

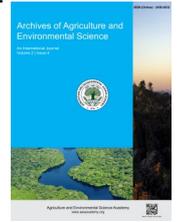


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ORIGINAL RESEARCH ARTICLE



Farmers' perceptions and responses to wildlife crop damage: A case study from Palpa district, Nepal

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ABSTRACT

Wildlife crop damage has been a serious problem for rural farming communities globally, including Nepal. To understand the perception of farmers of wildlife interventions, a survey was conducted in Bagnaskali Rural Municipality, Palpa district, Nepal, using a structured questionnaire. The responses were collected from 73 randomly sampled individuals (farmers). The findings revealed that rice, maize, and vegetables were the major crops cultivated in the region. The most followed farming system was rice-wheat-maize, with 70%, and maize-rapeseed-wheat with 16%. The post-sowing period was identified as the peak time for wildlife damage by the majority, i.e. 63 respondents. Monkeys, rabbits, and deer were the primary animals causing major damage to the crops. The random attack from these animals was found to be the most dominant issue for farmers. A majority (52%) of the respondents reported losses ranging from 10% to 30% due to the intervention of these wild animals. Furthermore, only 15% mentioned that the trend of wildlife damage in crops over the last 5 years has decreased, while 85% fully agreed that the damage is increasing daily. Regarding preventive measures, it was found that 31.5% used scarecrows, 16.4% used noise/light methods, and 32.9% used no significant mitigation strategy. These strategies were perceived to be ineffective by 70% of the farmers, while 27% found them effective, and 3% were unsure. The findings suggested the urgent need for government intervention to address this issue in Palpa district of Nepal.

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INTRODUCTION

Agriculture remains the backbone of Nepal's economy, with farming being a major job with about 62% of the total population engaged in agriculture (Ministry of Agriculture and Livestock Development (MOALD, 2022). Agriculture shares 23.95% of total national GDP (Nepal Rastra Bank, 2023). Though it plays a crucial role in Nepal's economy, agriculture has not achieved its full potential. Low productivity, erratic climatic conditions, and land fragmentation and wildlife-induced crop damage threaten the farmers' livelihood (Neupane *et al.*, 2022; Niroula & Thapa, 2007). Recently, crop damage by wildlife has been one of the serious problems of farming communities worldwide, including Nepal (Magar *et al.*, 2024). It gets even more serious in the

rural areas of the country where agriculture is the primary source of livelihood. Human-wildlife conflict is a great matter of concern to policymakers and conservationists due to economic damage caused by wild animals (Awasthi & Singh, 2015; Panta, 2024). Critical cases have been observed in Nepal where around 25% of land crops are damaged by wild animals every year (National Farmers Group Federation, 2023). Animals like swallows (Nilgai), wild boars, monkeys, elephants, and porcupines are major terrors in the agricultural zones of Nepal. In such a case, it is crucial to understand the farmer's perception of the damage wildlife causes to their crop. Their responses can provide significant insight into building effective mitigation strategies for this challenge.

The Palpa district has a great scope of farming due to suitable

environmental conditions and demand for domestic food. Palpa produces a variety of cereal crops, including rice, maize, wheat, millet, and barley. The district's subtropical climate and varying altitudes (251 to 1943 meters above sea level) support these crops. Thus, the district has great potential for agricultural production by utilizing favourable economic and climatic resources. However, there is an increased case of wildlife damage in the fields of maize, wheat, millet, and sorghum during critical growth stages, mainly by monkeys during the day and porcupines at night (Aryal, 2024; Joshi, 2022). These incidents lead to declining yields and also cause discouragement in farmers. Although farmers tried to mitigate these problems through simple techniques like scarecrows, they became ineffective when used singly. No single measure can guard against all types of crop raiders due to variations in their feeding habits, type of crops, and distance to the field of farmers (Pandey & Bajracharya, 2016). Most studies in Nepal have shown the wildlife conflicts in protected areas or the Terai lowlands. The study of wildlife interference in crop production from mid-hill areas like Palpa is very limited. The lack of data on the area-specific damage magnitude, affected crops, damage timing and local practices used to control limits the local government or policy-making agencies to develop targeted strategies. To understand the farmers' views and measures they use is crucial to design better and sustainable strategies that conserve biodiversity and also crop productivity. This study will be focused on investigating the perceptions and responses of farmers from Palpa to the interventions made by major wildlife animals in their fields, the loss from the interference, and coping mechanisms. The study's novelty lies in its district-level, farmers' perception-driven approach in the midhill agriculture system, a landscape often overlooked due to its geographic difficulties. This case study will explore the various dimensions of wildlife damage and the strategies used by farmers to mitigate them, along with their effectiveness. The findings of this study are expected to contribute to the government and agricultural stakeholders for the development of more effective wildlife management practices, contributing to an overall enhancement in the agricultural production in the Palpa district of Nepal.

