



EFFECT OF DRYING TEMPERATURE ON ANTIOXIDANT ACTIVITY, TOTAL PHENOLIC CONTENT, AND TOTAL FLAVONOID CONTENT OF *Chrysanthemum morifolium* L. Flowers

Ambar Pratiwi^{1*}, Lulu Fitriani², Novi Febrianti³, Eri Eryati⁴

¹Program studi Biologi, Fakultas Sains dan Teknologi Terapan, Universitas Ahmad Dahlan

Jl. Ringroad Selatan, Tamanan, Bnguntapan, Bantul, Yogyakarta

²Laboratorium Struktur Fisiologi Tumbuhan, Fakultas Sains dan Teknologi Terapan, Univeritas Ahmad Dahlan

Jl. Ringroad Selatan, Tamanan, Bnguntapan, Bantul, Yogyakarta

³Program Studi Pendidikan Biologi, Fakultas Keguruan Ilmu Pendidikan, Universitas Ahmad Dahlan

Jl. Ringroad Selatan, Tamanan, Bnguntapan, Bantul, Yogyakarta

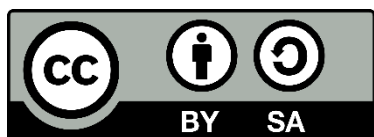
⁴Laboratorium Struktur dan Fisiologi Hewan, Fakultas Sains dan Teknologi Terapan, Univeritas Ahmad Dahlan

*Corresponding author: ambar@bio.uad.ac.id

ARTICLE INFO		ABSTRACT
Article history		<i>This study explores the effects of drying temperatures (40, 50, and 60°C) on the extraction yield, antioxidant potential, total phenolic content, and total flavonoid content of Chrysanthemum flower simplicia. Four sample groups were evaluated: fresh flowers and flowers dried at 40, 50, or 60°C. The antioxidant activity was analysed by the DPPH (2,2-diphenyl-1-picrylhydrazyl) method, with IC₅₀ values reported. The Folin- Ciocalteu assay measured total phenolic content and was reported as mg gallic acid equivalents per gram of extract (mg GAE/g). Flavonoids per gram of extract were reported in mg quercetin equivalents (mg QE/g), measured using the AlCl₃ colourimetric technique. The data were analysed statistically through one-way ANOVA, followed by Duncan's Multiple Range Test, with a significance level of $p < 0.05$. The fresh control produced a wet-basis extract yield of 0.82%, whereas the dried samples produced dry-basis yields of 3.0%, 3.2%, and 5.1% at 40, 50, and 60 °C, respectively. The highest antioxidant activity occurred in the 40°C group, with the lowest IC₅₀ value of 17.83 ppm. The total phenolic content peaked at 60°C, indicating a value of 124.0 ± 1.59 mg GAE/g extract. TFC differed significantly across the four sample groups because the fresh control was lower than all dried groups; however, the 40, 50, and 60°C drying treatments did not differ significantly from one another.</i>
Submission	2026-04-07	
Revision	2026-07-13	
Accepted	2026-10-06	
Keywords:		
Antioxidant		
<i>Chrysanthemum morifolium</i>		
Drying temperature		
Flavonoid		
Phenolic		



Copyright (c) 2026: Author(s)



Copyright (c) 2026: Author(s)

INTRODUCTION

Chrysanthemum morifolium L., colloquially known as chrysanthemum, is a commonly used medicinal herb available as herbal tea owing to its potent anti-inflammatory activity (Gong et al., 2019; Mutiah et al., 2021; Yuan et al., 2015). This plant possesses a multitude of bioactive compounds such as flavonoids, alkaloids, terpenoids, sesquiterpene lactones and phenolic acids, which all contribute to its pharmacological activity, including antibacterial, antifungal, and antioxidant effects (Astiti et al., 2021). Flavonoids, the most significant metabolites, are recognised for their health effects. Within this group, anthocyanins are crucial in determining flower pigmentation colours ranging from orange and red to purple and blue (Hodaei et al., 2017).

