

# QUANTITATIVE EVALUATION OF CROP DAMAGE BY WILD ANIMALS IN CHENAB VALLEY OF JAMMU AND KASHMIR INDIA

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## ABSTRACT

Chenab valley has varied climatic and topographic zones. The cropping system includes rice, wheat, maize, pulses and mustard as major crops. Crop depredation by wild animals is a major problem faced by the local farmers. Crop raiding by wild animals is to be a source of conflict between the animals and humans. The losses incurred by farmer communities living in these areas have antagonistic and intolerant attitude towards wildlife. Proximity of a farm to the forest edge and the presence or absence of neighboring farms best explains the livelihood of any farm sustaining crop damage. Crop losses lead to retaliatory killings of wildlife by the farmers. Crops are damaged not only by feeding but also by trampling and uprooting. Crop damage is one of the main threats to the continued survival of local farmers in study site. During present investigation crop losses were analyzed through questionnaire surveys and field visits. Results of field experience depict the crop loss in percent due to wild animals.

**Key Words:** Cropping system, Crop depredation, trampling and human retaliation.

## INTRODUCTION

The state Jammu and Kashmir is located in North-Western Himalayan regions in India. It has distinct climatic zones viz. Jammu region, temperate mid hills, temperate Kashmir valley and cold arid zone of Ladakh. The cropping system of the state includes rice and wheat as the major crops in irrigated areas whereas in rain fed areas the usual cropping system is wheat and maize as the major crops along with pulses. The Chenab valley is part of Jammu and Kashmir in India and state has occupied 222236 km<sup>2</sup> geographical areas comprising 72.62% rural population. The study site i.e. Chenab Valley is broadly divided into two districts viz. Doda and Kishtwar with geographical area 11691 Km<sup>2</sup> and 109434 km<sup>2</sup> (**India state of forest Report, 2015**). Majority of population in study area is dependent on agriculture sector for basic livelihood. Crop damage due to wild animals is serious problem in the valley. The incidents of crop damage are very high in the farms close to forests (**Bindu et al., 2017**). Wild animals move into the crop fields that humans grow for their own use. Local farmers guards their fields in order to prevent crop damage (**Sillero and Laurenson., 2001**). Among all the guarding methods, night visits and scarecrow are found to be most popular. Local farmers also use crackers and wooden fences are also used as guarding measures against crop damage (**Kumar et al., 2017**). Wildlife crop damage has negative impacts on rural food and livelihood security resulting from shortage of nutritional supplements and inadequate food reserves. Consequently, crop losses form negative perceptions in local farmers about invading wildlife species, which lead to retaliatory killings of wildlife (**Hill, 2012**). Crops are damaged not only by feeding but also by trampling and uprooting by the wild animals. Crop-raiding by wild animals had been known to be the source of conflict between the animals and humans (**Linkie et al., 2007**). Human wildlife conflict is one of the one of the main threat to the continued survival of many species and a significant threat to local populations.

Proximity of a farm to the forest edge and the presence or absence of neighboring farms best explains the likelihood of any farm sustaining crop damage (Warren *et al.*, 2007). Farmers that reside close to the border of forest reserves are vulnerable to crop raiding. Primate species raid crops because of their adaptability, intelligence and manipulative abilities. Crop raiding is cause of much conflict between farmers and wildlife. Conflict causing vertebrates has caused damage to agricultural crops and has been widely documented in different parts of India (Sethy and Chauhan., 2013). Most of the species has lost their natural habitat and adapted them to the man-altered situation which could be the main cause of crop damage. Habitat fragmentation of wild animals due to rapid deforestation also prompts these animals to enter in crop fields (Hartter, 2011). The aim of study is to extrapolate the crop losses of farmers due to uncontrolled damage by wild animals.

## MATERIALS AND METHOD

### 1) Study Area

The study area is Chenab valley which is part of state Jammu and Kashmir India. Chenab valley is comprised of two major districts i.e. Doda and Kishtwar with latitude 33.1300” and 33.3167” and altitude 3631 feet and 5374 feet respectively. The study site Chenab Valley is selected due to high frequency of crop loss facing by the farmers. Valley is known for its agricultural practices.



Fig.1. Map of study area

### 2) Methodology of Data Collection

#### Sampling Design

Field visit was conducted in 10 villages from the study area. Each village is selected randomly and questionnaire survey was conducted among the farmers. Two kinds of crops are sown in study site i.e. Rabi and Kharif. Rabi crops are sown in winter and are harvested in summer and Kharif crops are sown in summer and are harvested in winter. The study area has following crops mentioned *vide infra*.

