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Faculty of Engineering, Gifu University



Isolation of Secondary Metabolites from *Coreopsis lanceolata* Stems and Their Biological Activity

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Coreopsis lanceolata is an Asteraceous plant known to contain semiochemicals active against nematodes and leukemic agents. The objective of the study was to discover termite resistant constituents from *C. lanceolata* stems. Five compounds were isolated from *C. lanceolata* stems. These compounds were identified as 5-phenyl-2-(1-propynyl)-thiophene (1), 1-phenylhepta-1,3,5-triene (2), β -sitosterol (3), succinic acid (4), and protocatechuic acid (5), respectively; they were confirmed by spectroscopic analysis. Their antitermitic effects were evaluated with the no-choice feeding test against *Coptotermes curvignathus*. Of the isolates, 5-phenyl-2-(1-propynyl)-thiophene (1) and 1-phenylhepta-1,3,5-triene (2) showed strong potent antitermitic activity. Our findings suggested that compounds 1 and 2 isolated from *C. lanceolata* stems appears to be the active ingredients.

References

1. M. Adfa, A. J. Kusnanda, F. Livandri, R. Rahmad, W. Darwis, M. Efdi, M. Ninomiya and M. Koketsu, *Rasayan J. Chem.*, **10**, 153-159 (2017).
2. M. Ninomiya, T. Aoki, M. Adfa, T. Yoshimura and M. Koketsu, *Holzforchung.*, **68**, 361-365 (2014).
3. A. Pardede, K. Mashita, M. Ninomiya, K. Tanaka and M. Koketsu. *Bioorg. Med. Chem. Lett.*, **26**, 2784-2787 (2016).



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Introduction



Coreopsis lanceolata

Coreopsis lanceolata is an Asteraceous plant known to contain semiochemicals active against nematodes and leukemic agents.

This flower is beautiful and is planted for decoration on the roadside and bankside in Japan. However, *Coreopsis lanceolata* has high fertility; it is recognized as the invasive alien species today.

Extraction



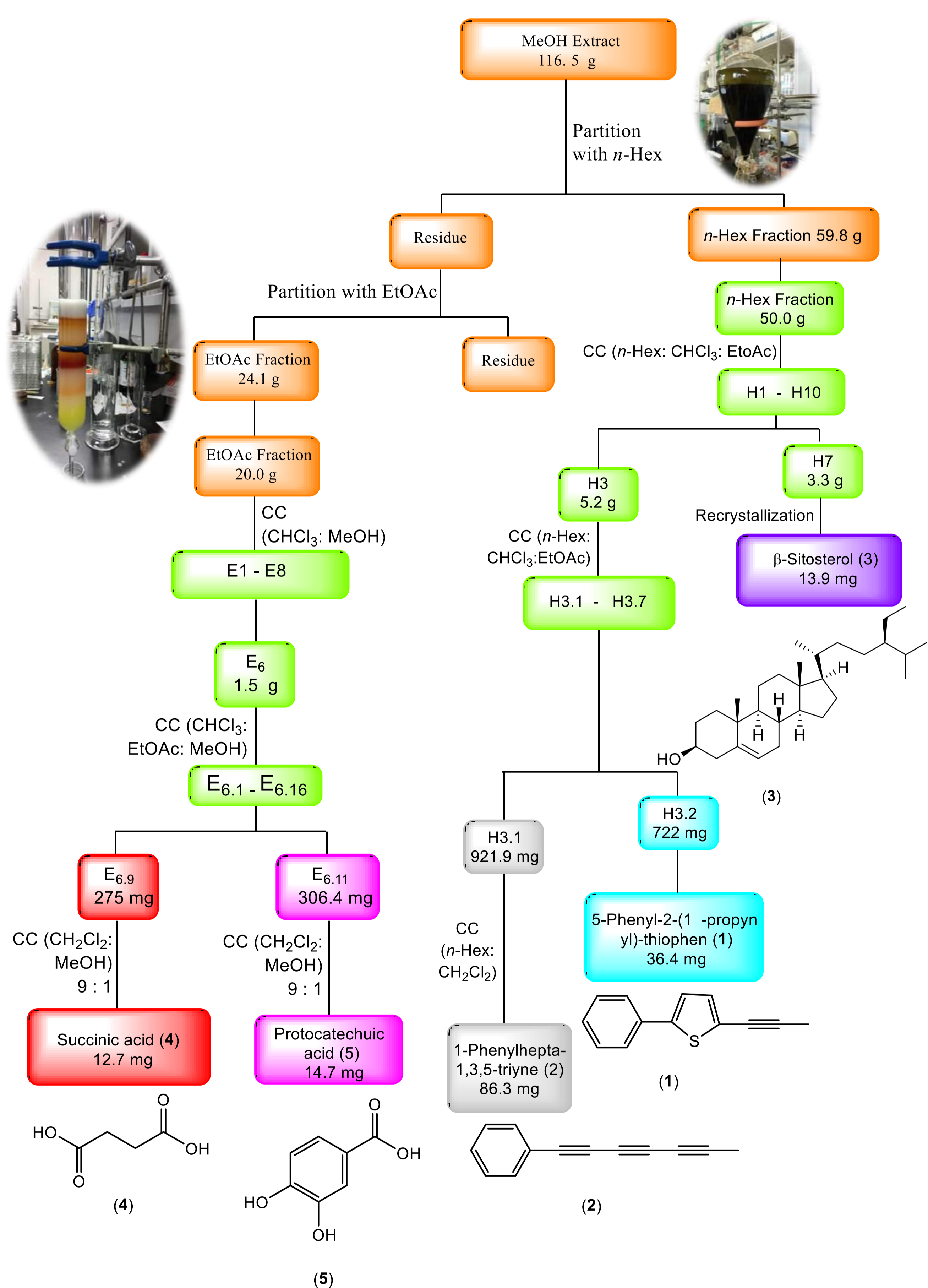
Dried stems of *Coreopsis lanceolata*
2.7 Kg

