



UNIVERSITAS  
GADJAH MADA

# Shallot Integrated Pest Management

**Y. Andi Trisyono**

**Department of Crop Protection**

**Faculty of Agriculture UGM; Yogyakarta 55281**

Webinar True Shallot Sees Workshop 2020; vegIMPACTNL; October 21-22, 2020

WUR, Department of Agriculture, and YBTS



# Topics

- Common practices in pest control: past vs. recent
- Problems of insect resistance
- Proposed management concept and practices

# Plenty of Food: For Who?



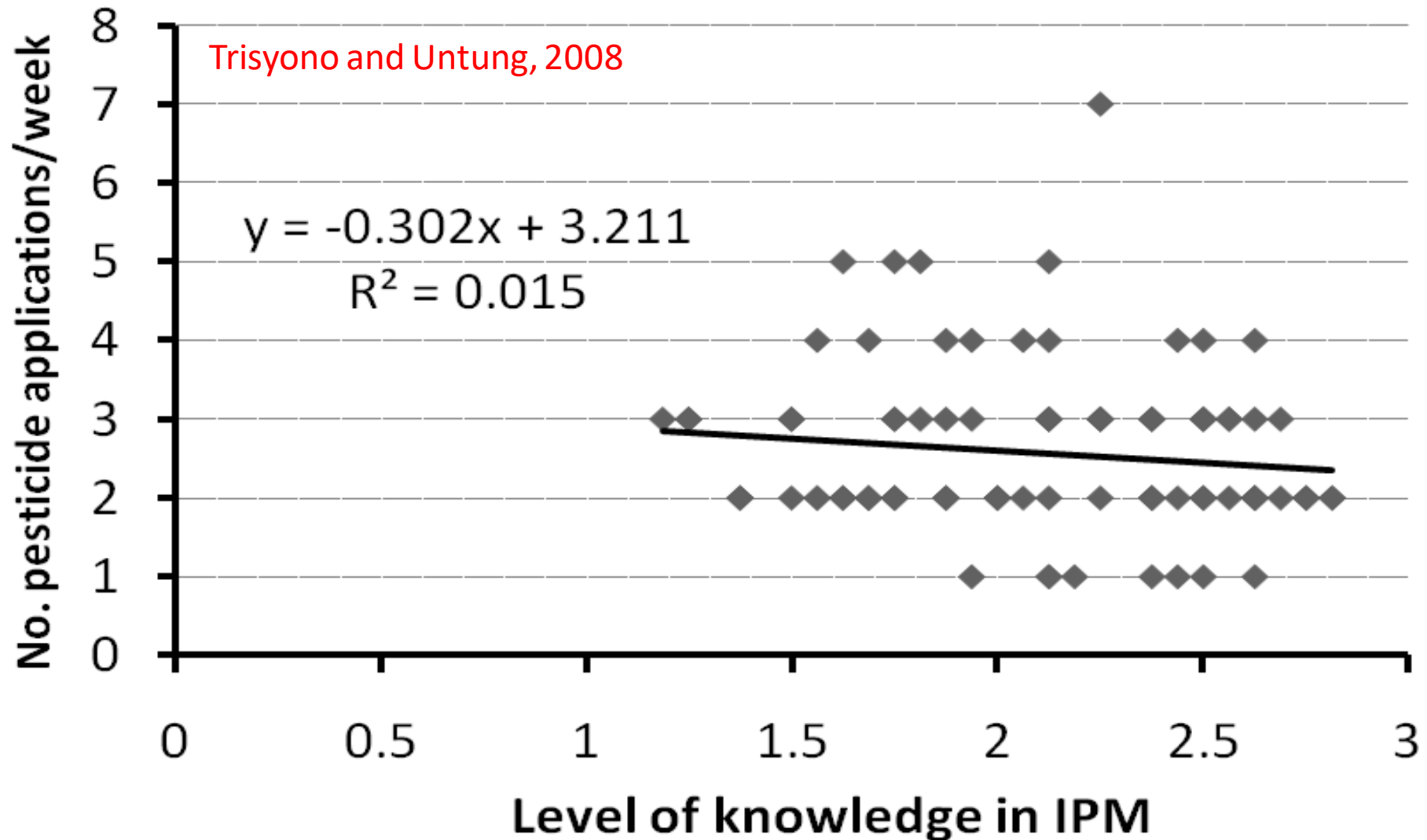
*Spodoptera exigua* (Photo by Wibisono 2009)



