Jurnal Pertanian Tropik ISSN NO: 2356- 4725/p- ISSN : 2655-7576
Vol.7.No.3. 2020 (43) 312-316 DOI: 10.32734/jpt.v7i3, Dec.4998

Primary Metabolite Qualitative Test of Bintaro Plant (*Carbera odollam Gaertn*) as A Pest Biopesticide Rattus Argentiventer

Uji Kualitatif Metabolit Utama Tanaman Bintaro (*Cerbera odollam Gaertn*) sebagai Biopestisida Hama Rattus Argentiventer

Rini Susanti*, Risnawati, Wiznie Fadhillah

Agrotechnology Study Program, Muhammadiyah University of North Sumatera, Medan, Indonesia Jl. Captain Mukhtar Basri No. 3, Glugur Darat II, East Medan, Medan City, North Sumatera 20238, Indonesia.

**Corresponding author*: rinisusanti@umsu.ac.id

ABSTRACT

Bintaro is a plant that contains poison in all parts of the plant. Cardiac glycoside compounds contained in Bintaro plants can be used as biopesticides to repel rats. Rat pests are one of the important pests in rice plants that are difficult to control, so rice production always decreases. Therefore it is necessary to look for an effective, efficient and environmentally friendly control technology, namely by using Bintaro plant extracts which are able to become biopesticides to repel rat pests. The purpose of this study was to determine the primary compound of the Bintaro plant (CarberaodollamGaertn) which acts as a repellent for thepest Ratusargiventer. The method used in this research is qualitative testing using phenol method to test the content of primary metabolites in the leaves and stems of Bintaro plants. From the results of the research conducted, it was found that the qualitative levels of primary metabolites from Bintaro leaves and stems contained protein content. Fat and carbohydrate content.

Keywords: *Bintaro, primary metabolites content, Rattus argentiventer*

ABSTRAK

Bintaro merupakan tumbuhan yang mengandung racun di seluruh bagian tumbuhan. Senyawa glikosida jantung yang terkandung dalam tanaman Bintaro dapat digunakan sebagai biopestisida untuk mengusir tikus. Hama tikus merupakan salah satu hama penting pada tanaman padi yang sulit dikendalikan sehingga produksi padi selalu menurun. Oleh karena itu perlu dicari suatu teknologi pengendalian yang efektif, efisien, dan ramah lingkungan yaitu dengan memanfaatkan ekstrak tumbuhan bintaro yang mampu menjadi biopestisida untuk mengusir hama tikus. Tujuan penelitian ini adalah untuk mengetahui senyawa primer tumbuhan Bintaro (*Carberaodollam gaertn*) yang berperan sebagai pengusir hama *Ratus argiventer*. Metode yang digunakan dalam penelitian ini adalah pengujian kualitatif dengan metode fenol untuk menguji kandungan metabolit primer pada daun dan batang tanaman Bintaro. Dari hasil penelitian yang dilakukan didapatkan bahwa secara kualitatif kadar metabolit primer dari daun dan batang Bintaro mengandung kandungan protein. Kandungan lemak dan karbohidrat.

Kata kunci: Bintaro, kandungan metabolit primer, Rattus argentiventer

INTRODUCTION

Bintaro plant *Cerbera odollam* Gaerthn. It is one of the mangrove plants that can grow on soils that are less nutritious and spread in almost all parts of Indonesia. Bintaro plants can grow up to 12 meters with oval green fruit 5–10 cm in diameter. (Top Tropicals, 2010). Local names for Bintaro include: Buta Badak, Sea Mango, Octopus Wood, White Kanyeri (Bali), Bilutation (NTT), Wabo (Ambon), Goro Goro Guwae (Ternate), Madang kapo (minangkabau),

Bintan (Malay), Lambuto (Makassar), Goro-goro (Manado) (Rismawati, 2011).

Bintaro plants are used as reforestation plants and dry flower crafts because Bintaro is known to have poison in all parts of the plant so that it is not widely used by the community and its economic value is still low (Rohimatun and Suriati, 2011).

Chemical compounds contained in Bintaro extract contain compounds that have an inhibitory effect on the development of rat pests. The leaves, fruit and bark of the Bintaro plant contain saponins, the leaves and fruit contain polyphenols which are known to be very toxic to mice (Apriantono *et al.*, 1988)

In Asian society, especially Indonesia, Bintaro fruit is widely used as a rat pest repellent. So far, the handling of rat pests has been carried out using commercially available rodenticides. In view of the many dangers posed by rodenticides which have an anticoagulant base, alternative ways of controlling rat pests were developed. One of the alternative ways to control rat pests is to utilize the content of one of the characteristics of Bintaro fruit. The toxic content of cardiac glycoside compounds contained in Bintaro fruit seeds can be used as a rat repellent (Kudduset *al.*2001).