In traditional medicine systems, chrysanthemum flowers have been used for centuries for treating fever, headache, cough, and certain visual disorders (Chen et al., 2024; Mutiah et al., 2021; Wanita, 2022). Phytochemical analyses of these extracts produced an array of active constituents, including flavonoids like 7-O- β -D-glucoside and linarin as well as phenolic acids such as chlorogenic acid and a variety of caffeoylquinic acid derivatives (Wanita, 2022). These compounds have been recognised as effective natural antioxidants, predominantly because they scavenge free radicals and reduce oxidative stress in biological systems.

Various studies have shown that how chrysanthemum is prepared affects its antioxidant potential. Hartanto et al. (2021) found that fresh chrysanthemum had an antioxidant activity of about 68.70%, while processed dried flower tea at 60°C had an increased activity of 87.52%. However, some extracts such as flavonoids, tannins, and saponins are thermolabile and degrade under high-temperature drying processes, leading to a loss of antioxidant activity. The role of drying temperature on antioxidant activity has also been highlighted by (Yulianti et al., 2019), whose investigation noted a decrease in antioxidant activity with increasing temperature.

Previous studies featured different drying methods ranging from low-temperature drying at 30–35°C (Chen et al., 2024) to freeze-drying processes (Yuan et al., 2015). On the other hand, Yulianti et al. (2019) applied only two extreme conditions, namely 30°C and 70°C, while Hartanto et al. (2021) used a single temperature setting of 60°C without including intermediate ranges for comparison. Drying of chrysanthemum has already

received much attention, but limited studies investigated only moderate drying (40–60°C) conditions, in comparison with conventional and extreme-temperature approaches. This limitation reveals a specific literature gap when it comes to the role of intermediate temperatures in preserving antioxidant properties in chrysanthemum medicinal products, e.g. herbal tea. Therefore, the purpose of this study was to analyse the effects of drying temperatures (40, 50, and 60°C) on extract yield, antioxidant activity, total phenolic content, and total flavonoid content of *Chrysanthemum morifolium* L. flowers

MATERIALS AND METHODS

Sample Collection and Preparation: Fresh *Chrysanthemum* flowers were obtained from Bandungan Market, Semarang, Central Java. Approximately 1,500 g of fully bloomed flowers were used for each treatment. The study comprised four sample groups: fresh flowers as the control and flowers dried at 40, 50, or 60 °C for 24 hours until constant weight. For the fresh control, 200 g of fresh flowers were used for extraction with 800 mL of methanol. The flowers were dried at 40°C, 50°C, or 60°C (Agrowindo, OVL-16) for 24 hours until constant weight (Riasari et al., 2022). The 50 g dried flowers (simplicia) were macerated with 200 mL methanol for 24 hours (Asworo & Widwastuti, 2023). Extracts were concentrated with a rotary evaporator (Heidolph, Hei VAP Core) at 50°C. The yield of the fresh control was calculated on a wet-weight basis, whereas the yields of the dried samples were calculated on a dry-weight basis. The extraction yield was calculated using the following formula:

$$Yield (\%) = \frac{\text{Weight of concentrated extract (g)}}{\text{Weight of dried flower simplicia (g)}} \times 100\%$$

A DPPH radical scavenging assay was carried out using a freshly prepared 50 µg/mL DPPH working solution, while gallic acid served as the calibration reference within a 0–100 ppm range. Sample extracts were prepared at incremental concentrations between 0 and 200 ppm. Absorbance readings were recorded at 517 nm using a UV–Vis spectrophotometer (Thermo Scientific, Genesys UV-Vis 150) (Fabiana, 2019). The antioxidant activity was expressed as percentage inhibition using the equation: % inhibition = $(1 - A_{\text{sample}}/A_{\text{blank}}) \times 100$. Each analysis was performed in triplicate

($n = 3$). IC_{50} values were obtained by plotting inhibition percentages against corresponding concentrations, followed by linear regression modelling.

