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Preliminary observations on the Indian wild boar (*Sus scrofa*) and ITS damage in agricultural crop fields

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Abstract

The Indian wild boar (*Sus scrofa* L.) is widespread animal throughout the India. A preliminary study was conducted to observe the prevalence of Indian wild boar (*Sus scrofa*) and its damage in agricultural crop fields in three selected areas in Punjab. The study period ranges from December 2016 – March 2018. During this period Indian wild boar activity was recorded to be 70.21%, 90.9% and 81.81% of the total number of observations at PAU (Ludhiana), University Seed Farm (Ladhowal) and Regional Station for Kandi area, Ballawal Saunkhri (SBS Nagar) respectively. For the study of pug-marks of Indian wild boar, Plaster of Paris casts of pug marks were prepared (n=16) from all the three selected locations which revealed the presence of juvenile (18.75%), sub-adult (25.0%) and adult (56.25%) individuals. The study also revealed that on an average 15-20% of the crop were damaged by Indian wild boar. More damage was observed to maize (*Zea mays*), Jawar (*Sorghum vulgare*), Rice (*Oryza sativa*), *Brassica spp.* and vegetables crops. The incident of damage was very high in crop fields adjacent to forest area. The farmers also used some traditional methods to minimize the damage of animals over the agricultural crops.

Keywords: Indian wild boar, agricultural crop fields, damage, pug marks, breeding season

1. Introduction

The Indian wild boar (*Sus scrofa* L.) also known as the wild pig is widespread animals throughout the world [1]. This species is native of North Africa and Eurasia (Europe and Asia) [2]. During the Europe exploration, wild boar was used for certain livestock practices in Eastern U.S. and certain European countries which results in the increase in population of wild boar. In some areas of the world Indian wild boar was used for domestication purposes [3]. The 'Sow' is the traditional name of the female wild boar that comes from the Western Germanic and Old English countries of certain wild boar species and is more related to the modern German 'Sau' [4]. The Indian wild boar belongs to the Family –Suidae, Order- Artiodactyla, Class-Mammalia, Genus- *Sus* and species- *scrofa*. The animal is medium sized, of mixed coloured and having short legs. The organs of smell are well developed and organs of hearing and sight are poorly developed due to the small size of eyes. The neck is thick, short and its shoulder arises upward forming a hump [5]. Indian wild boar is omnivorous in nature but mainly feeds on small mammals, birds, reptiles, amphibians, fishes, insects, vegetables and cereal crops etc [6]. They live in the mixed forest area which provides protective shelter and food resources to the animals but they mostly prefer areas near human habitation because the chance of food availability increases [6]. The animal requires large amount of food and the requirement of food increases during the winter and breeding season [7]. The breeding period of Indian wild boar starts from November- April in Punjab. During the breeding period animals require large amount of food resources for increasing the weight of body and thickness of insulating coat of body. A single male mates with 5-6 female boars at a time. This results in the loss of weight of male boar up to 20% as compared to the weight of animal before the start of breeding period [2]. After the breeding period male boar leaves the female and the young ones. The gestation period of female Indian wild boar varies with age. The average gestation period of pregnant female boar completes in 120-128 days but in older female takes longer. The young ones are produced in March - April in Punjab. The female produces 4-6 piglets in each litter but the number of piglets may vary from female to female [2]. The average life span of Indian wild boar is 10- 12 years. But it varies depending upon the various factors which influence the life activity of animals such as- food resources, shelter space, protection from enemies and other harmful diseases [6, 8].

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In 1990, 16 species of wild boar were recognized, which are divided into 4 groups depending upon the skull height and lacrimal bone length [9]. The Indian wild boar spreads the a number of diseases to domestic animals species. They cause foot and mouth disease, Swine plague and some other epizootics animals [2]. The Indian wild boar causes large damage to agricultural crops such as Rice, Sugarcane, Potato, and vegetables crops [2]. They cause damage to the crops when food becomes less available in natural environment [10]. The population of Indian wild boar is decreasing due to excessive hunting and loss of habitat [11]. The IUCN has classified them as animals present under Least Concern categories [13].

2. Materials and methods

2.1 Study Area

The study of prevalence and damage activity of Indian wild boar was carried out at three selected locations of Punjab *i.e.* Site I- Punjab Agricultural University Campus (Ludhiana; 75.79° E, 30.90° N, above mean sea level – 189m), Site II- University Seed Farm Ladhawal (Ludhiana; 75. 49° E, 30.59° N, above mean sea level - 189m) and Site III- Regional Station for Kandi area, Ballawal Saunkhri (Shaheed Bhagat Singh Nagar; 76.38° E, 31.09° N, above mean sea level- 295m) from December 2016 –March 2018 respectively. The questionnaire survey was conducted between December 2017- January 2018 from 10 villages of 3selected locations [14].