Primary metabolism modifies and synthesizes carbohydrates, fats and proteins. Primary metabolites play a role in the process of photosynthesis and plant respiration (Anurag *et al.*, 2015).

This research was conducted to determine the levels of primary metabolites from Bintaro plants which can function as biopesticides.

RESEARCH METHODOLOGY

The research was conducted in the laboratory of the Faculty of Agriculture, Muhammadiyah University of North Sumatra, Medan.

The materials used in this study were Bintaro plants (leaves and stems), alcohol, methanol, aquades, and others that support the research.

The tools used in this study were beaker glass, test tube, spatula, Erlenmeyer flask, stopwatch, calculator, writing instruments and others that support this research.

Qualitative test of primary metabolites

Sample Preparation

The samples used in this study were the leaves and stems of Bintaro. A total of 100 grams were cut into small pieces. Then dried using an oven at 60^{o}C for 6 hours.

Preparation of standard glucose solution

A total of 0.1 g of glucose powder was weighed and then put into a 100 mL flask. A total of 10 mL of glucose stock solution was taken using a pipette then put into a 100 mLmeasuring flask and diluted to the limit mark.The glucose standard solution was made with the concentrations of 0, 10, 20, 30, 40, 50 ppm by piping out the glucose standard solution as much as 0, 5, 10, 15, 20 mL then put into a 50 mL measuring flask and diluted to the marking area. The next step was measuring the absorbance with a spectrophotometer at a wavelength of 490 nm, then making its linear equation as standard curve (Bintang, 2010).

Determination of carbohydrates (Phenol Method)

Ten grams of Bintaro plant samples (stems and leaves) were weighed, then furnaced for 5 hours. 1 gram of sample ash was taken and dissolved in 10 mL concentrated HNO3,then filtered in a 10 mL

measuring flask. Then, the filtrate diluted with distilled water to mark the boundaries. Furthermore, 1 mL was taken and then added 1 mL of phenol 1% and 6 mL of sulfuric acid and 2 mL of distilled water. The mixture was allowed to stand at room temperature and then its absorption was measured at a wavelength of 490 nm.The treatment was repeated twice (*duplo*)

Determination of Protein (Kjeldhal Method)

A total of 1 gram sample was weighed, then put into a kjeldahl flask, added 1 tablet kjeldhal. Then 10 mL of concentrated sulfuric acid solution was added and all the ingredients were digested (heated) in the Kjeldahl flask until it boiled anddissolved and the liquid turned clear. 75 mL of distilled water was diluted and cooled to room temperature. 10 mL of the filtrate was taken to determine the total nitrogen content and determined using a spectrodirect at a wavelength of 410 nm. The treatment was repeated twice (*duplo*).

RESULTS AND DISCUSSION

Primary Metabolites

From the research, it was found that the primary metabolite content in Bintaro plants, can be seen in the table below

. Primary metabolite content

No	Sample	Fat content (%)	Protein (%)	Carbohydrate (%)
1	Bintaro leaf	14.60	0.024	3.21
2	Bintaro stems	12.80	0.013	3.54

Based on the data from the table, it can be seen that the content of primary metabolites inleaves has the highest fat content, namely 14.60% compared on bintaro stem 12.80%. In Bintaro stems the carbohydrate content is 3.54% higher than Bintaro stems by 3.21%. Primary metabolites are usually used to synthesize glucose through the process of photosynthesis to produce energy for plants (Anurag *et al.*, 2015).

The characteristics of living organisms vary greatly, the pathways for modifying and synthesizing carbohydrates, proteins, fats and nucleic acids are basically the same in all organisms. These processes represent the fundamental unity of all living matter, and are collectively described as the primary metabolism. The compounds involved in the pathway are called primary metabolites (Kuratul et al 2014). Hence, degradation of carbohydrates and sugars generally occurs via well-marked pathways known as glycolysis and the Krebs / citric / tricarboxylic acid cycle, which releases energy from organic compounds via oxidation reactions. The oxidation of fatty acids from fats in a sequence called β-oxidation also produces energy. Aerobic organisms are able to optimize this process by adding to the next process, namely oxidative phosphorylation. This process increases the efficiency of the oxidation by combining a more general process applicable to the oxidation of various substrates than having to provide a specific process for each substrate.

According to Utami (2010) The Cerberin content is poisonous in the Bintaro plant. The seeds and leaves of *Cerbera manghas* L. are known to contain toxic compounds. All parts of the tree contain cerberin poison, a toxic substance in Bintaro fruit and seeds, namely cerberin. Cerberin is an alkaloid / glycosie group that is thought to play an important role in disruption of the work function of the central nervous system in mice. Cerberin causes the medulla in the brain to be damaged, thus causing disruption of the work of the heart and respiration (Prayuda 2014).