MATERIALS AND METHODS

Survey site

The survey was carried out in Bagnaskali Rural Municipality of Palpa District of Nepal (27.868165°N 83.589448°E). It lies in the Lumbini Province of Nepal. It is one of the 10 municipalities under the Palpa district. It has a total population of 18,498, comprising 8,396 males (45.4%) and 10,101 females (54.6%), with a literacy rate of 81.74% (National Population and Housing Census, 2021). With a total area of 84.17 Km², the rural municipality holds a population density of 220 people per Km² and is divided into 9 wards.

Questionnaire design

A structured questionnaire including questions related to the

socio-economic conditions of households, agricultural practices, crops cultivated, different wildlife that raided crops, types of crops damaged, and overall economic losses was designed. As pretesting needs to be conducted with a sample similar to the actual population to be surveyed (Hashim et al., 2022), it was carried out in the same municipality. This helps to validate the questionnaire, i.e. to check if questions work as intended and are understood (Hilton, 2015).

Sampling and data collection

A total of 73 farmers were randomly selected for participation in the study. The data was collected through interaction with the respondents in their local language (Nepali). In case the respondents did not understand the question properly, it was explained in full detail by the interviewer to get a precise answer. Before the survey, participants were informed about the study objectives, and verbal consent was obtained (O' Sullivan et al., 2021). Respondents were assured that their personal information would remain confidential and the data would be used solely for research and educational purposes (Kaiser, 2009).

Data analysis

The collected data were organized and analyzed using MS Excel and R Studio Version 4.4.1. Descriptive statistics were employed for summarizing the findings relevant to crop damage due to wildlife intervention.

RESULTS AND DISCUSSION

Socioeconomic and demographic characteristics

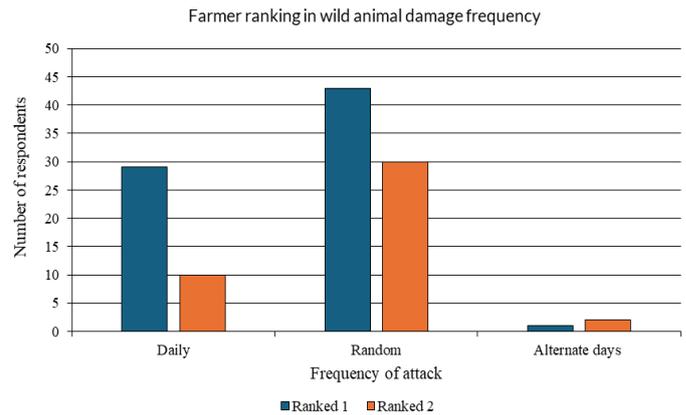
The survey was conducted among 73 households in the Bagnaskali Rural Municipality of Palpa district, Lumbini Province of Nepal (27.868165°N 83.589448°E). The average age of the surveyed population was 49.9 years, with 38.35% males and 61.65% females (Table 1). Most of the households were female-headed, agreeing with the result of the National Sample Census of Agriculture (NSCA, 2021). This increasing number of female-headed households is primarily due to the consequences of the economic recession and the mass migration of males to other countries (Prasain, 2025). Furthermore, 49.31% of people have an education at the primary level, while 21.91% of people do not have any formal education. This is a commonly observed pattern in rural and remote areas of Nepal, where a large section is deprived of education (UNICEF, 2022).

Distribution of sources of household income

The occupations were categorized as agriculture, Business, Teaching, Remittance, and Government Jobs. Among these, the major sources of income were agriculture and remittance, then business, teaching, government employment and working in hotels. Specifically, 80.82% of the population relied on agriculture, 6.84% relied on remittance, 5.47% considered business, and 4.10% were employees in the teaching field. This is in accordance with the national pattern where agriculture and remittance are key sources of Nepalese households' income (Pasa &

Table 1. Socioeconomic and demographic characteristics of the sampled household.

