

SOPPOA-MPOB Workshop on *Ganoderma*

Paper 3: Management of *Ganoderma* BSR in existing planting

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SLIDE PRESENTATION

INTRODUCTION

01

ALTERNATIVE TECHNIQUES
- CHEMICAL CONTROL
- SOIL MOUNDING

04

**DISEASE CONTROL &
MANAGEMENT**

02

ALTERNATIVE TECHNIQUES
- DAZOMET
- WHITE-ROT FUNGI

05

SANITATION TECHNIQUE

03

CONCLUSION

06

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- ❑ **Disease control** - Immediate or direct action taken to **reduce or suppress** the disease once it has appeared.
- ❑ **Disease management** - A **long-term, integrated approach** that combines multiple strategies to **prevent, reduce, and delay** the disease occurrence and spread.

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- ❑ Concept of **combining multiple strategies**:
 - **Census** - Early detection
 - **Sanitation / Cultural practices**
 - **Biological control agents (BCA's)**

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- ❑ Innovative Techniques in BSR Management
- ❑ Modern approaches being tested and applied to complement conventional methods

Penetration of Ptae. Pe



Compulsory census must be carried out **at 3 years of replanting**, along with census of other diseases **at 6 monthly interval**.



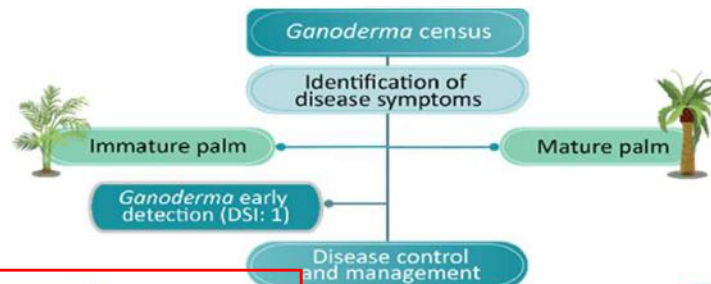
Infected palms should be **marked and tied with a bearing tape**.



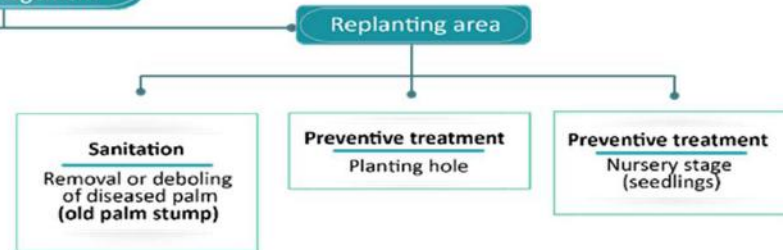
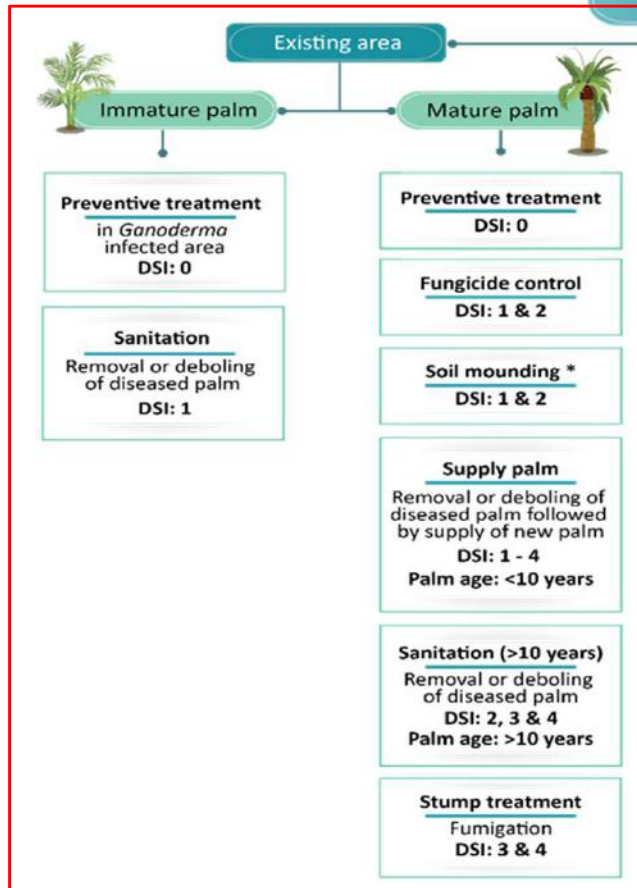
GPS coordinate is encourage for ground census.



