

**MOLECULAR IDENTIFICATION OF SYMBIOTIC BACTERIA IN
ENTOMOPATHOGENIC NEMATODES *Heterorhabditis* sp.**

UNDERGRADUATE THESIS



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**AGROTECHNOLOGY
FACULTY OF AGRICULTURE
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SURABAYA
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Submitted in fulfillment for obtaining
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STATEMENT OF ORIGINALITY

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I declare that I have not committed plagiarism in writing my undergraduated thesis entitled: "Molecular Identification of Symbiotic Bacteria in Entomopathogenic Nematodes *Heterorhabditis* sp.". Theories and/or findings from previous research conducted by other researchers have been cited appropriately. If it is proven that I have committed plagiarism, I will accept the sanctions in accordance with applicable laws and regulations. I hereby declare that this statement is true, without coercion from any party, and can be used as intended.

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Molecular Identification of Symbiotic Bacteria in Entomopathogenic *Nematodes Heterorhabditis* sp.

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ABSTRACT

The excessive use of chemical pesticides has caused various negative impacts on the environment and human health, highlighting the need for sustainable biological control alternatives. This study aimed to molecularly identify symbiotic bacteria associated with *Heterorhabditis* sp. using the 16S rRNA gene approach. Entomopathogenic nematodes were explored from sugarcane plantation soils in Kediri Regency, East Java, using the baiting method, followed by nematode propagation and molecular identification of the symbiotic bacteria. The results showed that the isolated nematodes were identified as *Heterorhabditis* sp., while the symbiotic bacteria were identified as *Chromobacterium rhizoryzae*. This bacterium exhibited morphological and physiological characteristics similar to those of the genus *Photorhabdus*; however, molecular analysis revealed a distant genetic relationship. These findings indicate that *Heterorhabditis* sp. is not strictly monoxenic but can associate with multiple bacterial species (polyxenic)..

Keywords: 16S rRNA; *Chromobacterium rhizoryzae*; symbiotic bacteria.

ABSTRAK

Penggunaan pestisida kimia yang berlebihan menimbulkan berbagai dampak negatif terhadap lingkungan dan kesehatan, sehingga diperlukan alternatif pengendalian hayati yang berkelanjutan. Penelitian ini bertujuan untuk mengidentifikasi secara molekuler bakteri simbiosis yang berasosiasi dengan *Heterorhabditis* sp. menggunakan pendekatan gen 16S rRNA. Nematoda dieksplorasi dari tanah pertanaman tebu di Kabupaten Kediri, Jawa Timur, menggunakan metode baiting, dilanjutkan perbanyakan NEP dan identifikasi Molekuler Bakteri simbiosis. Hasil penelitian menunjukkan bahwa nematoda yang diperoleh teridentifikasi sebagai *Heterorhabditis* sp., sedangkan bakteri simbiosis berasal dari spesies *Chromobacterium rhizoryzae*. Bakteri ini memiliki karakteristik morfologi dan fisiologi yang mirip dengan genus *Photorhabdus*, namun secara molekuler memiliki kekerabatan yang jauh. Temuan ini menegaskan Nematoda *Heterorhabditis* sp. tidak hanya dapat bersimbiosis dengan satu jenis bakteri (*Monoxenic*), melainkan bersifat dapat bersimbiosis dengan beberapa jenis bakteri (*Polyxenic*).

Kata kunci: 16S rRNA; *Chromobacterium rhizoryzae*; Bakteri simbiosis.

PREFACE

Praise and gratitude are due to God Almighty, for by His grace and blessings the author was able to complete this undergraduate thesis entitled “Molecular Identification of Symbiotic Bacteria Associated with the Entomopathogenic Nematode *Heterorhabditis* sp.”. This thesis was prepared to fulfill the academic requirements of the Agrotechnology Study Program, Faculty of Agriculture, Universitas Pembangunan Nasional “Veteran” Jawa Timur.

This research represents an effort to gain a deeper understanding of symbiotic bacteria that play a crucial role in the effectiveness of the entomopathogenic nematode *Heterorhabditis* sp. as a biological control agent. Through exploratory methods and molecular identification, this study is expected to contribute scientifically to the development of environmentally friendly pest management strategies.

The author welcomes constructive criticism and suggestions as valuable input for evaluation and improvement in future research. It is also hoped that this thesis will receive positive responses from the supervisors and examiners and provide useful information for readers and other parties who require references related to this study.

Surabaya, February 4th 2026

Author

William Fernando Simanjuntak

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