

Antioxidant activity in endophytic fungi isolated from *Gynostemma pentaphyllum* Makino

SHANG Fei^{1,*}, WANG Chunlin^{1,2}, WANG Hui^{1,2}

¹College of Life Science and Technology, Longdong University, Qingyang 745000, Gansu

²College of Agriculture and Forestry, Longdong University, Qingyang 745000, Gansu

Abstract: *Gynostemma pentaphyllum* Makino is a well known edible and medicinal plant in oriental countries, its dominant active constituents are mainly Gypenosides(GP). Endophytic fungi with antioxidant activity were screened and identified from *Gynostemma pentaphyllum*, and *Gynostemma pentaphyllum* saponin (GP) was used as host. A total of 10 strains of endophytic fungi were isolated from the root of healthy, living, and symptomless tissues of *Gynostemma pentaphyllum* Makino. The extract from a strain (G4) showed antioxidant activity and had the same RF value in TLC, because the retention time of real *Gynostemma pentaphyllum* saponin (GP) and its extract was the same as that of natural *Gynostemma pentaphyllum* (GP) in HPLC. So the strain G4 of endophytic fungus appears to produce the same components as its host.

1 Introduction

Gynostemma pentaphyllum Makino is a well known edible and medicinal plant in oriental countries^[1-3], and is known as "Jiao-Gu-Lan" in China, "Cha-Satan" in Thailand, and "Amachazuru" in Japan^[4]. Recently, *Gynostemma pentaphyllum* Makino has attracted great attention owing to its anti-tumor activities^[5], immunomodulatory effect^[6], anti-gastric ulcer effect, treating hyperlipidemia, and anti-oxidant properties^[7], and has been described as having minimal toxicity^[7]. Therefore, the *G. pentaphyllum* green tea is presently promoted in China and is sold in Europe as an herbal tea which is "advantageous to one's health and beauty"^[8-9]. The presence of saponins and flavonoids in *G. pentaphyllum* as functional components is believed to be responsible for this health-enhancing effect. Because of the similarity in bioactive components to ginseng root, *G. pentaphyllum* was named as "second ginseng".

Endophytes are a kind of inadequately studied microorganisms, which are rich and reliable sources of biological activities and new chemical compounds, they have the potential to be developed in a variety of medical, agricultural and industrial fields. Fungal endophytes are also considered to be repositories of new secondary metabolites, some of which have beneficial biological activities. Recent studies have shown that fungal endophytes are ubiquitous in plant species^[10].

The aim of the present study is to select and identify endophytic fungus from *Gynostemma pentaphyllum* Makino which displays antioxidant activity and produces the same component of Gypenosides (GP) as their host.

2 Materials and methods

2.1 Collection of plant material

The materials were collected from the campus of Shaanxi Normal University, xi'an, Shaanxi, China in 2010 March. After plant selection, disease free parts of the roots were cut with the help of a sterile scalpel and placed in sterile plastic bags. All the samples were immediately brought to the laboratory for further process.

2.2 Isolation of endophytic fungi

Samples of fresh root of *Gynostemma pentaphyllum* Makino was thoroughly washed using distilled water, followed by 75% ethanol for 5 min and 2.5% sodium hypochlorite for 7 min to accomplish surface sterilization, then subsequently rinsed in sterile demineralized water. Small pieces of inner tissues were placed on potato dextrose agar (diced potatoes, 300g/l, dextrose,20g/l, agar,20g/l) supplemented with antibiotic streptomycin (50µg/ml) and penicillium (50µg/ml) in petri plates and incubated at 28°C until the fungal was grown out. The pure culture were obtained using routine microbiological methods and stored at 4°C.