## Shallot Farmers in Understanding the Principles of IPM

No	Indicators	Bantul*		Brebes*	
		Alumni	No FFS	Alumni	No FFS
1	Principles of IPM	2.3 aA	1.8 bA	2.2 aA	1.9 bA
2	Decision making process	2.3 aA	2.0 bA	2.2 aB	2.1 aA
3	Risks of pesticide	2.1 aA	1.6 bA	1.5 aB	1.5 aB
4	Price determinants	2.1 aA	1.8 aB	2.1 aA	2.1 aA
5	Assistance	2.0 aB	1.4 bB	2.4 aA	2.2 aA

# Pesticide Usage by Shallot Growers in Brebes



## Insecticide Applications (Aldini et al. 2020)

Applications	No Farmers (%)			Average
	Brebes	Nganjuk	Bantul	
<b>A. 1. Schedule spray (days)</b>	<b>100,0</b>	<b>100,0</b>	<b>86,7</b>	<b>95,6</b>
a. One	30,0	40,0	15,4	29,1
b. Two	46,7	60,0	38,5	48,8
c. Three	20,0		38,5	17,8
d. Four	3,3		7,7	3,3
e. Five			3,8	1,1
<b>2. Based on observations</b>			<b>13,3</b>	<b>4,4</b>
<b>B. Product rotation</b>				
1. With rotation	63,3	63,3	50,0	58,9
2. No rotation	36,7	36,7	50,0	41,1

# Resistance of *Spodoptera exigua* to methoxyfenozide

(Wibisono et al. 2009)