Table.1. Major Crops sown of study area

S. No.	Crop	Season
1.	Paddy	Kharif
2.	Maize	Kharif

3.	Wheat	Rabi
4.	Pulses	Kharif Rabi
5.	Oilseed	Kharif Rabi
6.	Fodder	Kharif Rabi

### Field Visits

The methodology of data collection is based on evidences collected from the farmers during field visits from the study area. The field visit was conducted after ripening, crop harvesting and storage.

### Questionnaire Survey

The questionnaire survey was conducted in randomly selected villages of Chenab valley. The survey was conducted during the month of September-October 2018. The farmers who worked in the farms were selected as respondent to questionnaire (total of 25 questions) and these farmers are directly or indirectly dependent on agriculture for basic livelihood. The questionnaire was distributed among the farmers in order to estimate and analyze statistically the crop damage caused by wild animals.

### RESULTS

The questionnaire survey was conducted in randomly selected five villages i.e. Jagrote, Sharerna, Rehi, Chansu and Saras of Chenab valley dominated with food crops. The questionnaire was distributed among the farmers. The expected and actual production was calculated by,

$$\text{Mean}(\bar{X}), \quad \bar{X} = \frac{\sum x}{N} \text{ where, } \sum x = \text{Sum of observations}$$

N = Total number of observations

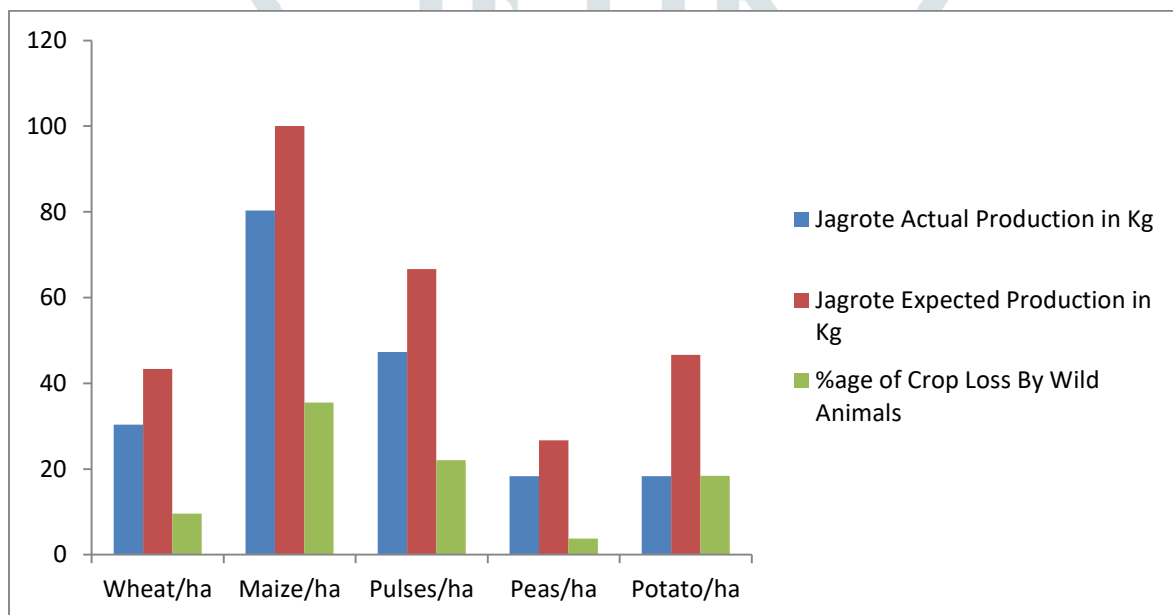
The actual and expected crop production during the month September-October in 2018 was recorded and the percent crop loss from the collected data is statistically analyzed *vide infra*.table.2.