Variables	Percentage
Farm category	
Large scale(1-2ha)	31.50
Small scale (less than 1 ha)	68.50
Gender of household	
Male	38.35
Female	61.65
Education	
No formal education	21.91
Primary schooling	49.31
Secondary schooling	12.32
Higher secondary	16.43
Occupation	
Agriculture	80.82
Business	5.47
Teaching	4.10
Remittance	6.84
Government job	1.36
Hotel	1.36

**Figure 1.** Wildlife animal impacts on crop damage.**Table 2.** Wild animals' impact time on crop damage in the study area, ranked by the respondents (n = 73).

Period	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Early emergence	7	52	7	4	3
Vegetative growth	4	9	49	5	6
Post sowing	63	3	3	1	3
Flowering period	3	8	10	44	8
Maturity and harvesting period	0	0	11	15	47

Table 3. Frequency ranking of management strategies adopted by local government.

Effort	Frequency	Ranking
Group formation for effective management	50	1
Training in wildlife management	40	2
Increased financial support	60	3
Subsidized fencing/repellents	5	4
None	3	5

Kharel, 2024). Besides, 68.50% of the total population have small-scale agricultural land (less than 1 ha), while 31.50% of households have large-scale agricultural land (1-2 ha). This predominance of fragmented landholding is primarily related to traditional inheritance practice and topographical constraints in the hilly region of Nepal (Chaudhary et al., 2020).

Farming practices

According to the survey, people have been farming for more than 10 years in the same location. The most followed farming system is rice-wheat-maize, with 70%, and maize-rapeseed-wheat by 16%. They mainly grow rice, maize, and vegetables. Besides, Rapeseed, millet, Asparagus, Bean, potato, tomato, Pea, pigeon pea, rapeseed, garlic, barley, cauliflower, ginger, chilly, legume, and turmeric were also grown. All the farmers mentioned that the most affected crop by the wildlife is Maize, aligning with to results of Ghimire & Chalise (2018). It was followed by damage to vegetables and wheat. The high susceptibility of maize is likely due to its status as a staple food in the hilly region, including Palpa, and its preference by wildlife such as monkeys (Sapkota et al., 2018; Malla, 2025).

Wildlife animal impacts on crop damage

Monkeys, Rabbits, and deer were the major animals that damage the crop (Baral et al., 2021), as per the respondents. This is primarily because forests, naturally connected to agricultural land, serve as a close habitat to these wild animals (Thapa et al., 2020). Figure 1 presents the frequency of wild animal damage as ranked by farmers. Random attacks emerged as the most significant, with 42 respondents assigning them Rank 1 and 38 assigning Rank 2, highlighting their unpredictable and widespread nature (Table 2 and Figure 1). Such randomness may be related to the unpredictable feeding patterns of wildlife, seasonal tonality of food, and the vicinity of farmlands to forests (Paudel et al., 2024; Bhushal et al., 2024). Daily attacks were the second most common, with 28 respondents ranking them as Rank 1 and 10 as Rank 2, indicating a consistent but less frequent challenge compared to random occurrences. Alternate-day attacks were negligible, with only 2 respondents each assigning them Rank 1 and Rank 2, reflecting minimal concern in this category (Table 3). These findings reveal that random attacks are the dominant issue for farmers, requiring targeted management strategies, while daily attacks also pose a considerable challenge.

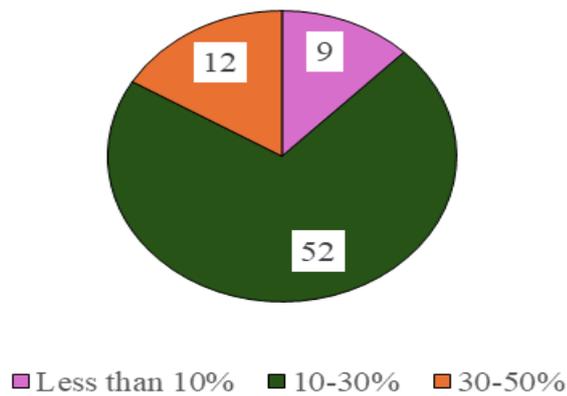


Figure 2. Crop yield loss due to wildlife impact.