Labelling infected palms on a map or GPS is important for future reference.



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Palms under 0- 3 years of age is categorized as immature palms.



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Disease severity DSI: 0

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Disease severity DSI: 1

Un YA YP, 5 , z A5U 4 A5Ai Y4 Y5

Mature palms

Palms age > 10 years of age is categorized as mature palms



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Disease severity DSI: 0

Disease severity DSI: 1 - 4

Disease severity DSI: 2, 3, & 4

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SOP *Ganoderma* 2024

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Disease severity DSI: 1 & 2

Disease severity DSI: 3 & 4



The sanitation technique is recommended as a preventive measure in managing BSR in existing plantings / replanting.



The tissues of stumps, trunks and root mass of the diseased palms are the primary sources of the infection in oil palm areas.



This sanitation programme should be carried out prior to replanting or in existing planting if incidences of *Ganoderma* in the category of DSI 3 and 4 are detected.



DSI 3

SEVERE INFECTION



Severe foliar symptom (>50%)



- 01 Severely infected palm.
- 02 Presence of white mycelium or fruiting body (e.g. small white button or bracket shaped form).
- 03 Palm showing severe foliar symptoms (>50%) and stem rotting (>30%) at the base.
- 04 Confirmed presence of *Ganoderma* fungus using early detection methods (e.g. GSM or PCR-DNA).

SANITATION TECHNIQUE

DSI 4

DEAD PALM



- 01 Very severely infected/dead palm.
- 02 Presence of white mycelium or fruiting body (e.g. small white button or bracket shaped form).
- 03 Collapsed/dead palm with severe foliar symptoms and stem rotting at the base.
- 04 Confirmed presence of *Ganoderma* fungus using early detection methods (e.g. GSM or PCR-DNA).

A5n A η 5 YPm5n Y



Step 1: BSR census palm with *Ganoderma*
- Disease Severity Index, DSI
3 & 4



Step 2: Pushing of the infected
palms / unproductive palms



Step 3: Excavating stump and
root mass at length of 1.5 m x
2.0 m, width of 1.5 m -2.0 x &
depth of 1.0m -1.5m



Step 4: Filling up the deboled
area with nearby soil or new
soil.



Step 5: The fallen trunk and
fronds are pushed aside.



