

GRAPHICAL ABSTRACT

Status and Mechanism of Insecticide Resistance in German Cockroach (*Blattella germanica* L.) Worldwide: A Literature Review

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Insecticide Resistance in German Cockroach (Blattella germanica L.) **Worldwide: A Literature Review (1953-2024)** Method Results Databases used → Google Scholar, ScienceDirect, Based on 102 studies → resistance to 60 active Wiley Online Library, and Oxford Academic Journal for ı ingredients of insecticides, dominantly from articles up to 2024. Keywords → "resistance," ı classes: pyrethroid, organophosphates, and "insecticide," "Blattella germanica," and "German organochlorine. cockroach." (Only studies involving field strains tested via contact-based assays were included.) kdr (targetsite) – 11.1% Rdl (target-P450 Distribution of insecticide resistance of B. germanica L. (metabolic) site) - 5.8% observed in 23 countries across 4 continents (1953-41.3% 2024). GST (metabolic) -6.0% Esterase netabolic) – 34.6% Distribution of resistance mechanisms of metabolic and target site reported in B. germanica L. (n = 440). Summary

- Resistance profiles vary greatly even between neighboring areas, highlighting the need for continuous local monitoring.
- The combination of mechanisms results in synergistic effects that increase resistance and cross-resistance, limiting alternative insecticide options.
- This study underscores the urgent need to prioritize the development and use of newer insecticides with distinct modes of action.