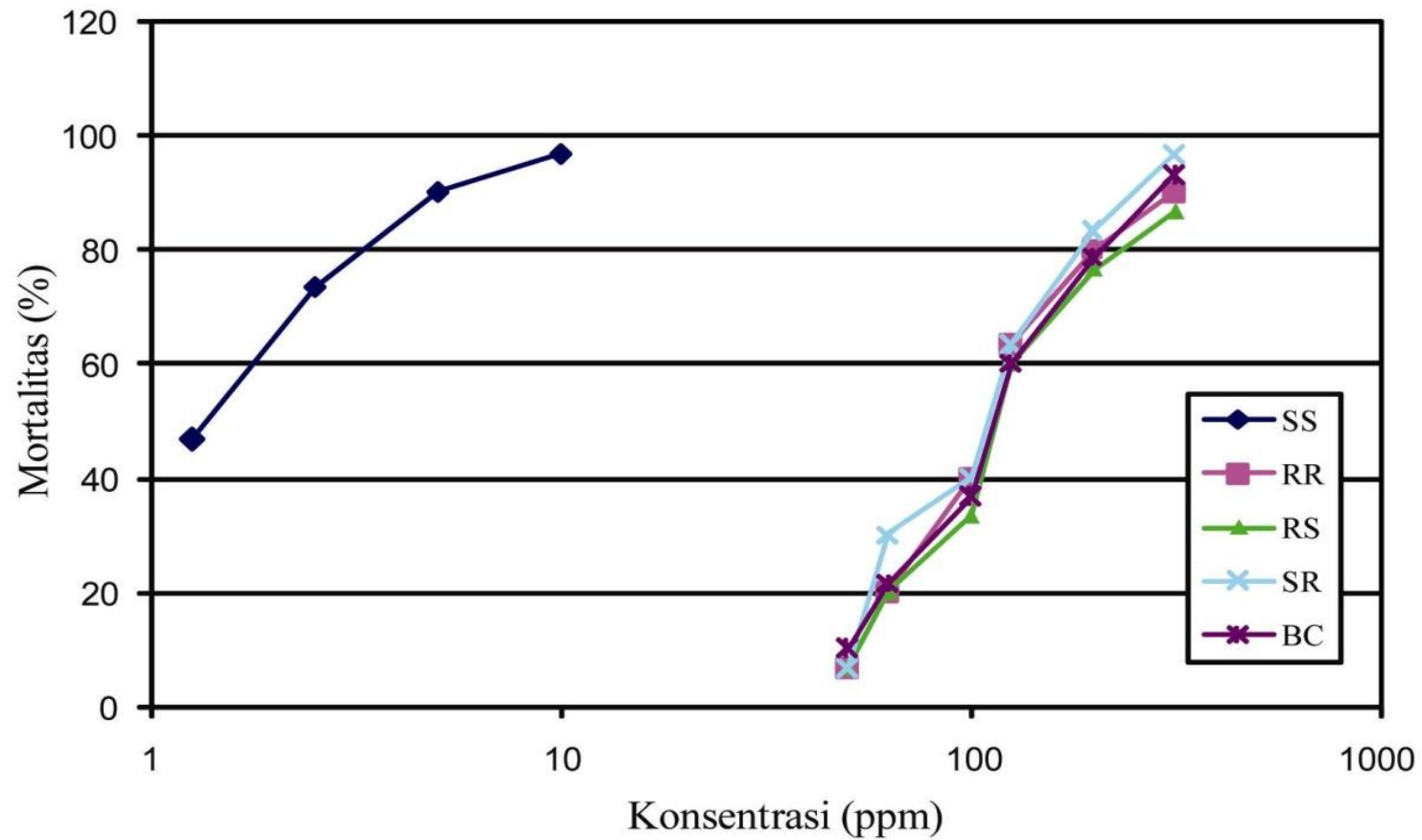
UNIVERSITAS GADJAH MADA

Population	RR		Population	RR
Sanden	1		Jatibarang	31
Kretek	5		Songgom	75
Pundong	30		Bulukumba	77
Panjatan	45		Kersana	93
Bagor	34		Larangan	141
Gondang	42		Tanjung	203
Sukomoro	45		Brebes	219
Rejoso	47		Wanasari	241



# Characteristics of Resistance in *Spodoptera exiqua* to Methoxyfenozone

(Wibisono et al. 2009)





# Genetics of Resistance to methoxyfenozide in field populations of *Spodoptera exigua*

- Inherited dominantly
- No maternal effects
- Monogenic

(Wibisono *et al.* 2009)



*Spodoptera exigua* populations in Java have developed resistance to mostly used insecticides (Aldini et al. 2020; submitted)

How much do we know about the bioecology of *Spodoptera exigua*?



Photo by Y. Andi Trisyono

Do we catch the male moths when shallot is not in the fields?



# Population dynamic: Spodoptera exigua Moth Capture

No.	Crop Season	Dates	No. moth/ 10 traps/wk
1	Chili	Nov 15, 2009 – Dec 10, 2009 (4 wks)	31
2	Rice	Dec 24, 2009 - Feb 28, 2010 ( 9 wks)	55
3	No crops	March 7-14, 2010 (2 wks)	31.5
4	Shallot	Mar 20, 2010 – Apr 15, 2010 ( 3 wks)	139.7



# Reflective Question?

- Where do *Spodoptera exigua* feed and live on when shallot is not present in the fields?



# Ujiyani (2019)

- *Spodoptera exigua* moths were caught no matter what plants were in the fields, and the traps caught more when shallot was present
- Thousands of eggs and larvae were collected from the fields and were exposed to the fields but no parasitoid emerged from eggs and larvae of *S. exigua*.





# Something to Think

- If we could reduce the populations of *Spodoptera exigua* while shallot is not in the fields, will we have the same number of insects entering our early shallot plantation compared to if we do not nothing?