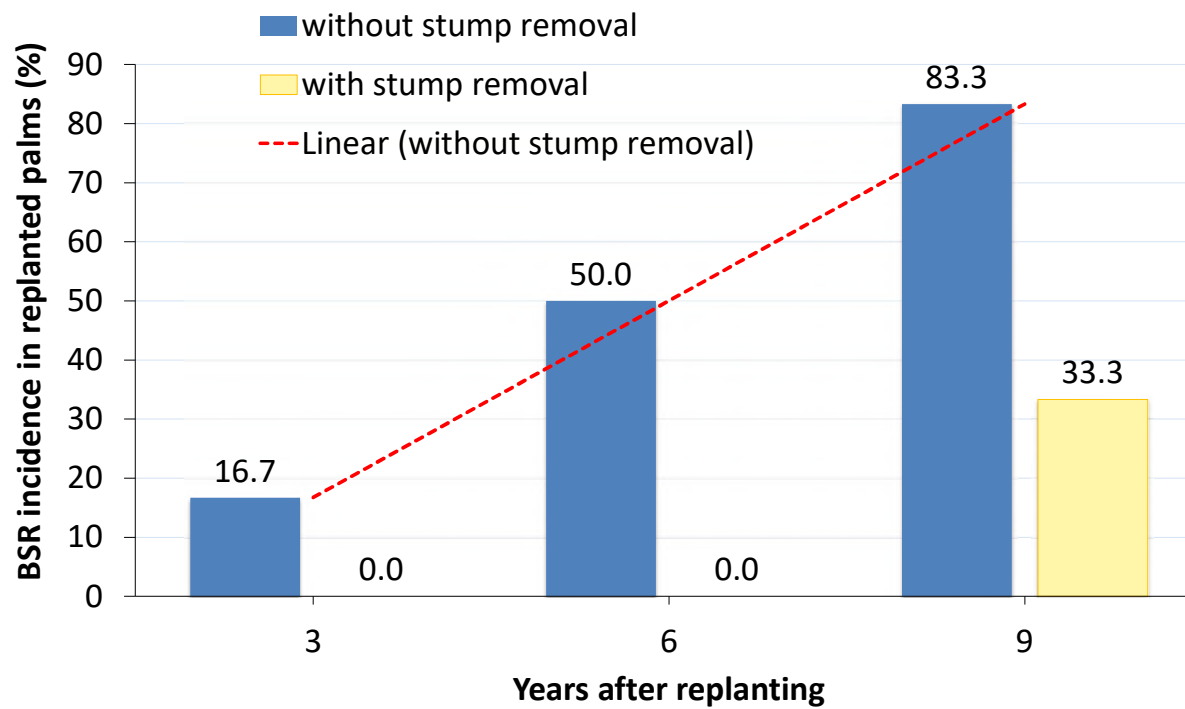
Step 6: Trunks are chipped or
the thickness of < 10cm.



Step 7: Resupplied with new
palm if the removed palm <
10 years old.



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TABLE 2. EFFECTS OF REMOVING DISEASED PALM FOLLOWED BY PLANTING WITH SUPPLY PALM, THREE, SIX AND NINE YEARS AFTER PLANTING (Trial 2)*

Treatment	Supply palms infected (%)		
	3 years**	6 years**	9 years**
T1 -Diseased stump not excavated (smallholder practices, <i>Figure 1</i>)	23.3	50.0	83.3
T2 -Diseased stump excavated to 1 x 1 x 1 m	0	13.3	30.0
T3 -Diseased stump excavated to 2 x 2 x 1.5 m	0	0	3.3
T4 -Diseased stump excavated to 2.5 x 2.5 x 1.5 m	0	0	3.3

Notes: *Study was conducted in 1995 when palm was 12 years old.

No. of supply palms/treatment: 30.

**Chi-square analysis: significant different at $p < 0.01$.

Az Y 5A n Y YPm5n Y



DSI 1

EARLY INFECTION



- 01 Early infection or mild infected palm.
- 02 Presence of white mycelium or fruiting body (e.g. small white button).
- 03 No foliar symptoms.
- 04 Mild (<10%) or no stem rotting at the base.
- 05 Early detection methods (e.g. GSM or PCR-DNA) showing positive *Ganoderma* detection.

DSI 2

MODERATE INFECTION



Yellowing of leaves

Snapping of frond (<50%)



- 01 Moderately infected palm.
- 02 Presence of white mycelium or fruiting body (e.g. small white button or bracket shape).
- 03 Palm showing foliar symptoms: yellowing and collapsed fronds (<50%) and stem rotting (<30%) at the base.
- 04 Confirmed presence of *Ganoderma* fungus using early detection methods (e.g. GSM or PCR-DNA).