**Table.2.** Actual and expected crop production in study site

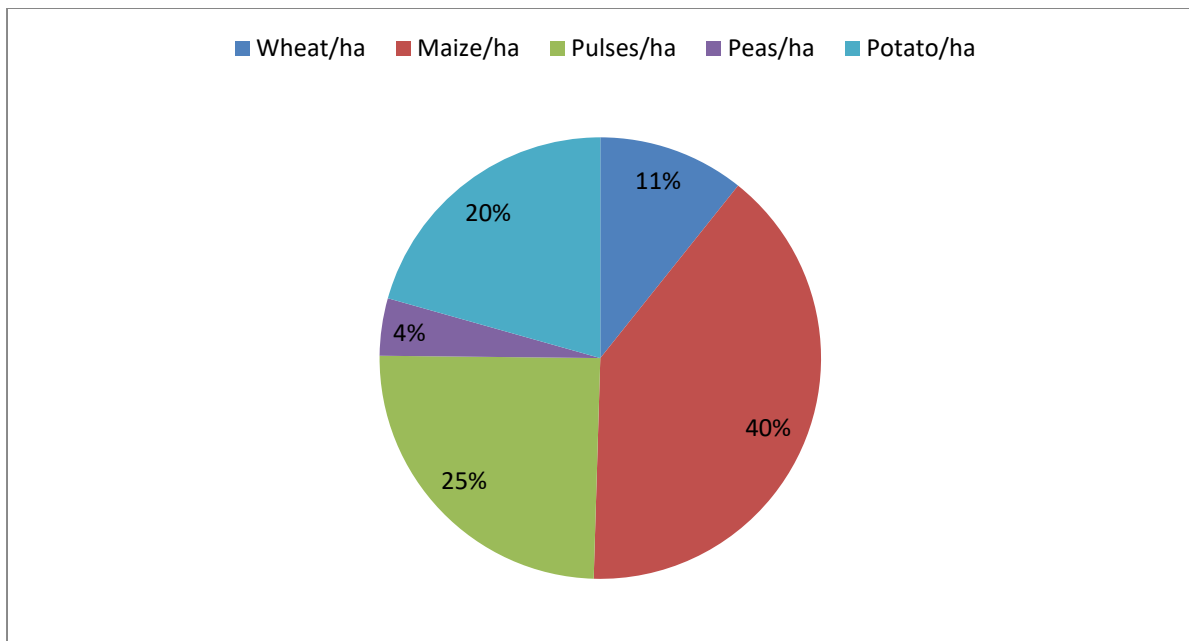
	Wheat/ha	Maize/ha	Pulses/ha	Peas/ha	Potato/ha
<b>Jagrote Actual Production in Kg</b>	30.33	80.33	47.33	18.33	18.33
<b>Jagrote Expected Production in Kg</b>	43.33	100	66.66	26.66	46.66
<b>Percent of Crop Loss By Wild Animals</b>	9.5758	35.4709	22.0343	3.74767	18.4117
<b>Sharerna Actual Production in Kg</b>	30.66	82.66	13.33	2.66	19
<b>Sharerna Expected Production in Kg</b>	40	103.33	21.66	6.66	26.66
<b>%age of Crop Loss By Wild Animals</b>	28.264	38.4441	2.91467	0.3728	3.49756

<b>Rehi Actual Production in Kg</b>	22.66	56.33	18	8.66	24.66
<b>Rehi Expected Production in Kg</b>	30	66.66	23.33	11.66	33.33
<b>%age of Crop Loss By Wild Animals</b>	3.86524	12.7049	2.20289	0.6096	5.02773
<b>Chansu Actual Production in Kg</b>	0	541	28.33	367	303.33
<b>Chansu Expected Production in Kg</b>	0	543	130	386.66	333.33
<b>%age of Crop Loss By Wild Animals</b>	0	21.68	160.974	148.17	190.998
<b>Saras Actual Production in Kg</b>	160	231	16.33	313.33	23.33
<b>Saras Expected Production in Kg</b>	300	350	28.66	500	332.33
<b>%age of Crop Loss By Wild Animals</b>	644	691.39	5.54727	1518.24	1098.99

**Jagrote:** This village has high actual production of maize and least actual production of peas. The expected production of potato has high mean value and least expected production value of peas (Fig.2). The pie chart (Fig.3.) depicts the high percent loss of maize followed by pulses, potato, wheat and peas respectively.

