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DUAL ROLE OF BIRDS IN AGRICULTURE

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ABSTRACT

Birds are the unique creatures on the earth that have the typical flying ability for long-distance travel. Earth is home to about 10,000 such bird species. They inhabit all continents and interface with agroecosystems worldwide. Birds are highly sensitive to agricultural intensification. Land transformation, from semi-natural habitats to agricultural areas, is thought to be one of the major drivers for population decline. Agriculture has been characterized as the 'greatest extinction threat' to birds. They have a dual role in agriculture in which some of them aid in pollinating the wild plants, contribute to soil fertility, and play a key role in pest and rodent control. On the other hand, they inflict serious damage to agricultural and horticultural crops by feeding on grains and ripened fruits. Measuring the net effect of birds in an agroecosystem may provide proper understanding to draw a common conclusion.

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INTRODUCTION

Birds are warm-blooded egg-laying vertebrates distinguished typically by the possession of feathers, wings, beaks, and the ability to fly. Out of 10,000 bird species in the world, Southern Asia is home to around 1400 species, among them 1295 species are found in India as it has a subtropical climate (Johnson et al., 2011). Around 500 species of birds occupy their habitat in the Western Ghats and Karnataka. A total of 63 bird species belonging to 19 families have been identified as damaging to several crops but only 2.1 % of total bird species were reported to inflict serious damage to the crops. Among the 46 species of beneficial birds, only 6 feed on rodents along with insects while the rest of the species feed exclusively on insects. Fifteen species of beneficial birds are omnivorous and have dual roles in the agroecosystem (Kale et al., 2012).

Birds have various roles on the farm which depend on their characteristics. The factors like their eating habits, foraging, habitats, and where they build nests play an important role in a farm. Overall, how these factors change depending on season or life cycle influences a bird's role in the farm.

BIRDS: AS FRIENDS OF AGRICULTURE

Birds are not directly employed by man in agriculture but they perform several roles in agro-ecosystem.

1. Pollination service: They help in the cross-pollination of many crops and forest trees. Hummingbirds play a key role in wild flower pollination. Sunbird (Tropics), Honeycreepers (Hawaii),Honeyeaters (Australia), Brush-tongued parrot (New guinea), and Spiderhunters play a vital role in the pollination of shrimp plants, verbenas bee balm, honeysuckle, fuchsias, hibiscus, and bromeliads. Around 5% of food and medicinal plants get benefited by such pollinating birds. Thirty-one Hawaiian bellflower species went extinct due to the absence of pollinating birds. This highlights the importance of pollinating aves.

2. Soil fertility: Bird excreta is rich in uric acid. This can readily convert to ammonia and act as fertile manure to plants by contributing to soil nitrogen. The contribution of birds in increasing the soil fertility in farms is very confined. However, waste from the poultry, if added to the soil, drastically enhances fertility.

3. Pest control: Birds rely on insects and their larva to feed themselves and their babies. During crop seasons, the insect population increases immensely which affects either the plant survival or its quantitative and qualitative yield. Birds play a key role in controlling the insect growth rate by feeding on these insect larvae.

- Verma (2006) found that house sparrow, common myna, red-vented bulbul, *Pycnonotus cafer*, and three other bird species in addition to wasps play an important role in reducing *Catopsilia* sp. larvae in a medicinal crop, *Cassia angustifolia*.
- Insectivore birds have also been found to play an important role in the biological control of insect pests through disease transmission besides direct predation. Some of these bird species transmit NPV infecting *Helicoverpa armigera* to healthy larvae of this pest (Vyas et al., 1988).

4. Rodent control: Birds like eagles keep an eye on these rodents and carry them away for consumption. Thus, they keep the rodent growth under control, which in turn helps the farmers. Besides these, birds also play a key role in the

seed propagation of forest trees and wild plants. Although it is well known that insectivorous and predatory birds play a useful role in controlling insect and rodent pests of crops, only a few attempts have been made to evaluate this role, and that too only in the case of insectivorous birds.