Some of the dominant fatty acid compounds contained in Bintaro fruit seeds are long chain compounds such as palmitic and oleic acids which have not been shown to have good antibacterial activity. However, it is suspected that the cerberin content and other ingredients in the seeds can be extracted using hexane solvent and have antibacterial activity although it is lower than the treatment of Bintaro fruit pulp extract with ethyl acetate solvent (Handoko *et al.*, 2012).

Bintaro plants contain lots of oil so that the oil sticks to the body of the larva and causes the larval spiracles to become clogged. Plant extracts that can inhibit or refuse to eat means that the extract contains anti-food or antifedant substances. Bintaro leaf extract is able to inhibit the feeding activity of the larvae of the order Lepidoptera. Besides being able to inhibit the activity of eating, Bintaro leaf extract is also able to inhibit spawning, inhibits the growth and development of insects and can cause death effects (Aldywaridha, 2010)

CONCLUSION

From the qualitative test results of primary metabolites from the leaves and stems of Bintaro plant, it was found that carbohydrates on Bintaro leaves were 3.21%, protein was 0.024% and fat content was 14.60% while on Bintaro stems carbohydrates were 3.54%, protein 0.013% and fat content 12.80%

REFERENCES

Anurag, K., Irchaiya, R., Yadaf, A., Gupta, N., Kumar, S., Prakash, A., and Gurjar, H. (2015). Metabolites in plants and its classification. World Journal of Pharmacy and Pharmaceutical Sciences, 4(1), 287-305

Aldywaridha. 2010. Uji efektivitas insektisida botani terhadap hama Maruca testulalis (Geyer) (Lepidoptera; Pyralidae) pada tanaman kacang panjang (Vigna sinensis). Jurnal Ilmiah Abadi, 3(2): 449-458

Apriantono, A., Dedi, F., Puspitasari, N., Sedarmawati & Slamet, B. (1988). *Analisis pangan.* Bandung: ITB.

Bintang, M. 2010 Biokimia Teknik Penelitian. Erlangga. Jakarta

Handoko, T. Suhandiaya, G. Mulyana, H. 2012. Hidrolisis Serat Selulosa Dalam Buah Bintaro Sebagai Sumber Bahan Baku Bioetanol. Jurnal Teknik Kimia Indonesia, Volume 11 No 1 (2012), halaman 26-33. Universitas Parahiyangan. Bandung

Harborne, J. B. (1987). Metode fitokimia penentuan cara modern menganalisis tumbuhan. Bandung: ITB.

Hermiati, Rusli, Manalu, N. Y., & Sinaga, M. S. (2013). Ekstrak daun sirih hijau dan merah sebagai antioksidan pada minyak kelapa. Departemen Teknik Kimia, Fakultas Teknik, Universitas Sumatera Utara, 2(1).

Juniaty Towaha dan Gusti Indriati. 2011. Potensi Tanaman Bintaro (Cerbera Manghas) Sebagai Alternatif Sumber Bahan Bakar Nabati. Warta Penelitian Dan Pengembangan Tanaman Industri. Volume 17 Nomor 1, April 2011. ISSN 0853-8204

Kuddus, M.R., Rumi, F., & Masud, M.M., 2011, Phytochemical Screening and Antioxidant Activity Studies of Cerberaodollam Gaertn. International Journal of Pharma and Bio Sciences, 2(1), 413-418

Kurratul A, Betty L dan Balqis. 2014. Skrining Fitokimia dan Penentuan Aktivitas Antioksidan Serta Kandungan Total Fenol Ekstrak Buah Labu Siam (*Sechium edule* (jacq.) Sw.).

Diploma Thesis, Universitas Negeri Malang.

Prayuda, Y.E. 2014. Efikasi Ekstrak Biji Bintaro (Cerberamanghas) Sebagai Larvasida pada Larva Aedes aegypti LInstar III/ IV. Program Studi Pendidikan Dokter Fakultas Kedokteran dan Ilmu Kesehatan UIN Syarif Hidayatullah Jakarta.

Rismawati, 2011. Informasi Singkat Benih. Sulawesi. No.121.

Rohimatun; Suriarti, Sondang. 2011. Bintaro (Cerberamanghas) Sebagai Pestisida Nabati: Warta Penelitian dan Pengembangan Tanaman Industri; ISSN 0853-8204, Bogor, IPB, Hal 1-4.

Utami S,L. Syaufina dan N. F. Haneda. 2010. Daya racun ekstrak kasar daun bintaro (*Cerbera odollam* Gaertn.) terhadap larva *Spodoptera litura* fabricius. Jurnal Ilmu Pertanian Indonesia.15 (2): 96-100.