Crop diversity and susceptibility of crop fields to elephant raids in eastern Okavango Panhandle, northern Botswana

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Abstract

Abstract 1. Elephants frequently raid farmers' crops within their ranges in Africa and Asia. This can have a large impact on agricultural productivity and food security for farmers. 2. Previous studies have examined susceptibility of crop fields to elephant raids using field characteristics such as field size and proximity to water sources. However, there are limited studies investigating how different crop types, individually and in their combinations influence crop susceptibility to elephant raiding. Also, spatio-temporal patterns in elephant crop raids in agro-ecological landscapes have not been extensively examined. 3. This study utilised data collected from crop fields raided by elephants between 2008 and 2018. Data on crops grown, the number of crop-raiding incidences for each crop, and elephant raiding incidences were recorded for each field assessed. Incidence risks (IR) and field risk value (RV) were computed using an adaptive epidemiological approach. 4. The results showed that elephant crop raiding incidents varied significantly amongst crop types, and over space and time ($P<0.0001$). Cereal crops (millet: Eleusine conaracana, maize: Zea mays) incurred a higher number of crop raiding incidents compared with leguminous crops (cowpea: Vigna unguiculata; groundnut: Arachis hypogea). Field RVs significantly varied depending on which crop was present in the field. There was a significant negative correlation between the number of crop types and the susceptibility of the field to raiding ($R2 = -0.680$, $P<0.0001$). 5. Our results suggest that the susceptibility of the fields to elephant raids could be minimised by selecting crop types and combinations less susceptible to elephant damage, thus enhancing food security for local subsistence farmers. Keywords: crop raiding, crop species, incidence risks, field risk value, food security, human-elephant conflict

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