

## Control Strategies to Avoid Locusts Attack

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### Abstract

Human population is increasing rapidly whilst food resources are shrinking due to urbanization and rapid converting of agriculture land to housing societies. This unnoticed situation may result in deprivation of large human population from food and threat to food security in coming decades. Therefore it is very need of the time to use the existing recourses in a wise and sustainable way and to explore the non-traditional food resources. Locusts are famous to badly damaging the crops, causing historic world famines. Different methods have been tried to control locusts swarm, however, biological control is always preferred. Swarm of locusts can be exploited for the productive purpose as these are healthy diet for the human, livestock, poultry, aquaculture, pets and zoo animals. During the recent locusts attack world have to spend huge money to control this disaster though there is no need to waste a huge amount in unproductive ways rather we should invest to control through poultry production that will result in to a huge return of the inputs. For this purpose Government of Pakistan should promote the backyard poultry farming especially duck farming to control the locusts in crop field areas. Therefore, backyard poultry farming especially duck farming should be suddenly promoted. For this PBPA (Pakistan Backyard Poultry Association) should be established which should work under the guidance of poultry scientists.

**Keywords:** *Locusts; Agriculture; Livestock; Backyard Poultry; Farming*

### Introduction

Human population is expected to reach 9 billion by 2040 whereas food production is declining due to shrinking of agricultural land area. This has led a huge pressure on environment as well as on physical and biological resources. To fulfill the food demands and for the food security of the world there is dire need to exploit the new (non-conventional) food resources [1-5]. A way of sustainability in use of resources, exploring the new foods of potential production and altering the feeding habits can helpful to meet the food security in future [2].

Locusts belong to order *orthoptera*. These produce lesser amount of green house gases therefore these are environmental friendly source of high quality protein production [6,7]. Locusts produce 5 times more protein per unit of fodder than cattle [8]. Feed conversion ratio (FCR) of locusts is lower (1.7) than beef (10) [9,10]. These are enriched with high quality protein (CP up to 60%), fat (14%), metabolizable energy, vitamins, minerals (Na, K, P, Ca, Zn Mg and Fe) and essential fatty acid i.e. linoleic, linolenic acids and oleic acid [11-14]. Commercial locust farming is developing rapidly in South East Asia and throughout the world [2,15]. More than 80 species of locusts, crickets and grasshoppers are commonly raised to fulfill the increasing demand of food for human food throughout the globe.

### Locusts swarms

Locusts generally live alone but under some conditions they develop into big population, can travel great distances move around quickly in fields, consume green vegetation and damage the crops [13]. These are famous to cause historic famines and large scale hu-

man migrations. A single swarm of locusts may consist of one lac to a billion locusts that can consume 200 tonnes crops/vegetation per day. A swarm can move up to 150 km per day then stay in new area [16,17]. A female locust lays her bag of eggs (about 80 eggs) in a soft, sandy and desert soils about up to 4 - 6 inches deep in the soil. However, these egg bags can be destroyed by deep plow the soil to offer the partridges, herons, quails and other birds. In early of 2020, an outbreak of millions of locusts has swarmed the Pakistan. Food and Agriculture Organization of the united Nations had already warned possible attack of locusts in Pakistan. Recent unusual heavy rains and cyclones supported extraordinary breeding and the explosive growth of locust populations on the Arabian Peninsula early 2019. Locusts have caused disaster on farms from East Africa to India before their entrance into Pakistan from the desert on the country's southwestern border (Balochistan province) with Iran. These invaders have already consumed/destroyed large quantities of crops in over 60 districts throughout the Pakistan. It is the big locust attack during the last three decades in Pakistan (GOP, 2020).

### Control strategies

Ancient people used to eat these insects to avoid locust's swarms. In 20<sup>th</sup> century, various efforts were made to control the locusts attack. These includes demolishing the laid eggs of locusts by ploughing/digging the soil, collecting insects with catching equipments (nets or other means), burning the insects in incinerators, ditching, and crushing with rollers etc. In 1950s use of organo-chloride dieldrin was found to be effective control the problem, though its residual effect made its use banned later [16].

Conventionally, insecticides were being used to spray from the ground or the air. For the better results these chemical/sprays are advised to be used by drone technology at small scale (A drone is usually used for 15 - 20 liters spray/hectare in about 20 minutes) and for large scale operation a helicopter (a helicopter can carry 400 liters spray for 400 hectares a in about 60 minutes) equipped with modern spray machines having ULV technology can be used to control the attack. However, insecticides have to be repeated once a week to get rid of locusts and every 2 - 4 weeks thereafter for complete control therefore, at the present time biological control is appreciated and provide effective control [18].

