(Pengembangan Komoditas Unggulan)*
  - Vegetables: shallot, chilli, potato, indigenous vegetables
  - Fruits : durian, mangosteen, mango, citrus, banana, papaya

Objectives

- To understand the problems and opportunities of horticultural crop production in Indonesia
  - To examine patterns of adoption of horticultural crops
  - To analyze the determinants of adoption of horticultural crops

Data: Farmer Survey

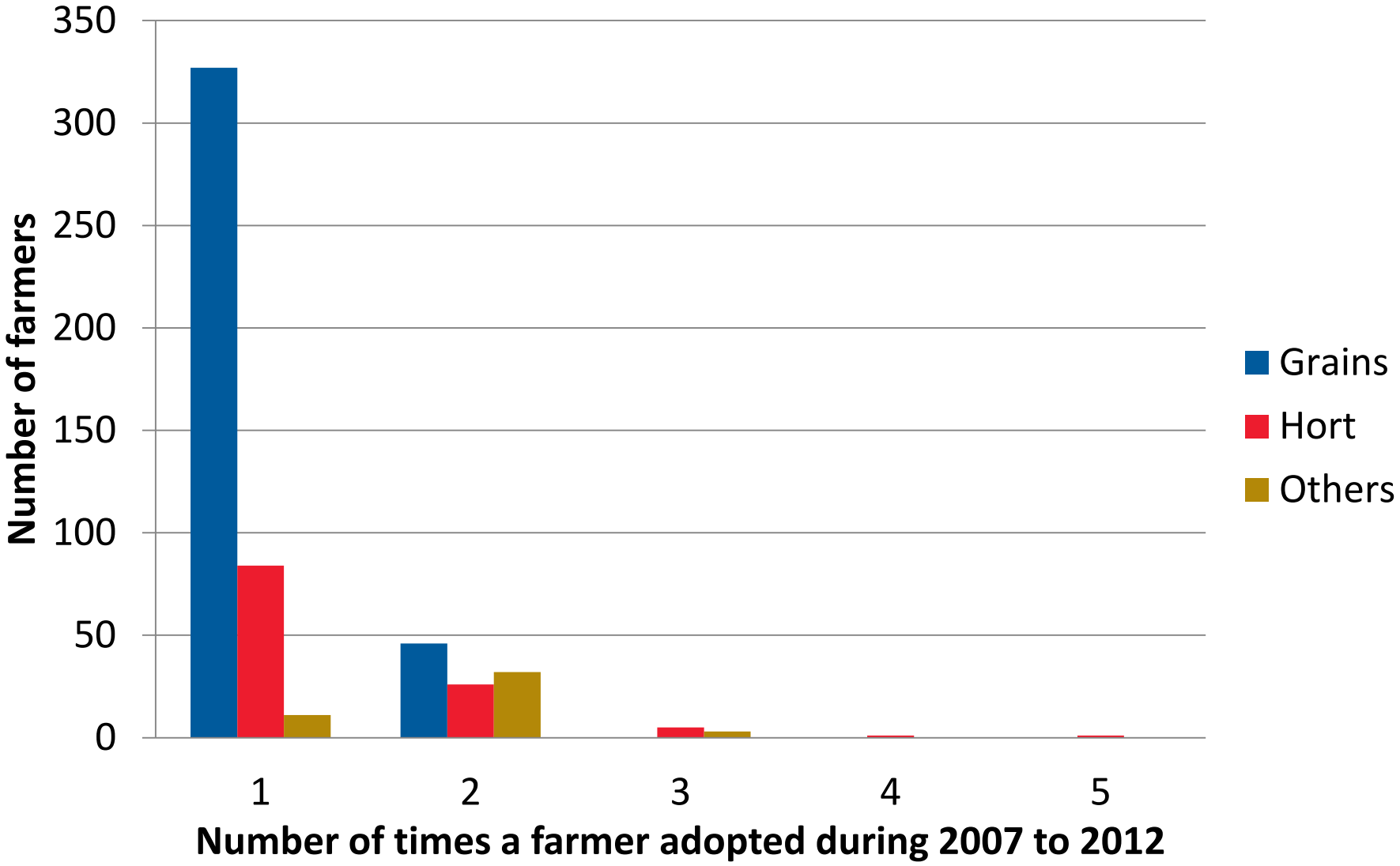
- Sample
  - 960 farmers in six districts, Java, Indonesia
  - Systematic random sampling technique



