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Bird Repeller – A Review

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A B S T R A C T

All around the world, the birds are a major threat in the field of agriculture causing damage to economic field crops, storage houses and also dirtying human life areas. These birds are control by practicing different traditionally outdated method. But now a day's with the change of technology different electronic repeller are adapted for bird control in agricultural field. This study had been carried out to know the different electronic bird repellers are available and also the technique used in it is discussed.

Introduction

Birds are the most fascinating group in the animal kingdom. They are an integral part of all natural ecosystems and attract the attention of laymen and scientists alike, because of their interesting biological attributes and the significant role played by them in nature. As in natural ecosystems, often, many birds are associated with agro-ecosystems for their survival and make some impact on such systems. Subsequent to the change in land use pattern, which has often resulted in the loss of natural habitats like forests, grasslands and wetlands, many of the birds had to rely on man-made habitats and agricultural crops. In the process of procuring food, birds started damaging cultivated crops. Population of some of these birds, which are well adapted to live on agricultural crops, have increased enormously in number and became pests. Such bird species comprised mostly of granivorous and frugivorous birds such as pigeons, doves, parakeets, munias, sparrows, weaver birds etc. These birds are often labeled as pests and if their impact on agriculture is sufficient to inflict serious damage, their population becomes the target of massive management or control efforts (Weins and Dyer, 1977).

Birds are one example of pests for farmers. Bird attacks are very much detrimental to farmers because the birds attacked in colonies

or groups in large numbers. A survey of the New Zealand farmers by the nation's Plant Protection Society, revealed that large percentage of them had encountered crop damage from birds (Coleman and Spurr, 2001).

The most common domestic birds are pigeons (*Columba liviadomestica*), sparrows *(Passer domesticus*), starlings *(Sturnus vulgaris*), Common myna (*Acridotheres tristis*), Jungle myna (*Acridotheres fuscus*), crows (*Corvus splendens*) and blackbirds (*Turdus merula*) in India as well as in many countries in the world (Summers, 1985; Saglem and Onemli, 2005; Avery *et al.,* 2005). These birds not only give damage to the agricultural area but also make dirty the human life area.

In order to protect these areas against bird damage, some studies about mechanical and chemical fighting methods have been made up to now. For instance, it was reported in the literatures that the effect of 50% anthraquinone and 75% methiocarb, caffeine, garlic extract, physical barriers such as net or acrylic fibres, distress calls of birds, human bird scarer and colored lights on birds were studied (Bruggers and Ruelle, 1982; Vickery and Summers, 1992; York *et al.,* 2000; Avery *et al.,* 2005).

Bird control is important because pest birds can create health-related problems through their feces, including histoplasmosis, cryptococcosis, and psittacosis.

Bird droppings may also cause damage to property and equipment. Birds also frequently steal from crops and fruit orchards. Methods of bird control include physical deterrents, visual deterrents, multi-sensory deterrents, sonic devices, trained birds of prey (falconry), chemicals, contraceptives and active barriers, among others.

Physical bird deterrents include such products as steel or plastic spike systems, bird netting, electrified wire systems, non-electrified wire systems, electrified track systems, slope barriers, mechanical spiders, chemical foggers and more. Sharp bird spikes can pierce and impale birds, while "blocking" and "shocking" methods do not harm birds. Unfortunately, blunt tip bird spikes may still impale birds on windy days. The safer shocking and blocking methods simply repel birds from an area with no harm. The Humane Society of the United States (HSUS) recommends the use of bird netting, bird wire, contraceptives and low-current electric barriers. (Anonymous)

Chemical deterrents range from products for turf to avicides. There are taste a version products for geese, and fogging agents used for birds. Many localities have restrictions on the use of chemicals and pesticides targeted at birds if they intend to kill them. Chemical deterrents that do not harm birds are widely used with limited results. (Anonymous)

Electronic bird repeller

Bird repeller is the dispersal of birds using sound that makes them uncomfortable. A bird repeller is any of a number devices designed to scare birds, usually employed by farmers to dissuade birds from eating recently planted arable crops.

Electronic bird repellent devices produce extremely effective audio and visual threats that frighten, irritate, and disorient birds, forcing them to seek calmer, untreated areas. They are also used on airfields to prevent birds accumulating near runways and causing a potential hazard to aircraft. Electronic bird deterrents condition pest birds to stay away from treated areas for good. In order to protect these areas against bird damage, some electronic based mechanical methods are adapted for control.

Salient features of electronic bird repeller

Electronic Bird Repeller has many advantages over a normal bird repeller. Some of the salient features are as follows:

Easy installation: The installation of the repeller is instantaneous as well as repellant action.
Power efficient: The device operates on a very small voltage equivalent to 12 volt thereby consumes less power and thus there is no need to modify the circuit for extra separate power supply.
Large coverage area: It cover large areas where use of physical barriers or visual scares may not be ideal.
Compactness: The device uses few IC's and other electronic components and can be packed compactly so that its size becomes small and can be kept anywhere making it portable in nature.
Simple and elegant circuit design: The circuit is simply made so that mass production can be easily done. Any damage to the circuit can be easily repairable.
Less maintenance: It is long-lasting and little maintenance is required.
Eco-friendly: It doesn't produce any smoke, gases and radiation and even the sound is not audible to human ear. So it is totally harmless and thus eco-friendly in nature.