Under developed countries have not adequate resources to control this problem as these countries have shortage of funds to procure sprayers/pesticides, limited equipments and vehicles for large scale operation, lack of trained staff and modern monitoring/communication system. In these areas farmers can be trained to capture by the locust via nets or other catching equipments to exploit this natural feed ingredient for the high quality protein production (Livestock, poultry and aquaculture) in order to get rid of the devastating activity of this creature. A good biological control by backyard poultry farming may prove highly fruitful. A chicken can eat 100 locusts in a day and a duck can eat 200 locust per day. Therefore, framers should be encouraged to rear duck flocks at field sites to control the locust population. For this PBPA (Pakistan Backyard Poultry Association) should be established which should work under the supervision of poultry scientists. Experts recommended the fumigation process to the affected areas to control over the problem.

Currently the use of repellents such Capsicum, garlic and onion extract are gaining popularity due to pretty effectiveness to avoid the locusts attack. These Extracts are applied to the soil and nearby spots to cause the locusts run away from the field. In the same way aqueous extract of grounded grains of paradise/Melegueta pepper can evoke a good control response. Although it is not very effective in eradicating locusts however, local farmers also use to beat drums and utensils and play music to temporarily aware away locusts swarms from their fields.

From the last few decades rapid progress (I say it "adversity" which has led us away from the nature, real life and ethics) and abrupt development throughout the world has led to imbalance the ecosystem and environment which is responsible for the number of natural outbreaks. To enhance per acre crop production a variety of highly toxic insecticides and pesticides are being excessively utilized (especially in cotton crop areas) from the last few decades which has deadly reduced the population of varying farmer friendly avian species. These farmer friends (birds) are reported to eat up to 28 million tons of insects which are otherwise harmful to crops. It is said that one of the reason of recent outbreak of locust swarm in Pakistan is also huge decline of population of bustard (*Houbara bustard*). Locusts are healthy diet of bustard and they help to control the locust population. However, during the last decades bustard population is drastically reduced due to over hunting of this environment friendly species. Therefore, bustard hunting should be banned to avoid locust swarm in

future. The reduced population of snakes, mongooses and other terrestrial insects in the deserts has also led to present locust attack. For this wildlife department should play its effective role to the breeding of desert animal which are helpful to keep the locust population in a control number.

Fungus spores (*Metarhizium acridum*) can also be sprayed in breeding areas of locusts so that these germinates the exoskeleton of locusts and attack the body cavity to kill the insect. The fungus prevail the whole population via insects. This method is safe for the environment and for the other animals [19,20]. Moreover, it adds the fertility of the land. GPS, GIS tools, and satellite imagery are advanced technologies and computers offer rapid data management and analysis to control over locusts attacks [21,22].

Poultry, ducks and fishes love to eat locusts therefore, backyard poultry, duck along with parallel fish farming can convert devastating activity of locusts into a productive work [23,24]. In areas of locust attack large scale duck farming should be promoted and government should take steps to encourage large scale backyard poultry farming and duck farming.

### Locust meal a promising substitute of soybean meal for animal feeds

Locusts are talked about in the Jewish (Book of Exodus), the Christianity and the Islam [25-28]. Using locusts in the ration/feed of livestock, poultry, aquaculture, pets and zoo animals and/or in human food may help to lessen the need of chemical/pesticides, thereby, helps in maintaining healthy environment. Having available in large quantities after locust outbreaks, highly nutritious dead locusts, grasshopper, cricket, katydid and other insect species are being collected, boiled, dried and ground to make locust meal which can be used as pets and zoo animal diets and also been reported to be successfully used in ration of livestock, poultry and aquaculture on large commercial scale [29].

### Conclusion

Locusts have a significant impact on the history of mankind and are famous to severely damaging the crops resulted into historic famines. Locusts attack has been reported to cause chaos through the whole time history of human. These are voracious eaters and a single swarm can disrupt the twenty percent of the Earth land depriving the huge human population from food resulting in to disaster and threat to food security. Currently, use of chemicals and insecticide is more prevalent which have potential environmental consternations. On the other hand microbial bio-pesticides have been considered a hopefully patent solution to control locusts swarm at large scale. However, the significance of biological control of locusts may be more fruitful and productive. Therefore, to address the problem, a well designed modern locusts control program involving the introduction of crops of less concerns/interest of locusts in areas where attacks are more common is essential. Experts should introduce modern and advanced methods to control the overwhelming harms before outbreak which are expected to occur. Use of locusts in the ration/feed of livestock, poultry, aquaculture, pets and zoo animals and/or even in human food may help to exploit the outbreak of this notorious species. Moreover, introducing livestock/poultry species which can potentially use locusts will improve the productivity of ecosystem. Moreover, backyard poultry farming especially duck farming should be suddenly promoted in crop field areas. For this PBPA (Pakistan Backyard Poultry Association) should be established which should work under the supervision of poultry scientists.

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