# Summary

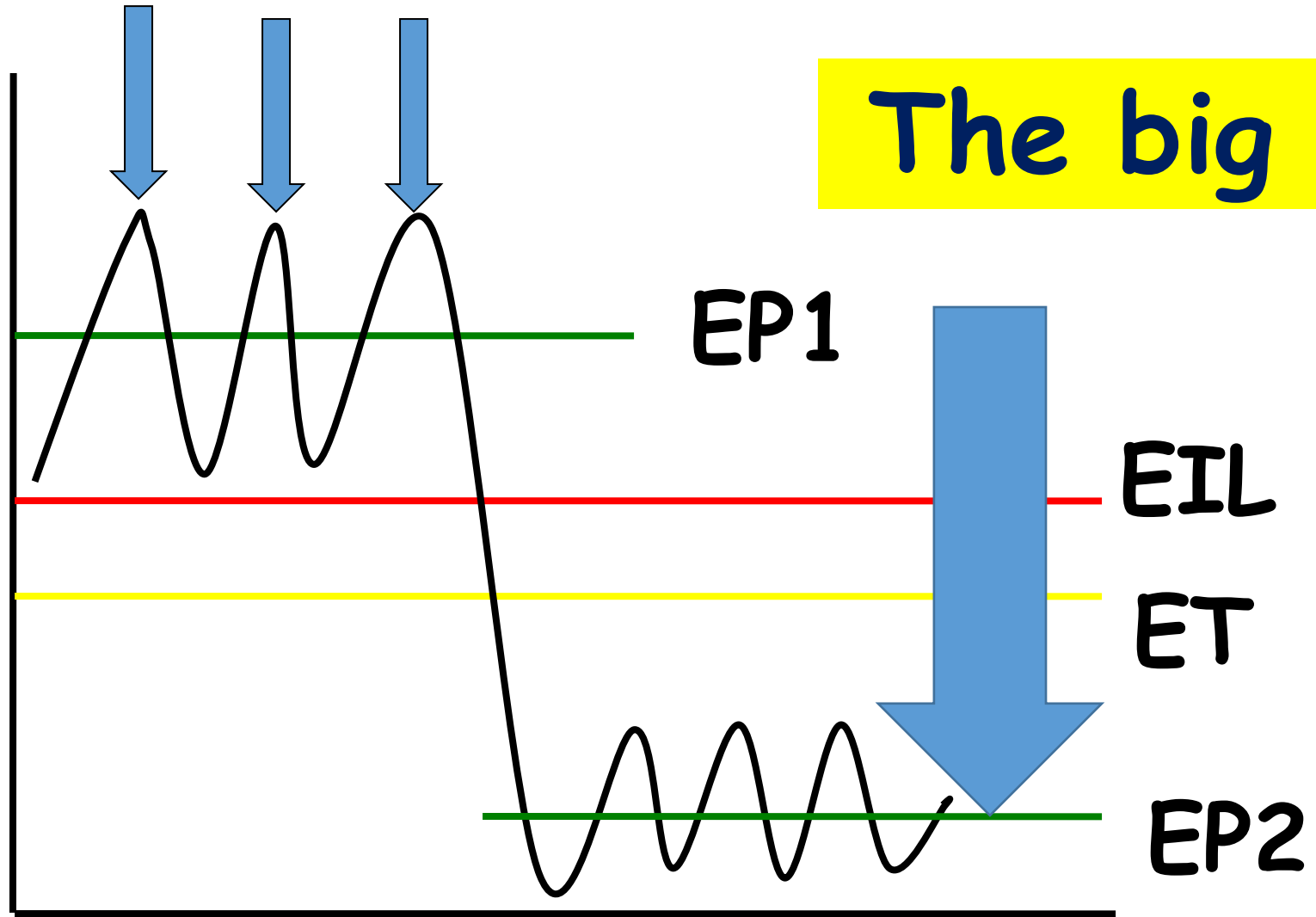
- Insecticides are the most common control measure for *Spodoptera exigua* and they are not used properly
- Resistance to insecticides commonly used is present and becomes a real problem
- This insect is present all year around even when shallot is not in the fields---alternate hosts
- Biological control agents, specifically parasitoids, are not playing their role



