

Review Article

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## Damages Caused by Wild Boars and Strategies for their Management-Review

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### ABSTRACT

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Wild boars cause damage to ecosystems, agriculture crops, livestock and disease threats to humans and livestock. Wild boars have become regular menace for farmers in major crops resulting into enormous damage. Several lethal and non lethal methods exist. Lethal techniques involve trapping, snares, shooting and hunting, toxicants etc. whereas the non-lethal methods include exclusion devices such as fences, harassment, guard animals to protect livestock, contraception etc. Various Indigenous Technical Knowledge (ITK's) used by farmers in Telangana for managing wild boars include spraying of local pigs dung solution, spreading of human hair, erection of used colored sarees, burning of dried local pig dung cakes, planting of thorny bushes, using of local dogs for scaring away wild boars etc. Other methods include using of solar/Battery charged power fencing, using white-colored plastic sheet fences, field patrolling etc. Successful management strategies will certainly depend upon persistent, adaptive, and integrated management programs involving all the methods.

### Introduction

Agricultural production in India is mainly affected by insect pests, plant diseases, and weed plants to a greater extent. In the recent times fauna mainly consisting of mammals with special reference to rodents, wild boars and monkeys are causing huge damage. Among them, wild boar has become regular menace for farmers in major crops resulting into enormous damage (Tisdell, 1982). Enormous damages have been reported due to wild boars in agricultural crops. The wild boars scientifically called *Sus scrofa* are very

vicious in self defence and cause rampant damage destroying fields and vegetation and are often encountered with unprovoked aggression because they can adapt to any ecological conditions and can feed on anything available to them (Mayer and Brisbin, 2009).

### Taxonomy and evolution wild boars

The wild boar (*Sus scrofa*), also known as the "wild swine", "common wild pig", or simply "wild pig", is native to much of Eurasia and North Africa. Wild boars probably originated

in Southeast Asia during the Early Pleistocene period and spread throughout the World (Kurten, 1968). The wild boar (*Sus scrofa*), include many subspecies which are divided into four regional groups.

Regional Group	Subspecies included
Western	<i>S. s. scrofa</i> , <i>S. s. meridionalis</i> , <i>S. s. algira</i> , <i>S. s. attila</i> , <i>S. s. lybicus</i> and <i>S. s. nigripes</i> .
Indian	<i>S. s. davidi</i> and <i>S. s. cristatus</i>
Eastern	<i>S. s. sibiricus</i> , <i>S. s. ussuricus</i> , <i>S. s. leucomystax</i> , <i>S. s. riukiuanus</i> , <i>S. s. taivanus</i> and <i>S. s. moupinensis</i> .
Indonesian	<i>S. s. vittatus</i>

### Description of wild boars

The wild boar is a bulky, massively built with short and relatively thin legs. The trunk is short and robust, while the hindquarters are comparatively underdeveloped. The region behind the shoulder blades rises into a hump and the neck is short and thick to the point of being nearly immobile. The animal's head is very large, taking up to one-third of the body's entire length (Baskin and Dannel, 2003). The structure of the head is well suited for digging. The head acts as a plough, while the powerful neck muscles allow the animal to upturn considerable amounts of soil: it is capable of digging 8–10 cm (3.1–3.9 in) and even more into ground and can upturn rocks weighing 40–50 kg (88–110 lb). The eyes are small and deep-set and the ears long and broad. The species has well developed canine teeth, which protrude from the mouths of adult males. (Heptner *et al.*, 1988)

### Types of damages by wild boar

#### Ecological Damage

Wild boars cause damage to ecosystems in the

form of decreased water quality, increased propagation of exotic plant species, increased soil erosion, modification of nutrient cycles, and damage to native plant species (Singer *et al.*, 1984; Stone and Keith, 1987; Cushman *et al.*, 2004; Kaller and Kelso, 2006) and are involved in extinction of numerous native species of flora and fauna worldwide (Tisdell, 1982; LaPointe, 2006). Ecological impact is more significant in case of endangered species (Mungall, 2001). Reduction of up to 80-95% of the herbaceous cover and local extinction of individual plant species due to rooting was reported in areas where the density of wild boar is high (Bratton, 1974; Howe *et al.*, 1981). Wild boars compete with native wildlife food items (Belden and Frankenberger, 1989; Yarrow and Kroll, 1989), predate on various fauna as well (Tolleson *et al.*, 1993; Lucas, 1977; Jolley *et al.*, 2010).