Total phenolic content (TPC) of chrysanthemum flower extracts was determined using the Folin–Ciocalteu assay following standard procedures (Septiani et al., 2018), with gallic acid employed as the calibration standard. Absorbance was measured at 750 nm, and results were reported as milligrams of gallic acid equivalents per gram of extract (mg GAE/g). All samples were analysed in three independent replicates. A calibration curve for gallic acid was established prior to quantification, yielding a coefficient of determination (R^2) of 0.968.

Total flavonoid content (TFC) was evaluated using the aluminium chloride colourimetric method, using quercetin as the reference compound. Absorbance was read at 415 nm, and flavonoid levels were expressed as milligrams of quercetin equivalents per gram of extract (mg QE/g) (Septiani et al., 2018). Measurements were conducted in triplicate, and a quercetin standard curve was prepared in advance, resulting in an R^2 value of 0.987.

Data from the four sample groups—fresh control and samples dried at 40°C, 50°C, and 60°C—were analysed using one-way analysis of variance (ANOVA). When the ANOVA indicated a significant overall difference, Duncan’s Multiple Range Test was applied at $p < 0.05$. Different superscript letters indicate significant differences between groups, whereas identical letters indicate no significant difference.

RESULTS AND DISCUSSION

Antioxidants function by donating electrons, thereby neutralising free radicals and interrupting the propagation of radical chain reactions (Siddiq et al., 2016; Widyasanti et al., 2016). They are generally categorised into two major types, namely natural and synthetic antioxidants. Natural antioxidants are commonly sourced from plant materials, including chrysanthemum flowers, which are known to contain bioactive compounds with antioxidant potential (Sayuti & Yenrina, 2015; Setiawati et al., 2019).

Maceration is one of the conventional extraction techniques in which plant material is immersed in an appropriate solvent for a defined period to facilitate compound diffusion (Agustina et al., 2018; Mawarda et al., 2020). In the present study,

maceration was selected because the samples were subjected to relatively high drying temperatures, making this method suitable for isolating thermolabile constituents that are easily degraded under heat exposure. Chairunnisa et al. (2019) also reported that maceration is effective in maintaining the stability of heat-sensitive phytochemicals during extraction.

The fresh control produced 4.1 g of concentrated extract from 500 g of fresh flower material, corresponding to a wet-basis yield of 0.82%. Among the dried samples, extract yields were 3.0%, 3.2%, and 5.1% at 40, 50, and 60 °C, respectively. Thus, the highest dry-basis extract yield was obtained at 60 °C. The higher yields observed in the dried samples may be associated with moisture removal, which increased the relative proportion of extractable solids, and with heat-induced alteration of tissue structures that may facilitate solvent penetration and compound release. However, the fresh-control yield was calculated using wet material, whereas the yields of the dried samples were calculated using dried material. Therefore, the yield of the fresh control cannot be directly compared quantitatively with those of the dried samples. Furthermore, the highest extract yield at 60 °C did not correspond to the strongest antioxidant activity, indicating that extract yield represents the total amount of recovered material rather than specifically the amount or activity of antioxidant compounds.

In the DPPH assay, antioxidant activity is based on a redox reaction in which antioxidant molecules donate electrons to DPPH radicals. This electron transfer leads to a visible colour transition from deep purple to lighter yellow or even colourless, indicating radical scavenging activity (Mutiah et al., 2021; Sami & Rahimah, 2018). The observed colour change reflects the presence of antioxidant compounds in the sample (Salim, 2018). The detailed antioxidant activity results are summarised in **Table 1**.