Macerated
with MeOH

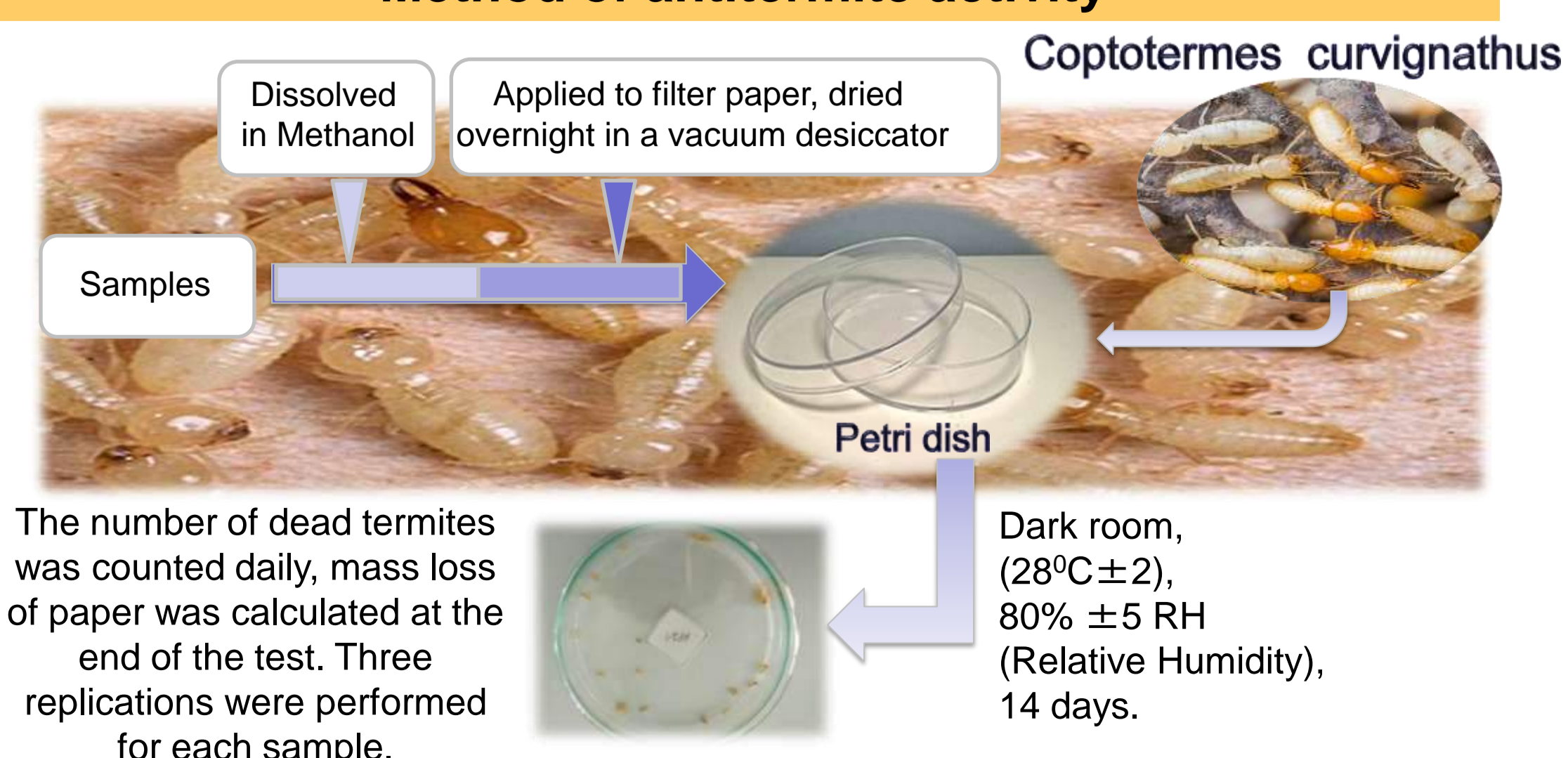


MeOH extract 116.5 g

Isolation Scheme



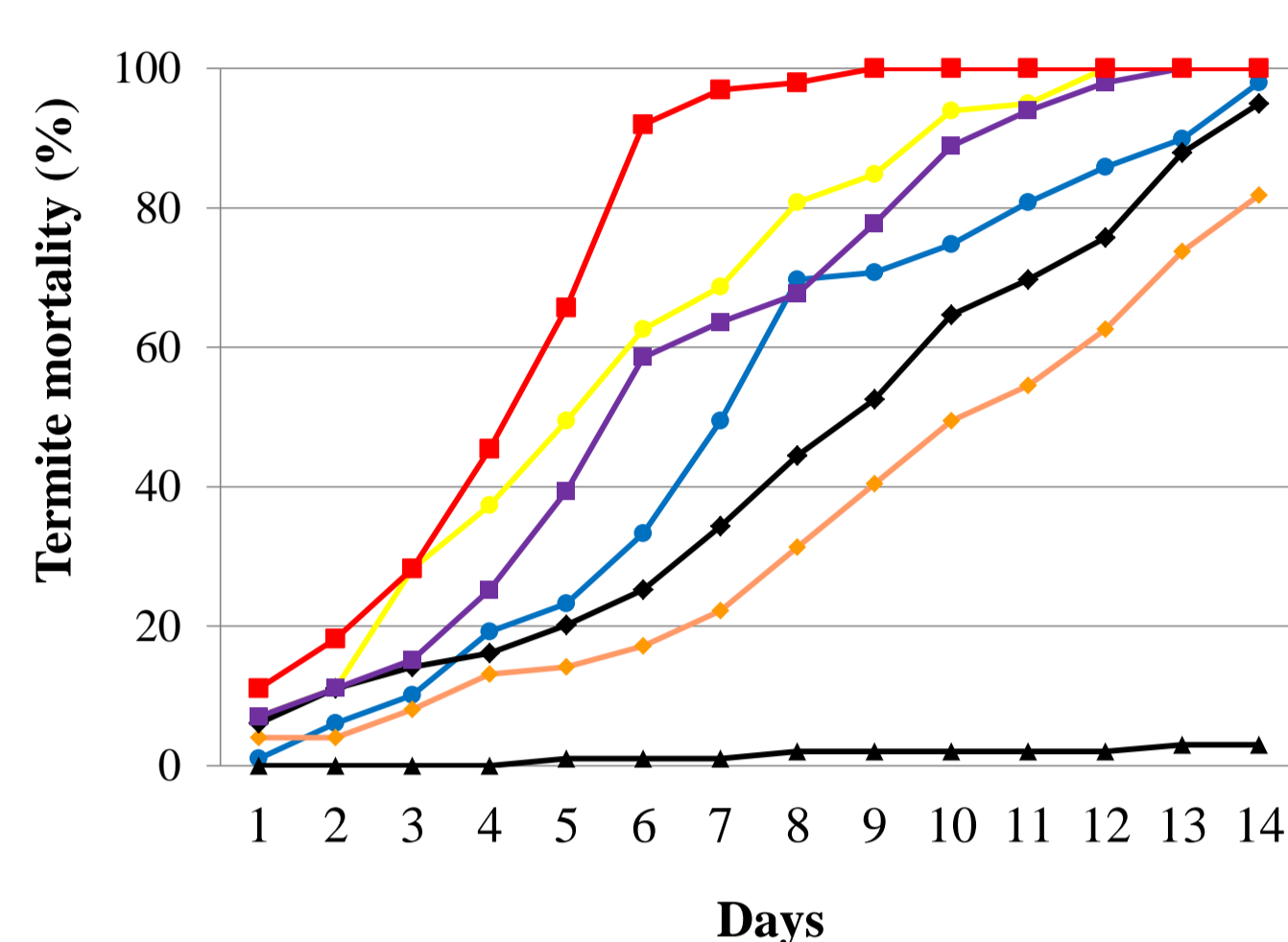