2.2 Materials

The camera (Sony DSC-H300) was used to capture the pictures from research field areas. GNSS viewer navigation application was used to know altitude, longitude and latitude of particular locations. The digital vernier caliper was used to measure the dimensions of casts of pug marks of Indian wild boar.

2.3 Methods

Regular observations were taken from the selected locations *i.e.* fortnightly from Punjab Agricultural University Campus, Ludhiana, bi-monthly from University Seed Farm Ladhawal (Ludhiana) and monthly from Regional Station for Kandi area, Ballawal Saunkhri (Shaheed Bhagat Singh Nagar). During data collection Line-Transect and Pug – marks methods were followed [15]. The other activities of the Indian wild boar including foraging, wallowing and track marks in the agriculture crop field were also observed. The damage of Indian wild boar to various crops at different time and stages of plants were also observed. The pug casts preparing method was used to prepare the pug marks of animal with the help of Plaster of Paris [16].

The data on damage was collected with the help of questionnaire form [14] (Table 3). Each form carried 19 questions related to Indian wild boar damage caused by animals to which crops, at what stage and season and how much damaged was caused by them. We also collected information about the identification of animal and the type of management practices used by farmers to minimize the damage of animals to crops. Interviews of farmers having agriculture as the only source of income were taken. The damage of Indian wild boar in agricultural fields was assessed with the help of survey forms. Traditional methods which are being used to deter the Indian wild boar were also recorded.

3. Results and Discussion

A total of 80 observations were taken from three selected locations. During these observations 33 out of 47 (70.21%), 20 out of 22 (90.9%) and 9 out of 11 (81.81%) times activities of Indian wild boar were observed in orchard fruit crop area at site I, in crop fields at site II and in orchard fruit crop at site III respectively. The damage of Indian wild boar to different agricultural crops was mostly observed in fields at site II and site III (Table 1).

Table 1: Observations on the Indian Wild Boar at selected locations of Punjab

Location	No. of visits	Presence of Indian wild boar	Observation on the basis of Foot-Print / wallowing / Excreta	Observation on the basis of damage caused by Indian Wild Boar
PAU, Campus, Ludhiana	47	Yes (33)	Yes (70.21%)	Nil
Ladhawal, Ludhiana	22	Yes (20)	Yes (90.9%)	Yes
Ballawal Saunkhri, SBS Nagar	11	Yes (9)	Yes (81.81%)	Yes

The Pug-marks casts of Indian wild boar were prepared from all the three selected locations. The casts of Pug-marks of animals were prepared by the following method of Plaster of Paris [16]. The different casts of pug-marks were prepared, marked and dimensions were recorded. These pug-marks

were distinguished on the basis of their size into different life stages of individuals. Out of total casts of pug-marks (n=16) prepared, presence of juvenile (18.75%), sub-adult (25.0%) and adult (56.25%) individuals was revealed (Table 2).

Table 2: Measurements of the Pug-marks of Indian Wild Boar

Sr. No.	Length (cm.)	Width (cm.)	Life Stage of Individual
1	4.9	5.1	Sub- adult
2	4.1	4.8	Juvenile
3	4.0	3.7	Juvenile
4	5.8	5.5	Adult
5	4.6	5.0	Sub- adult
6	5.3	4.2	Adult
7	5.1	4.7	Adult
8	5.5	4.6	Adult
9	5.0	4.4	Adult
10	5.3	4.3	Adult
11	4.8	4.2	Sub- adult
12	5.8	4.4	Adult
13	4.3	4.6	Sub- adult
14	4.5	4.0	Juvenile
15	6.5	5.3	Adult
16	8.0	7.5	Adult
Mean	5.21	4.76	

During the survey moderate amount of damage was observed at site II during every visit. Most of the damage to crops was recorded in July – February months. The Indian wild boar causes damage to different crops at different time period ^[11]. In case of Rice, damage was observed from July- November months. The Potato crop was damaged from November – February months. Pearl Millet crop damage was observed in October month. The damage to mustard crop was observed from December – January months. In the orchard, damage to fruit crops was observed from July- March. The foot-marks tracks were observed in every visit. The damage to maize crop was very less as it was protected by barbed fencing. The use of electric fencing around the Rice and Potato crops at some fields was also observed at site II. At all the three sites, chain link fencing was used by the farmers around the fruit crops providing protection from the damage by animals to the crops. The animals caused the damage to crops during the breeding period due to increase in requirement of food and metabolic rate ^[11]. It was observed that Indian wild boar causes the damage to rice and potato crops during maturing stage rather than very early and late stage as that period coincides with the last phase of pregnancy of female Indian wild boar that demands more food ^[11].

