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## The impact of Wild boar (*Sus scrofa*) on different agricultural crops in the northern governorates of Palestine

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### Abstract

The wild boar or wild hog (*Sus scrofa*) is an exotic, invasive species that has major impacts on different Agricultural crops in the northern governorates of Palestine. Today wild boar is the largest mammals in Palestine <sup>[1, 2]</sup>. According to the 19th-century expeditors, wild boars were abundant throughout Palestine, including the arid regions <sup>[2, 3, 4, 5]</sup>. We applied interviews to the local residents and realized 8 routes, each 3 kilometers long in different agricultural fields in Salfite; Nablus; Qalqilya; Tulkarem, and Tubas governorates. We collected data at 50 points. The impact of feral hogs on Cereal crops like (Barely, wheat, and lentil), horticulture fields including (Almonds, stone fruits and olive trees), as well as the vegetable crops fields, (tomato, squash, sweet pepper...etc) was recorded in 180 quadrants (each 100 m<sup>2</sup>), some containing evidence of feral hogs and others did not. The most impacted vegetation is the horticulture including (Olive trees, (41.3%) Almond's and stone fruits (38.7%), followed by the Cereal crops, (38.1%), and vegetable crops (36.8%).

Our results indicate that the best methods for controlling the hogs populations are by applying the poison including (Lannate and Ro-Stop 90), with (54.3%), and normal metal fence, with (43.9%). None of the investigated fields is using power fence. The use of different in size mechanical traps approach was much lower and less effective just 3.8%. The peak of hogs damage and encounters were in April to June, with 23.1%, while the less damage and encounters were in December to January 3.1%.

**Keywords:** Wildlife, wild boar, impact, Palestine

### 1. Introduction

Wild boars are one of the most widely distributed mammals in the world; present on all continents except Antarctica <sup>[6]</sup>. The World Conservation Union's Invasive Species Specialist Group lists feral hogs as among "hundred of the world's worst invasive alien species" and recognizes them as potentially major drivers of extinction and ecosystem change <sup>[7]</sup>. Wild boar occupies an extremely wide range of habitat types, where they feed opportunistically on plant and animal species (including crops and livestock). In addition, wild boar has the highest reproductive rates among ungulates and their local density can double in one year <sup>[8]</sup>

Wild boar may cause extensive damage to the agricultural ecosystem and natural habitats, through their rooting, wallowing, foraging and hunting <sup>[9, 10, 12]</sup>, threaten native species by competing with herbivore taxa, and carry diseases which can affect domestic animals or humans <sup>[3]</sup>. *Sus scrofa* carries parasitic infections transmissible to humans through eating undercooked pork and through contact, including trichinosis, cysticercosis, brucellosis and toxoplasmosis. They have also been implicated in an outbreak of human *Escherichia coli* infection in California <sup>[13]</sup>; and (H1N1 and H3N2), Virus) <sup>[13]</sup>.

Goulding *et al.* <sup>[14]</sup>, describes the species as almost immune to predation, except for humans; wolves and dogs that may act as predators also; with known pack instinct and a capacity to kill, for example, sheep/lambs. Wild pigs can be managed through small-scale exclusion, trapping, and/or shooting. Here are no toxicants currently registered for use on wild boars in the World and there are no known effective repellents. Further, there are no oral contraceptives approved for use with wild boars <sup>[15]</sup>.

In Palestine, wild boar numbers have increased in recent decades, possibly due to a combination of factors, such as the depopulation of rural areas, changes in agricultural practices, lack of predators, reduced and even absent of hunting due to Israeli Authority regime <sup>[16]</sup>, in addition to fact that the Palestinian farmers accuse settlers of deliberately releasing the wild boars onto their land, the Israeli segregation wall that prevent the movement of wild boars

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and finally the climatic changes [17]. Recently, there have been reports that settler owned boars have been released by the Israelis into Palestinian villages intentionally. On June 3rd, local residents of Salot reported that Israeli settlers from neighboring Ariel settlement released boars into their village causing havoc and destroying crops. The Palestinian Agricultural Trade Union also reported earlier that boars had been moving into Palestinian villages and destroying crops.

There are other claims that the Israeli military is also releasing these wild boars into Palestinian villages to destroy crops, which is the main source of income and livelihood for many small communities [17]. It is too early to assess the economic impact of the wild boars in Palestine

**2. Materials and Methods**

**2.1 Study area**

This study was conducted during 2015 to assess the impact of the wild boar in different agricultural crops in the northern governorates of Palestine, Salfite; Nablus; Qalqilya; Tulkarem, and Tubas governorates. These areas are characterized by suitable climatic variables for wild boar like temperature, humidity as well the diverse agriculture fields with diverse types of the plantation that include irrigated fields, and the availability of natural escaping shelters.