Table 1. Antioxidant Activity of *Chrysanthemum morifolium* Flower Extracts

No	Sample Group	IC ₅₀ Value (ppm)	Antioxidant Activity Classification
1	40°C	17.83 ^a	Very Strong
2	50°C	140.54 ^b	Moderate
3	60°C	212.28 ^c	Very Weak
4	Fresh flower	208.94 ^c	Very Weak

ANOVA indicated a significant overall difference among the four sample groups ($p < 0.05$). Duncan's test showed that the 40°C treatment differed from the 50°C and 60°C treatments; the 60°C treatment did not differ from the fresh control.

The diversity of phenolic compounds and antioxidant activity in the chrysanthemum flower variety 'Hangbaiju' may serve as a basis for the development of superior cultivars with higher antioxidant content (Gong et al., 2019). The antioxidant activity assay conducted on fresh samples and samples dried at 40°C, 50°C, and 60°C showed that the lowest average IC₅₀ value was obtained at 40°C, measuring 17.83 ppm, which falls under the category of very strong antioxidant activity. The 40°C drying treatment represented the lowest temperature tested. Antioxidant activity can be influenced by drying temperature (Ananta et al., 2021), consistent with the findings of Angraiyati & Hamzah (2017), who reported that drying temperature affects the active compounds contained in the material.

Table 2. One-Way ANOVA and DMRT Results for IC₅₀, Total Phenolic Content, and Total Flavonoid Content

Response variable	Between-groups df	Within-groups df	F-value	Exact p-value	Statistical conclusion	DMRT interpretation
IC ₅₀	3	8	4.102	0.049	Significant	40 °C differed from 50 and 60 °C; 60 °C did not differ from the fresh control
Total phenolic content (TPC)	3	8	4.520	0.039	Significant	The fresh control differed from 60 °C; the other comparisons were not significant
Total flavonoid content (TFC)	3	8	4.140	0.048	Significant	The fresh control differed from all dried samples; 40, 50, and 60 °C did not differ significantly

Higher drying temperatures generally result in weaker antioxidant activity. Additionally, thermolabile compounds or active constituents in the samples are sensitive to high-temperature exposure. Excessively high drying temperatures can lead to degradation or structural alterations of these compounds, thereby changing their chemical properties (Handito et al., 2021). Drying temperature plays a decisive role in preserving bioactive compounds. At 40°C, antioxidant activity was strongest, consistent with Ananta et al., 2021), who reported that moderate temperatures preserve thermolabile compounds. The weaker antioxidant activity observed at 60 °C may be associated with thermal alteration or degradation of particular heat-sensitive antioxidant

compounds (Syafrida et al., 2018). However, because TFC did not differ significantly among the three drying temperatures (Table 2), the reduction in antioxidant activity cannot be attributed solely to changes in total flavonoid content.

For the fresh flower extract treatment, the average IC₅₀ value was 208.94 ppm, categorised as very weak antioxidant activity. The fresh control exhibited a relatively high IC₅₀ value, indicating weaker radical-scavenging activity than the 40 and 50 °C treatments. This difference may reflect variation in the extractable compound profile between fresh and dried tissues. Elevated moisture content can reduce the concentration of antioxidant compounds present in the sample (Amrizal et al., 2020). Drying may alter the accessibility, concentration, or chemical form of antioxidant constituents; however, the contribution of individual compounds was not determined in this study. The determination of total phenolic and flavonoid contents is presented in Table 3.

Table 3. Total phenolic and flavonoid content measurement results of *Chrysanthemum* flower extracts.

No	Sample Group	Total Phenolic Content (mg GAE/g extract)	Total Flavonoid Content (mg QE/g extract)
1	40°C	122.00±1.23 ^{ab}	2.25±0.00 ^b
2	50°C	122.00±1.07 ^{ab}	2.25±0.00 ^b
3	60°C	124.00±1.59 ^b	2.17±0.01 ^b
4	Fresh flower	119.70±0.58 ^a	1.98±0.03 ^a

For both TPC and TFC, ANOVA indicated significant overall differences among the four sample groups ($p < 0.05$). Duncan's test showed that the fresh control differed from the 60°C group for TPC and from all three dried groups for TFC. TFC did not differ significantly among the 40°C, 50°C, and 60°C drying treatments.

