Ecology and Distribution of the Sugarcane Long-Horned Beetle *Dorysthenes* spp. (Coleoptera: Cerambycidae) in Thailand

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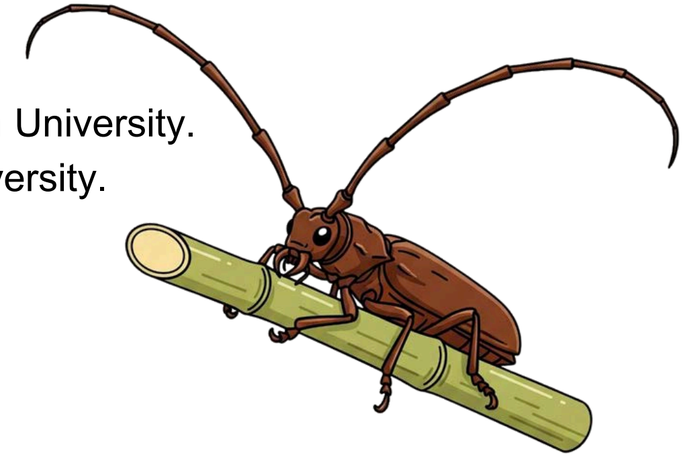
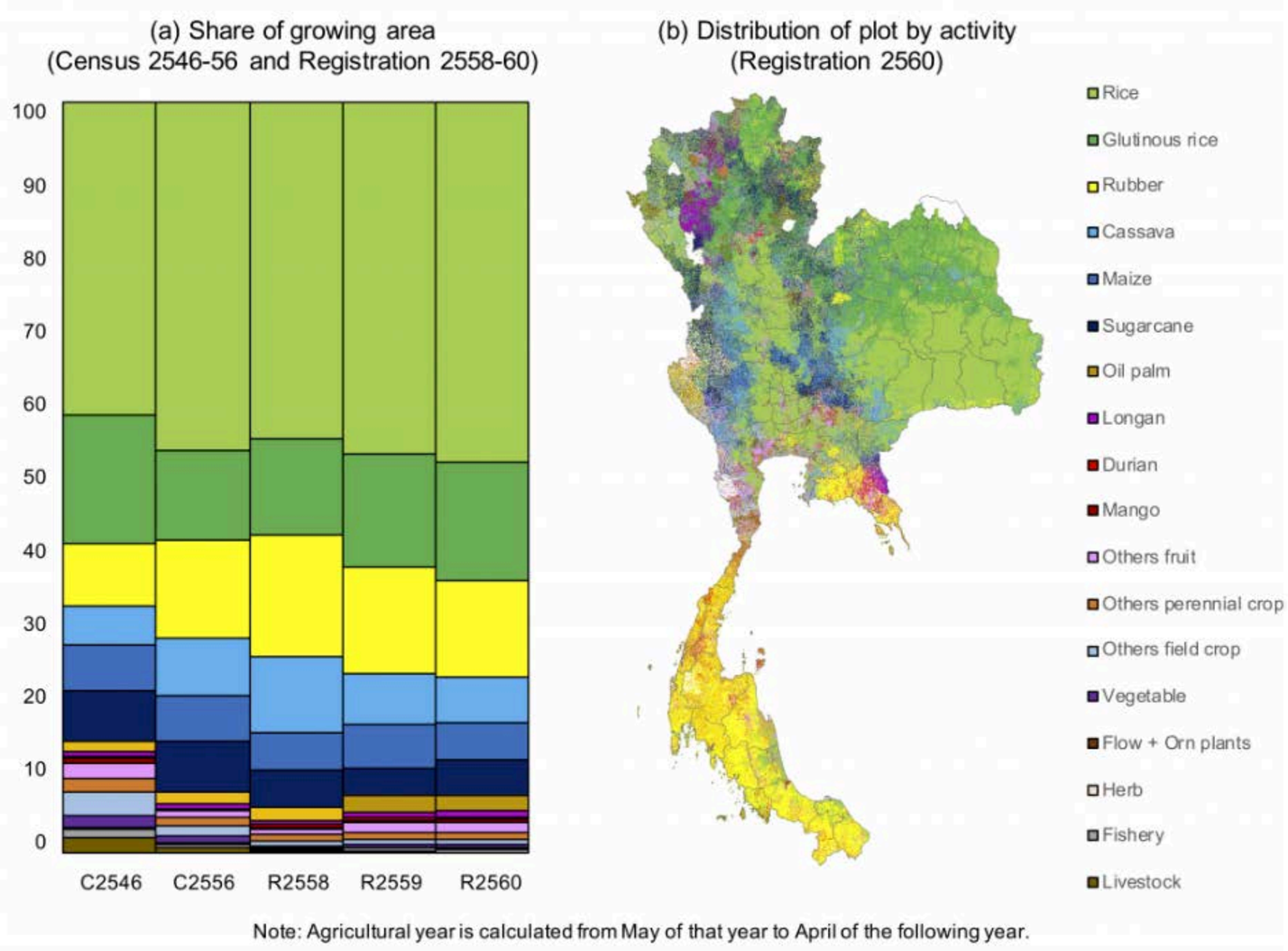




