Risk assessment for pesticide hazards of Prionailurus bengalensis in Taiwan

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World population has been rising ever since the 20th century which has compelled an increasing agricultural productivity. Chemical pesticide and fertilizer had been seen as indispensable in farm mechanization and conventional farming. However, they are not panacea- the mass application of pesticide in a short period of time, despite its strong effect and persistence, had caused soil acidification and the contamination of many farmland and groundwater which contribute to not only the drug resistance of viruses, but the pesticide residue in water and plants that eventually end up in animal bodies through the bioaccumulation. In these process, the soil is the main media for the flow of substances and pollutants, and it is an important environmental basis for various species to survive. Once produced, the pollutants follow the geophysical cycle and flow through the soil, the species living there become the first to bear the brunt of these pollutants.

In order to investigate the effects of pollutants, this present study aims at the pesticides and environmental agents used in agricultural activities. The distribution of pollutants in the soil was investigated, and the risk assessment of the effects of contaminants on specific mammals was constructed. The Prionailurus bengalensis, commonly known as Leopard cat, is the research object of this study. Surviving in important agricultural areas in western Taiwan, the small ethnic population makes it highly sensitive to environmental changes. The ecological stability and sustainability of the Leopard cats was evaluated in the context of the distribution/residual of pesticides and environmental agents applied during agricultural activities in this study.

First step is to understand the agricultural activities within the area of the study, and collect local soil samples to analyze the concentrations of pesticides and environmental agent residues. In the second step, the ecological risk assessment model for Leopard cat is established. The statistical data and the research results obtained in the first step is used to calculate the risk quotient of pesticides on Leopard cat. Spatial information analysis technology was applied to establishing the relationship between environmental test results and animal survival risk assessment.

Preliminary results indicated that the detected pesticides include insecticide, herbicides, and fungicides, and the risk quotient of a single pesticide falls between 0.0015 and 0.0005. If the species of pesticides applied at single place are more than one, not only the risk quotient will increase, but also the interaction of different pesticides will have a synergistic effect. As a result, Leopard cat's acuity decreased and the probability of pesticide poisoning increased, which indirectly reduced its chances of survival. In terms of wild mammal health risk assessment, few related studies have been reported. The calibration and application of the calculation model still require more equation deduction and parameter collection/acquisition.