Design of electronic bird repeller

Koyuncu and Lule (2009) designed and manufactured bird scarer mainly consisting of a photovoltaic (PV) panel (BP Solar SX20M and dimensions: 41.5x50 cm), dry-cell battery, converter, MP3 player, amplifier and a loudspeaker (8W, 30 W). Photovoltaic panel converts solar beam radiation into DC electricity during the day. Battery is charged by PV panel and the electricity stored in this device. The domestic bird's predators' calls were loaded to MP3 by using a PC. The amplifier increases the signal level (predators' calls level) for loudspeaker. The working voltage of battery, amplifier and speaker is 12V, but the MP3 needs 1.5V. In order to reduce the voltage from 12 to 1.5V for MP3, a converter was used. The observations and analysis of the developed bird scarer was taken for evaluation and the following data are noted down. Tests were arranged into 4 groups to determine the most effective predator's call and speaker play and pause periods. The most effective sound is the call from Falcon (Buteolagopus) when compared with other predators and the best speaker play and pause periods are 60 second (1 minute) and 360 second (6 minute), respectively.

Suryawanshi (2013) designed and tested of a solar powered audible bird scarer and studied various sound ranges used in it. The bird scarer consists of photovoltaic (PV) panel, dry-cell battery, converter, MP3 player, amplifier and a loudspeaker. It is said that the sound are coming from choosing the ideal predator's call, loudspeaker play, and scarer camouflage. In addition, it was seen that during tests that birds try to see the speaker when it play to be sure that it is real predator or any other artificial material before moving away. Out of the 22 sounds, the sound from Falcon (Buteolagopus) was seen most effective. Camouflage of bird scarer, sound quality and volume was seen important on crows. The performance of the scarer depends on the climatic characteristics of the day (dull or sunny).

Siahaan *et al.*, (2017) designed of bird detector and repellent using frequency based Arduino Uno with android system. The detector was designed to detect motion from birds, then forwarded to run driver relay and Android systems. The ultrasonic frequency generated by the repeller can be varied by changing the capacitor value. The detector is associated with Pyroelectric (PIR) Sensor to

which android system is connected. PIR sensor captures the movement of bird. The repeller is associated with Piezo Ultrasonic Transducer which is used as an ultrasonic wave transmitter or as a buzzer generated by an LC Oscillator Type Colpitts circuit. When a source movement received from the Pyroelectric sensor (PIR), the relay will be closed and activate the voltage source of the transmitter. PIR sensor as a detector with a movement distance that can be captured from a bird is 500 cm, according to the characteristics of the sensor. When birds are detected then the birds will automatically be given with ultrasonic waves. In this study, the frequency that makes the bird disturbed is about 28 kHz - 60 kHz. The prototype is set with a frequency output of about 60 kHz.

Muminov *et al.,* (2017) developed a solar powered bird repeller system with effective bird scarer sounds. The major components of the repeller system are a solar panel (7W, 12V), an intelligent PWM solar charge controller, 12V battery, MP3 player, amplifier (Stereo 20W Class D Audio Amplifier-MAX9744), two 20W speakers, three sonar sensor or PIR sensor and Arduino UNO controller. The domestic predator calls and special sounds (such as gunshot sounds) was loaded to SD Card of MP3 by using a PC. The amplifier increases the signal level for speakers. The concept of this bird repeller system is that it applies a stimulus to the wild birds as a control function. The effect of sound stimuli on the birds helps to fly away by playing several types of sound.

Furtherthe image processing to detect birds and animals to be carried out by conducting several physical experiments. New algorithm to be created using machine learning to make effective repeller system which will lead to new and improved models. These models will lead to better understanding of birds and animals.

Ogochukwu *et al.,* (2012) constructed and tested an ultrasonic bird repeller. He used the ultrasonic waves; which human ears do not detect, but are perceived by small birds as a novel technology that can effectively repel such birds from designated places. Ultrasonic waves was successfully generated, with automatically varied frequency (between 15kHz and 25kHz), amplified and broadcast at high enough sound pressure level from a locally fabricated solar powered electronic device. The 7.98W device produced an ultrasound of 118dB, on the average will cover a distance of 45.02m^2 while the 23.98W with an ultrasound of 123dB will cover a distance of 232.26m^2 when placed on the elevation of 0.78m but when placed on the elevation of 1.86m, their average area coverage will be 175.83m^2 and 429.53m^2 respectively. The ultrasonic waves created a hostile environment for the pest birds and had a repulsive influence on them, though they have a small radius of action but eventually drove the birds away from the designated locations. Response to the ultrasonic wave stimulus broadcasted from the environmentally friendly gadget was visibly demonstrated by targeted weaver birds and black birds but not quelea birds. The waves travelled farther with increasing power of the gadget and for wet days than for dry days. About 5-6 pieces of the 23.98W device will be needed to cover a hectare sized field.

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