

## Full Length Research Paper

# Effects of wild boar (*Sus scrofa*) on farming activities: A case study of Turkey

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**The aim of the present study is to determine the effects of wild boar (*Sus scrofa*) on farming activities in Samsun, Turkey. The presence and damages of wild boar was monitored by means of direct and indirect observations. Wild boar was the main cause of the decision made by farmers, concerning which area they want to cultivate. Intensity of damage was high in areas close to the woodland areas. Crops losses, from areas close to woodland (up to 100 m), contributed to more than 60% of the total losses for each crop. Some farmed areas, especially those areas located in the nearest woodland, were given up to agricultural activities due to the wild boar damages, particularly in the last five years. Before this date, wild boar population has a very low rate and damages were only one or two reports in one farming season. Wild boar population was determined by the point counts method. Population size of wild boar was counted as 64 individuals and wild boar density was determined as 7.11 individual 100 ha<sup>-1</sup>. This case study showed that wild boar damages were the main subject that shaped farming activities in the region.**

**Key words:** Wild boar, crop damages, *Sus scrofa*, Turkey.

## INTRODUCTION

In continental Europe, the wild boar was often associated with crop damage. Agricultural crops often occurred with high frequency in the diet and were consumed in large volumes. Where crops were present in the diet, quantitative differences between studies suggested that their consumption depended, to a large extent, on availability (Schley and Roper, 2003).

Wild boar damages agricultural crops and grassland by rooting or by directly feeding on crops, such as maize, cereals or potatoes (Mackin, 1970; Genov, 1981; Dardaillon, 1986; Schley and Roper, 2003). Use of open habitats, such as agricultural land, is influenced by seasonal changes in foraging patterns (Mackin, 1970; Dardaillon, 1986; Boitani et al., 1994). However, wild boar prefers woodland and other natural or semi-natural habitats as safe resting sites (Spitz and Janeau, 1990; Gerard, et al., 1991; Boitani, et al., 1994).

Wild boar (*Sus scrofa*) populations have been increasing across mainland Europe since the mid 1960's (Sáez-Royuela and Telleria, 1986; Geisser, 1998; Hahn and Eisfeld, 1998), and it is very similar to those living in Europe, Russia, Caucasia and Iran, which exist in the forests of northern, southern and western Turkey (in fact almost everywhere except in open flat areas and in the

high mountains) (Eroğlu and Baskaya, 1995). It is estimated that wild boar population have been increasing steadily, especially in the last ten years, in Turkey.

Wild boar is considered one of the most important game species on a national level, and hunting of wild boar is carried out year-round in Turkey. However, the main hunting season starts on the 14<sup>th</sup> of August and ends on the 22<sup>nd</sup> of February in 2011 (Anonymous, 2010) like other years. During the remainder of the year, hunting of wild boar is only allowed with tourism hunting, although there is a possibility for the government to organise hunts so as to reduce populations in areas where damages were reported for the whole year, except 22 February and 15 May (Anonymous, 2010).

This paper discuss the interactions between the wild boar and farming activities, crops damages, preventing methods employed, local people demography and population size and density of wild boar.