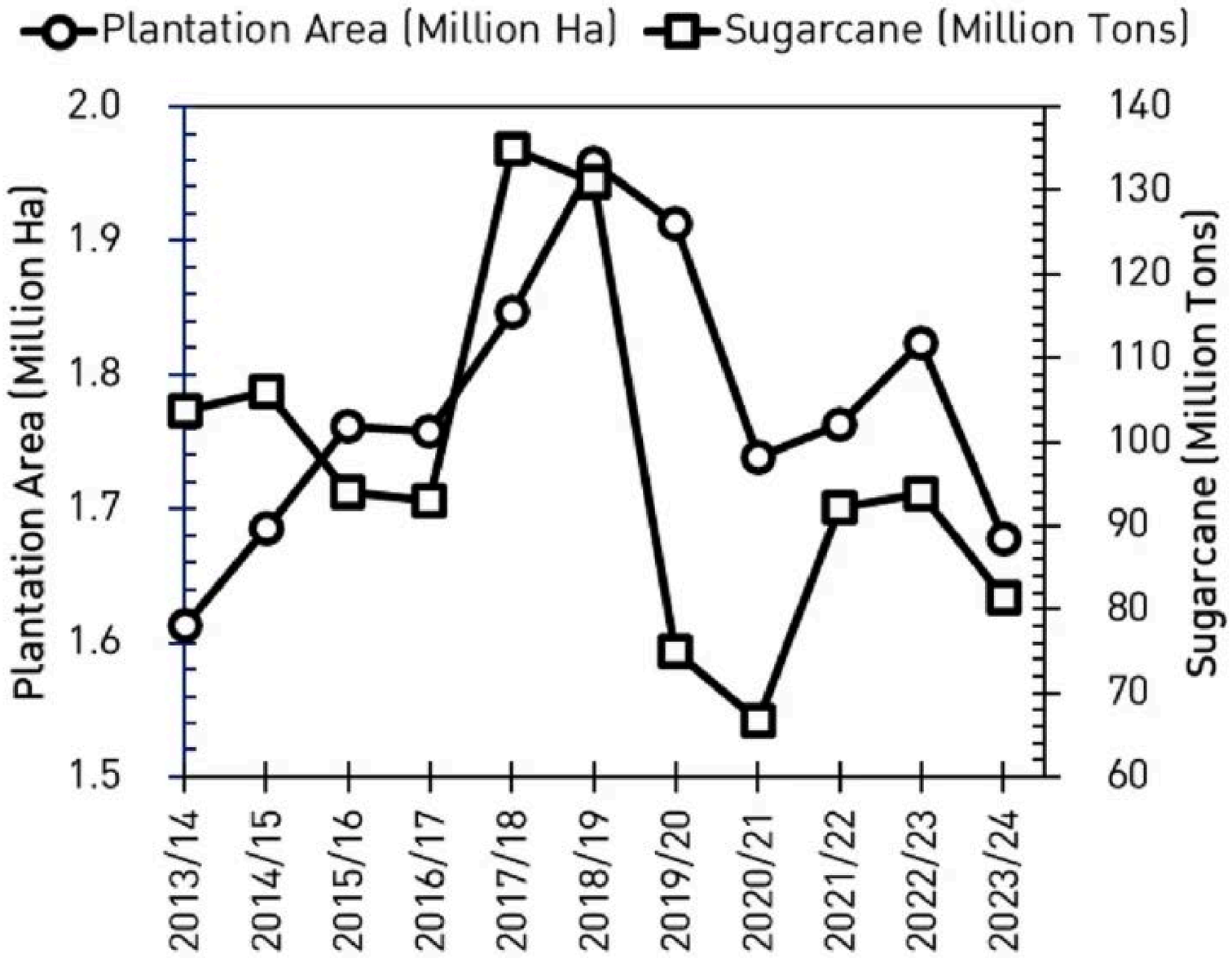
A Global Sugarcane :

- Ranks 4th largest global sugarcane producer.
- Ranks 2nd largest global sugar exporter. (30% / 70%)

Critical to Thailand's Economy :

- Supports over 420,000 farming households across the nation.

