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Avian Community Composition and Behavioural Observation on Damage inflicting Avian species at the Grape Orchard

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ABSTRACT: Agriculture throughout the world has an issue with bird damage. By directly consuming fruit, birds impose enormous expenses on fruit farmers. An essential first step in reducing bird damage is to identify the species that cause crop damage. The present study was conducted to record avian composition and behavioural observations of damage-inflicting avian species at the experimental grape orchard, CCSHAU, Hisar from February, 2021 to May, 2021 and February, 2022 to May, 2022. A total of 10 bird species were visiting the grape crop and of these, 6 (Rose-ringed Parakeet, Red-vented Bulbul, Brown headed Barbet, Western Koel, Rufous Treepie and Common myna) were recorded to cause damage to grapefruit. Feeding guild status revealed that insectivorous was the most dominating guild followed by frugivorous and omnivorous. The number of bird visits recorded maximum at ripen stage as compared to the unripe stage. Rose-ringed Parakeet being the most abundant cause severe damage followed by Common Myna, Brown headed Barbet, Red-vented Bulbul, Western Koel and Rufous Treepie. Bird damage to fruit crops is a long-standing problem imposing great loss to growers a more species-specific management effort may be implemented with the help of current information on the pest birds.

Keywords: Agriculture, birds, damage, grapefruit, Orchard.

INTRODUCTION

Avian fauna is an essential component of biodiversity, which contributes to maintaining the ecological balance. Bird behaviour, distribution, seasonal phenology, and demography are all linked with changes in agricultural practices on both regional and temporal scales (Tabur, 2010). Birds are ecologically diverse, better-known vertebrate groups, found all over the world and conspicuous in a variety of habitats. The overall number of bird species known to exist on the planet has been estimated to be around 10896, (Gill and Donsker 2019). India harbours around 1306 species and 531 species found in Haryana (Praveen *et al*., 2016). Birds are an important component of the agroecosystem. The function of birds in agriculture is complex and influenced by several factors such as their feeding habits and degree of reliance on crops, physiological conditions and age etc. (Rana and Narang 2004). Agriculture provides birds with a concentrated and reliable supply of food. There are three types of food: fruits grain and seeds (ii) green vegetation such as grasses and crop plants (iii) insects, arthropods, and rodents found in the soil and crops (Dhindsa and Saini, 1994). Birds supply several services to the agroecosystem in exchange. Plant-frugivore interactions are an important element of many plants' reproductive cycles, and frugivorous bird species play a significant role in seed dispersal. Birds consume termites, beetles, moths, spiders, and ants to keep a potent check on insect population. Raptors also control the population of birds, mammals, and reptiles in agriculture and act as bioindicators in agroecosystems (Sekercioglu, 2006).

Despite this, several bird species are among the most pestiferous species, causing significant harm to crops. It's worth mentioning that in India, 05 out of 1000 bird species (or 2.1 per cent) have been documented damaging crops and fruits. Many species cause damage to crops either directly by granivory or frugivory (Schackermann *et al*., 2014) or indirectly by devouring natural enemies of pests (Martin *et al*., 2013). The percentage of damage may vary in different crops e.g. small berry production is estimated to be damaged by 30 to 35%, wine and table grapes by 7%, apples and pears by 13%, stone fruits by 16 %, and nut crops by 22 %. Growers are concerned about bird damage to fruit orchards, which costs them millions of dollars each year in addition fruit-eating birds may cause damage to fruit by making it prone to infection and lowering its quality (Elser *et al*., 2019).

So, the present investigation was carried out to study the community composition and damage by birds at different fruit developmental stages of the grape crop, because knowledge about bird species in a given geographic region is required to establish conservation measures.

MATERIALS AND METHODS

Study area. Chaudhary Charan Singh Haryana Agricultural University is situated in Hisar, Haryana. It has geographical extension from 29^{o} 08′59.1″N latitudes and 75^{o} 42′16.8″E longitudes.

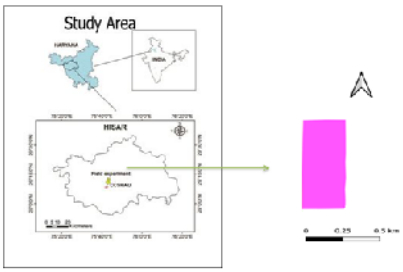

Fig. 1. Location map of the study area.