## METHODS

### Study area

The study was carried out in a local area in Samsun, which was

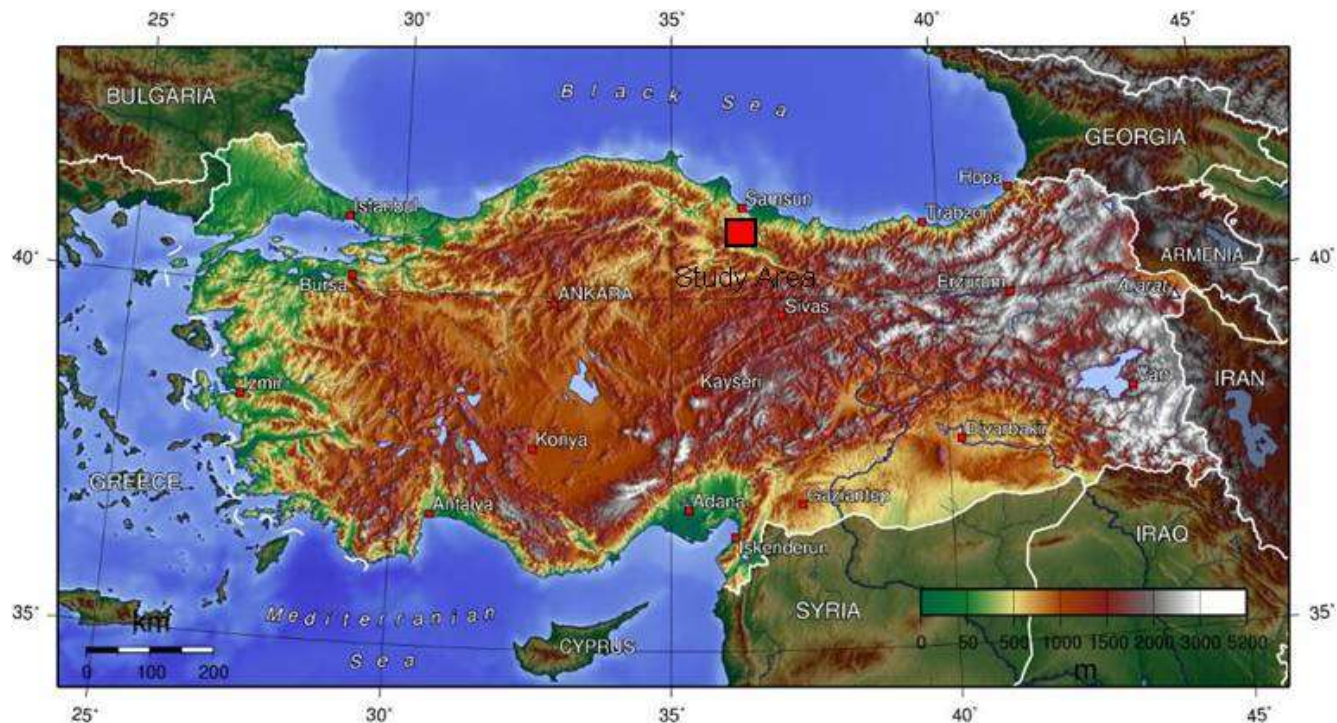


Figure 1. Location map of the study area

located between  $40^{\circ} 50'$  and  $41^{\circ} 51'$  Northern latitude and between  $37^{\circ} 08'$  and  $34^{\circ} 25'$  Eastern longitude in Turkey. The area mainly consisted of woodlands, scrubs, grassland and, in particular, cropland. Woodland areas mainly consisted of Oak (*Quercus* spp), Oriental beech (*Fagus orientalis*), Oriental hornbeam (*Carpinus orientalis*) and European hornbeam (*Carpinus betulus*). Other plant species are *Prunus* spp, *Pyrus* spp, *Fraxinus excelsior*, *Salix alba*, *Populus alba* and *Acer* spp. The study area was just about 900 ha and it covered three villages: Baslamis, Ayvali and Cadirkaya. There was also Tersakan river and small streams (Figure 1).

Samsun has a typical Black Sea climate with high and evenly distributed rainfall all year round. Summers are warm and humid, and the average maximum temperature is around  $27^{\circ}\text{C}$  in August. Winters are cool and damp, and the lowest average minimum temperature is around  $5^{\circ}\text{C}$  in January. Precipitation is heaviest in late autumn and early winter. Snowfall is quite common between December and March. It snows for a week or two, and it can be heavy once it snows (BBC, 2009).

#### Observation of wild boar damages

The aim of the present study is to investigate the effects of wild boar damages on local people farming activities in Samsun, Turkey. We carried out six years (from 2005 to 2010) observations to figure out the effects especially in spring, summer and autumn seasons. We searched for signs of wild boar by traveling on road, using a car, and also on foot, searching for signs of digging, scats, tracks and mud wallows. Report date, location and amount of damages to crops were recorded in 66 damaged areas (Figure 2). We also spoke with officials and carried out a total of 50 surveys on local people and farmers. Attention was also given to the welfare of local people to compare whether or not there were any changes in view of farming activities and farming crops.