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mY AP, 5A , zY



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PmY4 rPAz P, 5 , z h 5i rPrUY
mY AP, 5A , zY



A5 rz

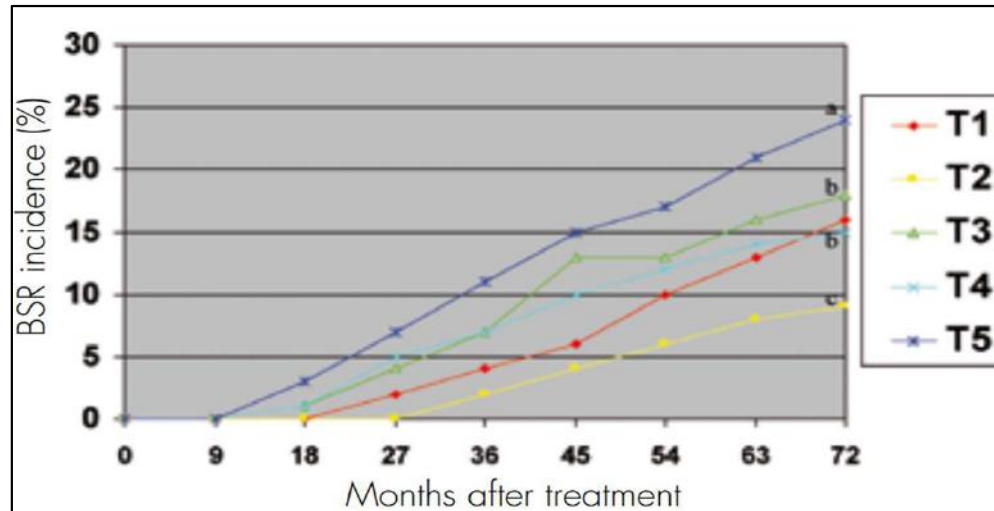


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PmY4 rPAz P, 5 , z h 5i rPrUYmY AP, 5A , zY



Treatments:

T1 - Soil injection + 90 ml hexaconazole (4.5 g a.i)

T2 - Soil injection + 180 ml hexaconazole (9 g a.i)

T3 - Soil drenching + 90 ml hexaconazole (4.5 g a.i)

T4 - Soil drenching + 180 ml hexaconazole (9 g a.i)

T5 – Untreated (as control)



Motorized Knapsack Sprayer



Tractor Mounted Sprayer

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PmY4 rPAz P, 5 , z h 5i rPrUYmY AP, 5A , zY