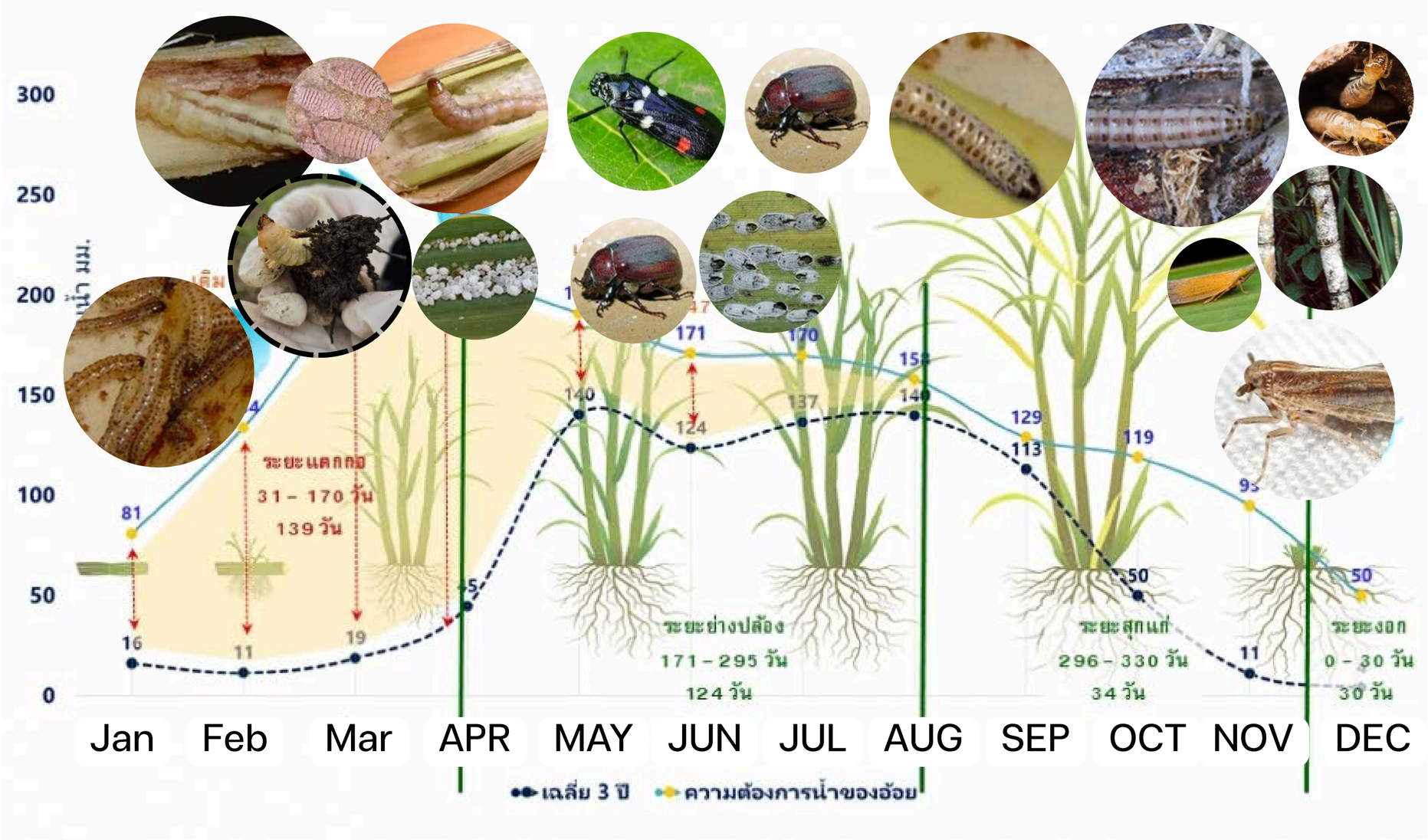
Current Situation and Trends in Thailand's Sugarcane Sector



- Sugarcane covers ~1.8 million hectares, 8% of Thailand's total agricultural land.

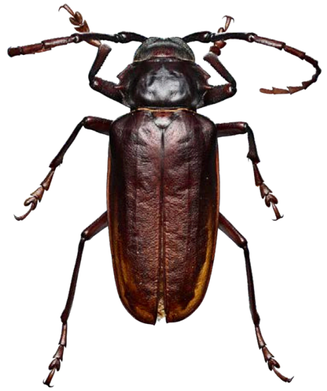
(Pongpat et al., 2023)

What do we do when we don't know the life cycle?



www.mitrpholmodernfarm

Dorysthenes spp. (Sugarcane Longhorn Stem Borer)



Dorysthenes buqueti

Dorysthenes granulosus

Host

Current research on *Dorysthenes* spp. in Thailand is advanced, focusing on biocontrol, taxonomy (identifying new species), and distribution mapping.

- Outdated basic life cycle data, (1990s or earlier).
- No one is revalidating this fundamental biological data.
- The old data was for D. buqueti. We now know pest species *D. granulosus* are present, and we cannot assume they have the same life cycle.
- Applying biocontrol agents depends on precise timing. If that timing is based on outdated life cycle data, the control measures may fail or be inefficient.

The "Hidden" Threat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Papitchaya Teawkul