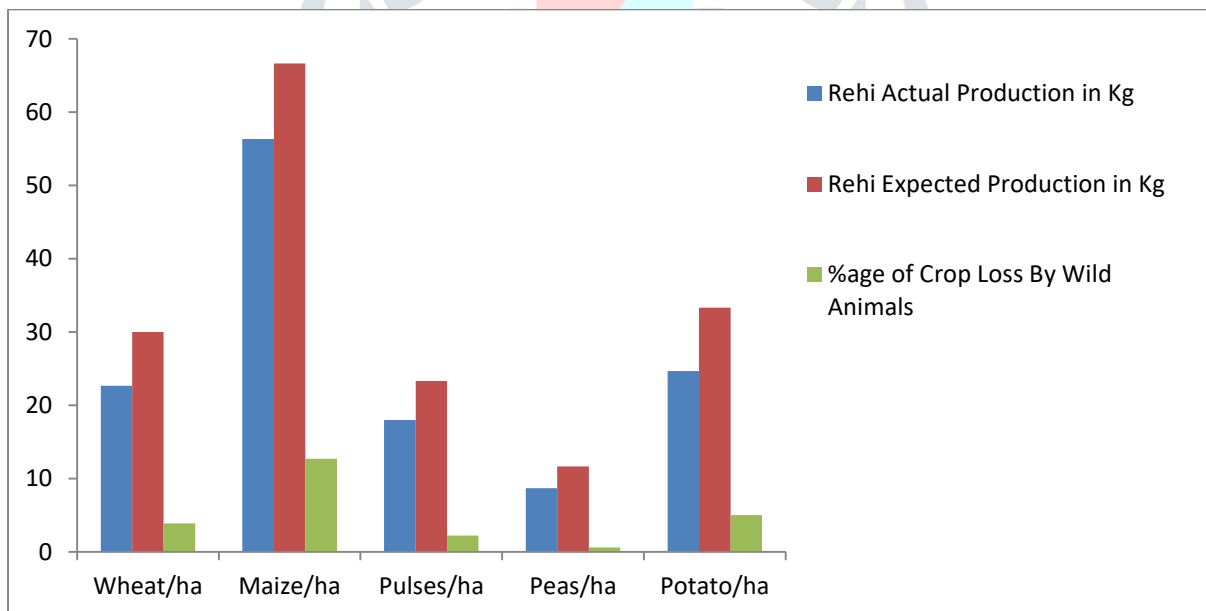


**Fig.2. Graph depicting the crop damage in Jagrote**

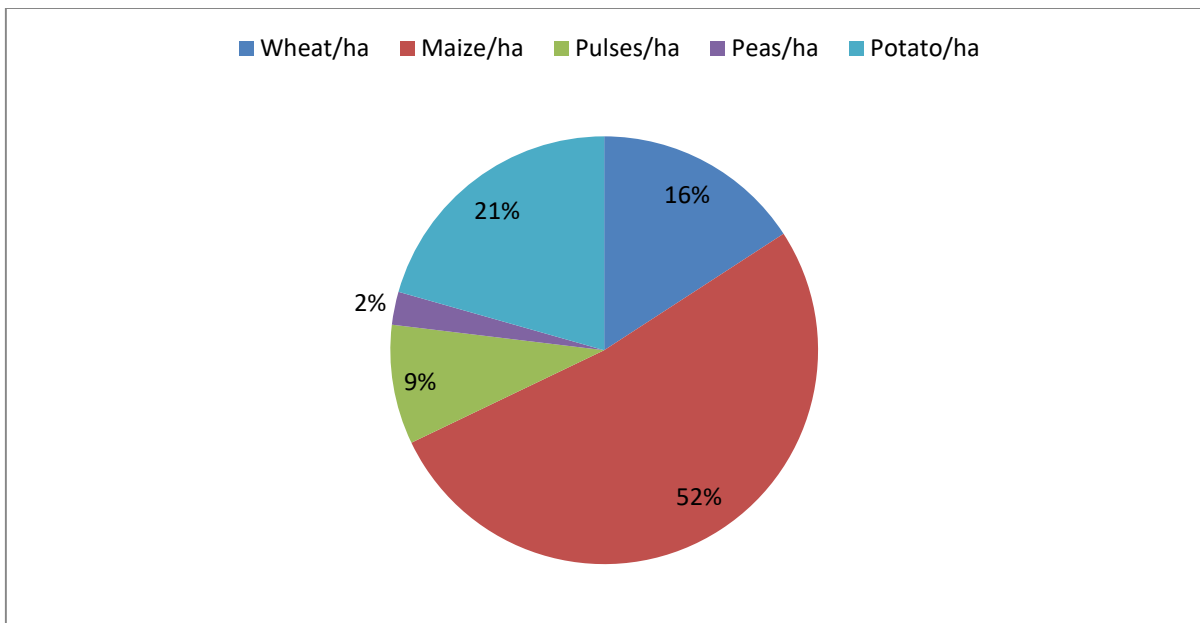


**Fig.3. Pie Chart depicting crop loss of Jagrote**

**Rehi:** This village has also high actual production of maize and least actual production of peas. The expected production of maize has high mean value and least expected production mean value of peas (Fig.4). The pie chart (Fig.5.) depicts the high percent loss of maize followed by potato, wheat, pulses and peas respectively.