Method of antitermite activity



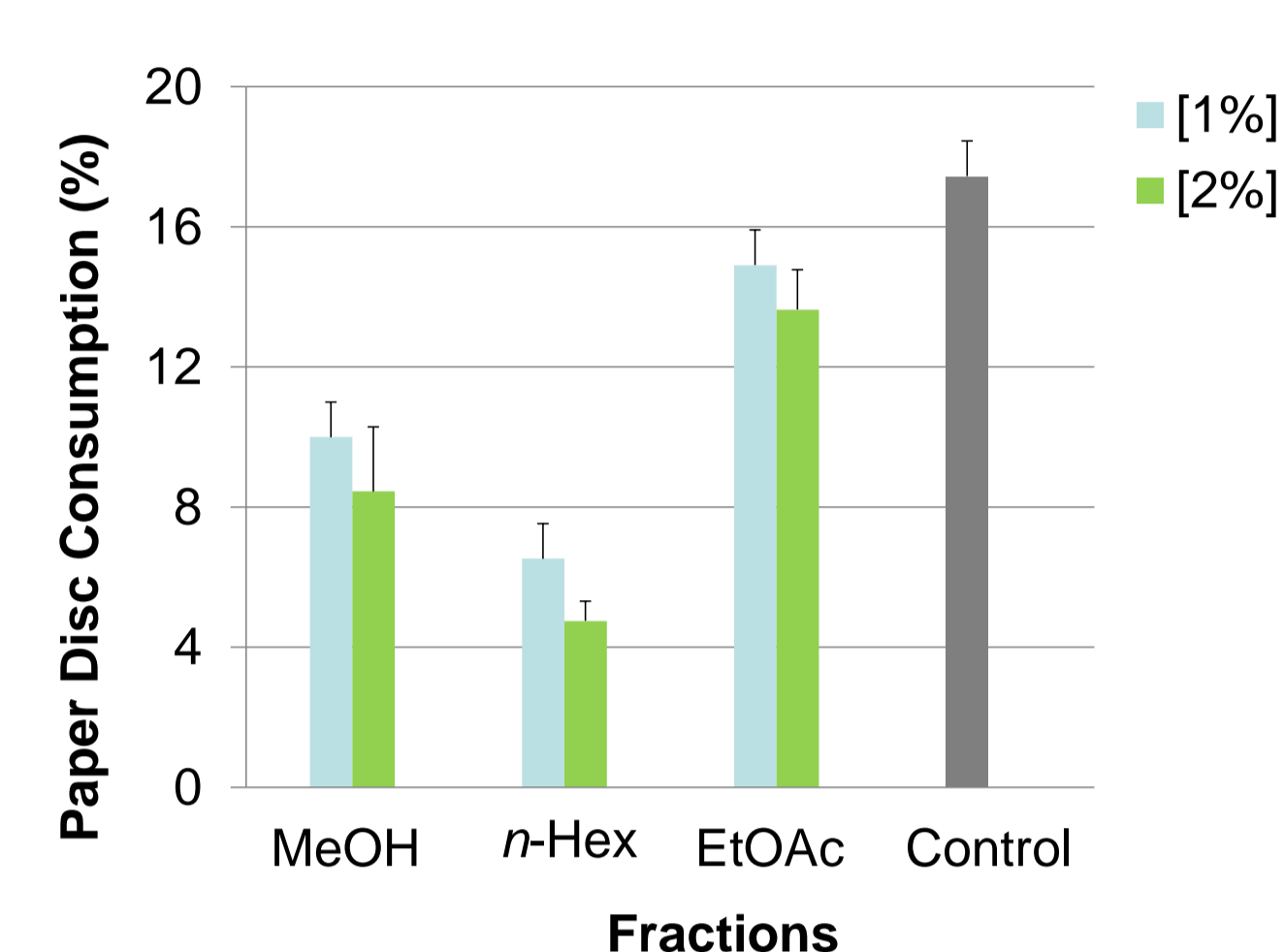
*S.T Chan and S.S Chen. *J. Agric. Food Chem.* 2002, 50: 1389-1392.