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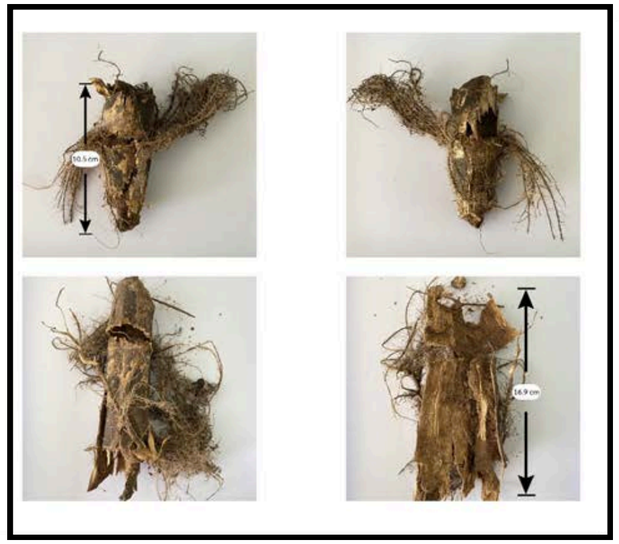
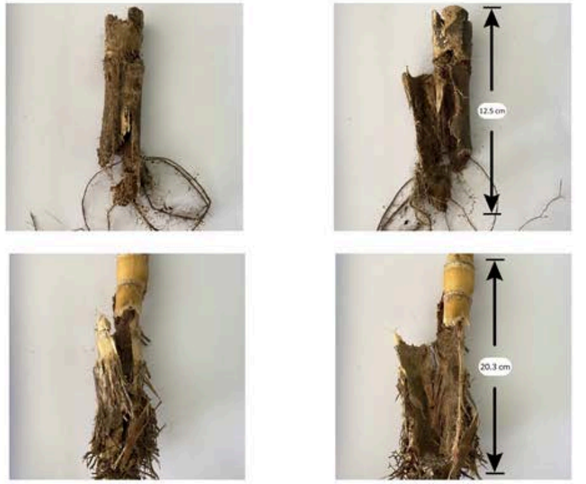
The Economic Impact

- Dorysthenes infestations cause severe yield reductions, with outbreak areas reporting losses of over 70%.
- Infested plots yield ~50–70 tonnes/ha, while healthy plots in the same area yield ~110–135 tonnes/ha.
- The farmer loses the entire ratoon crop and must pay the full cost of re-planting the entire field years ahead of schedule, wiping out profits.





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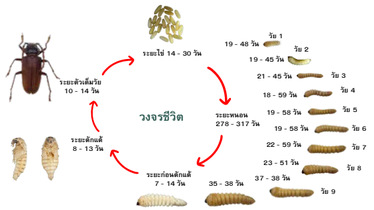
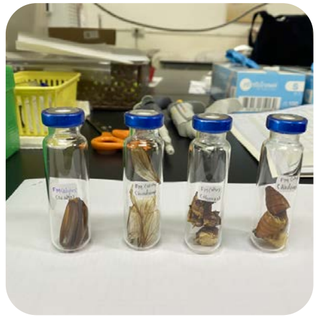
A Need for New Data

Life cycle



Morphology

Flight Dispersal



Mating Behavior

Insect Semiochemicals

Updated Life Cycle

Egg

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Larva

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L1-L10

what specific larval instar (age/size) does the most significant damage?

Pupa

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Adult

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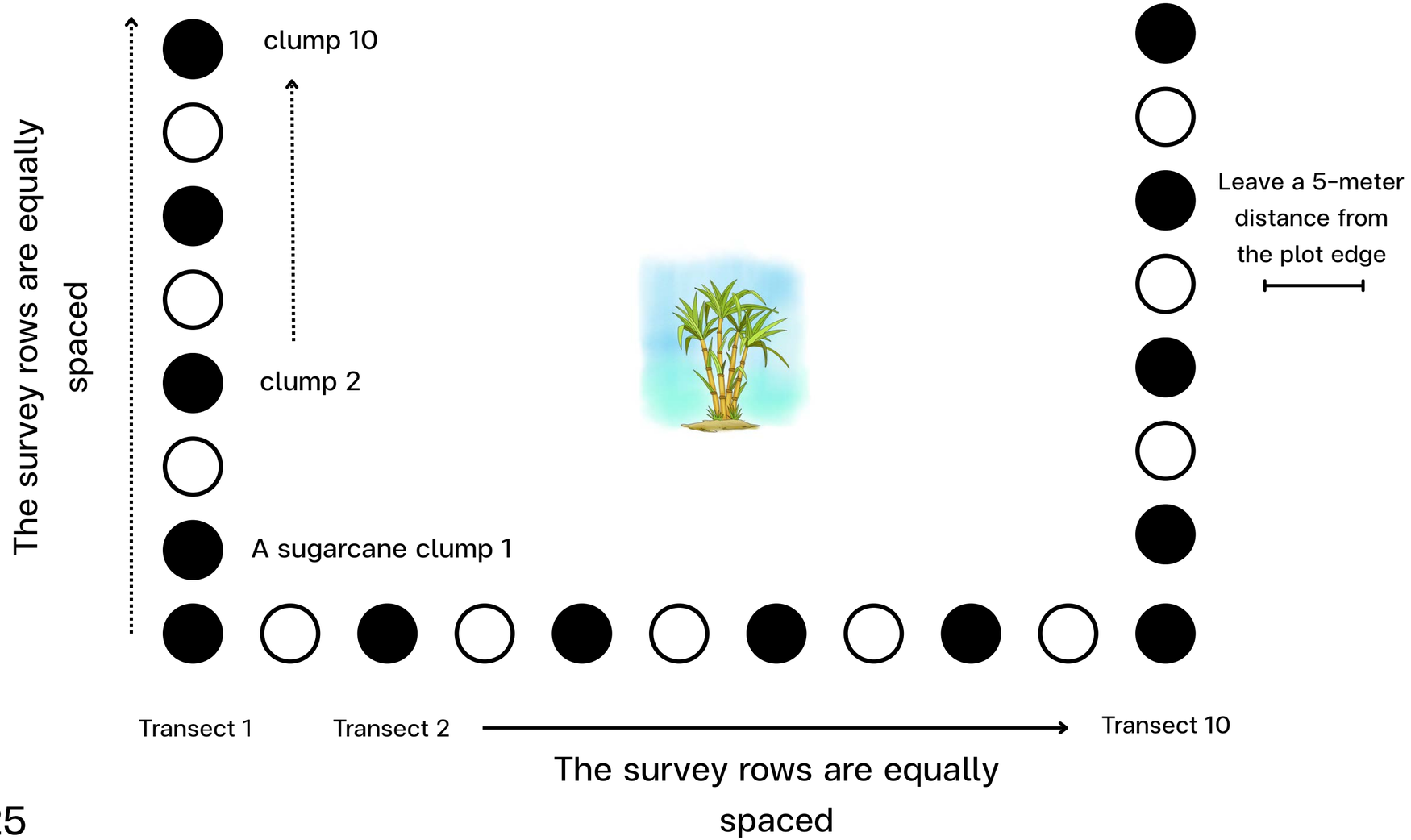
400-1000 eggs