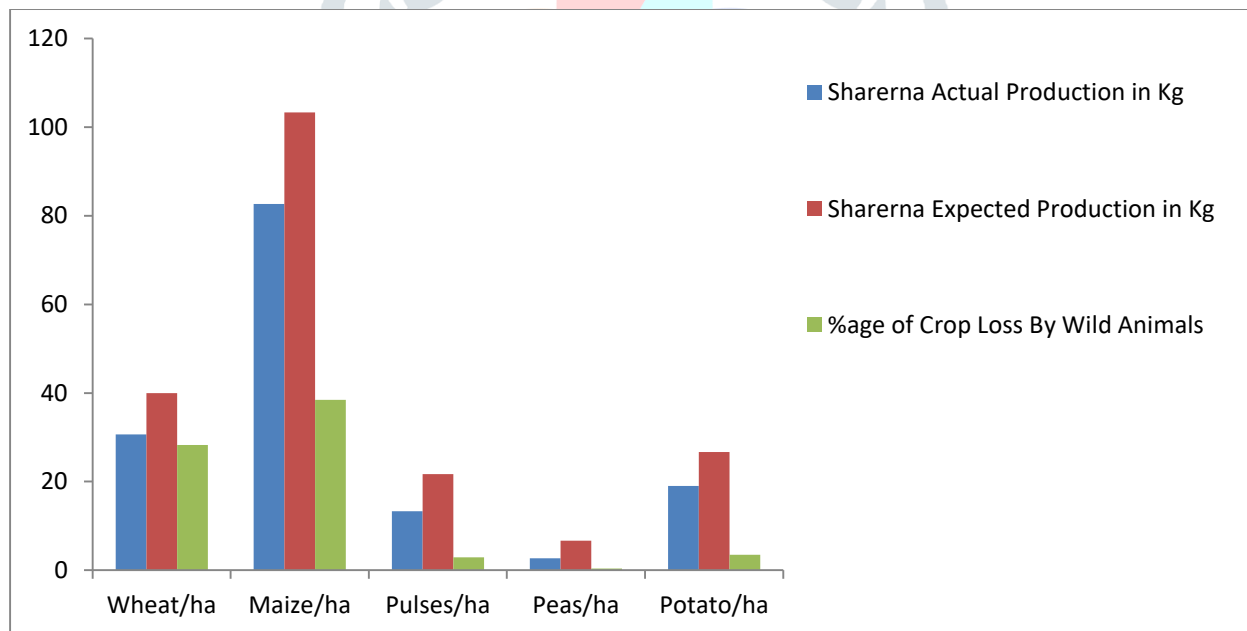


**Fig.4. Graph depicting the crop damage in Rehi**

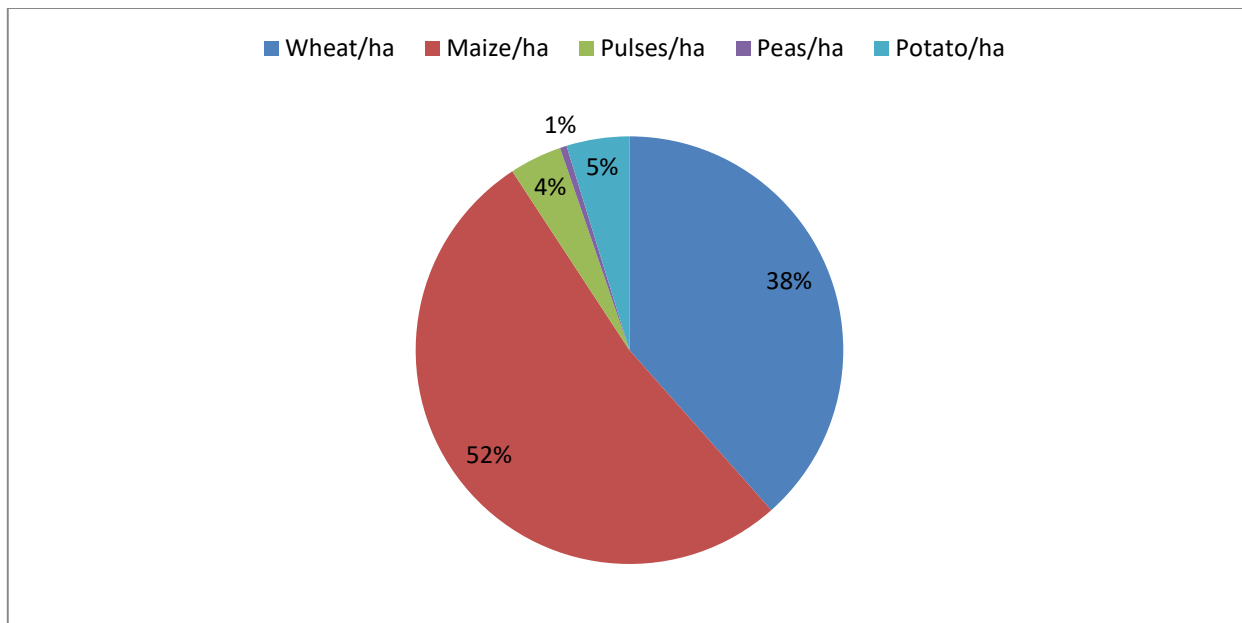


**Fig.5. Pie chart depicting percent crop loss in Rehi**

**Sharerna:** This village has high actual production of maize and least actual production of pulses and peas. The expected production of maize has high mean value and least expected production mean value of peas (Fig.6). The pie chart (Fig.7.) depicts the high percent loss of maize followed by wheat, potato, pulses and peas respectively.