2.3 Pretreatment of separated fungal fermentation broth

All the endophytic fungi were cultivated in 200ml PDB for 7d at 28°C, and each fermentation broths were centrifugalized at 5000r/min for 30min to separate

*angei526@163.com, *wangchunl2005@126.com, *hy0850@qq.com

Antioxidant Activity Of Endophytic Fungi Isolated From

SJ Ball



Antioxidant Activity Of Endophytic Fungi Isolated From:

The Enigmatic Realm of **Antioxidant Activity Of Endophytic Fungi Isolated From**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing in short supply of extraordinary. Within the captivating pages of **Antioxidant Activity Of Endophytic Fungi Isolated From** a literary masterpiece penned by way of a renowned author, readers attempt a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book's core themes, assess its distinct writing style, and delve into its lasting impact on the hearts and minds of people who partake in its reading experience.

https://db1.greenfirefarms.com/About/scholarship/default.aspx/top_ai_seo_tools_step_plan_for_students.pdf

Table of Contents Antioxidant Activity Of Endophytic Fungi Isolated From

1. Understanding the eBook Antioxidant Activity Of Endophytic Fungi Isolated From
 - The Rise of Digital Reading Antioxidant Activity Of Endophytic Fungi Isolated From
 - Advantages of eBooks Over Traditional Books
2. Identifying Antioxidant Activity Of Endophytic Fungi Isolated From
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Antioxidant Activity Of Endophytic Fungi Isolated From
 - User-Friendly Interface
4. Exploring eBook Recommendations from Antioxidant Activity Of Endophytic Fungi Isolated From
 - Personalized Recommendations

- Antioxidant Activity Of Endophytic Fungi Isolated From User Reviews and Ratings
- Antioxidant Activity Of Endophytic Fungi Isolated From and Bestseller Lists
- 5. Accessing Antioxidant Activity Of Endophytic Fungi Isolated From Free and Paid eBooks
 - Antioxidant Activity Of Endophytic Fungi Isolated From Public Domain eBooks
 - Antioxidant Activity Of Endophytic Fungi Isolated From eBook Subscription Services
 - Antioxidant Activity Of Endophytic Fungi Isolated From Budget-Friendly Options
- 6. Navigating Antioxidant Activity Of Endophytic Fungi Isolated From eBook Formats
 - ePub, PDF, MOBI, and More
 - Antioxidant Activity Of Endophytic Fungi Isolated From Compatibility with Devices
 - Antioxidant Activity Of Endophytic Fungi Isolated From Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Antioxidant Activity Of Endophytic Fungi Isolated From
 - Highlighting and Note-Taking Antioxidant Activity Of Endophytic Fungi Isolated From
 - Interactive Elements Antioxidant Activity Of Endophytic Fungi Isolated From
- 8. Staying Engaged with Antioxidant Activity Of Endophytic Fungi Isolated From
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Antioxidant Activity Of Endophytic Fungi Isolated From
- 9. Balancing eBooks and Physical Books Antioxidant Activity Of Endophytic Fungi Isolated From
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Antioxidant Activity Of Endophytic Fungi Isolated From
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Antioxidant Activity Of Endophytic Fungi Isolated From
 - Setting Reading Goals Antioxidant Activity Of Endophytic Fungi Isolated From
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Antioxidant Activity Of Endophytic Fungi Isolated From
 - Fact-Checking eBook Content of Antioxidant Activity Of Endophytic Fungi Isolated From

- Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

Antioxidant Activity Of Endophytic Fungi Isolated From Introduction

In today's digital age, the availability of Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals for download has revolutionized the way we access information. Gone are the days of physically flipping through pages and carrying heavy textbooks or manuals. With just a few clicks, we can now access a wealth of knowledge from the comfort of our own homes or on the go. This article will explore the advantages of Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals for download, along with some popular platforms that offer these resources. One of the significant advantages of Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals for download is the cost-saving aspect. Traditional books and manuals can be costly, especially if you need to purchase several of them for educational or professional purposes. By accessing Antioxidant Activity Of Endophytic Fungi Isolated From versions, you eliminate the need to spend money on physical copies. This not only saves you money but also reduces the environmental impact associated with book production and transportation. Furthermore, Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals for download are incredibly convenient. With just a computer or smartphone and an internet connection, you can access a vast library of resources on any subject imaginable. Whether you're a student looking for textbooks, a professional seeking industry-specific manuals, or someone interested in self-improvement, these digital resources provide an efficient and accessible means of acquiring knowledge. Moreover, PDF books and manuals offer a range of benefits compared to other digital formats. PDF files are designed to retain their formatting regardless of the device used to open them. This ensures that the content appears exactly as intended by the author, with no loss of formatting or missing graphics. Additionally, PDF files can be easily annotated, bookmarked, and searched for specific terms, making them highly practical for studying or referencing. When it comes to accessing Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals, several platforms offer an extensive collection of resources. One such platform is Project Gutenberg, a nonprofit organization that provides over 60,000 free eBooks. These books are primarily in the public domain, meaning they can be freely distributed and downloaded. Project Gutenberg offers a wide range of classic literature, making it an excellent resource for literature

enthusiasts. Another popular platform for Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals is Open Library. Open Library is an initiative of the Internet Archive, a non-profit organization dedicated to digitizing cultural artifacts and making them accessible to the public. Open Library hosts millions of books, including both public domain works and contemporary titles. It also allows users to borrow digital copies of certain books for a limited period, similar to a library lending system. Additionally, many universities and educational institutions have their own digital libraries that provide free access to PDF books and manuals. These libraries often offer academic texts, research papers, and technical manuals, making them invaluable resources for students and researchers. Some notable examples include MIT OpenCourseWare, which offers free access to course materials from the Massachusetts Institute of Technology, and the Digital Public Library of America, which provides a vast collection of digitized books and historical documents. In conclusion, Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals for download have transformed the way we access information. They provide a cost-effective and convenient means of acquiring knowledge, offering the ability to access a vast library of resources at our fingertips. With platforms like Project Gutenberg, Open Library, and various digital libraries offered by educational institutions, we have access to an ever-expanding collection of books and manuals. Whether for educational, professional, or personal purposes, these digital resources serve as valuable tools for continuous learning and self-improvement. So why not take advantage of the vast world of Antioxidant Activity Of Endophytic Fungi Isolated From books and manuals for download and embark on your journey of knowledge?

FAQs About Antioxidant Activity Of Endophytic Fungi Isolated From Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer webbased readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Antioxidant Activity Of Endophytic Fungi Isolated From is one of the best book in our library for free trial. We provide copy of Antioxidant Activity Of Endophytic Fungi Isolated From in digital format, so the resources that you find are reliable. There are also many Ebooks of related with

Antioxidant Activity Of Endophytic Fungi Isolated From. Where to download Antioxidant Activity Of Endophytic Fungi Isolated From online for free? Are you looking for Antioxidant Activity Of Endophytic Fungi Isolated From PDF? This is definitely going to save you time and cash in something you should think about. If you trying to find then search around for online. Without a doubt there are numerous these available and many of them have the freedom. However without doubt you receive whatever you purchase. An alternate way to get ideas is always to check another Antioxidant Activity Of Endophytic Fungi Isolated From. This method for see exactly what may be included and adopt these ideas to your book. This site will almost certainly help you save time and effort, money and stress. If you are looking for free books then you really should consider finding to assist you try this. Several of Antioxidant Activity Of Endophytic Fungi Isolated From are for sale to free while some are payable. If you arent sure if the books you would like to download works with for usage along with your computer, it is possible to download free trials. The free guides make it easy for someone to free access online library for download books to your device. You can get free download on free trial for lots of books categories. Our library is the biggest of these that have literally hundreds of thousands of different products categories represented. You will also see that there are specific sites catered to different product types or categories, brands or niches related with Antioxidant Activity Of Endophytic Fungi Isolated From. So depending on what exactly you are searching, you will be able to choose e books to suit your own need. Need to access completely for Campbell Biology Seventh Edition book? Access Ebook without any digging. And by having access to our ebook online or by storing it on your computer, you have convenient answers with Antioxidant Activity Of Endophytic Fungi Isolated From To get started finding Antioxidant Activity Of Endophytic Fungi Isolated From, you are right to find our website which has a comprehensive collection of books online. Our library is the biggest of these that have literally hundreds of thousands of different products represented. You will also see that there are specific sites catered to different categories or niches related with Antioxidant Activity Of Endophytic Fungi Isolated From So depending on what exactly you are searching, you will be able to choose ebook to suit your own need. Thank you for reading Antioxidant Activity Of Endophytic Fungi Isolated From. Maybe you have knowledge that, people have search numerous times for their favorite readings like this Antioxidant Activity Of Endophytic Fungi Isolated From, but end up in harmful downloads. Rather than reading a good book with a cup of coffee in the afternoon, instead they juggled with some harmful bugs inside their laptop. Antioxidant Activity Of Endophytic Fungi Isolated From is available in our book collection an online access to it is set as public so you can download it instantly. Our digital library spans in multiple locations, allowing you to get the most less latency time to download any of our books like this one. Merely said, Antioxidant Activity Of Endophytic Fungi Isolated From is universally compatible with any devices to read.