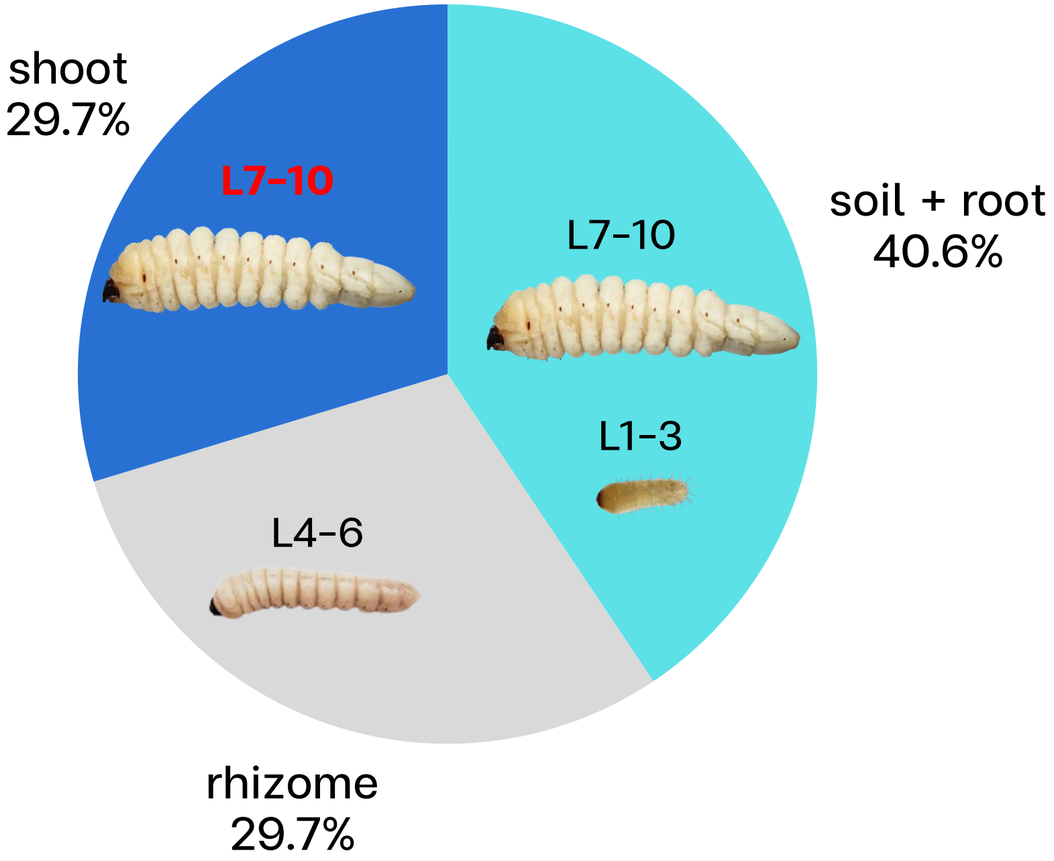
Where they are?

At what specific larval instar (age/size) does the most significant damage begin?

Methodology

Larval infestation during the harvest season: Observation Data from Sep 2024 - Jan 2025





Observation Data (Sep 2024 - Jan 2025)