Problems in aquatic systems by increased soil erosion and bacterial contamination had impacted a variety of aquatic flora and fauna, most notably freshwater mussels and insects. Wild boars have caused the level of fecal coliforms in some streams to exceed human health standards (Kaller, 2005; Kaller *et al.*, 2007; Kaller and Kelso, 2006).

#### Agricultural crops

Wild boars are omnivorous and they will eat and relish on anything they come across including many agriculture crops like grains/cereals (e.g., wheat, sorghum, barley, hay, rye, oats, millet, maize/corn, and rice), vegetables (e.g., various potatoes, yams, squash, turnips, rutabagas, beets, cassava, lettuce, cabbage, beans, peas, soybeans, and artichokes), fruits (e.g., pumpkins, grapes, blueberries, pineapples, avocados, bananas, apples, various citrus species, watermelons, cantaloupes, and coconuts), and other crops (e.g., cotton, linseed, sunflower, peanuts,

almonds, oilseed/rapeseed, groundnuts, pecans, clover, thyme, basil, oil palms, sugar cane, rubber seeds, and turf/sod/pasturage) (Tisdell, 1982; Brooks *et al.*, 1988; Stevens, 1996; Devine, 1999; Schley and Roper, 2003; Mapston, 2004).

Crop losses typically vary depending upon location and season. For example, almost half of the annual losses of crops in Australia are due to depredation of wheat by wild boars (Tisdell, 1982). Wild boars cause an estimated 20,000 tons of annual losses in sugarcane in Australia (Choquenot *et al.*, 1996). Up to 40% of the loss of the sugarcane crop in Pakistan is due to wild boar depredation (Abbas *et al.*, 2004).

Wild boar damage is more pronounced in crop fields which are near adjoining forest areas. Wild boar is a major problematic species in the crops in many parts of India, raid crops and utilizes the agroecosystem for food and shelter (Chauhan *et al.*, 2009). Damage to *Zea mays*, *Arachis hypogea*, *Sorghum vulgare*, *Oryza sativa*, some pulses and vegetables crops were ranged between 10-75%, 5-56%, 5-30%, 10-35%, 5-20%, 10-30%, respectively in southern Telangana areas (Vasudeva Rao *et al.*, 2015). Similar reports of damage to agricultural crops by Indian wild boars in India were reported to varying extent (5-36 %) (Chauhan *et al.*, 2009), 15-20 % (Ravinder Singh and Manoj Kumar, 2018). In addition to directly damaging crops, boars can damage infrastructure such as fences, irrigation ditches, roads and other structures. Rooting and wallowing in agricultural fields creates holes that, if unnoticed, can damage farming equipment and pose potential hazards to equipment operators (Nunley, 1999).

### **Livestock**

Wild boars sometimes prey on livestock, including lambs, goats, newborn cattle.

Predation on young livestock animals usually occurs on calving or lambing grounds where wild boars may be attracted by after birth (Beach, 1993). Though predation is usually concentrated on young animals, livestock giving birth are sometimes killed and consumed (Wade and Bowns, 1985).

### **Disease Threats to Humans and Livestock**

Wild boars are capable of carrying numerous parasites and diseases that potentially threaten the health of humans, livestock, and wildlife (Forrester, 1991; Williams and Barker, 2001; Sweeney *et al.*, 2003).

Humans can be infected by several of these, including diseases such as brucellosis, leptospirosis, salmonellosis, toxoplasmosis, *E. coli*, and trichinosis. Diseases of significance to livestock and other animals include pseudorabies, swine brucellosis, tuberculosis, vesicular stomatitis, and classical swine fever (Nettles *et al.*, 1989; Davidson and Nettles, 1997; Williams and Barker, 2001; Davidson, 2006).