Inventory for wild boar population size and density was carried out with point counts in the total areas. Point counts were carried out in

the study area from 12 to 17 February, 2010. Counting was made with two teams shaped with 3 people in the total areas. The observations were carried out first, between 05.00 and 08.00 in the morning and secondly, between 16.00 and 19.00 in the evening for each day. Density of wild boar was determined by dividing the population size of the total areas

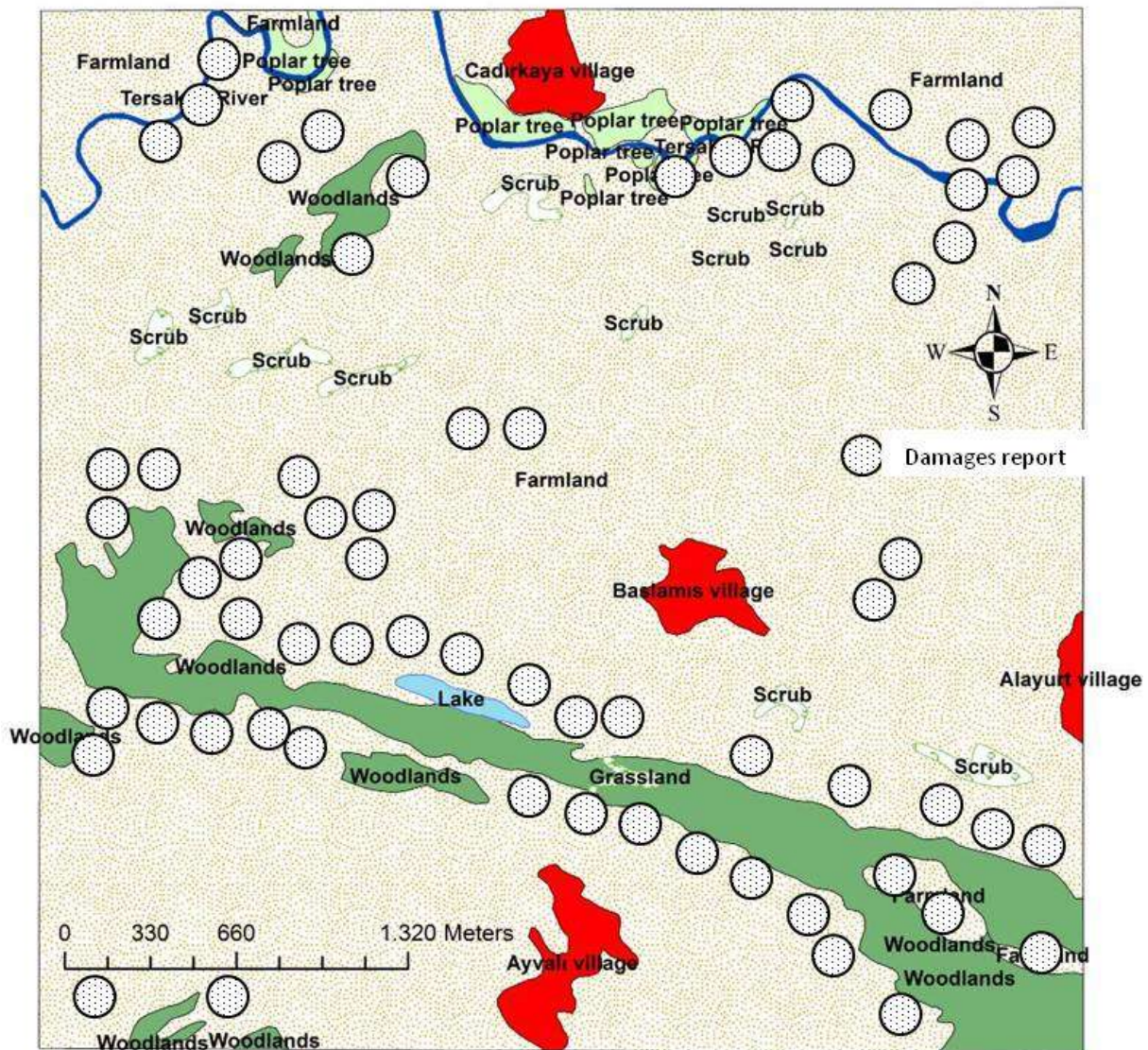
## RESULTS AND DISCUSSION

The observations showed that wild boar populations in the region have been increasing steadily, especially in the last ten years. Total count of wild boar in the study area was counted as 64 individuals (8 male, 19 female and 37 piglets). The wild boar density in the area was estimated as  $7.11$  individual  $100\text{ ha}^{-1}$ .

