

**PENGARUH IRADIASI ELEKTROMAGNETIK
SMARTPHONE (GSM 1800MHz) DAN BUAH KIWI HIJAU
(*Actinidia deliciosa* Planch.) TERHADAP SINTASAN DAN
MORFOLOGI ORGAN REPRODUKSI LALAT BUAH
(*Drosophila melanogaster* Meigen, 1830)**

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INTISARI

Gelombang elektromagnetik dapat berasal dari sumber alami maupun alat elektronik, dan tubuh manusia terus-menerus terpapar radiasi ini, termasuk dari *smartphone*. Radiasi elektromagnetik dapat menyebabkan efek termal yang meningkatkan suhu sel dan mengganggu metabolisme, serta efek nontermal yang mencakup gangguan sistem saraf, hormon, reproduksi, dan kanker. Radiasi juga dapat membentuk radikal bebas (ROS) yang memicu stres oksidatif, menyebabkan kerusakan seluler dan penyakit seperti kanker dan diabetes, meskipun tubuh secara alami memiliki mekanisme pertahanan melalui antioksidan. Buah kiwi hijau (*Actinidia deliciosa* Planch.) dikenal kaya akan antioksidan seperti vitamin C dan E, serta senyawa bioaktif lainnya. *Drosophila melanogaster* sering digunakan sebagai hewan model dalam penelitian bioradiasi karena kemiripan genetiknya dengan manusia dan kemudahan pemeliharaannya. Penelitian ini bertujuan untuk mengeksplorasi kemampuan buah kiwi hijau dalam melindungi terhadap radiasi EMF *smartphone* menggunakan *Drosophila melanogaster* sebagai hewan model, dengan fokus pada sintasan dan perubahan morfologi organ reproduksinya. Dua pasang indukan hasil *rearing* dimasukkan ke dalam botol kultur dengan diet dan perlakuan EMF yang berbeda, meliputi medium pisang kontrol (PCON) dan pisang dengan iradiasi EMF (PEMF) serta medium kiwi kontrol (KCON) dan kiwi dengan iradiasi EMF (KEMF). Iradiasi EMF dilakukan dengan menggunakan *smartphone* 4G (GSM 1800 MHz) pada jarak 3 cm selama 2 jam per hari hingga hari ketiga. Analisis Two-way ANOVA dan uji lanjut Tukey HSD yang dilakukan pada tingkat signifikansi ($p < 0,05$) menunjukkan bahwa iradiasi EMF dapat menurunkan sintasan lalat buah serta mengganggu proses kawin dan peletakan telur. Sementara itu, tidak terdapat pengaruh signifikan dari paparan EMF terhadap morfologi dan morfometri organ reproduksi lalat buah generasi F1. Namun demikian, perkembangan organ reproduksi, khususnya ovarium pada perlakuan penambahan nutrisi dengan buah kiwi hijau lebih bermakna positif daripada iradiasi EMF.

Kata kunci: antiradiasi, pakan buatan, radiasi elektromagnetik, sintasan, organ reproduksi

THE EFFECT OF SMARTPHONE ELECTROMAGNETIC IRRADIATION (GSM 1800MHz) AND GREEN KIWIFRUIT (*Actinidia deliciosa* Planch.) DIET ON THE SURVIVAL AND MORPHOLOGY OF THE REPRODUCTIVE ORGANS OF FRUIT FLIES (*Drosophila melanogaster* Meigen, 1830)

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ABSTRACT

Electromagnetic waves can originate from natural sources as well as electronic devices, and the human body is continuously exposed to this radiation, including from smartphones. Electromagnetic radiation can cause thermal effects that increase cellular temperature and disrupt metabolism, as well as non-thermal effects that include disturbances to the nervous system, hormones, reproduction, and cancer. Radiation can also generate reactive oxygen species (ROS), triggering oxidative stress that causes cellular damage and diseases such as cancer and diabetes, although the body naturally has defense mechanisms through antioxidants. Green kiwifruit (*Actinidia deliciosa* Planch.) is known to be rich in antioxidants such as vitamins C and E, along with other bioactive compounds. *Drosophila melanogaster* is frequently used as a model organism in bioradiation research due to its genetic similarity to humans and ease of maintenance. This research aims to study the protective capability of green kiwifruit against smartphone EMF radiation using *Drosophila melanogaster* as a model organism, focusing on survival and morphological changes in its reproductive organs. Two pairs of parent flies were placed in culture bottles with different diets and EMF treatment conditions, including a control banana medium (PCON), a banana medium with EMF irradiation (PEMF), a control kiwi medium (KCON), and a kiwi medium with EMF irradiation (KEMF). EMF irradiation was performed using a 4G smartphone (GSM 1800 MHz) at a distance of 3 cm for 2 hours per day until the third day. Two-way ANOVA and Tukey HSD post-hoc tests conducted at a significance level ($p < 0.05$) indicated that EMF irradiation reduced fruit fly survival and disrupted mating and egg-laying processes. However, there was no significant impact of EMF exposure on the morphology and morphometry of the reproductive organs of the F1 generation fruit flies. However, the development of reproductive organs, specifically the ovaries, in the treatment with the addition of nutrients from green kiwifruit showed more positive significance than EMF irradiation.

Keywords: antiradiation, artificial diet, electromagnetic radiation, survival rate, reproductive organs