The Folin–Ciocalteu assay is a standard analytical technique commonly employed to quantify total phenolic compounds in plant-derived samples, operating through a redox-driven colourimetric mechanism. This reagent system is generated via the reaction between sodium tungstate (Na₂WO₄) and sodium molybdate (Na₂MoO₄), forming a yellow molybdotungstate (Mo–W) complex. During analysis, phenolic substances in the extract function as reducing agents that convert this complex into a blue chromophore, which is typically detected in the 745–765 nm wavelength region. The resulting colour intensity reflects the reduction of molybdenum from its +6 oxidation state (Mo (VI)) to a lower state (Mo(V)) (Nurmiati & Dyah, 2018).

Phenolic compounds are a broad class of plant secondary metabolites defined by the presence of one or more hydroxyl (-OH) groups attached to an aromatic ring structure. These metabolites are widely distributed across plant tissues and are well known for their diverse biochemical functions and biological activities (Mahardani & Yuanita, 2021; Marjoni & Novita, 2015; Rousdy et al., 2021).

The results indicate that sample processing affected the measured TPC. The highest value was recorded at 60°C (124.0 mg GAE/g extract), whereas the fresh control had the lowest value (119.7 mg GAE/g extract; Table 2). Because the flowers had already been harvested before oven drying, the higher measured TPC at 60°C is more plausibly explained by heat-induced disruption of tissue and cell-wall structures, which may release matrix-bound phenolics and improve their extractability, rather than by active stress-induced phenolic biosynthesis. An increase in measured TPC does not necessarily produce stronger antioxidant activity because heating may also transform or degrade particular compounds with high radical-scavenging activity. This interpretation is consistent with the reported increase in TPC after drying of chrysanthemum flowers (Gong et al., 2019; Yuan et al., 2015).

Flavonoids react with AlCl_3 by forming complexes between hydroxyl groups adjacent to ketones or other hydroxyl groups. AlCl_3 interacts with the ketone group at C4 and hydroxyl groups at C3 or C5 of flavones or flavonols to produce a stable yellow-colored complex (Sari & Ayuchecaria, 2017). In higher plants, flavonoids are found in both vegetative parts and flowers. As flower pigments, flavonoids play a significant role in attracting birds and insect pollinators. While some flavonoids are colourless, others absorb ultraviolet (UV) light (Rousdy et al., 2021).

TFC differed significantly across the four sample groups because the fresh control (1.98 ± 0.03 mg QE/g extract) was lower than each dried group (Table 2). In contrast, the 40°C, 50°C, and 60°C treatments shared the same Duncan grouping and therefore did not differ significantly from one another. The numerically highest TFC values occurred at 40°C and 50°C (2.25 ± 0.00 mg QE/g extract), while the value at 60°C was slightly lower (2.17 ± 0.01 mg QE/g extract). This numerical decrease may reflect the thermal sensitivity of some flavonoids, but it should not be described as a statistically significant difference among the three drying temperatures (Syafri et al., 2018; Yulianti et al., 2019).

CONCLUSION

Drying conditions influenced the measured characteristics of *Chrysanthemum morifolium* flower extracts. Among the tested drying temperatures, 40 °C produced the strongest antioxidant activity, whereas 60 °C produced the highest dry-basis extract yield and measured TPC. TFC differed significantly between the fresh control and the dried samples but did not differ significantly among the 40, 50, and 60 °C treatments. Therefore, 40 °C was the most suitable of the tested temperatures for preserving antioxidant activity, whereas 60 °C produced the highest extract yield and TPC among the dried samples.