Data collection. The avifaunal diversity was studied at the experimental grape orchard of HAU. Observations on birds were taken by following line transects and point count method (Altman, 1974; Gaston, 1975; Sales and Berkmuller, 1988) from February, 2021 to May, 2021 and February, 2022 to May, 2022, Birds were observed with binoculars to pin down their unique morphological features crucial for identification. After that photographs were clicked with a COOLPIX NIKON P900 camera. All field surveys were conducted on a weekly basis from 6:00 to 9:00 A.M. and from 5.00 P.M. - 7.00 P.M. during the summer season. The bird observed in the study areas were identified using reference books (Grimmet *et al.*, 2016). For identification and preparation of the checklist, authentic avian databases (IUCN Red list of threatened species, Oriental Bird Club image database and Merlin bird ID) were also used. Feeding bird's status (e.g., Insectivore, Carnivore, Omnivore, Frugivore, Herbivore, Granivore, Nectarivore, and Piscivore) were categorised based on field observations and available literature (Ali, 2002). Data related to each survey were kept separate and examined for local abundance status based on several sightings: Very common (VC) were sighted > 10 times; Common (C) seven to nine times; Uncommon (UC) three to six times and Rare (Ra) were sighted once or twice (MacKinnon and Phillipps, 1993). The residential status of birds was also categorised based on presence or absence in a particular season and different status categories were assigned: resident (presence throughout the year), winter migrant (present from October to March) and summer migrant (present from March to August) and passage migrant (present from August to October). IUCN (2021) conventions were used to assess the species conservation status and population trends.

RESULTS AND DISCUSSION

A total of 10 species (Asian Green Bee-eater, Western Koel, Rufous Treepie, Grey-bellied Cuckoo, Ashy Prinia, Red-vented Bulbul, Common Myna, Asian Pied Starling, Brown headed Barbet, Rose-ringed Parakeet) were recorded visiting grape crop from February, 2021 to April, 2021 and February, 2022 to April, 2022 as shown in table 1. Common Starling was the most abundant species in vineyards (Tracey and Saunders, 2003). The observations on the feeding guild of recorded species in the study area unveiled that insectivorous is a highly dominated guild. Out of 10 species, 4 species (Asian Green Bee-eater, Grey-bellied Cuckoo, Ashy Prinia, Rufous Treepie) were chiefly insectivorous, 3 species (Red-vented Bulbul, Brown headed Barbet, Rose-ringed Parakeet) were frugivorous and 3(Western Koel, Common Myna, Asian Pied Starling) were omnivorous. Similarly, insectivores were a dominating group of birds in different areas reported by Narayana *et al*. (2019) in agricultural landscapes of Peddagattu and Sherpally area of Telangana, India, Kumar and Sahu (2020) in agricultural landscapes of Panipat, Haryana, Platt *et al*. (2021) at traditional rice ecosystem, Myanmar. Residential status revealed that 9 species were resident and one was a summer migrant. According to IUCN red list (2021), all species are categorised as the least concern. Out of these, 5 species have increasing, 4 have been stable and one has decreasing population trend. Abundance status of recorded avian species on basis of sightings reveals that 5 species were very common (Asian Green Bee-eater, Red-vented Bulbul, Common Myna, Rose-ringed Parakeet, Rufous Treepie), 4 (Western Koel, Ashy Prinia, Brown headed Barbet, Asian Pied Starling) were common and one (Grey-bellied Cuckoo) was rare.

Table 1: Bird species recorded at experimental grape orchard CCSHAU, Hisar.

Family	Common name	Scientific name	Guild status	Residential status	Abundance status	IUCN	GPT
Meropidae	Asian Green Bee-eater	*Merops orientalis* (Latham, 1802)	In	R	VC	LC	↑
Cuculidae	Western Koel	*Eudynamys scolopaceus* (Linnaeus, 1758)	O	R	C	LC	→
	Grey-bellied Cuckoo	*Cacomantis passerinus* (Vahl, 1797)	1n	SM	Ra	LC	→
	Rufous Treepie	*Dendrocitta vagabunda* (Latham, 1790)	In	R	VC	LC	↓
Cisticolidae	Ashy Prinia	*Priniasocialis* (Sykes, 1832)	1n	R	C	LC	→
Pycnonotidae	Red-vented Bulbul	*Pycnonotus cafer* (Linnaeus, 1766)	F	R	VC	LC	↑
Sturnidae	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	O	R	VC	LC	↑
	Asian Pied Starling	*Gracupica contra* (Linnaeus, 1758)	O	R	C	LC	↑
Megalaimidae	Brownheaded Barbet	*Psilopogon zeylanicus* (Gmelin, 1788)	F	R	C	LC	→
Psittacidae	Rose-ringed Parakeet	*Alexandrinus krameri* (Scopoli, 1769)	F	R	VC	LC	↑

In- Insectivore, O- Omnivore, F- Frugivore, R- Resident, S- Summer migrant, VC- Very common, C- Common, Ra- Rare, IUCN- International union for conservation of nature and natural resources, LC- Least concern, GPT- Global population trend, ↑- Increasing, ↓- Decreasing, Stable - →

Fig. 2. Avifaunal species visiting and inflicting damage to grape crop.

