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นายณวัฐ เทศพิทักษ์

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ANTI-PHYTOPATHOGENIC FUNGAL ACTIVITY OF BENZOIC ACID AND
CINNAMIC ACID DERIVATIVES

Mr. Nawarat Thedpitak

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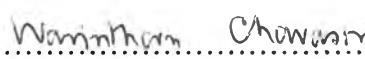
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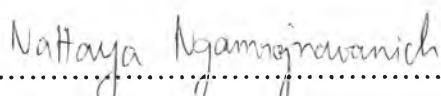



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(Professor Piamsak Menasveta, Ph.D.)

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..... Chairman
(Professor Udom Kokpol, Ph.D.)


..... Thesis Advisor
(Assistant Professor Warinthorn Chavasiri, Ph.D.)


..... Member
(Associate Professor Nattaya Ngamrojnavanich, Ph.D.)


..... Member
(Jittra Piapukiew, Ph.D.)

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การศึกษากิจกรรมต้านเชื้อราก่อโรคพืชของอนุพันธ์กรดเบนโซอิกและสารที่เกี่ยวข้อง 40 ชนิดและอนุพันธ์ของกรดซินนามิก 50 ชนิดเพื่อศึกษาความสัมพันธ์ระหว่างโครงสร้างของอนุพันธ์กับฤทธิ์ต้านเชื้อรา 4 ชนิด ได้แก่ *Alternaria porri*, *Fusarium oxysporum*, *Pestalotiopsis* sp. และ *Phytophthora parasitica* พบว่าการเติมหมู่ไฮดรอกซิลในวงเบนซีนของกรดเบนโซอิกทำให้ความสามารถในการยับยั้งเชื้อราลดน้อยลง ในทางตรงกันข้ามเมื่อเติมคลอรีนกับวงเบนซีนโดยเฉพาะอย่างยิ่งในตำแหน่งที่สองหรือสามของกรดเบนโซอิกพบว่ามีฤทธิ์การยับยั้งเชื้อราที่ดีขึ้น การศึกษากิจกรรมต้านเชื้อราของซินนามัลดีไฮด์พบว่าสามารถยับยั้งเชื้อ *A. porri*, *F. oxysporum* และ *P. parasitica* ได้ 100% ที่ความเข้มข้น 2.5 mM นอกจากนี้จากการศึกษาความสัมพันธ์ของการยับยั้งเชื้อรากับความยาวหมู่อัลคิลของ 4-ไฮดรอกซีเบนโซเอต พบว่า บิวทิล 4-ไฮดรอกซีเบนโซเอตมีความสามารถในการยับยั้งเชื้อราทดสอบทั้งหมดได้ดีที่สุด จากการศึกษาความสามารถในการยับยั้งเชื้อรา ทดสอบความเป็นพิษต่อพืชและการสลายตัวภายใต้ภาวะเร่งของกรด 2,6-ไดไฮดรอกซีซินนามิก พบว่ากรดดังกล่าวมีความเหมาะสมที่จะนำไปพัฒนาเพื่อใช้ในการเกษตรได้เป็นอย่างดี โดยเฉพาะอย่างยิ่งเมื่อนำไปใช้ยับยั้ง *Pestalotiopsis* sp. และ *P. parasitica*


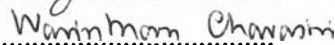
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Screening of antifungal activity of forty benzoic acid derivatives and related compound and fifty cinnamic acid derivatives were evaluated on four phytopathogenic fungi; *Alternaria porri*, *Fusarium oxysporum*, *Pestalotiopsis* sp. and *Phytophthora parasitica*, in order to define a possible structure–activity relationship. The addition of a supplementary hydroxyl group in various positions on the benzene ring of benzoic acid suppressed the antifungal activity on all tested fungi. On the contrary, the addition of a chlorine in the 2 or 3 position and conversion of carboxylic acid function group to an aldehyde increased the mycelial growth inhibition. Further evaluation of antifungal activity of cinnamaldehyde found that it completely suppressed *A. porri*, *F. oxysporum* and *P. parasitica* at 2.5 mM and nearly completely suppressed *Pestalotiopsis* sp. Methyl, ethyl, propyl, butyl, hexyl, octyl and dodecyl 4-hydroxybenzoates were tested against *A. porri*, *Pestalotiopsis* sp. and *P. parasitica*, in order to investigate the structure–activity relationship on the length of alkyl chain. The results showed that butyl 4-hydroxybenzoate showed generally good activity against all tested fungi. Further evaluation of antifungal activity, phytotoxicity and stability of 2,6-dichlorocinnamic acid were determined. It was found that compared to the conventional chemical fungicide captan and iprodione, 2,6-dichlorocinnamic acid is much more efficient and therefore can be an antifungal agent, particularly to control *Pestalotiopsis* sp. and *P. parasitica*.

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LIST OF ABBREVIATIONS

°C	degree celsius
cm	centrimeter
DMSO	dimethylsulfoxide
g	gram
mg	milligram
ml	milliliter
No.	number
PDA	potato dextrose agar
ppm	part per million
sp.	species
w/w	weight by weight
μl	microliter
UV	ultraviolet