Wild boar can serve as a reservoir and amplifier for many diseases, making it difficult or impossible to eradicate disease in livestock and humans in areas with wild boars (Hone *et al.*, 1992; Corn *et al.*, 2005; Hutton *et al.*, 2006; Wyckoff *et al.*, 2009). Reports of humans getting infected with diseases like Swine Brucellosis, Pseudorabies, Classical Swine Fever and Trichinosis were directly related to either involving in wild boar hunting or eating under cooked meat (Davidson and Nettles, 1997; Davidson, 2006).

### **Management of Wild Boars**

Several effective lethal and nonlethal methods exist. Lethal techniques involve trapping, snares, shooting and hunting, toxicants etc whereas the non-lethal methods include

exclusion devices such as fences, harassment, guard animals to protect livestock, contraception etc.

## **Lethal Techniques**

### **Trapping**

Trapping followed by euthanasia is the most popular method for removing wild boars from a population. Intense trapping program can reduce populations by 80 to 90% (Choquenot *et al.*, 1996). In general, cage traps, including both fixed corral traps and portable drop-gate traps, are most popular and effective, but success varies seasonally with the availability of natural food sources (Barrett and Birmingham, 1994).

Cage traps are by far the most common type of trap used to capture wild boars. Stationary corral-type traps, portable box traps, cage or pen traps using swing doors, fall doors or lift or roofer doors with triggers for closing of the doors.

### **Snares**

Leg snares or neck snares to catch the wild boars can be useful in specific situations, such as in rough terrain, where cage traps are impractical, or in scenarios where boars grow wary of other trapping techniques and are cost effective. Snares are generally designed with a loop of iron or steel cable which closes easily but will not open because of a sliding lock device and are connected to anchor stick/pole.

### **Shooting and Hunting**

Shooting and hunting of boars usually has little effect on the size of wild boar populations (Barret and Stone, 1993) but it results in the removal of mostly adults, and this alone may not be enough to reduce the population (Bieber and Ruf, 2005).

Shooting of boars on bait at night using night vision technology and sound-suppressed weapons after several days to a few weeks of pre baiting before shooting can greatly enhance the success boar management programme.

Hunting with dogs can be effective in local areas and has been successfully used as part of larger control programs (Choquenot *et al.*, 1996).

### **Toxicants**

Researchers across the world are working to identify a toxicant that can humanely kill wild boars while having a benign effect on non target animals and the larger environment. Warfarin, an anticoagulant widely used as a rodent toxicant, has been used to control and nearly eliminate wild boar populations in Australia (Saunders *et al.*, 1990).

Other toxicants used are Compound 1080, Sodium nitrite with mixed results. These toxicants are successful in Australia (Cowled *et al.*, 2006) but research of the same compound in Texas demonstrated that the non target organisms would be affected and hence not a viable option (Campbell *et al.*, 2006).

### **Nonlethal Techniques**

#### **Fencing**

Fencing wire mesh fencing, electric fencing, or a combination of both can be an effective control measure. While some fence designs completely exclude wild boars, many can restrict their movements. Though fences may restrict boar movements, they can be expensive to install and one should ultimately consider the value of the commodity and cost of the fence before committing to this avenue of control (Conover, 2002).

### **Harassment**

Human activity can have a substantive impact on wild boar behavior, movement, and survival. Harassment of boars through hunting, trapping, and other harassment

### **Contraception**

Studies have shown that injections of gonadotropin-releasing hormone (GnRH) to be effective in reducing the reproduction capacities in treated animals of both sexes and keeps females infertile without boosting. However, this infertility is not permanent (lasting 1 to 4 years) and reverses on its own over time. Multiple injections increase the longevity of the vaccine (Miller *et al.*, 2004).

### **Scenario of Wild Boar Management in India**

Vasudeva Rao *et al.*, (2015) scientifically evaluated and validated the various Indigenous Technical Knowledge (ITK's) used by farmers in Telangana for managing wild boars.

### **Spraying of local pigs dung solution**

The dung solution of local pigs when sprayed will confuse wild boars with a false assumption of entering into the territory of other pigs and their movement will be prevented to avoid territorial conflict.