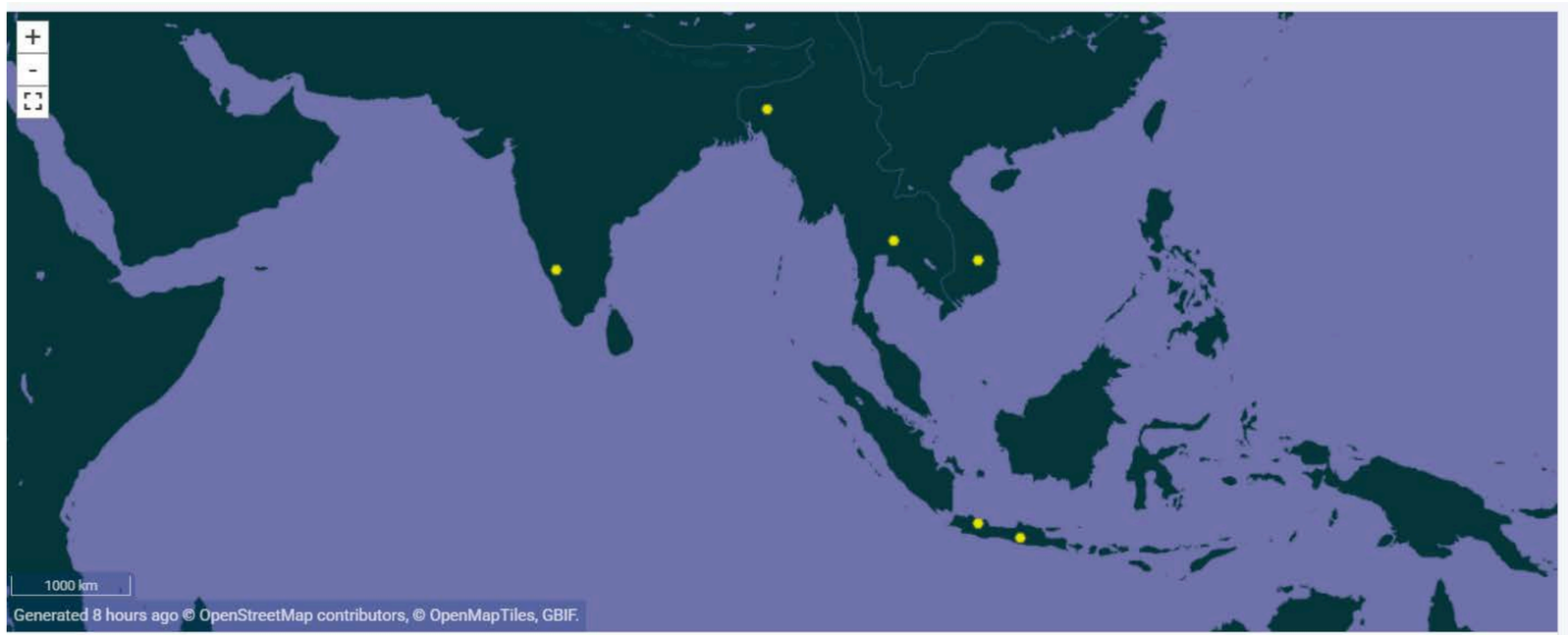
The appearance of visible, above-ground symptoms (leaf yellowing, stunting, or dead heart)

L4-6

L4-6

L7-10

Where they are?



Dorysthenes buqueti distribution

Methodology

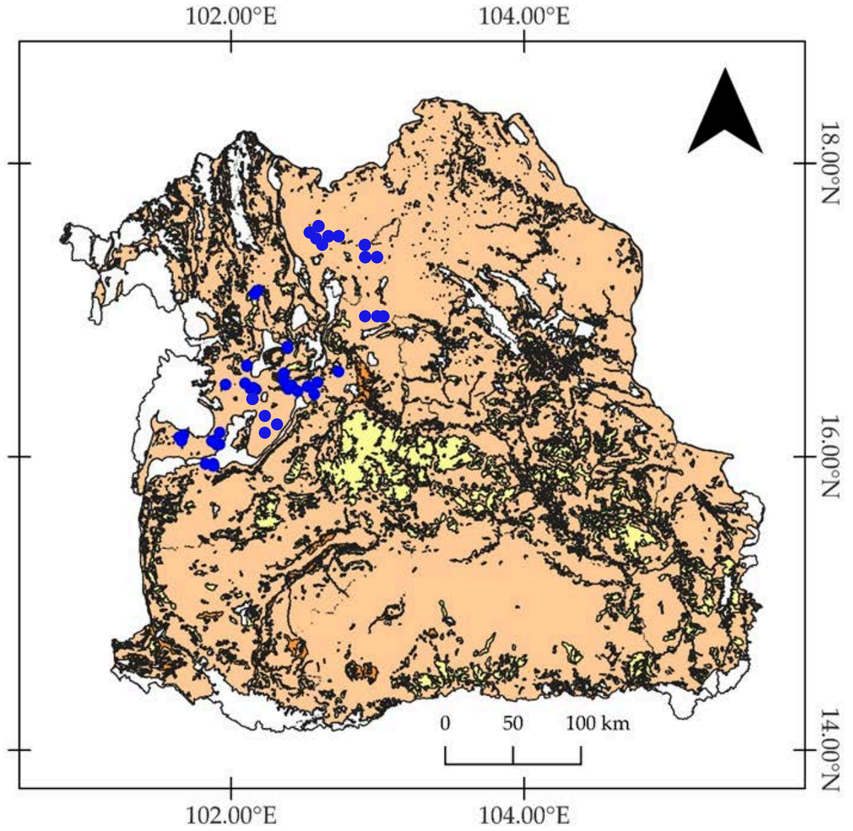
Occurrence Data
Field Surveys (109)