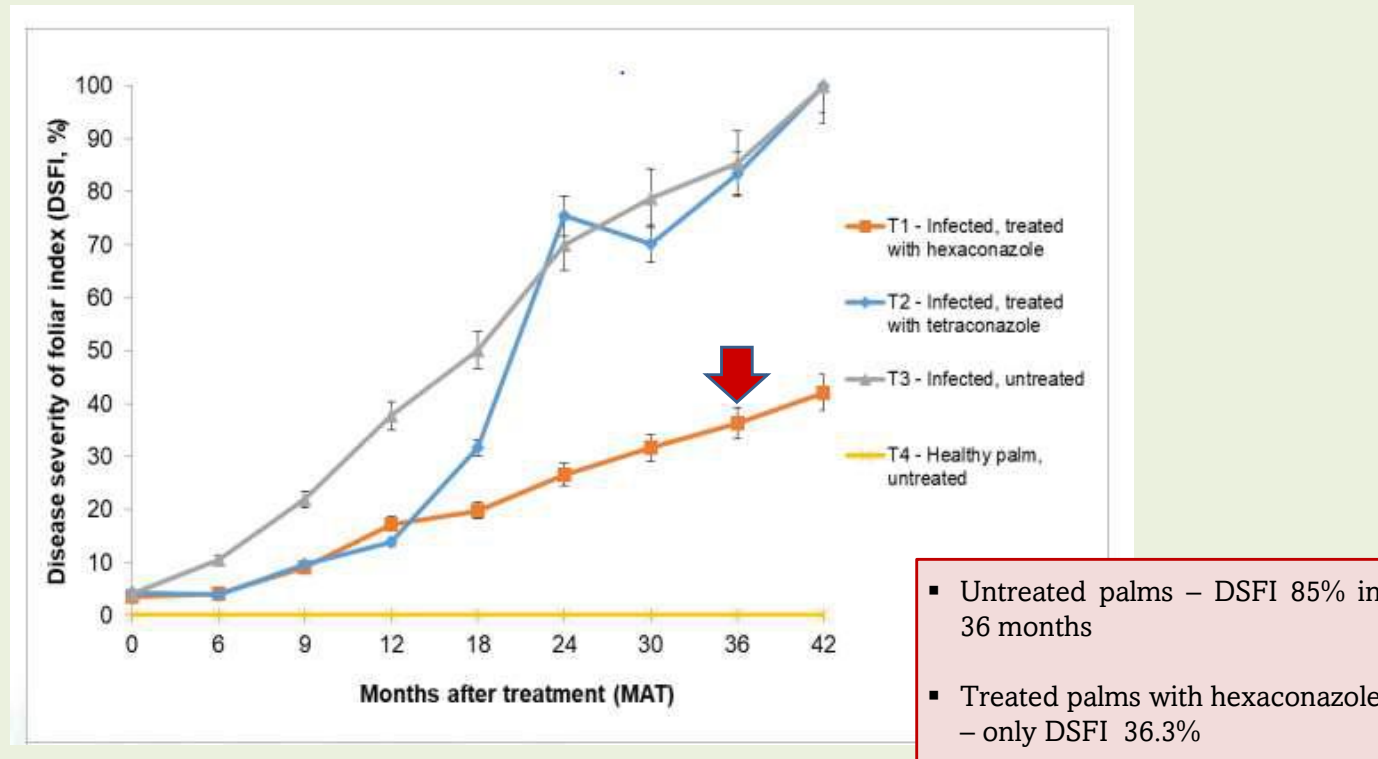


Figure 5: Effect of hexaconazole on basal stem rot (BSR) incidence (%) in oil palms at Kluang, Johor. Means with the same letter denote no significant difference according to the Least Significant Difference (LSD) test at $p=0.05$.

Az Y 5A n Y YPm5n Y

DSI 1

EARLY INFECTION



- 01/ Early infection or mild infected palm.
- 02/ Presence of white mycelium or fruiting body (e.g. small white button).
- 03/ No foliar symptoms.
- 04/ Mild (<10%) or no stem rotting at the base.
- 05/ Early detection methods (e.g. GSM or PCR-DNA) showing positive *Ganoderma* detection.

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DSI 2

MODERATE INFECTION



Yellowing of leaves
Snapping of frond (<50%)



- 01/ Moderately infected palm.
- 02/ Presence of white mycelium or fruiting body (e.g. small white button or bracket shape).
- 03/ Palm showing foliar symptoms: yellowing and collapsed fronds (<50%) and stem rotting (<30%) at the base.
- 04/ Confirmed presence of *Ganoderma* fungus using early detection methods (e.g. GSM or PCR-DNA).

4



Soil mounding
(Ho and Khairudin, 1997)



Soil mounding,
after 2 years



Soil mounding + trenching
(4m x 4m x 75cm, Lim and
Wahidin, 2011)

