Online library database from national center for information on biotechnology (NCBI) regarding *Ganoderma boninense*

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Abstract. *Ganoderma boninense* now becomes a trending topic to researchers, and it spreads through the roots and usually the oil palm tree will basal stem rot cause harm the plantation. The National Center for Biotechnology Information (NCBI) online available overall suite of online resources can be accessed for biological information the data, including the PubMed database and additional NCBI resources, focus on literature, health, genomes, genes, proteins, and chemicals regarding *G. Boninense* and can prevent intention of Ganoderma pathogenic diseases for the health of sustainable oil palm plants. *G. boninense* pathogens have 28 books and reports, 10 online books, collection of journals and others in the NLM, 62 scientific and medical abstracts or citation and 65 articles. This information can be used in biotechnology research which contains explanations about pathological diseases, including prevention and early detection for *G. boninense* worldwide. Moreover, 162 nucleotide DNA and RNA sequences have reported.

1. Introduction

*Ganoderma boninense* is a fungal pathogen which on average attacks palm oil plantations and causes of Basal Stem Rot (BSR) which causes economic losses [1]. The BSR development was indicated fungi around the roots of asymptomatic plant stages, furthermore yellowing leaves indicated exhaustion of lowes the biotrophic interaction of the pathogen will gradually cause necrosis of the parent plant so that the whole plant becomes infected, and the leaves and stems will become frail and then the tree will cause death [2]. Still with no known remedy at present to *G. boninense* now and becomes a trending topic to researcher [3]. Bioinformatics plays an essential role in plant pathology with regards to the development of new pathogen diagnostic tools and disease management in plant [4]. The National Center for Biotechnology Information (NCBI) online available overall suite of online resources can be accessed for biological information the data, including the PubMed database and additional NCBI resources, focus on literature, health, genomes, genes, proteins, and chemicals regarding *G. Boninense* and can prevent intention of Ganoderma pathogenic diseases for the health of sustainable oil palm plants. The biological information data, including the PubMed database [5].
This study aims to present information online about the biological of *G. boninense* pathogen to open mind insight in biotechnology researchers for information diseases known from several plants attacked by Ganoderma pathogens. Early identification of the pathogen Ganoderma is the one step even though there is currently no specific method that can stop the spread disease. NCBI online provides biological information including infection mode and infection of *G. boninense* and proposed various types of methods for detection that have been carried out by previous researchers. PubMed Central through the journal illustrates several possible ways to control BSR disease [6]. The output can contribute significantly to maintaining the health of oil palm plants.

2. Materials and method
The literature, health, genomes, genes, protein and chemical properties of *Ganoderma boninense* was performed using NCBI databases (GQuery) (www.ncbi.nlm.nih.gov). The calculated factors define the Bookshelf, NLM Catalog, PubMed, PubMed Central, OMIM, PubMed health, Assembly, BioProject, BioSample, Genome, Nucleotide, SRA, Taxonomy, PopSet, Identical Protein Groups, Protein, PubChem BioAssay, PubChem Compound, PubChem Substance.

3. Results and Discussion
The NCBI literature online is providing national online libraries and free access information of bookshelf, NLM catalog reported, Pubmed and PubMed Central documentation in the pathogens. *Ganoderma boninense* pathogens have 28 books and reports, 10 Books includes the journals collections and over in the NLM, 62 scientific and abstracts or citations, 65 full-text journal articles can be read (Table 1). The PubMed database contains citations from experiment biomolecular *Ganoderma boninense*, many links to detection and control *G. Boninense* full-text articles open access.

![Table 1](image)

| Literature       | Number | Description                        |
|------------------|--------|------------------------------------|
| Bookshelf        | 28     | Books and reports                  |
| NLM Catalog      | 10     | Books, journals and more in the NLM Collections |
| PubMed           | 65     | Scientific and medical abstracts/citations |
| PubMed Central   | 79     | Full-text journal articles         |

Information on pathology, including how to prevent and detect G. Boninense for the pathway of spread and handling (Table 2). Online Mendelian Inheritance in Man (OMIM) offers assistance to researchers in the compound relationship between genes and Ganoderma, thoroughly reported and knowing of the main full characteristics of collected Ganoderma [7].

The NCBI resource for *G. boninense* organizes information on genomes including 2 assemblies, 6 biological projects providing data, 5 descriptions of biological source materials and 1 genome sequencing project. *G. Boninense* has 162 nucleotides, DNA and RNA sequences have been reported (Table 3). On the other hand, also available taxonomic classification and nomenclature of fungi.

FASTA base sequences for genomes can be downloaded on the GFF menu, currently available in 2 genomes in GenBank BLAST from NCBI for *G. boninense*. Pop sequence genes sets have six from phylogenetic and population studies (Table 3). Furthermore, BLAST program optimized to search specialized datasets search to *G. boninenses* strain NJ3 in the database of NCBI have been reported [8].

![Table 2](image)

| Health          | Number | Description                                   |
|-----------------|--------|----------------------------------------------|
| OMIM            | 3      | online mendelian inheritance in man          |
| PubMed Health   | 5      | clinical effectiveness, disease, and drug reports |
Table 3. Genomes source NCBI database for *Ganoderma boninense*

| Genomes  | Number | Description                                |
|----------|--------|--------------------------------------------|
| Assembly | 2      | genome assembly information                |
| BioProject | 6    | biological projects providing data to NCBI |
| BioSample | 5     | descriptions of biological source materials |
| Genome   | 1      | genome sequencing projects by the organism |
| Nucleotide | 162  | DNA and RNA sequences                      |
| SRA      | 3      | high-throughput DNA and RNA sequence read archive |
| Taxonomy | 1      | taxonomic classification and nomenclature catalog |

Table 4. Genes source NCBI database for *Ganoderma boninense*

| Genes  | Number | Description                                |
|--------|--------|--------------------------------------------|
| PopSet | 7      | sequence sets from phylogenetic and population studies |

Cyclophilins (CYP) are *peptidyl prolyl cis-trans isomerases* (PPIase) protein implicated in various cellular processes and the virulence factors in some pathogenic fungi include *G. boninense*, cDNA encoding CYP to enhance tolerance of oil palm against BSR have reported [9].

Table 5. Proteins source NCBI database for *Ganoderma boninense*

| Proteins  | Number | Description                                |
|-----------|--------|--------------------------------------------|
| Identical Protein Groups | 5      | protein sequences grouped by identity |
| Protein   | 23     | protein sequences                          |

Table 6. Chemicals source NCBI database for *Ganoderma boninense*

| Chemicals       | Number | Description                                |
|-----------------|--------|--------------------------------------------|
| PubChem BioAssay | 5      | bioactivity screening studies              |
| PubChem Compound | 3      | chemical information with structures, knowledge, and links |
| PubChem Substance | 53    | deposited substance and chemical information |

Antifungal chemical compounds that are capable of murder pathogens *G. boninense* are *Taxononins, Ophiopogonin C* and *Cyclopassiflosides, Elemicin, Neocnidilide, Gingerglycolipid* and *Apiole* have been reported [10]. Providing some of these compounds in plants can protect trees from attack by pathogens

4. Conclusions
The NCBI online describes various biological information including infection modes, prevention methods, *Ganoderma boninense* functional genes and explains various types of techniques for their detection. PubMed Central through journals experiment previously explained several possible molecular ways to control the pathogens. The output can contribute significantly to maintaining the health of plants loose of *G. boninense* disease.
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