Damages to farming areas and crops have been increasing in the region. The main crops cultivated were wheat, barley, oat, vetch, corn, sugar beet, bean and pea. From these species, wheat, corn, pea and bean were the most damaged crops by wild boar. Similarly, wild boar causes great damages to corn, barley, wheat, potatoes, sugar beet, bean, leek, lucerne, meadow, grapevine and hazelnut, when resources in the natural habitat are not sufficient, and especially with an increase of their populations in Turkey (Eroğlu and Baskaya, 1995).

Wheat damages could have occurred in the spring or early summer season, but on the other hand, corn, pea and bean were damaged in summer or early autumn season. Damages to crops lead to decreasing of farming activities, especially for those crops that are cultivated in





**Figure 2.** The areas closest to the forest habitats were more damaged in the region. Damages (66 report points) were mainly reported in the woodland and scrub areas. Cadirkaya village has more fruit trees near the Tersakan river, and wild boar damaged this area more, especially in autumn season, than in spring season. Ayvali village, having more woodland habitats, was more affected by wild boar. Some damages were reported from fairly opened areas. Wild boar tracks showed that this area was damaged roughly by passing wild boars, coming through the woodlands to water sources and returning back to the woodlands.

areas close to residential areas, since residential areas decrease the pressure of wild boar to crops. Corn, bean and pea, which were the main crops for local people, were cultivated at the nearest villages, or the local people spent the whole night in the landed area waiting to cultivate the crops. On the other hand, the use of different wheat species that are less damaged by wild boar was closest to the forest/woodland habitats or more damaged farming areas (Figure 2).

In many parts of the region, farming activities decreased because of wild boar damages. The spatial distribution of total crop yield losses indicated that they were highest in

the area close to the forest and least in the area close to the village for all crops (Rao et al., 2002). Crops losses, from areas close to woodland (up to 100 m), contributed more than 60% of the total losses for each crop (Table 1). Some damaged cultivated areas, especially those closest to the forest habitats, were altered from wheat or corn farming to stocks animal herding.

Substantial economic losses, due to crop damage by wildlife, have been reported in many studies (Parry and Campbell, 1992; Newmark et al., 1993; Heinen, 1993; Studsrod and Wegge, 1995; Udaya-Sekhar, 1998; Naughton-Traves, 1998; Rao et al., 2002). Similarly, the

**Table 1.** Cultivated crops and changes by years.

Crop	Selling price (\$/kg)*	Average cultivated land (years/rood)						Average damages by wild boar (%)***
		2005	2006	2007	2008	2009	2010	
Wheat	0.32	4200	3700	3400	3000	3500**	3800**	30
Corn	0.28	500	420	300	250	200	200	50
Pea	0.72	20	15	10	10	5	5	60
Bean	0.57	50	40	35	20	15	10	50
Barley	0.22	400	450	400	450	500	500	5

\*: Average crops selling price (TOBB, 2009); \*\*: Included different wheat species (1000 rood) that were less damaged by wild boar; \*\*\*: Each damages report was evaluated by the size of the damaged areas and the yield amount of the undamaged areas.

**Table 2.** Preventive measures employed.

Method	Households in the village (%)*
Use of camp fire	20
Stayed on the field in watch tower	30
Sound bomb mechanism	5
Farming in the nearest village	40
Use of different wheat seeds	40
Not taken any care	20

\*: Some farmers used different preventive methods simultaneously.

wild boar could have heavily affected the local economy in many areas about 20 to 30 years ago in Turkey (Eroglu and Baskaya, 1995). The extent and intensity of damage may vary depending on the cropping patterns, livestock composition, wildlife population density and behaviour, and feed availability in wild habitats (Rao et al., 2002). Woodland areas were very fragmented cultivated areas, so wild boar and local people had more trouble. The most common preventive measures employed were farming very close to the villages and using different wheat seeds (Table 2).

In general, the abundance of herbivorous ungulates is positively correlated with the availability of vegetation (McNaughton et al., 1989), with climatic variables providing an indirect measure. Wild boar, however, are omnivores relying on plant roots, fallen seeds and mast, soil invertebrates and carrion (Kozlo, 1970; Schley and Roper, 2003); thus, factors other than plant biomass may influence their abundance.

It seems to be generally accepted that crop damage is not avoided through supplementary feeding in the scientific literature (Geisser and Reyer, 2004; Cellina, 2008). On the other hand, the present study showed that farmed crops cultivated, especially close to the woodlands, served as an artificial food for wild boar. This may be as a result of the increase in wild boar population.