Bioclimatic
Variables

http://www.worldclim.org

Maximum Entropy

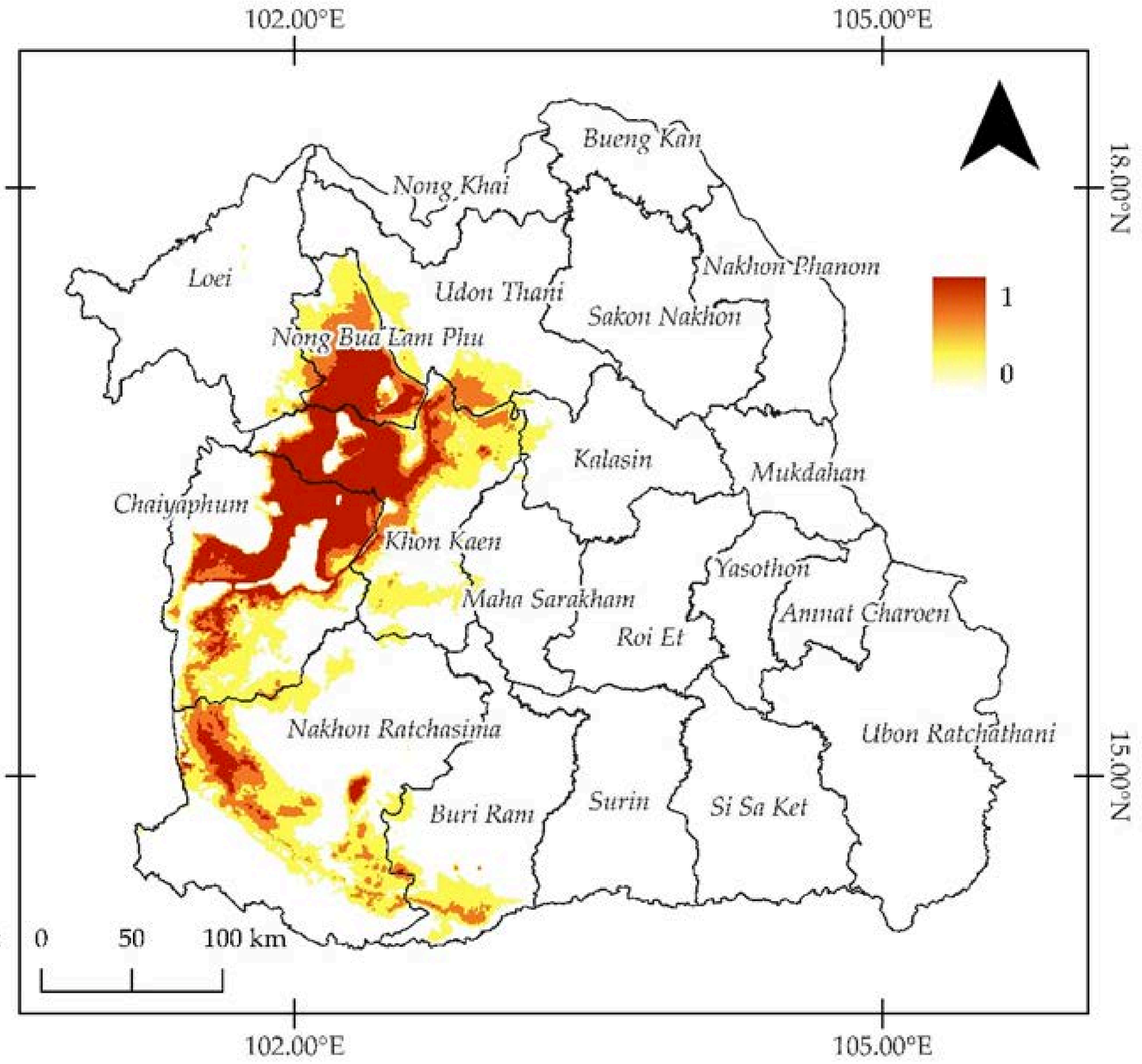
Suitable Habitat 0-1



Code	Percent contribution
bio_16 Precipitation of Wettest Quarter	40.4
bio_7 Temperature Annual Range	25.4
bio_1 Annual Mean Temperature	16.3
bio_11 Mean Temperature of Coldest	14.4
bio_10 Mean Temperature of Warmest Quarter	3.1
bio_12 Annual Precipitation	0.3
Area Under the Curve	0.948