Antitermite activity of fractions from *Coreopsis lanceolata* stems

Termite mortality by treatment of fractions from *Coreopsis lanceolata* stems against *Coptotermes curvignathus*, dose 1% and 2%, *n* = 3

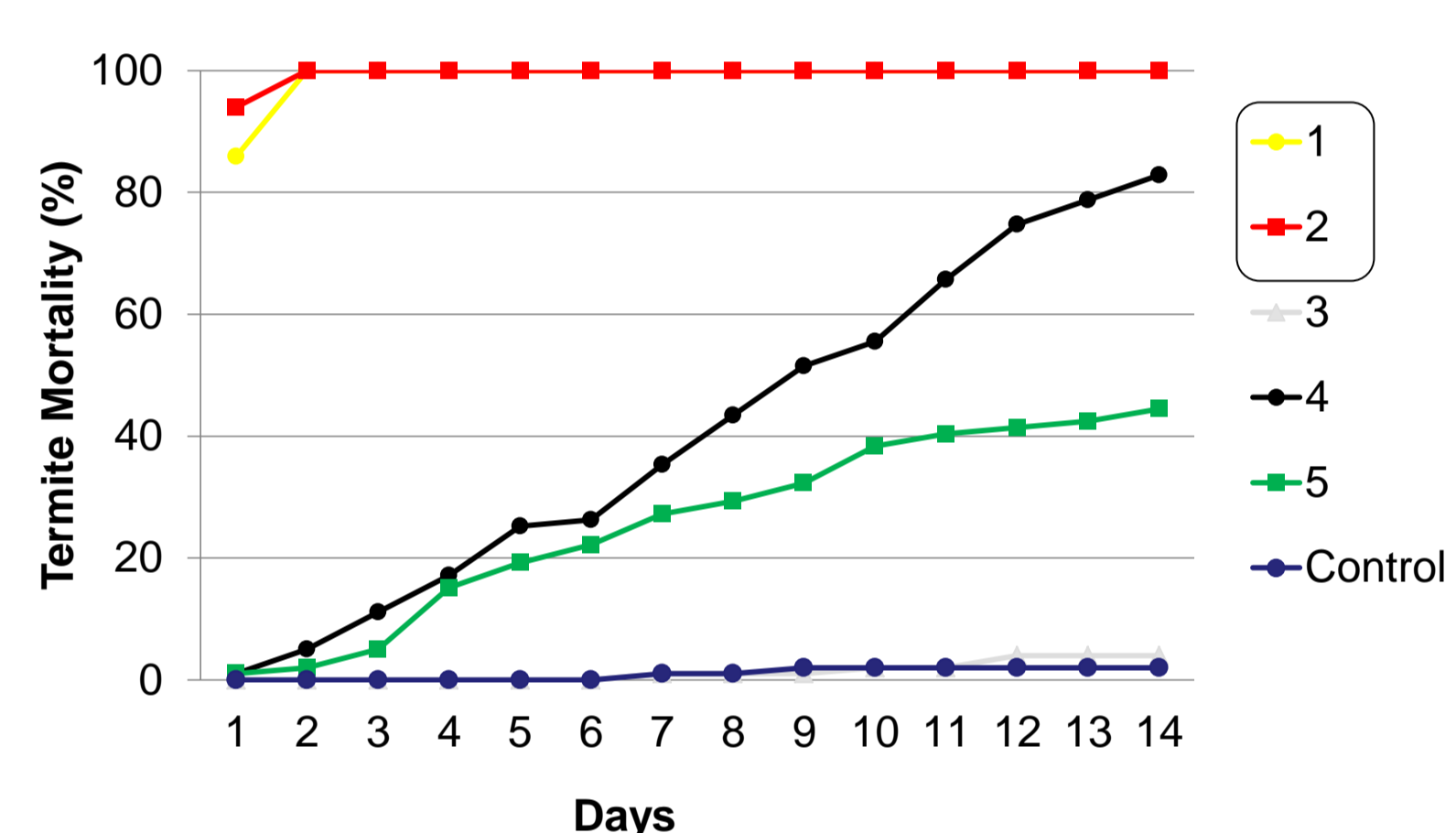


Paper disc consumption by *Coptotermes curvignathus* after 14 days exposure to fractions of *Coreopsis lanceolata* stems