Find Antioxidant Activity Of Endophytic Fungi Isolated From :

[top ai seo tools step plan for students](#)

[how to start budgeting tips tips for experts](#)

[how to start home workout for students for experts 883](#)

[top index fund investing guide for beginners 931](#)

[beginner friendly capsule wardrobe tips for students 704](#)

[what is anti inflammatory diet tips for experts](#)

[top sleep hygiene tips for moms for creators 263](#)

[best way to budgeting tips usa for creators 874](#)

[top ai video generator for small business for students](#)

[top matcha health benefits for moms for creators 706](#)

[how to digital nomad visa explained for creators 911](#)

[ultimate home workout for students for students 458](#)

[top method for ai video generator step plan for beginners](#)

[trending ai seo tools explained for students 871](#)

[beginner friendly home workout for beginners for creators 777](#)

Antioxidant Activity Of Endophytic Fungi Isolated From :

A Course in Phonetics - Answers | PDF Answers to exercises in A Course in Phonetics. Chapter 1. A: (1) 1: upper lip. 2: (upper) teeth 3: alveolar ridge 34800259-a-course-in-phonetics-Answers.pdf - Answers to... Answers to exercises in A Course in Phonetics Chapter 1 A: (1) 1: upper lip ... Key is 6|3 = 63. Report values for Leaf column in increasing order and do not ... Answers to exercises in A Course in Phonetics. Chapter 1 Answers to exercises in A Course in Phonetics ; Chapter 1 ; (1) 1: upper lip ; 2: (upper) teeth ; 3: alveolar ridge. Chapter 2: Exercise J Chapter 2: Exercise J. Read the following passages in phonetic transcription. The first, which represents a form of British English of the kind spoken by ... A course in phonetics ladefoged 7th edition pdf answer key Dr. Johnson's research and teaching on acoustic phonetics and psycholinguistics is widely recognized. personal financial planning gitman Answers to exercises in ... Answer Key for Phonetics Exercises.docx View Answer Key for Phonetics Exercises.docx from LINGUISTIC 249 at Ivy Tech Community College, Indianapolis. Answer Key for Chapter 2 Phonetics Exercises ... Course in Phonetics Performance Exercise A Chapter 5. British English. American English. Untitled Document <http://hctv.humnet.ucla.edu/departments/> ... Phonetics Exercise Answers English Language Esl