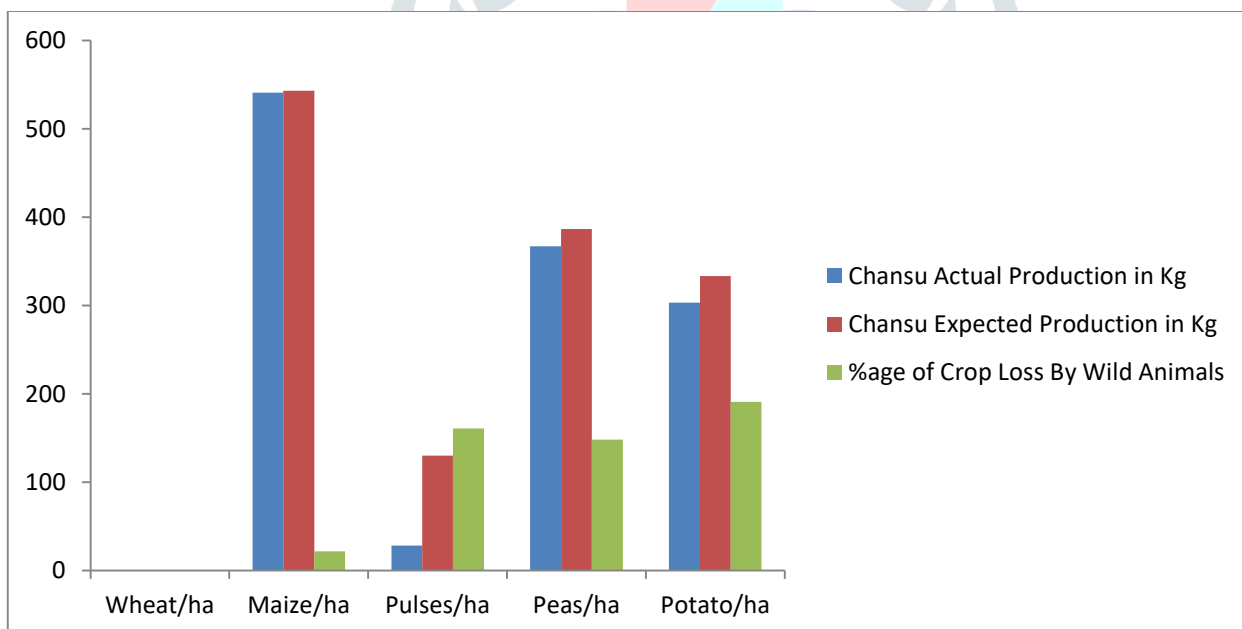


**Fig.6. Graph depicting the crop damage in Sharerna**

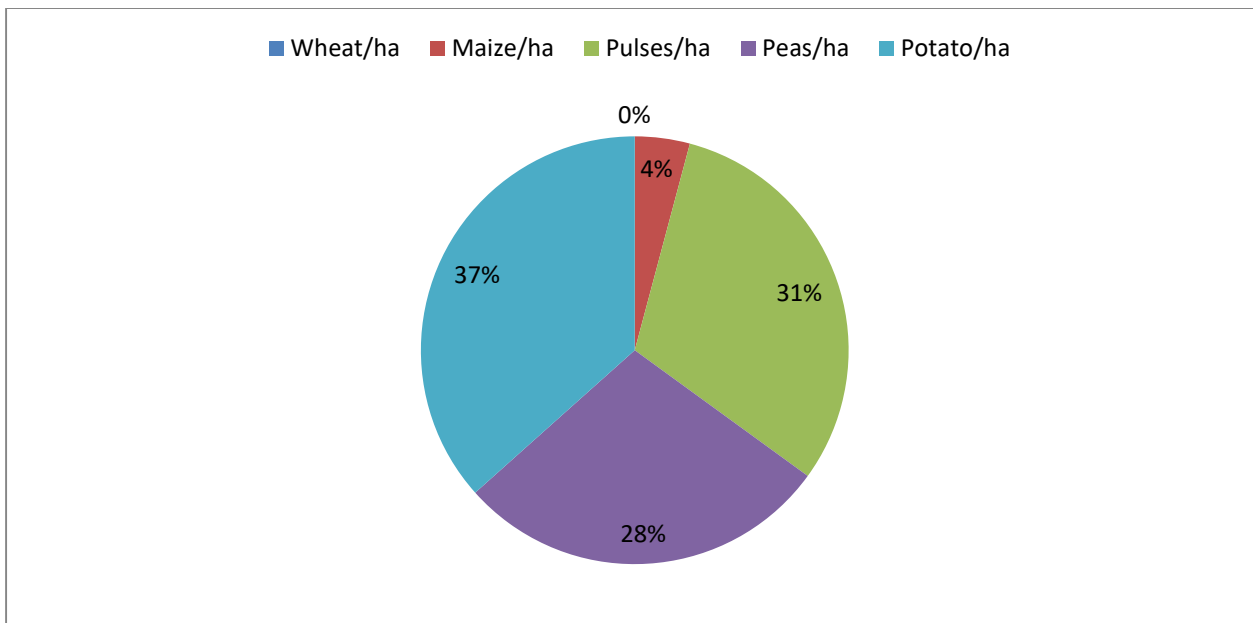


**Fig.7. Pie chart depicting percent crop loss in Sharerna**

**Chansu:** This village has also high actual production of maize and least actual production of pulses. The expected production of pulses has high mean value and least expected production mean value of maize (Fig.8). The pie chart (Fig.9.) depicts the high percent loss of potato followed by peas, pulses and wheat respectively. In this village there is no production of wheat.

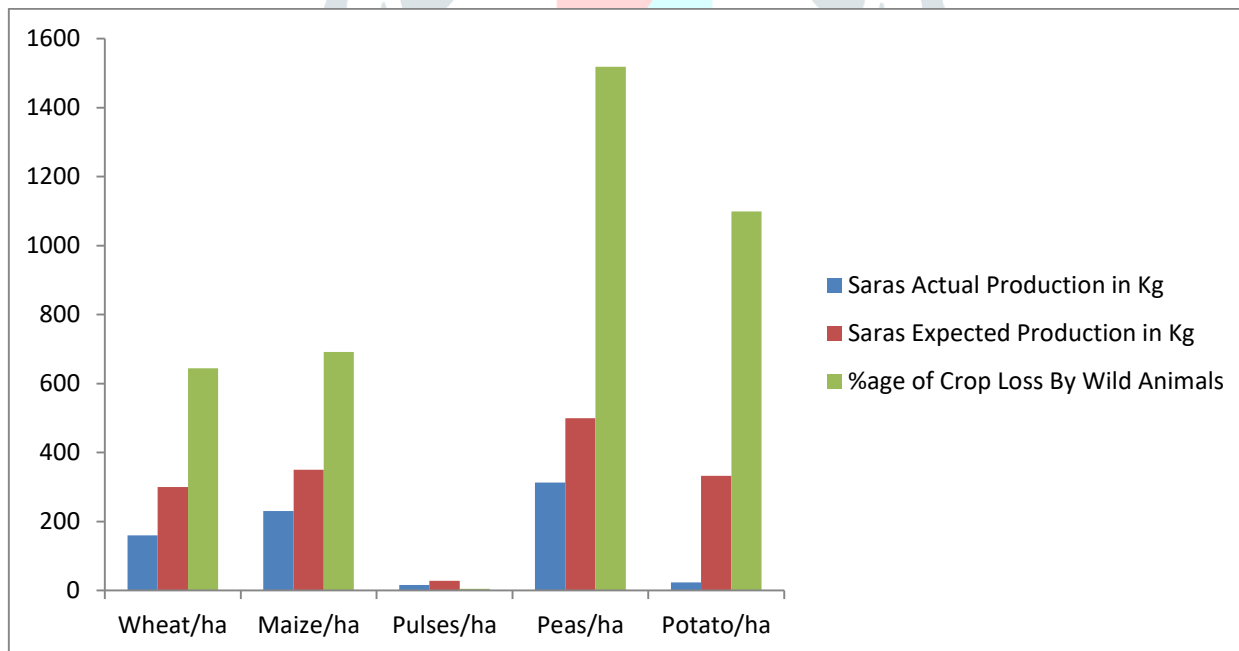


**Fig.8. Graph showing the crop damage in Chansu**



**Fig.9. Pie chart depicting percent crop loss of Chansu**

**Saras:** This village has also high actual production of peas and least actual production of pulses. The expected production of peas has high mean value and least expected production mean value of pulses (Fig.10). The pie chart (Fig.11.) depicts the high percent loss of peas followed by potato and maize respectively. In this village there has been zero percent loss of pulses.