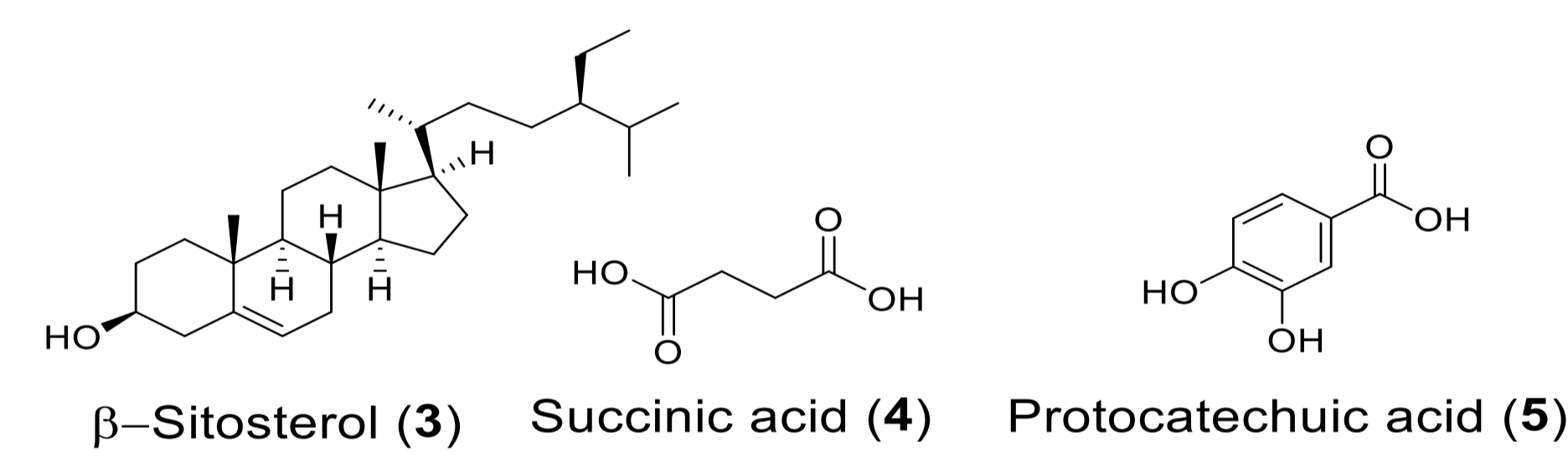
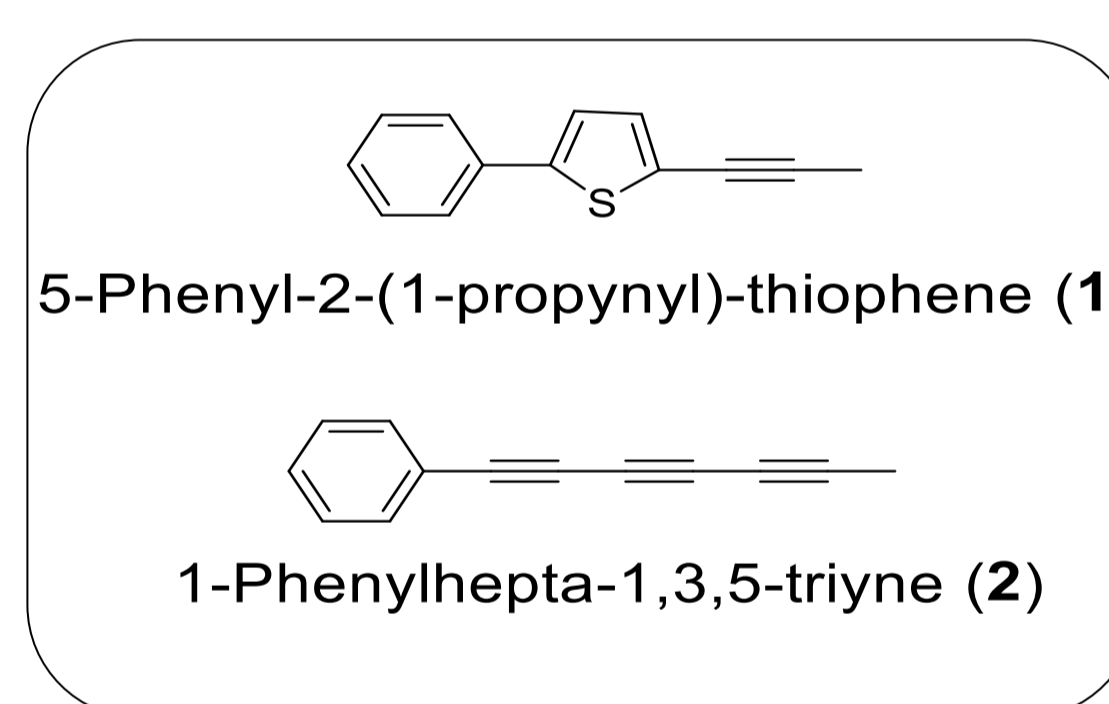
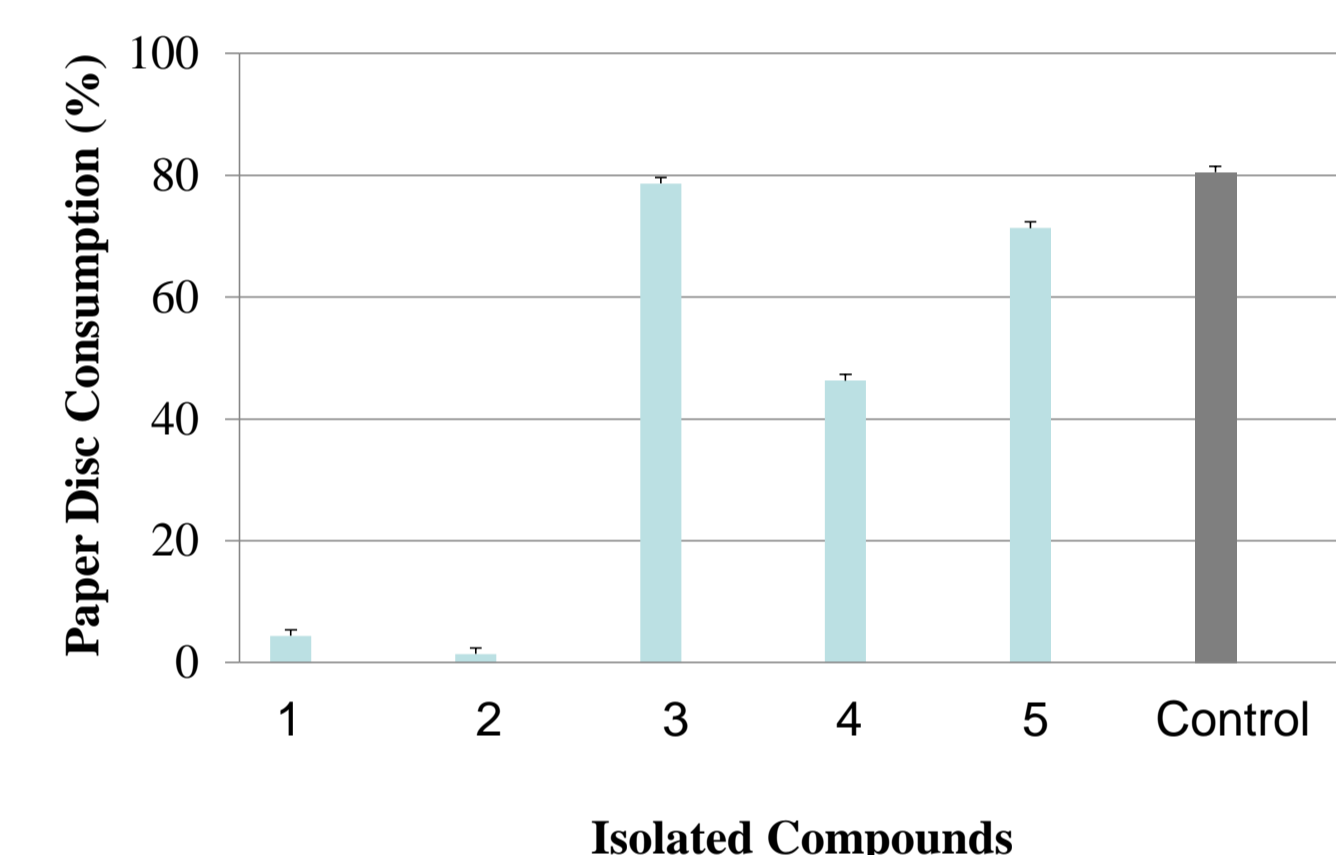


