

Evaluation of Pesticide Residues in Honey from Cocoa and Forest Ecosystems in Ghana

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Abstract : The cultivation of cocoa (*Theobroma cocoa*), an important cash crop that contributes immensely towards the economic growth of several Western African countries, depends almost entirely on pesticide application owing to the plant's vulnerability to pest and disease attacks. However, the extent to which pesticides inputted for cocoa cultivation impact bees and bee products has rarely received attention in research. Through this study, the effects of pesticides applied for cocoa cultivation on honey in Ghana were examined by evaluating honey samples from cocoa and forest ecosystems in Ghana. An analysis of five honey samples from each land use type confirmed pesticide contaminants from these land use types at measured concentrations for acetamiprid (0.051mg/kg); imidacloprid (0.004-0.02 mg/kg), thiamethoxam (0.013-0.017 mg/kg); indoxacarb (0.004-0.045 mg/kg) and sulfoxaflor (0.004-0.026 mg/kg). None of the observed pesticide concentrations exceeded EU maximum residue levels, indicating no compromise of the honey quality for human consumption. However, from the results, it could be inferred that toxic effects on bees may not be ruled out because observed concentrations largely exceeded the threshold of 0.001 mg/kg at which sublethal effects on bees have previously been reported. One of the most remarkable results to emerge from this study is the detection of imidacloprid in all honey samples analyzed, with sulfoxaflor and thiamethoxam also being detected in 93% and 73% of the honey samples, respectively. This suggests the probable prevalence of pesticide use in the landscape. However, the conclusions reached in this study should be interpreted within the scope of pesticide applications within Bia West District and not necessarily extended to other cocoa-producing districts in Ghana. Future studies should therefore include multiple cocoa-growing districts and other non-cocoa farming landscapes. Such an approach can give a broader outlook on pesticide residues in honey produced in Ghana.

Keywords : honey, cocoa, pesticides, bees, land use, landscape, residues, Ghana

Conference Title : ICT 2023 : International Conference on Toxicology

Conference Location : Toronto, Canada

Conference Dates : September 18-19, 2023