**Fig.10. Graph showing crop damage in Saras**



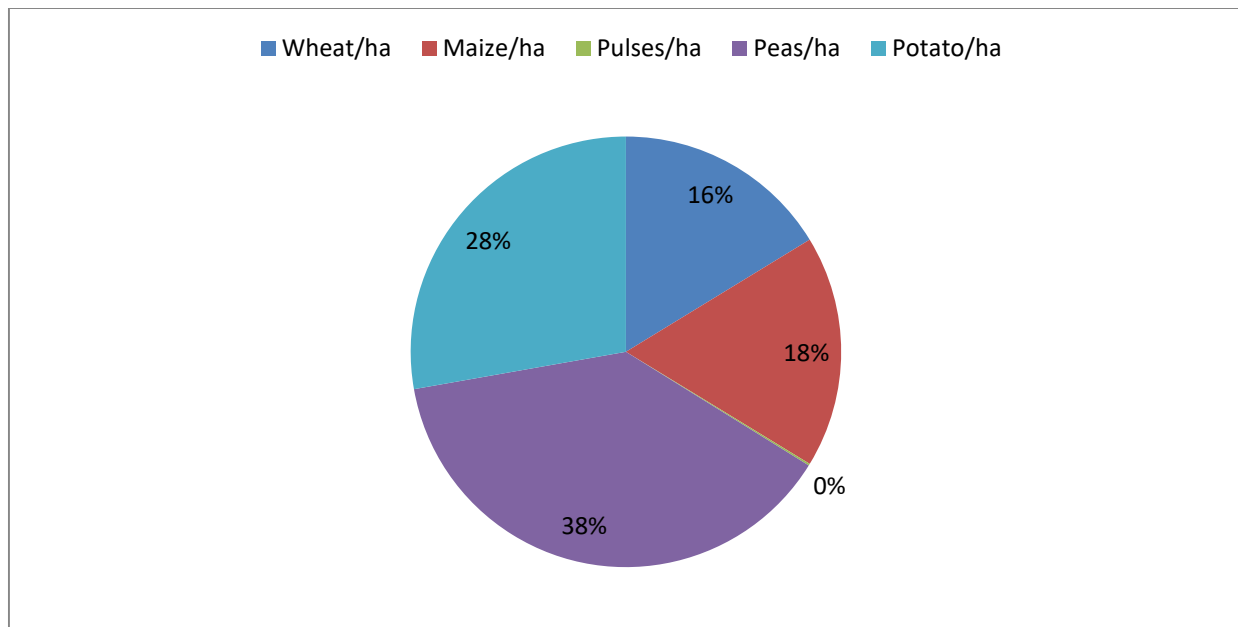


Fig.11. Pie chart depicting percent crop loss in Saras

## DISCUSSION

The crop damage caused by wild animals has been a highly topical issue. The finding of present study reveals that crop varieties, distance of the farm from the park boundary, and the surrounding ecology are the main factors in crop damage. Crop damage by wild animals occurs in study site which is in the form of feeding, trampling and uprooting as the questionnaire results are supporting the hypothesis. Even though both agricultural damage and livestock depredation were observed in the study area but crop loss due to wildlife was the most serious problem in the study sites (Caro *et al.*, 2011). It differs from site to site depending on distance from the forest and others. Most of the crop losses occur in the Jagrote village of Chenab valley. As this village is close to the boundaries of forest area and therefore crops are more frequently attacked by wild animals (Kideghesho, 2010). Those living closer to the forest experience more contact with wild animals such as leopard and black bear (Oguto *et al.*, 2012). Annually an average loss of 20kg wheat, 10kg mustard, 60kg maize, 15kg peas and 15kg potato as per household is a big loss when taking into consideration that most of the people in the study area depend on agricultural production. Local farmers have negative attitude toward wild animals due to losses they incur in the form of crop damage and sometimes their own injuries or loss of life. Those farmers who incurred most loss are more negative towards wild animals this is evident from the respondents of all the villages (Roskaft *et al.*, 2007). Similar findings have been reported from most of the respondents of Chenab valley and those farmers perform retaliatory behavior on crop raider species (Holmern *et al.*, 2007). Those farmers who are away from forests areas face least crop damage.

## CONCLUSION

Crop damage is frequent in valley due to wild animals. Although different means are used to prevent crop damage, most of the means are only temporarily effective. Different types of preventive measures are used by the local farmers including traditional measures for different types of animals. Therefore there is a need for site-specific management techniques to minimize the crop loss problem faced by the farmers by wild animals. As households stated, a few crops avoided by wildlife provide economic benefits, park management should conduct further research on sustainability of those crops. In addition, exchange of

information among farmers about different mitigating means, and a learning process within the park management could help to minimize the crop damage problems.

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## CONFLICT OF INTEREST

The author declares no conflict of interest.

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