Antitermite activity of isolated compounds from *Coreopsis lanceolata* stems

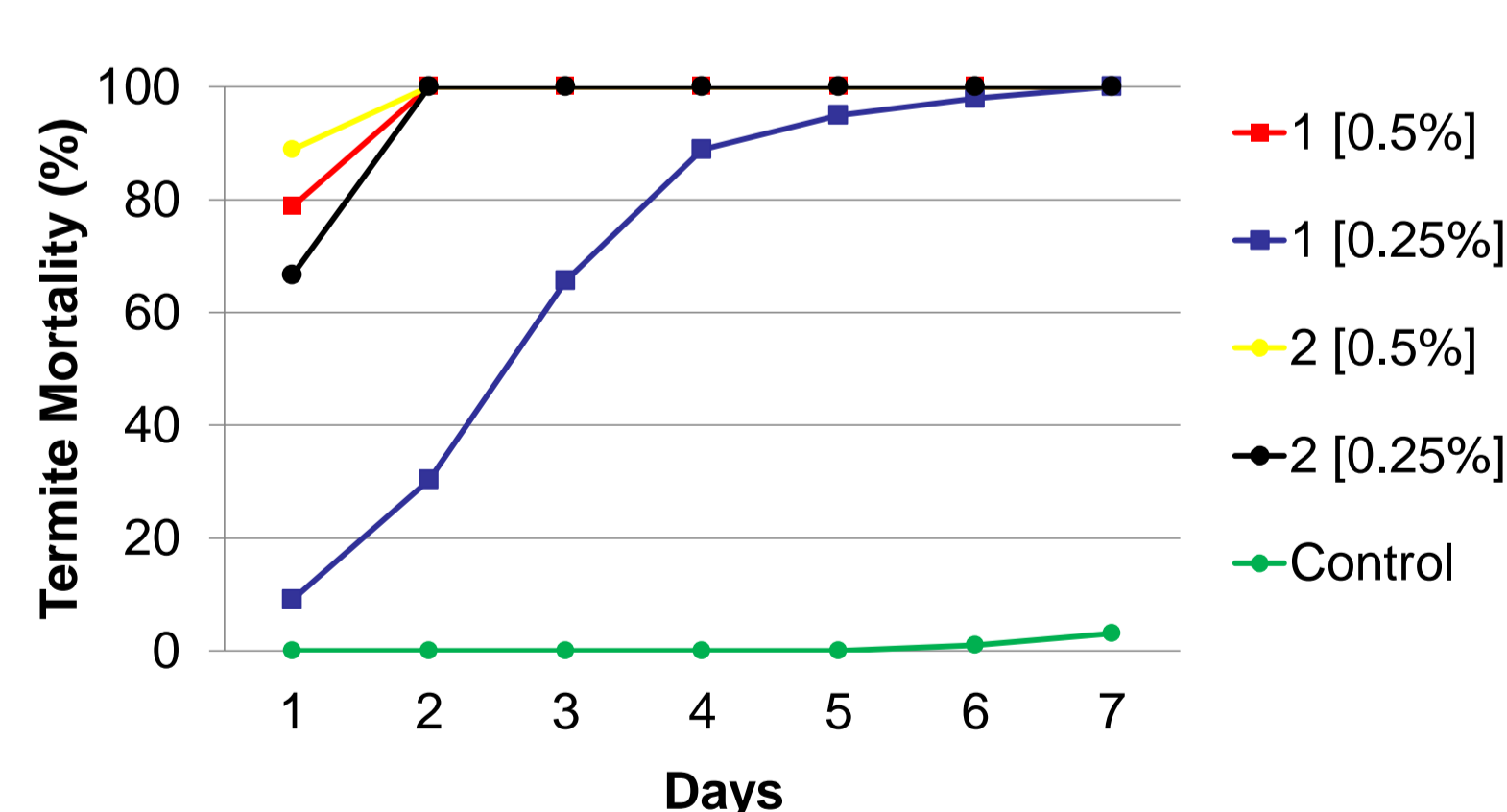
Termite mortality by treatment of isolated compounds from *Coreopsis lanceolata* stems against *Coptotermes curvignathus*, dose 1%, *n* = 3



