

The effects of lignins as diet components on physiological activities of a lower termite *Coptotermes formosanus*



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Introduction



- Termites are highly effective in degrading lignocellulosic biomass.
- This ability relies on their partnership with a diverse community of bacterial, archaeal and eukaryotic gut symbionts (Brune, 2014).
- **Termites must overcome lignin barrier to achieve an efficient decomposition of the wall polysaccharides.**
- **The aim of the present study was to investigate the effects of lignins as diet components on physiological responses of *Coptotermes formosanus*.**

Experiment 1.

Isolation of Holocellulose, Cellulose, MWL Samples

Sapwood Blocks
Rice straws



- Powdered by mixer (40 mesh)
- Extracted with Benzene: Ethanol



Extractive-free
Lignocelluloses

Purified MWLs

- Extracted with acetic acid, sodium chlorite

Holocellulose



- Extracted with 17.5% NaOH

Cellulose



Experiment 2.

Bioassay Tests for Termite Physiological Responses

☐ Termite Survival and Body Mass



100 workers, 10 soldiers
12 weeks incubation



Termite
Survival



Termite
Body mass

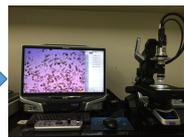
☐ Termite Protist Observation



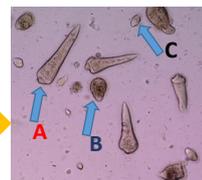
130 workers



Pulled out the gut



KEYENCE VHX-5000
(Keyence Corp., Osaka,
Japan)



A = *Pseudotrichonympha grassii*
B = *Holomastigotoides hartmanni*
C = *Spirotrichonympha leidy*

Yoshimura, T. (1995) Wood Res 82: 68-129

Summary

All lignins from Japanese cedar (softwood), Japanese beech (hardwood), and rice (grass) positively affect the survival of *C. formosanus* workers and their major protists in the hindgut

Lignin types did not show a clear difference in physiological activities of *C. formosanus*

The mineral components (e.g., silica) in grass lignocellulose may affect the physiological activities of *C. formosanus*

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