BIRDS: AS FOES OF AGRICULTURE

Birds can inflict damage to the crops and cause loss to the farmers in any of the stages of crop growth from sowing to harvest (Figure 1). Damage to crop harvest is caused by birds feeding on grains at stores, shelling yards, and market-places (Figure 2). At the sprouting stage, sometimes this damage is so severe that farmers have to re-sow the affected fields. The re-sown crop may mature later than those sown at the normal time and suffer relatively more bird damage at the ripening stage. Negative impacts of birds on agricultural crops vary from "region to region, season to season and crop to crop".

Factors that influence the extent of bird damage to the crop:

- Concentration of local bird population
- Concentration of migrants
- Total area under the crop
- Cropping pattern of the area
- Ecology of the Area
- Cropping season
- Food habit of the birds
- Physiological status of the birds

TYPES OF DAMAGE BY BIRDS

Birds can cause crop losses by feeding on grains, fruits, and sown seeds, pulling up the seedlings trampling of seedlings, breaking branches when roosting, nipping buds, fouling nursery stock and lawns, damage irrigation pipes, and serve as vectors of plant pathogens like bacteria which aggravates the disease potentiality.

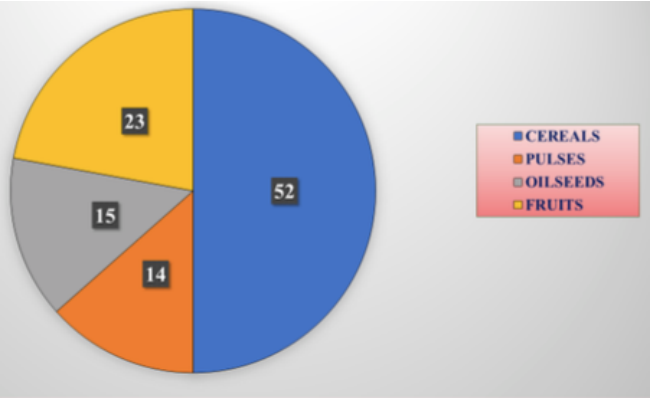

Figure 1: Number of bird species that affect crop plants

Fruits injured by birds lose marketability. Thus, an attack of a bird on a seed or a fruit produces 100 % loss. Cereals are more vulnerable to bird attack, especially at the dough stage. Damage to the crops of smaller grains such as pearl millet and sorghum is more serious as compared to larger size grains (e.g., Maize). Usually, the small cereal grains are preferred by both smaller and larger birds, whereas large grains like maize is depredated primarily by larger species such as parakeets and crows. Isolated fields are always prone to bird damage. Early and late-maturing fields are highly susceptible. Hence, the even distribution of bird's damage, synchronization of crop cultivation is advocated.

CROPS DAMAGED BY BIRDS

Birds severely damage crops at various stages of yield and harvesting. They inflict damage at various locations including fields and granaries (Table 1).

CONCLUSION

Measuring net effects could reveal undiscovered synergies between conservation, crop production, and human well-being. Using a net

effect approach, there may be opportunities to simultaneously reduce disservices, enhance services and conserve biodiversity with the objective of sustaining current and future human well-being within ecological limits.

Hence, there is a need for interdisciplinary research in the development of eco-friendly bird repelling techniques as well as enhancing beneficial avian population in the Agro-ecosystem.

Figure 2. Bird damage in different crops (Source: https://en.wikipedia.org/)

Table 1. The extent of bird damage to crops

Sl. No.	Crop	Stage of damage	Birds	Extent of loss (%)
1	Groundnut	Ripening	Crows	24
2	Maize	Sprouting	Crows, Doves, Babblers	20
3	Mustard	Ripening	Parakeets, Crows	63
4	Pearl millet	Ripening	Sparrows, Parakeets, Weaverbirds	10-100
5	Peas	Ripening	Pigeons	54
6	Pulses	Sprouting	Doves, Pigeons, Parakeets, Sparrows	66
7	Rice	Sprouting	Weaverbirds, Sparrows	41
		Ripening	Sparrows, Weaverbirds, Munias, Parakeets, Saras cranes	26
8	Sorghum	Ripening	Pigeons, Doves	12-85
9	Sunflower	Sprouting	Crows	65
		Ripening	Crows, parakeets	22
10	Wheat	Sprouting	Crows	17-20

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