REFERENCES

- Agustina, E., Andiarna, F., Lusiana, N., Purnamasari, R., & Irfan Hadi, M. (2018). Identifikasi senyawa aktif dari ekstrak daun jambu air (*Syzygium aqueum*) dengan perbandingan beberapa pelarut pada metode maserasi. *BIOTROPIC The Journal of Tropical Biology*, 2(2), 108–118. <https://doi.org/10.29080/biotropic.2018.2.2.108-118>
- Ananta, D.A., Putra, G.P.G., & Arnata, I.W. (2021). Pengaruh suhu dan waktu maserasi terhadap aktivitas antioksidan ekstrak kulit buah kakao (*Theobroma cacao* L.). *Jurnal Rekayasa Dan Manajemen Agroindustri*, 9(2), 186–197. DOI: [10.24843/JRMA.2021.v09.i02.p04](https://doi.org/10.24843/JRMA.2021.v09.i02.p04)
- Amrizal, S.N., Apriliani, E.P., & Ramadhani, D. (2020). Pengaruh penambahan bayam merah (*Amaranthus tricolor* L.) terhadap kapasitas antioksidan dan sifat sensoris nori rumput laut (*Eucheuma spinosum*). *Marinade*, 03(02), 121–127. <https://doi.org/10.31629/marinade.v3i02.3398>
- Asworo, R. Y., & Widwastuti, H. (2023). Pengaruh ukuran serbuk simplisia dan waktu maserasi terhadap aktivitas antioksidan ekstrak kulit irsak. *Indonesian Journal of Pharmaceutical Education*, 3(2), 256–263. <https://doi.org/10.37311/ijpe.v3i2.19906>
- Chairunnisa, S., Wartini, N. M., & Suhendra, L. (2019). Pengaruh suhu dan waktu maserasi terhadap karakteristik ekstrak daun bidara (*Ziziphus mauritiana* L.) sebagai sumber saponin. *Jurnal Rekayasa dan Manajemen Agroindustri*, 7(4), 551–560. DOI: [10.24843/JRMA.2019.v07.i04.p07](https://doi.org/10.24843/JRMA.2019.v07.i04.p07)
- Chen, N., Fan, J., Li, G., Guo, X., Meng, X., Wang, Y., Duan, Y., Ding, W., Liu, K., Liu, Y., & Xing, S. (2024). Comparative analysis of the chemical constituents of *Chrysanthemum morifolium* with different drying processes integrating LC/GC–MS–Based, non-targeted metabolomics. *Metabolites*, 14(9), 1–15. <https://doi.org/10.3390/metabo14090481>