# Need to Change the Approach (Paradigm)

- Large scale bases; in addition to field by field management
- Continuous management; not only during the shallot season
- Improve the ecosystem services by adding the diversity in the fields

Population density



The big dream

EP1

EIL

ET

EP2

Time

# The use of sex pheromone either for mass trapping and or MD Technology (Isomate)

(Trisyono *et al.* 2010)





Number of *Spodoptera exigua* moths caught  
(per trap for 63 days) (Trisyono *et al.* 2010)

Village	MD	Control
1. Dusun Sono	2	197
2. Dusun Depok	3	199
3. Dusun Sanden	2	383

**Landscape IPM in  
Pliken, Banyumas  
(FAO dan Kementerian  
Pertanian)**



**Intervention:  
flowering plants as  
refuge for natural  
enemies**

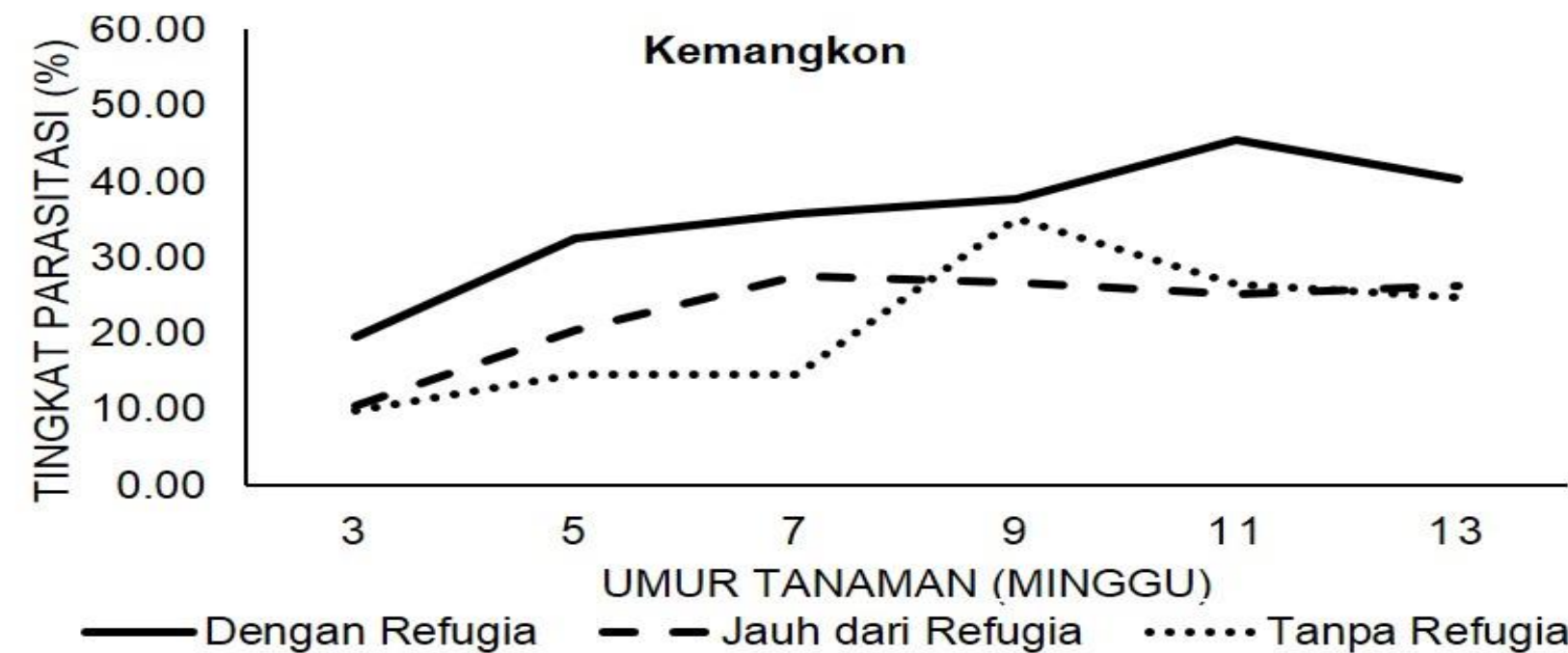
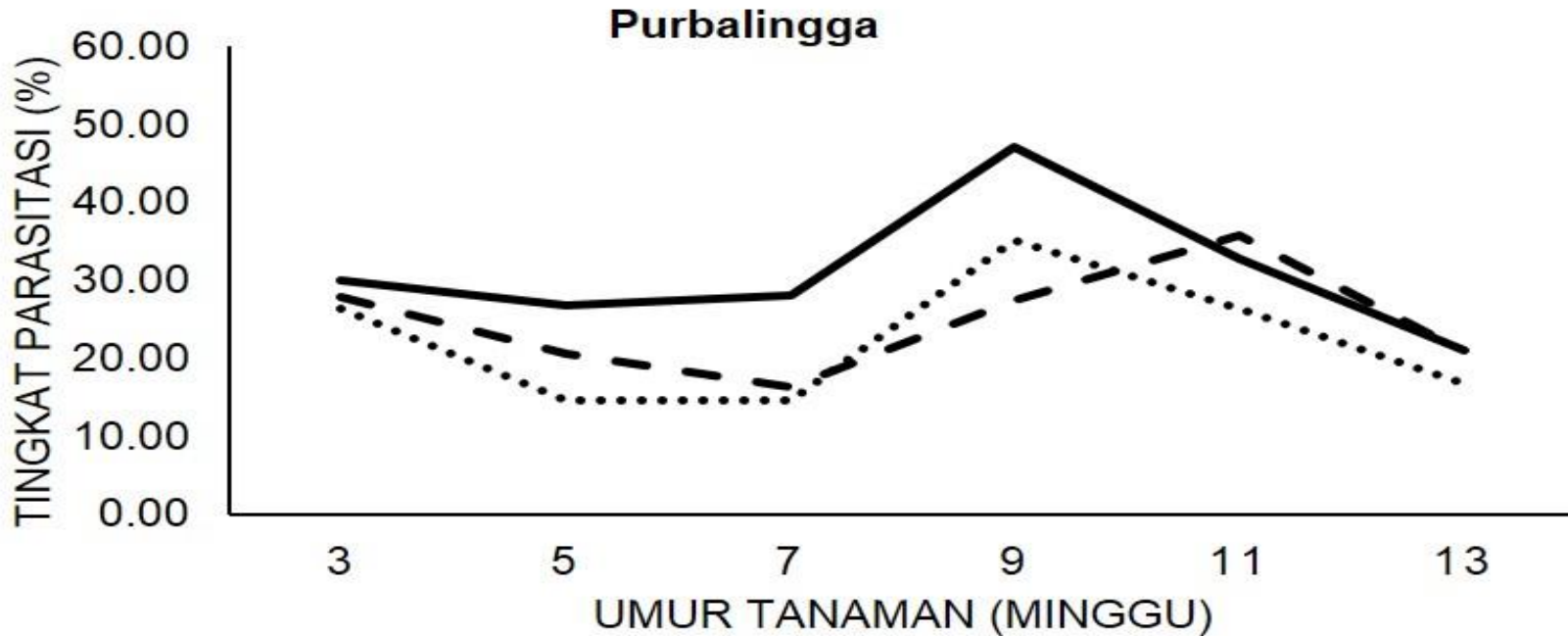


(Courtesy of Anas, 2016)



# Purbalingga

(Sinulinga 2017)



The parasitism of rice brown plant hopper eggs were always higher in rice fields with refuge





# Synergistic Roles

- Government, private sector, and growers: area-wide *S. exigua* management
- Growers: IPM in their owned land

*We need to change in our  
paradigm and work together for  
shalloot IPM*



*Terima kasih  
Thank you*