Crop yield loss

Figure 2 illustrates the distribution of crop yield loss percentages caused by wildlife. A majority (52%) of the respondents reported losses ranging from 10% to 30%, indicating this as the most common range of impact. Meanwhile, 12% of the cases experienced more severe losses of 30% to 50%, suggesting significant challenges in those areas. A smaller proportion, 9%, reported minimal yield losses of less than 10%. These findings emphasize that wildlife-induced damage is a notable issue, predominantly affecting crops in the moderate loss range (10–30%), consistent with findings of Dahal *et al.* (2021). Although farmers incur such losses, they do not reduce their spending on food with extra money to compensate for the losses due to damaged crops. This may be because they either depend on subsistence farming or other sources of income like remittances. While considering factors like deforestation, urbanization, etc., which often influence wildlife interactions, farmers in Palpa believed that these do not significantly affect the intensity of crop damage. This might be because the severity of damage to crops is more dependent on the local wildlife movement and the availability of food or farms nearby. Similar arguments were made by Prins *et al.* (2021).

Impact on crop stage

The study analyzed the impact of wild animals on crop damage at different growth stages. The post-sowing period was identified as the most critical, with the highest number of respondents (63) ranking it as the most impacted time. The early emergence stage followed, indicating high vulnerability shortly after crops began to emerge. The vegetative growth phase showed a moderate impact, while the flowering period had significant damage but was ranked fourth. The maturity and harvesting periods were the least impacted, suggesting reduced vulnerability as crops reach maturity. Thus, early stages of crop development, particularly post-sowing and early emergence, are the most susceptible to wild animal damage. These findings are consistent with Anshul & Kumar (2025), who found that maximum damages (69%) by wild animals occurred in the germinating stage. The vulnerability during the younger stage of plants is because young plants are more tender and accessible to wild animals. The tougher plant tissues and less palatable features of crops

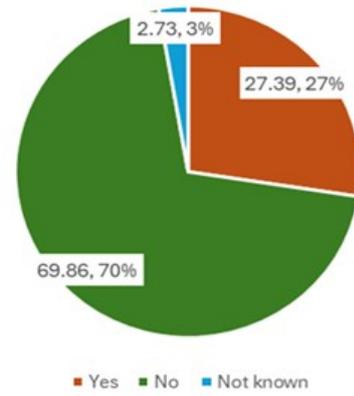


Figure 3. Perception of farmers towards the effectiveness of preventive measures.

lower the feeding of the wildlife as plants grow older. Effective management strategies should focus on these critical periods to minimize crop losses.

Farmer perception of wildlife damage and its prevention

About 96% of the farmers believe that they have some sorts of religious belief that affect the approach of wildlife management. A similar result was observed by Yeshey *et al.* (2023) and Niroula & Singh (2015), who found that the religious belief of respondents shaped their attitudes towards wildlife. Besides, only 15% said the trend of wildlife damage in crops over the last 5 years has decreased, while 85% fully agree with the fact that the damage is increasing day by day. A similar result was also found by Subedi *et al.* (2020). This upward trend of wildlife intervention can be related to escalating human-wildlife conflicts fueled by habitat encroachment and changing wildlife behaviour. Moreover, if the damage continues, about 76% of the total respondents said that they will opt out of this business and look for an alternative to farming. This high proportion planning to exit farming shows the intensity of socioeconomic impact that farmers from Palpa are facing due to wildlife damage. Approximately, farmers spend annually less than NPR 10000 (\$71.35) on preventive measures. 89.04% of farmers have not increased their spending on preventive measures within the last 5 years. Among the remaining who increased their spending, they increased by 10%, which is minimal compared to the economic losses, which average below NPR 50,000 (\$365.76) annually, still challenging profitability. 61.64% of the total farmers are adjusting their cropping patterns due to wildlife damage. Some are leaving the land fallow. This is in accordance with Gautam (2025), who mentioned that farmers in the hilly region of Nepal are choosing to abandon their farmland or move to other locations because of the threat of wild animals. Most of them are changing their crop by replacing it with less vulnerable crops like Asparagus, chili, ginger, and turmeric. Very few farmers have shifted toward citrus cultivation as well. 38.35% have mentioned that they must add extra costs while changing crops. The average cost that they are adding while changing the crop is NPR 7696.42 (\$54.92). These results show a complicated relationship between cultural beliefs, rising patterns of destruction, economic limitations, and adaptive coping mechanisms in the farmers of Nepal in the mid-hills.