- Gong, J., Chu, B., Gong, L., Fang, Z., Zhang, X., Qiu, S., Wang, J., Xiang, Y., Xiao, G., Yuan, H., & Zheng, F. (2019). Comparison of phenolic compounds and the antioxidant activities of fifteen *Chrysanthemum morifolium* Ramat cv. 'Hangbaiju' in China. *Antioxidants*, 8(8), 1-14. <https://doi.org/10.3390/antiox8080325>
- Handito, D., Basuki, E., Saloko, S., Dwikasari, L.G., & Triani, E. (2022). Analisis komposisi bunga telang (*Clitoria ternatea*) sebagai antioksidan alami pada produk pangan. *Prosiding SAINTEK LPPM Universitas Mataram*, 4, 64–71. Mataram: Universitas Mataram.
- Hartanto, R., Fitri, S. R. F., Kawiji, Prabawa, S., Sigit, B., & Yudhistira, B. (2021). Analisis fisik, kimia, dan sensoris teh bunga krisan putih (*Chrysanthemum morifolium* Ramat.) dengan pengeringan kabinet. *AGROINTEK*, 15 (4), 1011-1025. DOI: [10.21107/agrointek.v15i4.10531](https://doi.org/10.21107/agrointek.v15i4.10531)
- Hodaei, M., Rahimmalek, M., & Arzani, A. (2017). Variation in morphological characters, chemical composition, and anthocyanin content of different *Chrysanthemum morifolium* cultivars from Iran. *Biochemical Systematics and Ecology*, 74, 1–10. <https://www.sciencedirect.com/science/article/abs/pii/S0305197817300972>
- Mahardani, O.T., & Yuanita, L. (2021). Efek metode pengolahan dan penyimpanan terhadap kadar senyawa fenolik dan aktivitas antioksidan. *UNESA Journal of Chemistry*, 10 (1), 64-78. <https://doi.org/10.26740/ujc.v10n1.p64-78>
- Marjoni, M.R., Afrinaldi, & Novita, A.D. (2015). Kandungan total fenol dan aktivitas antioksidan ekstrak air daun kersen (*Muntingia calabura* L.). *Jurnal Kedokteran YARSI*, 23(3), 187–196. <https://doi.org/10.33476/jky.v23i3.232>
- Mawarda, A., Samsul, E., & Sastyarina, Y. (2020). Pengaruh berbagai metode ekstraksi dari ekstrak etanol umbi bawang tiwai (*Eleutherine americana* Merr) terhadap rendemen ekstrak dan profil kromatografi lapis tipis. *Proceeding of Mulawarman Pharmaceuticals Conferences*, 11, 1–4. Samarinda: Universitas Mulawarman. <https://doi.org/10.25026/mpc.v11i1.384>
- Mutiah, R., Marsyah, A., & Saputra, A.F. (2021). Systematic review: phytochemical content and pharmacological effects of *Chrysanthemum* sp. Proceedings of International Pharmacy Ulul Albab Conference and Seminar (PLANAR), 31-41. DOI: [10.18860/planar.v1i0.1457](https://doi.org/10.18860/planar.v1i0.1457)
- Nurmiati, & Wijayanti, E.D. (2018). Perbandingan kadar fenolik total antara seduhan daun gaharu dan kombucha daun gaharu (*Aquailaria malaccensis*). *Journal Cis-Trans (JC-T) Jurnal Kimia dan Terapannya*, 2(1), 6–11. DOI: [10.17977/um026v2i12018p006](https://doi.org/10.17977/um026v2i12018p006)
- Riasari, H., Fitriansyah, S. N., & Hoeriah, I.S. (2022). Perbandingan metode fermentasi, ekstraksi, dan kepolaran pelarut terhadap kadar total flavonoid dan steroid Pada daun sukun (*Artocarpus altilis* (Parkinson) Fosberg). *Jurnal Sains dan Teknologi Farmasi Indonesia*, 11(1), 1-17. DOI: [10.58327/jstfi.v11i1.165](https://doi.org/10.58327/jstfi.v11i1.165)
- Rousdy, D. W., Wardoyo, E. R. P., & Ifadatin, S. (2021). Aktivitas larvasida fraksi