### **Human hair as deterrent**

Human hair collected from local barber shops and spread in the movement routes of the wild boar gets sucked through nostrils causing severe respiratory irritation.

Due to this the wild boars gets totally disturbed and loses its track by making distress calls, which will ward off other wild boars entering into the cropped area.

reduce or shift home ranges (Hayes, 2007; Gaston, 2008). On the other hand, Sodeikat and Pohlmeier (2003) found that boars may temporarily flee an area in the face of intense hunting, but they often return to their original home range.

### **Erection of used colored sarees**

This method also is a farmer's innovation, which has a behavioral background as far as wild boar is concerned. By arranging used sarees of different colors around the crop will make wild boars to assume human presence in the area there by not preferring to enter into such areas.

Even though, not feasible in all situations it has some marginal benefit in the areas of human movement. By using this, extent of damage by wild boar can be minimized to the level of 30-55%. This practice is most commonly used among the farmers in Telangana.

### **Burning of dried local pig dung cakes**

The dried cakes made from local pig dung are burnt in earthen pots. This will ensure slow generation and spreading of smoke during dusk time.

The smoke coupled with smell of local pig dung helps in sensitizing wild boar about the presence of local pigs. As a result, to avoid territorial conflict, the wild boars don't prefer to move in such areas.

### **Arrangement of three rows of "NIWAR" soaked in Kerosene**

The NIWAR should be soaked in Kerosene solution for about 2 hrs and will be arranged around the crop in 3 rows by keeping 1 ft distance between rows with the help of wooden poles. Sufficient care should be taken to drain off excess kerosene. The dominating

smell of the kerosene does not allow wild boars to identify the crop.

### **Arrangements of Coconut ropes soaked in mixture of Sulphur + Pig oil**

Arranged of coconut rope in three rows around the crop by keeping 1 ft distance between the rows with the help of wooden poles can be done. Preparation of solution with sufficient quantity of sulphur is mixed with local / domestic pig fat oil is done and that mixture should be smeared on the arranged coconut ropes. This mixture generates the typical smell there by repelling wild boars not to enter into the crop area.

### **Planting of thorny bushes and xerophytes around the crop**

Different xerophytic species like Cacti sp (*Euphorbia caducifolia*, *E. meriifolia*), *Opuntia spp.* (*Opuntia elatior*, *O. dillenii*), *Zizipus spp.* (*Ziziphus oenopolia*, *Z. mauritiana*), and *Agave sps.* (*Agave americana*) can be planted on the bunds around the crop which will not allow the wild boars due to their thorny in nature.

The wild boars after unsuccessful trail of entry get injuries and making alarming calls, which makes the other animals to flee.

### **Creation of sounds and light through born fire**

Scaring away the wild boars from damaging their crops farmer's employ methods such as using fire crackers, making sounds through local drums, empty tins, making born fires and shouting.

### **Traditional use of local dogs for scaring away wild boars**

In endemic areas of wild boar attacks farmers do follow using of trained dogs on a community basis to scare away the

approaching wild boars. In selected cases this method proved to be effective and sustainable.

### **Solar/Battery charged power fencing**

Solar charged or battery charged electricity fencing was found as a good deterrent to keep away the wild animals from the agriculture areas. Gopakumar *et al.*, (2012) stated that the electrical (solar-powered too) fencing was an ultimate successful deterrent for wild boars in and around Aravalli in Rajasthan.

### **White-colored plastic sheet fences**

In the rubber plantations of central Kerala, white-colored plastic sheet fences create panic in the herds of Wild boars. (Gopakumar *et al.*, 2012).

### **Field patrolling**

'Field patrolling' by farmer groups on a regular rotation basis can also be a successful crop protection strategy. (Gopakumar *et al.*, 2012).

An integrated approach to wild pig management involving a variety of techniques to remove wild boars and prevent damage is most effective (Choquenot *et al.*, 1996; Mapston, 1999). Wild boars may quickly learn to avoid single control techniques but often have difficulty avoiding multiple techniques implemented in combination (Richardson *et al.*, 1997). Nevertheless, successful management strategies will certainly depend upon persistent, adaptive, and integrated management programs that incorporate sound biological and ecological information (Campbell and Long, 2009).

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