**Methodology**

We applied interviews to the local residents and realized 10 routes, each 3 kilometers long in different agricultural fields in Salfite; Nablus; Qalqilya; Tulkarem, and Tubas governorates. We collected data at 50 points. The impact of feral hogs on Cereal crops like (Barely, wheat, and lentil), horticulture fields including (Almonds, stone fruits and olive trees), as well as the vegetable crops fields, (tomato, squash, sweet pepper, etc) was recorded in 150 quadrants (each 100 m<sup>2</sup>), some containing evidence of feral hogs and others did not. Field observations were concentrated in the forest and Agricultural fields. Assessment of the hog's damages in various field of study was made by comparing damaged fields with undamaged fields of the same agro-ecosystems. Descriptive statistical is used for comparing between damage percentage, damage wise month of the year, and the best method used for controlling the hog's disturbance.

**3. Results & Discussion**

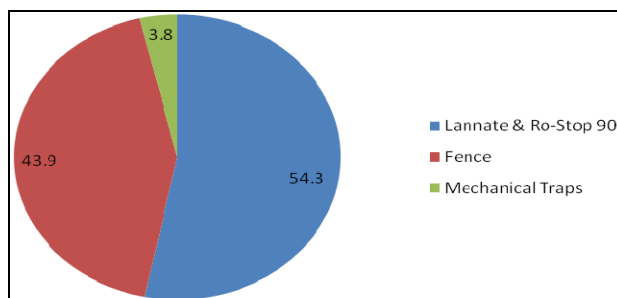
The quantity of damage to cultivated species results from the combined action of direct feeding and mechanical disturbance to plants that are not consumed. The percent damaged (rooted or debarked) area calculated as rooting is considered as a major cause of disturbance to plant communities for field crops in different governorates. The most impacted vegetation is the horticulture including Olive trees, (41.3%) Almond's and stone fruits (38.7%), followed by the Cereal crops, (38.1%), and vegetable crops (36.8%).The most impacted governorate is Salfite, followed by Nablus, then Tulkarem, Qalqilya and finally Tubas. But the vegetable crops in Tubas are impacted more than Nablus, Tulkarem and Qalqilya as shown in Fig.1.

Field Crops	District				
	Salfite	Nablus	Tulkarem	Qalqilya	Tubas
Horticulture	33.0	21.0	18.0	17.8	19.0
Cereal	24.0	19.0	13.2	14.0	17.5
Vegetable	20.35	15.2	12.7	11.9	16.2

**Fig 1:** Wild boar damage percentage vs crops in different governorates.

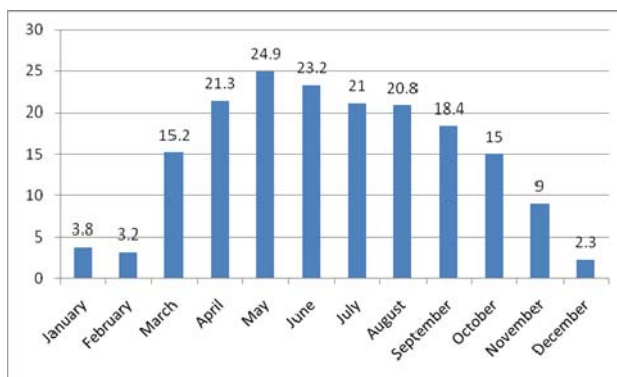
Many studies, agreed upon the statement, which considers rooting as a major cause of disturbance to plant communities, affects the species that are directly consumed by a wild boar, as well as those that are not eaten, but whose roots are left exposed Furthermore, the loosening of the soil surface caused by rooting may lead to erosion on steep slopes [18]. The spatial and temporal difference of rooting between governorates can be explained as a result of variation in habitat type, soil moisture, and month of the year.

As for the effective method used in controlling the wild boar attacks, our results indicates that use of Methomyl insecticides (Lannate and Ro-Stop 90) was the most effective approach with 54.3% followed by fences with 43.9% and the less effective method was the use of mechanical traps, as shown in fig.2.



**Fig 2:** Percentage of controlling methods used against Wild boar in different governorates.

As for Percentage of Wild boar distributions throughout months of years 2015 in different governorates, subsequently their damage and encounters by communities our results indicate that the peak months were April and May, reaching an average of 23.1%, while the less damage and encounters were in December to January with an average 3.1%, as shown in fig 3.



**Fig 3:** Percentage of Wild boar distributions/damage activities throughout months of years 2015 in different governorates.

As for the peak months of distribution, these phenomena may due to the fact that this period is the ideal time for giving birth by pregnant females. A single female gives birth to an average of 4-6, and sometimes up to 10-12 wild piglets a year. The other reason could be the availability of sufficient feeding resource, along with moderate weather conditions. These explanations are in agreement with many international studies.

#### 4. Conclusion

As wild boar populations and geographical range continue to expand in Palestine as well as worldwide, the threats they might pose to native flora, fauna; and Agricultural sectors including plant and animal productions are increasing, so regional collaborative research on the implications for agricultural sectors, biodiversity, is the core platform for any management strategy and action plan aimed at controlling or eradicating wild boar populations and subsequently their impacts.

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