- metanol dan etil asetat buah lakum (*Cayratia trifolia* (L.) Domin.) terhadap larva nyamuk *Aedes aegypti*. *Bioma: Jurnal Ilmiah Biologi*, 10(1), 1–13. <https://doi.org/10.26877/bioma.v10i1.5595>
- Salim R. (2018). Uji aktivitas antioksidan infusa daun ungu dengan metode DPPH (1,1-diphenil-2-picrylhidrazil). *Jurnal Katalisator*, 3(2), 153–161. DOI: [10.22216/jk.v3i2.3372](https://doi.org/10.22216/jk.v3i2.3372)
- Sami, F. J., & Rahimah, S. (2018). Uji aktivitas antioksidan ekstrak metanol bunga brokoli (*Brassica oleracea* L. var. Italica) dengan metode DPPH (2,2 diphenyl-1-picrylhydrazyl) dan metode ABTS (2,2 azinobis (3-etilbenzotiazolin)-6-asam sulfonat). *Jurnal Fitofarmaka Indonesia*, 2(2), 107–111. DOI: <https://doi.org/10.33096/jffi.v2i2.179>
- Sari, A.K., & Ayuchecaria, N. (2017). Penetapan kadar fenolik total dan flavonoid total ekstrak beras hitam (*Oryza sativa* L) dari Kalimantan Selatan. *Jurnal Ilmiah Ibnu Sina*, 2(2), 327–335. DOI: <https://doi.org/10.36387/jiis.v2i2.112>
- Sayuti, K., & Yenrina, R. (2015). *Antioksidan Alami dan Sintetik*. Padang : Andalas University Press.
- Septiani, N.K.A., Parwata, I.M.O.A., & Putra, A.A.B. (2018). Penentuan kadar total fenol, kadar total flavonoid dan skrining fitokimia ekstrak etanol daun gaharu (*Gyrinops versteegii*). *Wahana Matematika dan Sains: Jurnal Matematika, Sains, dan Pembelajarannya*, 12(1), 78-89. DOI: <https://doi.org/10.23887/wms.v12i1.13868>
- Setiawati, T., Annisa, Fitriani, N., & Bari, I.N. (2019). Pengenalan khasiat obat tanaman krisan dan pembuatan teh krisan sebagai minuman kesehatan. *ETHOS (Jurnal Penelitian dan Pengabdian kepada Masyarakat)*, 7(1), 64–69. DOI: [10.29313/ethos.v7i1.4133](https://doi.org/10.29313/ethos.v7i1.4133)
- Siddiq, H. B. H. F., Hari, R., & Prabawati, E. F. (2016). Uji aktivitas antioksidan ekstrak etanol biji edamamme (*Glycin max* (L) Merril) dengan metode DPPH. *Jurnal Ilmiah Farmasi Akademisi Farmasi Jember*. DOI: [10.53864/jifakfar.v1i1.128](https://doi.org/10.53864/jifakfar.v1i1.128)
- Syafrida, M., Darmanti, S., & Izzati, M. (2018). Pengaruh suhu pengeringan terhadap kadar air, kadar flavonoid dan aktivitas antioksidan daun dan umbi rumput teki (*Cyperus rotundus* L.). *Bioma: Berkala Ilmiah Biologi*, 20 (1), 44-50. DOI: <https://doi.org/10.14710/bioma.20.1.44-50>
- Utaminingsih, Astiti, A., & Sutikno. (2021). Morfologi trikoma petal dan sepal beberapa varietas bunga krisan (*Chrysanthemum morifolium* Ramat.). *Al-Hayat: Journal of Biology and Applied Biology*, 4(2), 87–95. <https://doi.org/10.21580/ah.v4i2.6861>
- Wanita, Y. P. (2022). Potensi produk samping budidaya krisan sebagai minuman fungsional: senyawa kimia dan nilai tambahnya. *Jurnal Pertanian Agros*, 24(2), 526–533. DOI: [http://dx.doi.org/10.37159/jpa.v24i2.1942](https://doi.org/10.37159/jpa.v24i2.1942)
- Widyasanti, A., Rohdiana, D., & Ekatama, N. (2016). Aktivitas antioksidan ekstrak teh putih (*Camelia sinensis*) dengan metode DPPH (2,2 Difenil-1-Pikrilhidrazil).

EDUFORTECH,

1(1),

1-9

DOI: <https://doi.org/10.17509/edufortech.v1i1.3966>

- Yuan, J., Hao, L. J., Wu, G., Wang, S., Duan, J. Xie, G. Y., & Qin, M. (2015). Effects of drying methods on the phytochemicals contents and antioxidant properties of chrysanthemum flower heads harvested at two developmental stages. *Journal of Functional Foods*, 19, 786–795. <https://doi.org/10.1016/j.jff.2015.10.008>
- Yulianti, D., Sunyoto, M., & Wulandari, E. (2019). Aktivitas antiosidan daun pegagan (*Centella asiatica* L. Urban) dan bunga krisan (*Crhysanthemum* sp.) pada tiga variasi suhu pengeringan. *Pasundan Food Technology Journal*, 6(3), 142–147. <https://doi.org/10.23969/pftj.v6i3.1215>