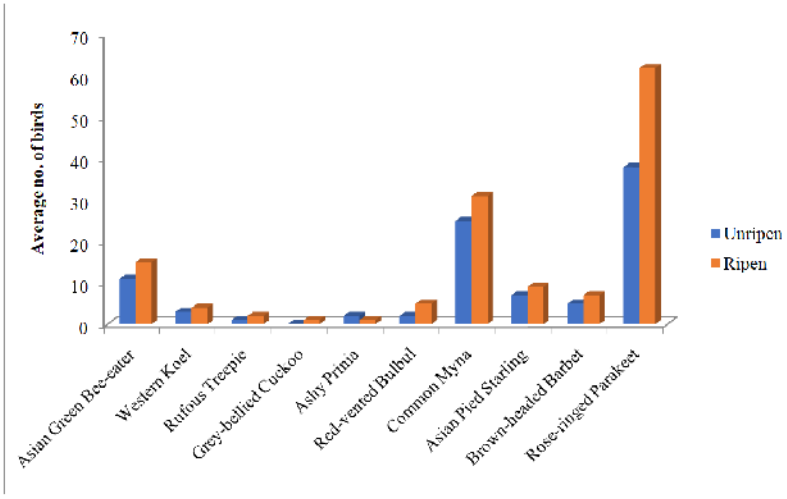

Fig. 3. Average number of birds visited at the experimental grape orchard, CCSHAU, Hisar.

Table 2: Level of damage and stages during the damage inflicted by frugivorous birds to grape crop.

Sr. No.	Birds species	Level of Damage	Stages
1.	Rose-ringed Parakeet	Serious	UR, R
2.	Red-vented Bulbul	Medium	UR, R
3.	Brown-headed Barbet	Medium	UR, R
4.	Western Koel	Low	UR, R
5.	Rufous Treepie	Low	UR,R
6.	Common myna	Serious	UR, R
	UR- Unripe, R-Ripen		

Field observation revealed that Rose-ringed Parakeet, Red-vented Bulbul, Brown headed Barbet, Western Koel, Rufous Treepie and Common myna were the major frugivorous birds. According to Simwat and Sidhu (1973); Toor, (1982); Chakravarthy (1993) some species of bulbuls, parakeets, mynas, crows and one species of koel are frugivorous. A total of 6 species were recorded to cause damage to grapefruit. Dhindsa and Saini (1994) recorded similar findings that only 5 of the nearly 1000 bird species or (2.1%) inflicted damage to fruits and crops. Even with protection, bird damage can still cost a vineyard 83% of its production (Wang *et al*., 2019). The number of bird visits were recorded maximum at the ripening stage as compared to the unripe stage. The bird damage started early in the ripening stage of grapefruit (Somers and Morris, 2002). Grasswitz and Fimbers (2013); Patyal *et al*. (2003) observed the correlation between the extent of damage and the preference for red apple colour in the late ripening stage.The most severe damage was caused by Rose-ringed Parakeet and was the most abundant species followed by Common Myna, Brown headed Barbet, Red-vented bulbul, Western Koel and Rufous Treepie. Our findings are similar to Klug *et al*. (2019); Patyal and Rana (2006) who also reported that the Rose-ringed Parakeet is the worst agricultural pest, and it causes significant harm to standing crops, orchards, and vegetable crops. The average number of visitations of Rufous Treepie was recorded minimum as compared to other birds (Fig. 3 and Table 2). It's important to recognize the species that are present in the vineyard, their occurrence patterns, and the damage they cause. Bird numbers and species vary as the fruit ripens. This knowledge is crucial and probably will have an impact on the use of control measures (Tracey and Saunders, 2003).

CONCLUSION

The phases of fruit development in the grape crop were found to be associated with bird community characteristics. It may be suggested that different eco-friendly bird scaring techniques should be used in crop agronomic programmes for improved fruit output and reduced financial losses to farmers.

FUTURE SCOPE

Birds are widely recognised as indicators of overall biodiversity in agricultural landscapes because of the range of ecological functions performed by them. The economic loss caused by avifauna in the agroecosystem appears modest when compared to the enormously important ecosystem services provided by birds. Behavioural studies on damage-inflicting birds help in the control of pest birds by using the eco-friendly technique.

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Conflict of Interest. None.

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