The data on damage was collected with the help of questionnaire form (Table 3). On the basis of survey conducted at selected locations, 96% of farmers agreed that damage was caused by wild animals to crop fields 56% of farmers agreed that all wild animals were harmful to agricultural crops while 46% did not agree. Similar findings were also reported by other workers, revealed that primates and elephant cause considerable damage during maturation maize, cassava and banana in the fields ^[11, 12]. 12% of farmers agreed that wild animals were harmful in one way but beneficial in another way, 45% did not agree and 43% of farmers expressed no knowledge about it. All the farmers agreed that management of harmful animals can be done before the inflorescence stage. Large number of farmers (91%) agreed that more damage was there in crop fields which were present near the forest area. It was clear to farmers (93%) that yield of crops increased after management practices were adopted in crop field. 79% of farmers agreed that damage of animals to crops was after harvesting but 20% did not agree. 98% of farmers agreed that traditional methods were suitable methods for protection of crops from harmful animals but 2% did not agree. 78% farmers agreed that management of harmful animals was possible at their own level but 20% did not agree and 2% expressed ignorance. All the farmers who were interviewed agreed that management of harmful animals was possible at village level, efforts of scientists and policies of government play important role to manage the damage by harmful animals to agricultural crops and the damage of crops by harmful animals can be controlled after obtaining the training from concerned authorities.

The farmers used traditional methods to control the damage to agriculture crops from Indian wild boar. Different opinions were observed *i.e.* (a) 80% of farmers agreed with use of barbed fencing but 18% did not. (b) 100% of farmers agreed with use of electric fencing. (c) 100% of farmers agreed with scaring of harmful animals from crop field. 74% of farmers agreed with use of human hairs for irritation, 9% did not agree and 17% of farmers had no idea. 62% of farmers agreed with plantation of thorny plants around crop field, 33% did not agree and 5% denied any knowledge. 65% of farmers agreed with digging of trenches around crop field, 27% did not agree and 8% had no knowledge. The farmers (100%) agreed that

hunting of wild animal is prohibited (Table 3).

Table 3: Overview on questionnaire prepared on the basis of animals harmful to both the agricultural crops and human being depending upon the life activity

1.	Identification about wild animals coming to crop fields.		
	Less (2)	Moderate (13)	More (85)
2.	Loss caused by wild animals to agricultural crops.		
	Less (4)	Moderate (58)	More (38)
3.	All the wild animals harmful to agricultural crops.		
	Agree (44)	Disagree (46)	Not known (10)
4.	Its possible, the animal harmful in one way but beneficial in another way.		
	Agree (12)	Disagree (45)	Not known (43)
5.	Before the inflorescence stage, the damage of harmful animal over the agricultural crops becomes manageable necessary.		
	Agree (100)	Disagree (0)	Not known (0)
6.	Animals cause more damage to those crops which are present near the habitat / river/ forest area.		
	Agree (91)	Disagree (3)	Not known (6)
7.	The use of management methods yield of agricultural crops increase.		
	Agree (93)	Disagree (6)	Not known (1)
8.	After crop harvesting, the animal cause the damage?		
	Agree (79)	Disagree (20)	Not known (1)
9.	Traditional methods are the best method for management of crops from harmful animals.		
	Agree (98)	Disagree (2)	Not known (0)
10.	The management of harmful animals successfully possible.		
	Agree (78)	Disagree (20)	Not known (2)
11.	The management of harmful animal is possible at own level.		
	Agree (80)	Disagree (18)	Not known (2)
12.	The management of harmful animals possible at village level.		
	Agree (100)	Disagree (0)	Not known (0)
13.	The efforts and policies of scientists and government play some role in managing the effect of harmful animals over the crops.		
	Agree (100)	Disagree (0)	Not known (0)
14.	The farmers take the proper knowledge from authorities / damage controlling programs, they becomes control the damage of animals its own level.		
	Agree (100)	Disagree (0)	Not known (0)
15.	The farmers easily control the effect of harmful animals when using some of the following methods e.g. :-		
	I. Use of Barbed (Spikes) Fencing.		
	Agree (80)	Disagree (18)	Not known (2)
	II. Use of Electric Fencing.		
	Agree (100)	Disagree (0)	Not known (0)
16.	III. Scaring of wild animal from crop field.		
	Agree (100)	Disagree (0)	Not known (0)
	Create irritation in Respiration System by use of human hairs.		
17.	Agree (74)	Disagree (9)	Not known (17)
	Growing of thorny bushes around the crop field.		
18.	Agree (62)	Disagree (33)	Not known (5)
	Digging the trench around the crop field.		
19.	Agree (65)	Disagree (27)	Not known (8)
	Hunting / Killing of wild animals are legally prohibited.		
	Agree (100)	Disagree (0)	Not known (0)