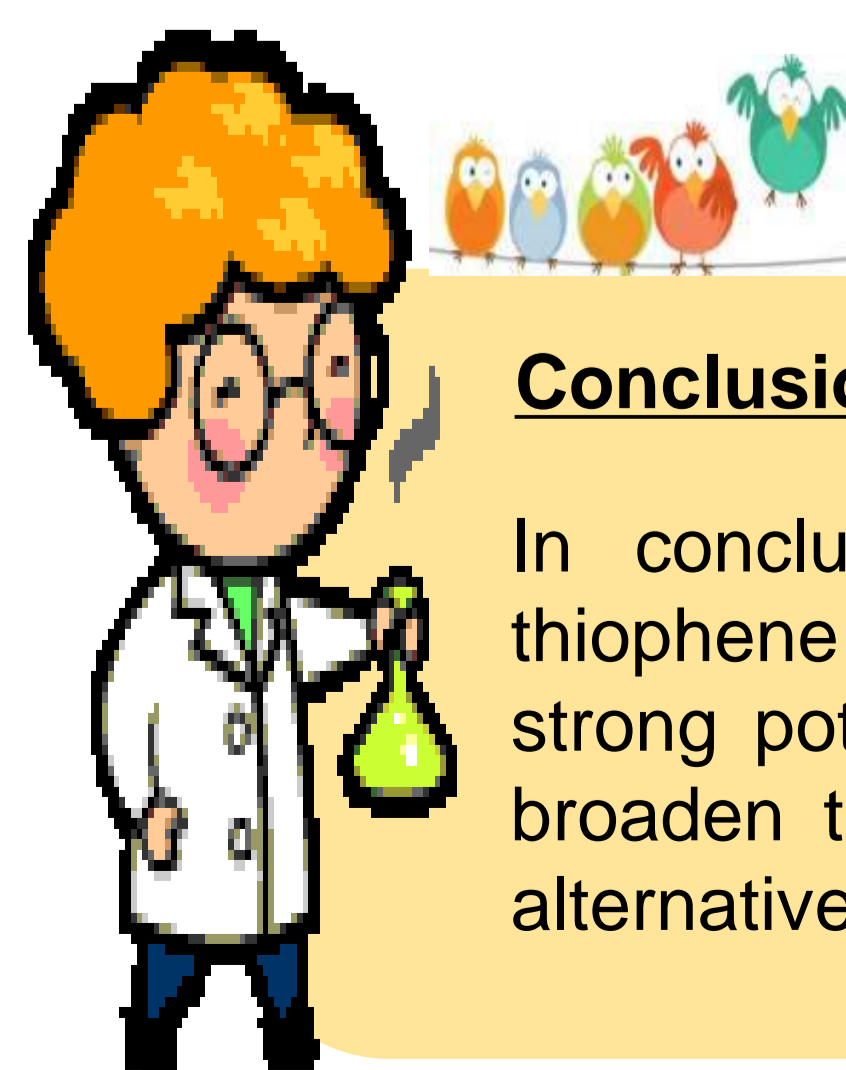
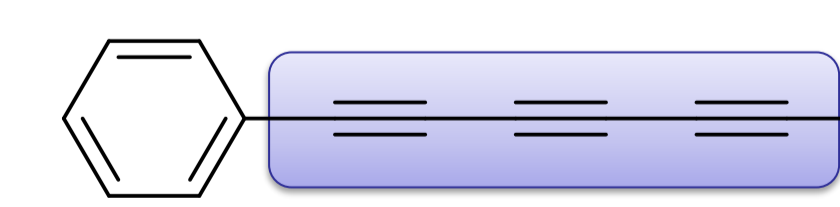
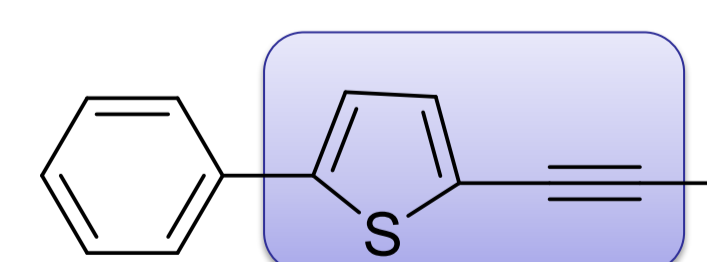
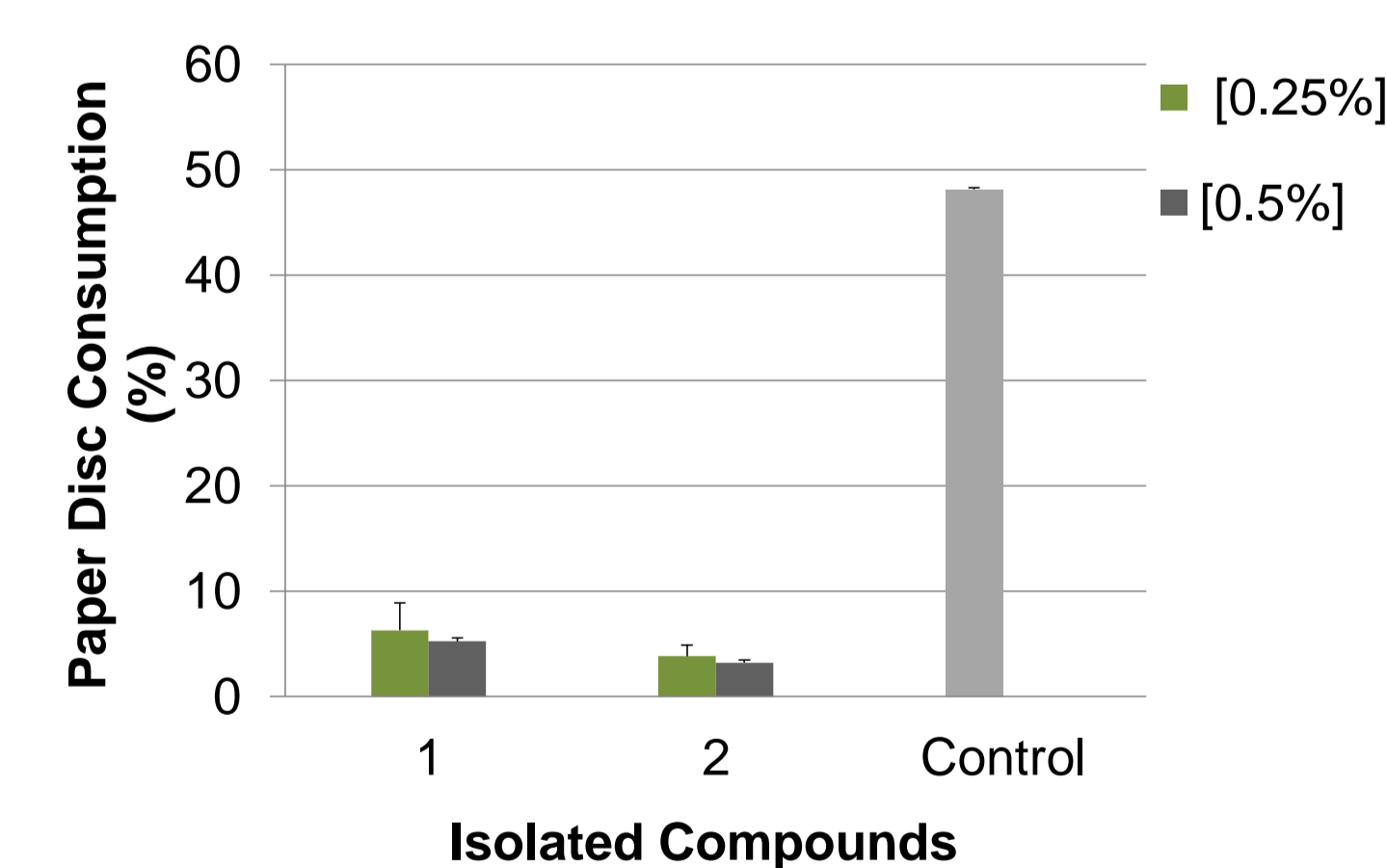
Paper disc consumption by *Coptotermes curvignathus* after 14 days exposure to isolated compounds from *Coreopsis lanceolata* stems