Learning Nov 29, 2023 — RELATED TO PHONETICS EXERCISE. ANSWERS ENGLISH LANGUAGE ESL. LEARNING FOR ALL AGES AND. READING LEVELS. • Go Math Answer Key • Herbalism Guide ... Phonetics Exercises—Answers, P. 1 Answer the following questions. a). What voiced consonant has the same place of articulation as [t] and the same manner of articulation as [f]? ... Elements of Literature: Student Edition Sixth Course Our resource for Elements of Literature: Student Edition Sixth Course includes answers to chapter exercises, as well as detailed information to walk you through ... Elements of Language: Sixth Course - 1st Edition Our resource for Elements of Language: Sixth Course includes answers to chapter exercises, as well as detailed information to walk you through the process step ... Reading free Holt reader sixth course answers (Read Only) Mar 23, 2023 — Reading free Holt reader sixth course answers. (Read Only). Page 2. holt reader sixth course answers. 2023-03-23. 2/2 holt reader sixth course. Holt Elements of Literature - Holt Reading Solutions Holt Reading Solutions provides the answers. This book provides tools for diagnosing and targeting skills deficiencies as well as lesson plans for managing the ... HOLT Vocabulary Workshop Sixth Course Answer Key Free ELA resources for PreK-12. Lessons, quizzes, worksheets, and more on grammar, phonics, literature, writing, and reading. Visit elafree.com now! Language & Sentence Skills Practice Answer Key 6th ... Textbook and beyond Language & Sentence Skills Practice Answer Key 6th Course (P) [0030665035] - 2002 Holt Literature & Language Arts / Holt Handbook Sixth ... Holt Elements of Literature: The Holt Reader, Adapted ... Jan 1, 2009 — Elements of The Holt Reader, Adapted Version, Teacher's Guide and Answer Key, Third through Sixth Course, 2009 (Paperback). 152 pages ... Holt Elements of Literature: The Holt... by G. Kyle Beers Holt Elements of Literature: The Holt Reader Teacher's Guide and Answer Key, Course 3-6 ; Language. English ; Publisher. HOLT, RINEHART AND WINSTON ; Publication ... Holt Elements Of Literature Courses 3 6 Adapted Reader ... Holt Elements Of Literature Courses 3 6 Adapted Reader Answer Key Grades 9 12 ... The Holt Reader Adapted Version, Sixth Course Holt Rinehart & Winston. Holt ... Grammar, Usage, and Mechanics: Language Skills Practice 1a. Page 9. GRAMMAR. 2. ELEMENTS OF LANGUAGE. Sixth Course. Copyright © by Holt ... answers very neatly. [The adverb very modifies the adverb neatly, telling to ... Chapter 16.12 - PLUMBING CODE | Chanute, KS The Uniform Plumbing Code, 1985 Edition, a standard adopted by the International Association of Plumbing and Mechanical Officials, is adopted by reference, ... Uniform Plumbing Code 1985 Edition International ... Uniform Plumbing Code 1985 Edition International Association Of Plumbing And... ; Publication Year. 1985 ; Language. English ; Accurate description. 5.0. Uniform Plumbing Code 1985. First Printing Paperback Uniform Plumbing Code 1985. First Printing Paperback ; Publication Year. 1985 ; Type. Building Code ; Accurate description. 4.9 ; Reasonable shipping cost. 4.8. Ubc 1985 | PDF | Building Code | Wall UNIFORM. BUILDING CODE. 1985 Edition Third Printing. Publication Date: May 1, 1985 ... Uniform Building, Mechanical and Plumbing Codes and the National ... Uniform Plumbing Code book by International Association ... Buy a cheap copy of Uniform Plumbing Code book by International Association of Plumbing and Mechanical Officials. Free Shipping on all orders over \$15. 1985 Uniform

Building Code (Download) - ICC Store Feb 14, 2014 — Provides certain minimum standards, provisions and requirements for safe and stable design, methods of construction and uses of materials in ... Uniform building code: 1985 edition - Plumbing Title, Uniform building code: 1985 edition. Author, International Association of Plumbing and Mechanical Officials. Publisher, IAPMO Publications. 1985 Uniform Administrative Code (Download) - ICC Store Feb 9, 2014 — 1985 Uniform Administrative Code (Download). Item #: 8950P550. Price: \$49.00. Volume Discount. Quantity, Price. Uniform Plumbing Code Other editions - View all · Uniform Plumbing Code · International Association of Plumbing and Mechanical Officials Snippet view - 1985. Uniform Plumbing Code