2021-2040 SSP1-2.6

Dorysthenes buquetii

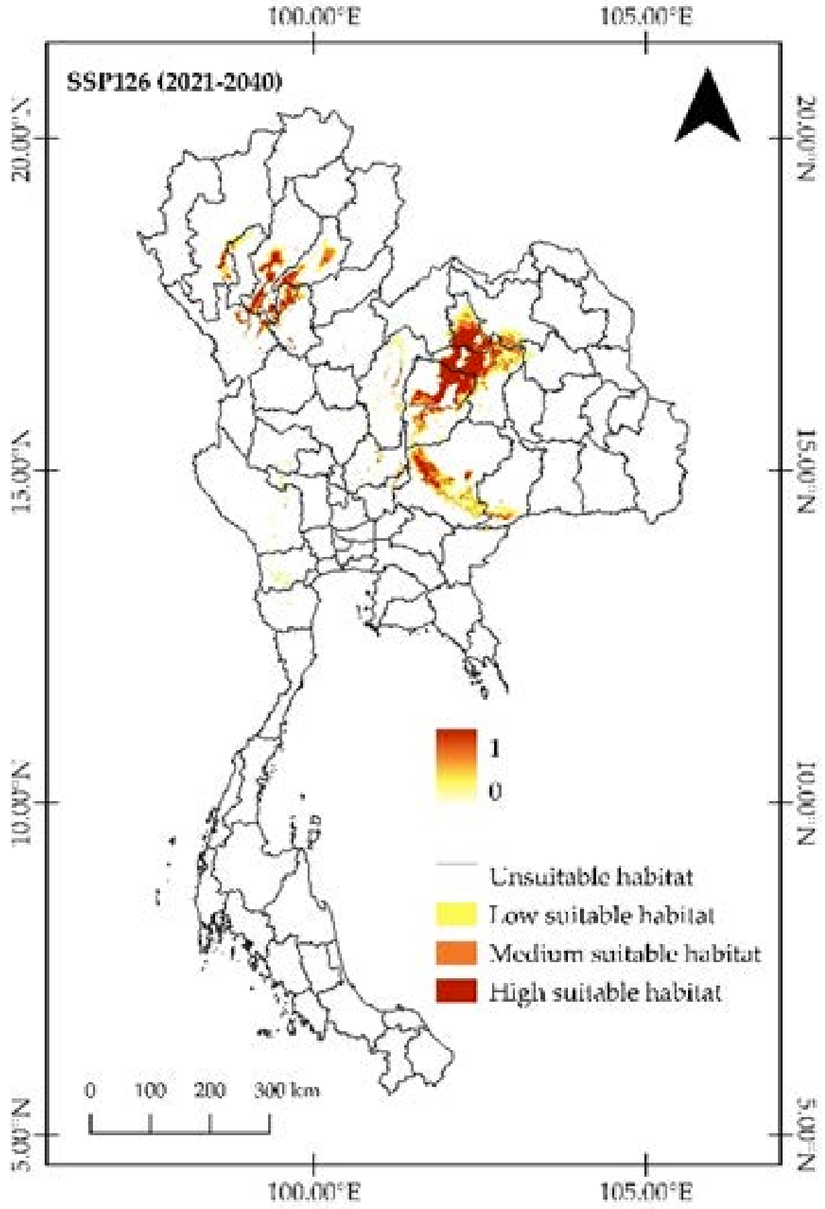


Unsuitable habitat

Low suitable habitat

Medium suitable habitat

High suitable habitat



District	Current distribution							
	Unsuitable habitat		Low suitable habitat		Medium suitable		High suitable habitat	
	Area (Km2)	**Area %**	**Area (Km2)**	**Area %**	**Area (Km2)**	**Area %**	**Area (Km2)**	**Area %**
Amnat	3258	2.3	0	0	0	0	0	0
Bueng Kan	3975.1	2.8	0	0	0	0	0	0
Buri Ram	8661.1	6.2	1129.5	8.4	246	4.1	10.9	0.1
Chaiyaphum	5495.9	3.9	2543.6	19	1353.7	22.6	3193	41.5
Kalasin	6644.1	4.8	244	1.8	0	0	0	0
Khon Kaen	4031.4	2.9	2824.9	21.1	1292.9	21.6	2459.1	32
Loei	9921	7.1	356.1	2.7	117.2	2	20.7	0.3
Maha	5533	4	74.5	0.6	0	0	0	0
Mukdahan	4104.1	2.9	0	0	0	0	0	0
Nakhon	5570.8	4	0	0	0	0	0	0
Nakhon	14463.7	10.4	4026.7	30.1	1626.8	27.2	535.5	7
Nong Bua	622.4	0.4	960.6	7.2	1008.5	16.9	1472.7	19.1
Nong Khai	3239.4	2.3	0	0	0	0	0	0
Roi Et	7819.1	5.6	0	0	0	0	0	0
Sakon	9527	6.8	0	0	0	0	0	0
Si Sa Ket	8850.1	6.3	0	0	0	0	0	0
Surin	8795.8	6.3	0	0	0	0	0	0
Ubon	15432.8	11.1	0	0	0	0	0	0
Udon Thani	9511.4	6.8	1206.8	9	336	5.6	0	0
Yasothon	4097.3	2.9	0	0	0	0	0	0

Control

Standard pesticides struggle to reach the grubs deep in the soil, making management extremely difficult.

Natural Enemies (Biocontrol)

- Entomopathogenic fungi (*Metarhizium anisopliae*) attack the grubs in the soil.
- Predators: Birds, ants, (and humans!) that eat the grubs or adults.

25 USD/kg.

35 USD/kg.

Key Take-Home Messages

- Host Availability is Key: The distribution and phenology of sugarcane and cassava directly predict the distribution of the pest.
- The Threat is Chronic and Hidden: The pest is not a one-time event. Larvae live underground for 1-2 years, creating a constant, invisible source of damage.
- The Main Economic Loss is the Ratoon: a 3-generation ratoon is making a long-term investment in that field.
- Today's Larvae are Tomorrow's Adults: Every larva left in the soil after harvest is the seed for the next generation. It will emerge as an adult to re-infest the field.

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