Termite mortality by treatment of 5-phenyl-2-(1-propynyl)-thiophene (1), 1-phenylhepta-1,3,5-triynes (2) isolated from *Coreopsis lanceolata* stems against *Coptotermes curvignathus*, dose 0.5% and 0.25%, *n* = 3



Paper disc consumption by *Coptotermes curvignathus* after 14 days exposure to 5-phenyl-2-(1-propynyl)-thiophene (1), 1-phenylhepta-1,3,5-triynes (2) isolated from *Coreopsis lanceolata* stems.



Conclusion

In conclusion, our result demonstrated that 5-phenyl-2-(1-propynyl)-thiophene (1) and 1-phenylhepta-1,3,5-triynes (2) in *n*-Hex fraction exerted strong potent antitermite activity against *C. curvignathus*. Our result will broaden the possibility of the application of *C. lanceolata* stems as an alternative for termite control.



Certificate of Attendance

This is to certify that
Dr. Antoni Pardede

has attended as
POSTER PRESENTER

in the
***6th Asian Network for Natural & Unnatural Materials
(ANNUM VI) 2018***

held on July 27st -28th, 2018
in Nagaragawa Convention Center
and Gifu University Satellite Campus, JAPAN

Organized by
Faculty of Engineering, Gifu University, JAPAN



Chairperson: Prof. Mamoru Koketsu
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