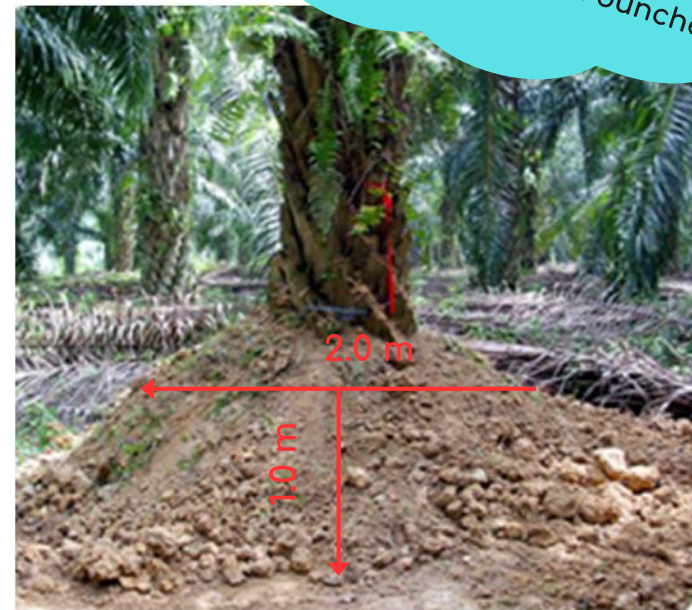
DSI 1 & 2



Step 1:
Selection of *Ganoderma*-infected palm with disease severity index DSI 1 and 2



Step 2:
Soil mounding using excavator or backhoe - topsoil was scrapped from beneath the frond stacking.



Step 3:
Mounding (1m height x 2 m diameter) with soil gathered from the inter-rows

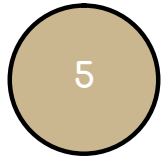
Diseased palm should only be maintained if the palm still actively producing fruit bunches

Sources obtained from Pn. Normahnani (SD-Guthrie), presented during the Task Force Meeting at IOI Gemenceh, 2024.

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- » Obtain the soil by digging a pit along the avenue.
- » Soil mounding with just 10cm depth is able to increase the root density as well as enhancing the root development (Mojeremane *et al.*, 2013).
- » The mound height should be sufficient to cover all rotted areas, including *Ganoderma* fruit bodies.
- » The costs (RM23.50/palm - RM25.00/palm) and logistical challenges, such as requiring suitable machinery to access the fields and finding appropriate topsoil.





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DSI 3 & 4

Stump treatment - Dazomet



Step 1

Removal of *Ganoderma*-infected palm with DSI 3 and 4 using chainsaw

Step 2

Ganoderma-infected trunk is cut down using chainsaw and trenches were made on the top of infected stump

Step 3 & 4

Applying the dazomet at 485 g a.i./stump at the trenches

Step 5

Spraying with 250-300 ml of water

Step 6

Infected stump treated with dazomet is securely covered with large polyethene bag/soil for 15-30 days



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A YP, h n5Uz A , APm

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promising wood degrader



antagonistic against *Ganoderma boninense*



non-pathogenic to oil palm

6

4 YA 4 Y5 n m mn Y ,
h 5i n



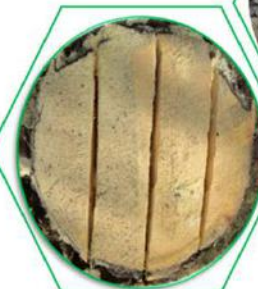
Unproductive / infected palm with BSR



Trunks were pushed and cut into smaller discs – height 30cm



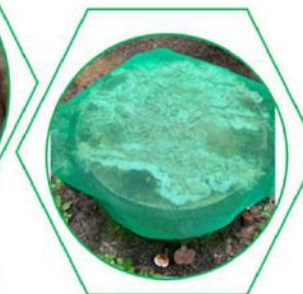
Making drain (3 drains/ disc)
Depth: 3-5 cm. Distance: 3-5 cm apart



In situ treated stump (field)