Design of Farmer Survey

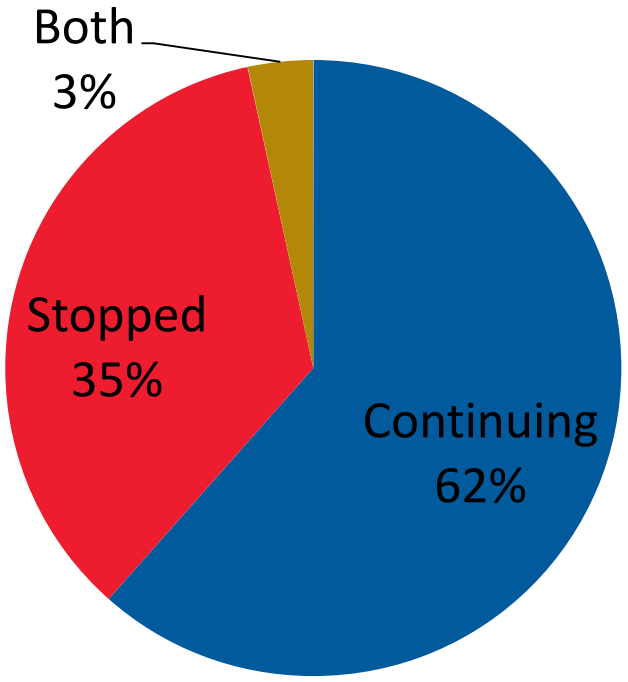
- Questionnaire
  - 26 page questionnaire
    - HH characteristics
    - Housing and assets
    - Agricultural land
    - Crop production (input use, post-harvest processing) and marketing
    - Production and marketing information
    - Collective action
    - Adoption of crops and farming system
    - On-farm and off-farm income
- Data Collection
  - 18 experienced and trained enumerators in three teams
  - February to March 2013

Findings – Intensity of adoption of any new crops/varieties among Indonesian farmers, 2007-2012



Findings - Adoption rate of horticultural crops in Indonesia

- Relatively low adoption (10.5%)
  - Cucumber, shallot and chilli
  - Melon, tomato and watermelon



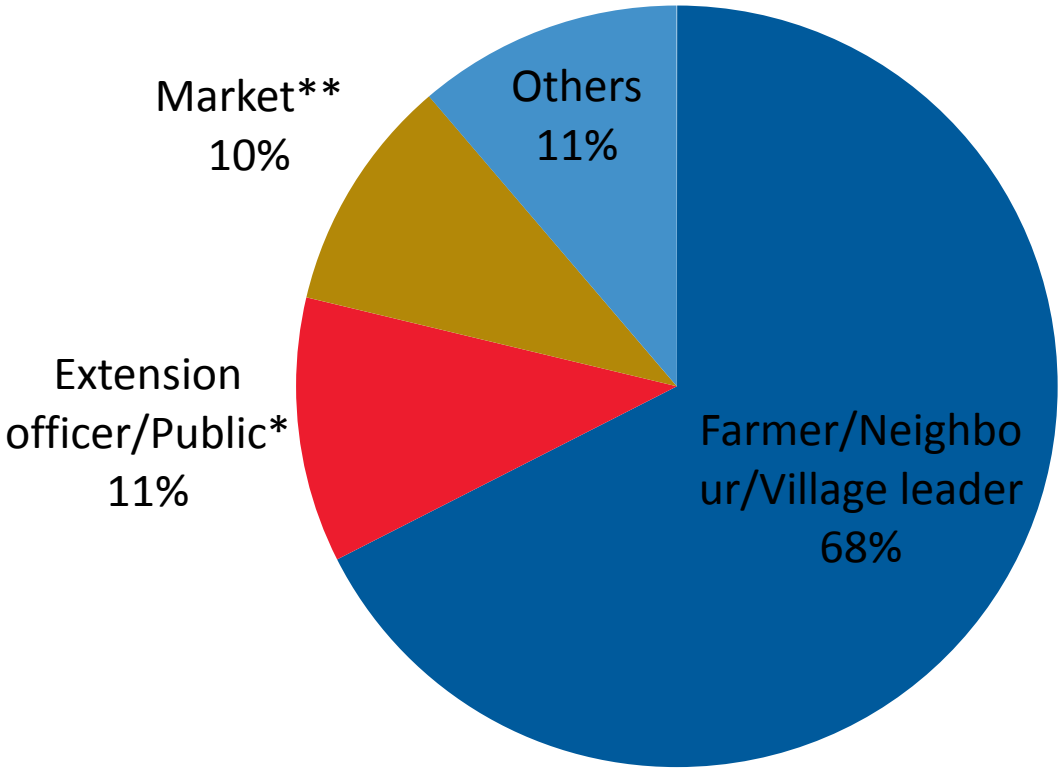
Findings: Why farmers adopt?

