

# Ultrasonic-assisted extraction increases the antioxidant and antibacterial capabilities of ciplukan (*Physalis angulata*) extract

Ade Chandra Iwansyah<sup>1</sup>, Rihuh Wardhani<sup>1,2</sup>, Cici Darsih<sup>1</sup>, Taufik Kurniawan<sup>1</sup>, Raden Cecep Erwan Ardiansyah<sup>1</sup>, Yusuf Andriana<sup>1</sup>, Rohmah Luthfiyanti<sup>3a</sup>, Siti Nuurul Huda Mohammad Azmin<sup>4</sup>, Mohd Shukri Mat Nor<sup>5</sup>

<sup>1</sup>Research Center for Food Technology and Processing, National Research and Innovation Agency, Indonesia. Jl. Jogja-Wonosari km 31,5 Playen Kab. Gunungkidul 55861, Yogyakarta, Indonesia

<sup>2</sup>Department of Biology, Faculty of Mathematics and Natural Sciences, Hasanuddin University, Jl. Perintis Kemerdekaan km 10 Kec Tamalanrea Indah, Tamalanrea 90245, Makassar, Sulawesi Selatan

<sup>3</sup>Research Center for Agro-industrial, National Research and Innovation Agency, Jl. Puspiptek. -. Kec. Setu, Tangerang Selatan, 15314, Prov. Banten, Indonesia

<sup>4</sup>Faculty of Agro-Based Industry, Universiti Malaysia Kelantan Jeli Campus, Locked Bag 100, 17600 Jeli Kelantan, Malaysia.

<sup>5</sup>Jeli Agricultural Technology (DC0008911-T), PT7458 Kampung Gemang Baru, 17700 Ayer Lanas, Jeli Kelantan, Malaysia.

<sup>a</sup>Corresponding email: [adec001@brin.go.id](mailto:adec001@brin.go.id)

**Abstract.** Ciplukan (*Physalis angulata*) is a member of the Solanaceae family that is particularly well-known for its antibacterial and antioxidant properties. Ciplukan fruit is known to contain various bioactive compounds that can inhibit the growth of pathogenic bacteria and have radical scavenging activity. This study aims to determine effect of ultrasonic-assisted extraction to antioxidant and antibacterial capabilities of ciplukan extract. This research was conducted using ciplukan extract obtained from ultrasonic treatment (P0= maceration 24 hrs, P1= 30 mins, P2= 60 mins, and P3= 120 mins). The ciplukan extract was then analyzed for the total phenolic, flavonoid, and antioxidant activity using DPPH (2,2'-diphenylpicryl hydrazyl), followed by an analysis of antibacterial activity using the agar diffusion method. The results showed that the ultrasonic-assisted extraction treatment significantly affected total phenolic contents, flavonoids, and antioxidant activity ( $p < 0.05$ ). The highest total phenolic content, flavonoid content, and antioxidant activity ( $IC_{50}$ ) obtained from the two-hour ultrasonic treatment (P3) were 176.62 mg GAE/g, 121.33 mg QE/g, and 50.80  $\mu$ g/mL, respectively. The potential antibacterial activity of ciplukan extract was also evaluated in inhibiting the growth of gram-positive and gram-negative pathogenic bacteria. P3 treatment can determine inhibition zones of 12.5 mm and 13 mm, respectively, in *Staphylococcus aureus* and *Salmonella thypi*. These results indicate the antioxidant and antibacterial capabilities of ciplukan extract obtained from the physical extraction process using ultrasonic.

**Keywords:** antioxidant, antibacterial, ciplukan, *Physalis angulata*, ultrasonic-assisted extraction