Some authors considered depth of snow to be an important wild boar population density. Similarly, at the local scale, annual temperature, snow cover and

availability of acorns (*Quercus* sp.) were believed to be essential factors shaping year-to-year variation in the population density of wild boar (Je,drzejewska and Je,drzejewski, 1998; Kanzaki et al., 1998; Volokh, 2002). Observations and inventories showed that the population density of wild boar was 7.11 individual 100 ha<sup>-1</sup>. As such, there was no regulation to balance the wild boar. Some farmers, waiting for the crops all night, shut only a few individual for the entire season.

The demography of local people was also observed when discussing the changes in farming decision led by working capacity. Some farmers, too old to do farming activities, could hire workers to carry out their crops seeding and harvesting for them. However, the demography of local farmers may not explain the decrease of cultivated areas.

Generally depending on the distributed area, wild boar always consume at least one energy-rich plant food such as acorns, beechnuts, chestnuts, pine seeds, olives, cereal grains or other crops (Schley and Roper, 2003). The study area was served as fruit sources for wild boar, especially the areas close to Cadirkaya and Baslamis villages.

Seasonal, interannual and regional differences in the diet, together with its striking overall breadth, indicate that wild boars are opportunistic omnivores, whose diet, in any particular instance, is largely determined by the relative availability of different food types (Schley and Roper, 2003). Melis (2006) propose that winter harshness imposes density independent mortality on wild boar populations at higher latitudes and competition for food in less productive regions may cause stronger density dependence in birth and death rates of wild boar populations. Moreover, climate appeared to be notably more important in shaping wild boar population densities than predation (Je,drzejewska et al., 1997; Je,drzejewska and Je,drzejewski, 2005). At a biogeographical scale, predation by wolves seems to have a weaker effect on the density of wild boar than climate and vegetation productivity (Melis, 2006). Despite the fact that wild boars were not found in the wolf diet in some regions (Vos, 2000), and the presence of wolves had a weak limiting effect on population densities of wild boar at the bio-

geographical scale (Melis, 2006), some local people implied that decreasing of wolf population might lead to increasing of wild boar in the region. Not only that the climate conditions were suitable for wild boar, but also crops helped as artificial food resources, especially in areas that were very close to the woodlands.

Human presence apparently induced some alterations in movements of wild boar. We concluded that there was human influence on wild boar activity when the animals were disturbed, because when some farmers were waiting for the crops to be damaged by wild boar, wild boar was monitored in undisturbed farming areas or forests. When they were more active, during summer and winter after a mast failure, they moved over 22% of the seasonal ranges (Singer et al., 1981).

Characteristics of damage to agricultural land, caused by a small feral population of wild boar in southern England, were studied. Fifty-eight reports of rooting damage to grassland and one of rooting in a cereal crop were recorded, and most of the reports (74%) concerned damage in January, February or March. Damage mainly occurred in fields adjacent to woodland, but there was no evidence of selection between different grassland types (Wilson, 2004). Wild boar damaged reports (65%) in the study area showed that farming areas, having more mud than other regions, were more damaged than dry regions.

## Conclusion

The main crops cultivated were wheat, barley, oat, vetch, corn, sugar beet, bean and pea. From these species, wheat, corn, pea and bean were the most damaged crops by wild boar. Although wheat damages could have occurred in the spring or early summer, other crops damaged occurred in summer or early autumn season. Crops losses, from areas close to woodlands (up to 100 m), contributed more than 60% of the total losses for each crop. Corn, bean and pea, which were the main crops for local people, were cultivated at the nearest villages, or the local people spent the whole night in the landed area waiting to cultivate the crops. Damages to crops led to decreasing of farming activities in affected areas. As a result, farmers started to cultivate crops close to residential areas, because residential areas decrease the damages of wild boar to crops. Woodland areas were very fragmented cultivated areas, so wild boar and local people had more trouble. Similarly with the study area, the wild boar could have heavily affected the local economy in many areas lately in Turkey.

Observations showed that the total count of wild boar in the study areas was counted as 64 individuals and the density of wild boar was determined as 7.11 individual 100 ha<sup>-1</sup>. In accordance with some studies, climate appeared to be notably more important in shaping wild boar population densities than predation. Some farmers, waiting for the crops all night, shut only a few individual for the entire season. The observations also showed that

farming crops could serve as artificial food resources for wild boar. However, wild boar populations have been increasing and this led to damaging of farming crops.

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