Farmer's response to damage

There are several preventive measures that farmers adopt to cope with wildlife damage. Among all, scarecrow ranked 1st by 56.52% in effectiveness. This aligns with Paudel (2017), who found that apart from constant vigilance of farms, most farmers used scarecrows as a coping strategy against wild animals. The considerable use of this scarecrow is primarily due to its minimal cost and easy construction in the field. The second most used was the noise or light method, which, however, was only used by 16.43%. Guard animals, fencing, noise, or light methods are also used by the farmers (Wszelaki, 2025). The cost for any noise or light devices is less than NPR 5000. On the use of preventive measures for mitigating the wildlife intervention on agriculture, the data show significant pessimism among the farmers of the Palpa region. A massive 32.87% decided not to use any method in the field to deal with this issue. This is shown in Figure 3, where only 27% believe that the strategies to control damage are effective, while 70% are indifferent to the effectiveness of these methods. 3% of people are unaware of the efficacy of the use of these methods. This is an interesting finding, which is in contrast to Ghimire *et al.* (2022), who found that farmers used at least one method and technique to prevent crop damage. This reluctance from farmer can be a result of a lack of adequate resources, the absence of effective options, and a belief that the use of these interventions is an additional burden to their already-declining agricultural income. This dissatisfaction is also a result of the ineffectiveness of the use of a single method for crop protection. Thapa (2010) argued that because of the range in the sizes of these wild animals, feeding, the type of crops and the distance to farmland, no particular measures would be adequate for all. An example is that the deer method cannot be applied to the elephants because they are large and feed differently. Overall, the data has shown a concerning picture of farmers of Palpa who aren't very convinced to mitigate the problems primarily due to a lack of accessible, effective, and affordable solutions to the wildlife intervention issue on their farms.

Local government efforts for wildlife damage management

A majority (94.5%) of the farmers are receiving some sort of governmental or non-governmental support for wildlife damage control. However, the relief and compensation packages received aren't adequate and are not easily available to poor rural farmers (Paudel, 2024). 28.78% of farmers receive the sound gun as a means of support. The local government's efforts to assist farmers in managing wildlife-induced crop damage in Palpa District have been varied in frequency and effectiveness. The most impactful initiative has been the formation of farmer groups, cited by 50 respondents. This might be due to the farmer group being effective in facilitating collective action and resource sharing (Hazard *et al.*, 2022). Training programs on wildlife management, noted by 40 respondents, have also been significant in equipping farmers with the necessary skills. Financial support, although ranked third, was mentioned by 60 respondents, indicating its importance in mitigating economic losses. Subsidized fencing and repellents were less frequently mentioned, suggest-

ing limited reach. A small number of respondents (3) reported receiving no support, highlighting gaps in the implementation of these initiatives. The ineffectiveness can be a result of local government having a lack of adequate resources and authority to take rigid strategies, as mentioned by Pokhrel (2025). Overall, while the efforts are beneficial, there is a need for broader site-specific strategies and technical and financial support to effectively reduce wildlife damage to crops (Pandey & Bajracharya, 2016). Allocation of internal budget for crop losses can be a significant help to the farmers (Upreti, 2025).

Conclusion

The study highlights significant challenges faced by farmers from Palpa district due to the impact of wildlife damage on crop production. Local Farmers, primarily engaged in rice-wheat-maize farming systems, have been facing critical interference from wild animals like monkeys, rabbits and deer. Random attacks by these animals in the field were experienced by most farmers. The damage is critical during the early stage of crop development, particularly post post-sowing stage. Most farmers have experienced that the intensity of these wildlife interventions has increased in the last five years. Despite using preventive measures like scarecrows and noise devices, farmers aren't satisfied with their effectiveness. They are also planning to seek an alternative to farming due to a consistent increase in agricultural damage. Therefore, there is a clear need for broader, site-specific strategies supported by technical and financial assistance to effectively reduce wildlife damage to crops in Palpa district, Nepal.

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DECLARATIONS

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