P3-49

나노 입자화를 통한 Thiamine Di-lauryl Sulfate (TDS)의 잘록병균 *Rhizoctonia solani*에 대한 항진균 활성

강원대학교 생물소재공학과 : 서용창, 최운용, 김지선, 이춘근, 송치호, 이현용
두산에코비즈넷 : 조정섭, 임태빈
강원대학교 식품생명공학과 : 윤원병

Antifungal Activity of Nano-encapsulated Thiamine Di-lauryl Sulfate (TDS) against *Rhizoctonia solani* Damping-off

[1]Department of Biomaterials Engineering, Kangwon National University, Chuncheon 200-701, Korea
[2]DooSan EcoBizNet, Chuncheon 200-161, Korea
[3]Department of Food Science and Biotechnology, Kangwon National University, Chuncheon 200-701, Korea
Yong Chang Seo[1], Woon Yong Choi[1], Ji Seon Kim[1], Choon Geun Lee[1], Chi Ho Song[1], Jeong Sub Cho[2], Tae Bin Yim[2], Won Byung Yoon[3], Hyeon Yong Lee[1]*

실험목적 (Objectives)

TDS has antifungal activities, but was not well distributed in water solution due to its low stability even though it was down sized to a nanopaticle of 200 nm diameter. Therefore, in this study, TDS was encapsulated by an edible polymer, gelatin to improve its dispersion in water solution as well antifungal activity against *Rhizoctoniasolani*.

재료 및 방법 (Materials and Methods)

First, 25 mg of gelatin was dissolved with a small amount of water in a 50 mL round bottom flask and the solvent was evaporated at room temperature using a rotary evaporator to produce a dried thin gelatin film. Next, TDS solution of 100 ppm added to the gelatin film and dispersed by ultrasonication at 500 W for 2 h. The condition of the ultrasonication was fixed at 25 ℃, 7:4 sec pulse to break interval, and 32% amplitude. To determine the size and size distribution of TDS nanopaticle, DLS measurements were performed. Antifungal activity was measured by method of Ko (Ko *et al.,* 2009). In order to measured antifungal activity, we performed inhibitory hypha growth of *Rhizoctonia solani*.

실험결과 (Results)

Encapsulated TDS showed as 76% of encapsulation efficiency with 150~200 ㎚ of average diameter, which is relatively good yield for insoluble biomaterials. Antifungal activity was also measured as inhibitory hypha growth of Rhizoctonia solani : 100 ppm of TDS nanoparticles showed 57% higher growth inhibition than the case of 22% inadding 100 ppm of the TDS solution. It was found that TDS nanoparticle were well dispersed in water solution and easily attached to the cell membrane, then well penetrated into the cell membranes. There results improve the antifungal activities against Rhizoctonia solani, indicating that TDS can be effectively used as a bio-pesticide by being properly nano encapsulated with edible polymers.

주저자 연락처 (Corresponding author) : 이현용 E-mail : hyeonl@kangwon.ac.kr Tel : 033-256-4819

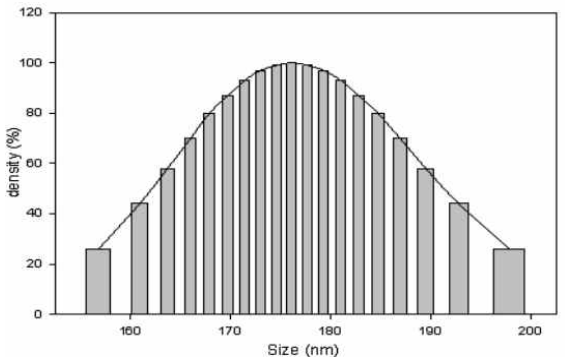

Fig. 1. Distribution of TDS nanoparticle by dynamic light scattering (DLS)

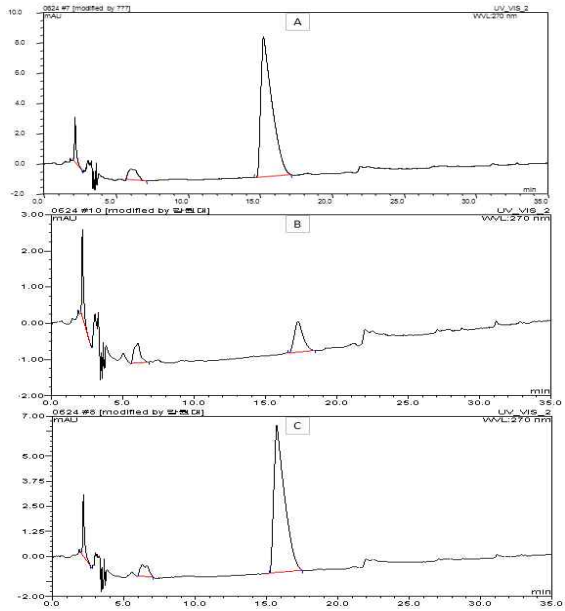

Fig. 2. Comparison of HPLC analysis of TDS concentrations in TDS solution and nanoparticles.

A : TDS solution

B : TDS nanoparticle solution after being filtered

C : TDS cocentrations in the nanoparticles

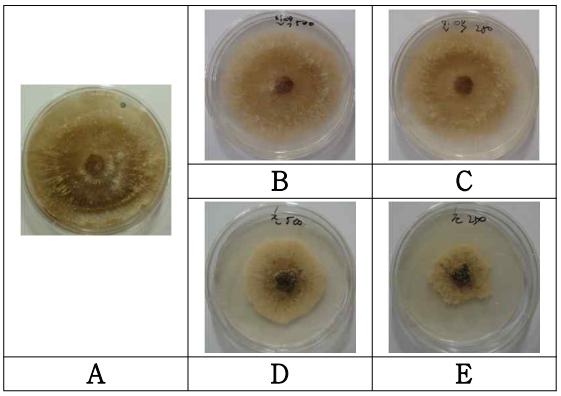

Fig. 3. Comparison of antifungal activity in same volume (20 ㎖) of TDS solution and TDS nano particles for two different concentrations.

A : Negative control (no treatment)

B : TDS solution 50 ppm

C : TDS solution 100 ppm

D : TDS nanoparticle solution 50 ppm

E : TDS nanoparticle solution 100 ppm

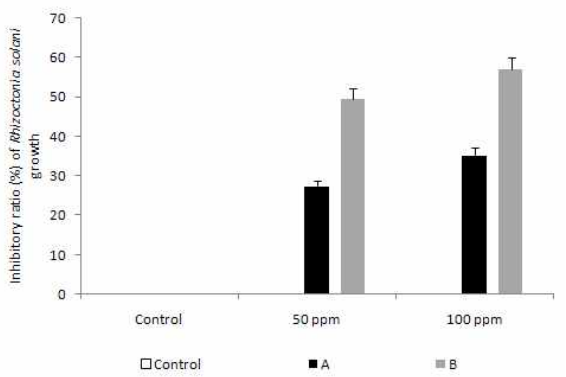

Fig. 4. Comparison of growth inhibition of *Rhizoctonia solani* in adding different concentrations of TDS and TDS nanopaticles.

Control : Negative control (no treatment)

A : TDS solutions.

B : TDS nanoparticle solutions.