4. Traditional Methods used by farmers to protect the crops from the damage of Indian wild boar

4.1 Planting of thorny bushes around the crop

Different xerophyte species like *Opuntia spp.* (*Opuntia elatior*, *O. dillenii*), *Zizipus spp.* (*Ziziphus oenopolia*, *Z. mauritiana*), and *Agave spp.* (*Agave americana*, *A. tequilana*)

planted around the crops were recorded at site III. They restrict the entry of Indian wild boar into the crop fields due to thorny nature. During first time entry of Indian wild boars the animal gets injured and unsuccessful in attempt. From the next time animal does not prefer that site which proves harmful to itself and its family members. The animals also produce alarming calls to signal others about the site. This method is less utilized due to lack of information but more sustainable and less dangerous to the animals ^[17].

4.2 Electric fencing around the crop

The electric fencing method was observed at site II. In this method single aluminum wire was attached to the main current wire of electric pool ^[18]. The aluminum wire was at a height of 1-1.6 feet above ground level. A moderate amount of current passes from the aluminum wire which does not kill the animal but provides shocks at short intervals. The supply of current was from late evening to early morning in these wires. In case any member of family suffered from that condition the alarming calls are sent to other family members for restriction to that site which was harmful to animal. This method is more effective but less sustainable to the animals and some time to human beings.



Aluminum wire attach to main current supply



Electric Wire Fencing around the Potato crop

4.3 Fencing around the crops

In agricultural crops, it was observed at all three selected locations fencing was used to keep animals away from the crop field. The fencing method is more effective, reliable and sustainable than some other methods for damage control ^[19]. Mainly two type of fencing was used against the harmful animals i.e. barbed fencing and chain linked fencing. In most of the cases average height of fencing was about 4 feet in agriculture fields. The cost of this method was less as compared to others and very easy to apply in field.



Barbed fencing around the Maize crop



Chain-linked fencing around the Maize crop

4.4 Building of wall around the crop fields

This method was more effective than other methods for restricting the entry of animals in crop field. This method was mostly used by big farmers because it is more expensive than other methods. This method is more effective in those areas where large no. of animals were present and near the town areas. This method was more effective against the large animals such as Nilgai, wild boar, deers etc.

4.5 Use of local dogs for scaring away wild boars

At all the three selected locations use of trained dogs by farmers was recorded and it played an important role in protecting the crops. In selected cases this method proved to be more effective and sustainable for controlling the damage of animal up to 20-30% ^[17]. In most of foreign countries Indian wild boars are controlled by hunting, poison bait, translocation, chopping and shooting ^[18]. But in India population of Indian wild boar becomes protected under the Schedule III of Wild life protection Act 1972. As a result the controlling of Indian wild boar population in India becomes quite difficult. Any method resulting into either intentional or unintentional death of the animal punishable.

4.6 Scaring Indian wild boar using the traditional methods

Traditional methods like sound of crackers, drumming; alarming calls were also used by the farmers. These methods were quite effective ^[17].

5. Conclusion

The preliminary study on the observations on prevalence of Indian wild boar (*Sus scrofa*) and its damage in agricultural crop fields revealed its presence and activity at PAU (Ludhiana), University Seed Farm (Ladhowal) and Regional Station for Kandi area, Ballawal Saunkhri (SBS Nagar). The

presence of juvenile (18.75%), sub-adult (25.0%) and adult (56.25%) individuals were recorded with the help of Plaster of Paris casts of pug marks. The study also revealed that on an average 15-20% of the crop were damaged by Indian wild boar. More damage was observed to maize (*Zea mays*), Jawar (*Sorghum vulgare*), Rice (*Oryza sativa*), *Brassica spp.* and vegetables crops. The incidence of damage was very high in crop fields adjacent to forest area. The farmers also used some traditional methods to minimize the damage of animals over the agricultural crops. Therefore, further work should be carried out to evaluate suitable eco-friendly techniques for minimizing the crop damage by Indian wild boars to increase production and productivity of various crops and also reduce the man animal conflict.

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