- To earn **high profit**
- To earn **high yield**
- To have **shorter planting period**

Findings: Reasons for discontinuing to adopt

- **Price** of the crop lower than expected
- **Yield** lower than expected due to **pests**
- **Yield** lower than expected due to **soil/climate**
- **Cost of production** higher than expected

Findings: Sources that gave idea to adopt



*Including Dinas officers and universties
**Including trader, input companies and input seller

Findings: Characteristics of adopters and non-adopters

Variable	Non adopters (n=859)	Adopters (n=101)	
	Mean	Mean	Significance
HH characteristics			
Age of head HH (years)	52.1	48.3	***
Age of spouse (years)	42.2	41.0	n.s
Education of head HH (years)	7.1	8.1	***
Education of spouse (years)	6.5	7.6	***
HH size (persons)	3.7	4.1	**
# Children (persons)	0.6	1.1	***

[1]Based on t-test: *** significant at the 1% level, ** (5%), * (10%)

Findings: Characteristics of adopters and non-adopters

Variable	Non adopters (n=859)	Adopters (n=101)	
	Mean	Mean	Significance[1]
HH and farm assets (in 2012)			
Owns mobile phone (unit)	1.79	2.24	***
Access to internet (1/0)	0.27	0.45	***
Farm size (ha)	0.76	0.82	n.s
% of rented land	12.38	22.97	***
% of irrigated land	56.92	50.71	*
Transportation asset (million Rp)	8.61	6.81	n.S
Production asset (million Rp)	1.44	1.95	n.s
Storage asset (million Rp)	1.46	7.08	***

[1]Based on t-test: *** significant at the 1% level, ** (5%), * (10%)

Findings: Characteristics of adopters and non-adopters

Variable	Non adopters (n=843)	Adopters (n=117)	
	Mean	Mean	Significance[1]
Production & marketing characteristics			
Subsidy availability from government (1/0)	0.64	0.58	n.s
Credit availability (1/0)	0.11	0.11	n.s
Cooperative/Farmer group involvement (1/0)	0.81	0.92	***
Women farmer group involvement (1/0)	0.04	0.10	***
Participated in FFS for horticultural crops (1/0)	0.08	0.16	**
Extension services (1/0)	0.16	0.43	***

[1]Based on t-test: *** significant at the 1% level, ** (5%), * (10%)

Findings: Characteristics of adopters and non-adopters

Variable	Non adopters (n=843)	Adopters (n=117)	
	Mean	Mean	Significance[1]
Income Activities & Location			
Net income (million Rp)	42.7	39.5	n.s
% of off-farm income	42.8	44.3	n.s
Horticultural income (milion Rp)	2.2	6.7	***
Remittance income (million Rp)	1.4	0.6	n.s
Altitude (m)	185.5	293.0	***
Distance to nearest urban market (km)	20.2	23.3	**

[1]Based on t-test: *** significant at the 1% level, ** (5%), * (10%)

Findings: Determinants of Adoption

Logit Regression:

Adoption (1/0) = f (HH Characteristics, Farm Characteristics, HH and Farm Assets, Institutional Factors, Information and Location)

The effect of [...] on horticulture crop adoption

- Extension services on horticulture **(+)**
- Collective action (producer organizations) **(+)**
- Farmer Field School GAP for horticulture crops **(+)**
- Farmer Field School ICM for food crops **(-)**
- Age of HH **(-)**

Other significant variables: transportation asset, production asset, storage asset, altitude, share of rented land

Summary and Policy Implications

- The opportunities to improve smallholder farmers' participation on horticultural crop production are relatively high
- Understanding patterns and determinants of adoption are important as it sheds light on **what constraints for farmers** to adopt a new (horticulture) crop

- Who are the adopters?
  - more involved in cooperative/farmer group and Farmer Field School
  - more exposure to the extension services
  - younger and more educated

Summary and Policy Implications (2)

- Including and encouraging **smallholder farmers** in horticulture production will be critical **to assure** high value products' **supply** and **offer potential income**

- Implications
  - How to make "adopted-farmers" more productive?
  - More targeted policy and development programs

Acknowledgements

- ACIAR for funded this survey projects : “Markets for High-Value Commodities in Indonesia : Promoting Competitiveness and Inclusiveness”
- Dr. Nicholas Minot (IFPRI)
- CAPAS team and Wahida
- 18 enumerators who provide their great enthusiasm and high spirit in data collection process.

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