Inoculation method of the developed eco-friendly product



DSI 3 & 4

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O2

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(a) 0 month



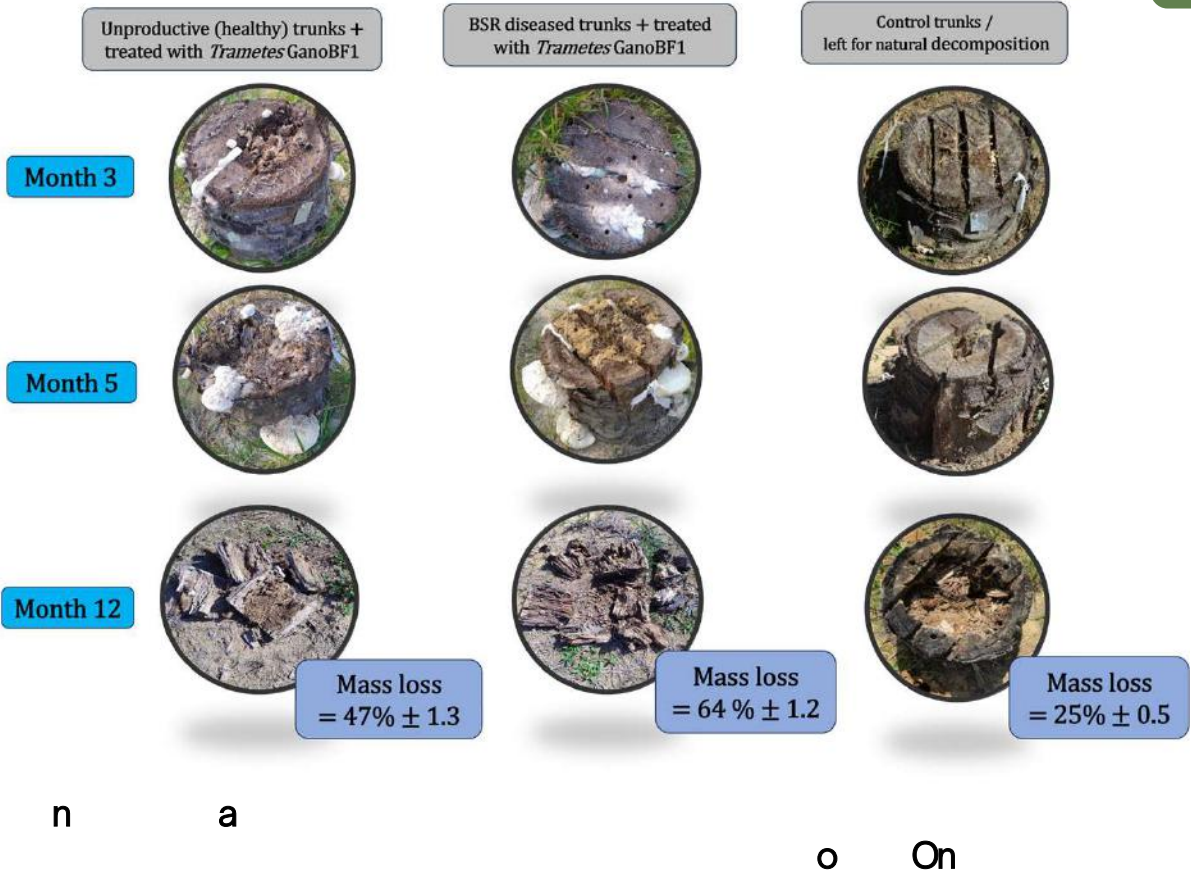
n

(b) 12 month



9) O2

4 YA 4 Y5 n m mn Y
 , h 5i n



(a)



n

n 9) O2

(b)

T1 – *Trametes lactinea* GanoBF1 + green net + N



T2 – *Trametes lactinea* GanoBF1 + green net



T5– *Un-inoculated stumps/ natural*



After two years

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2025
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OIL PALM PLANT
PROTECTION
(ICOPP)**

Innovate, Adapt And Strategise

21-22
November 2025 

Berjaya Times Square Hotel,
Kuala Lumpur 

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Oil palm is an important commodity crop planted along the equatorial belt. As the global population continues to grow, the importance of effective crop protection practices becomes even more pronounced. Embracing innovative and sustainable approaches in crop protection is essential in securing the future of oil palm and adapting to the ever-growing demand for food. It is highly anticipated that this conference will provide the right platform for sharing experiences in research and challenges faced by oil palm growers complementing crop protection and strategies according to their respective countries.

