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Grass species utilization by Munia birds (Estrildidae) at Abhera Biological Park, Kota, Rajasthan, India

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Abstract

Granivorous birds are closely associated with grassland structure and seed availability, particularly within managed urban landscapes. The present study examines the foraging ecology of four munia species—Indian Silverbill (*Euodice malabarica*), Scaly-breasted Munia (*Lonchura punctulata*), Red Avadavat (*Amandava amandava*), and Tricoloured Munia (*Lonchura malacca*)—at Abhera Biological Park, Kota, Rajasthan. A total of 280 focal foraging observations were recorded across nine grass species. All four munia species were observed feeding on *Ischaemum rugosum*, which accounted for the highest proportion of total foraging records. Species-specific preferences for other grasses were also evident. Statistical analysis using a chi-square goodness-of-fit test confirmed significant deviation from random grass use ($\chi^2 = 96.4$, $df = 8$, $p < 0.001$). The findings emphasize the ecological importance of native grasses in sustaining granivorous bird communities in urban protected areas.

Keywords: Granivorous birds; Munia; Grassland management; Urban biodiversity; Native grasses; Abhera Biological Park Kota

Introduction

Grassland ecosystems support a diverse assemblage of seed-eating birds, yet these habitats are increasingly modified by urban expansion and intensive management practices. Munias (family Estrildidae) are small granivorous passerines that rely heavily on grass seeds throughout their life cycle. Their feeding behavior reflects both resource availability and habitat quality, making them useful indicators of grassland health.

Urban biological parks often retain fragments of semi-natural grasslands, but these areas are frequently subjected to mowing, landscaping, and plant replacement. Information on how granivorous birds utilize grass resources within such settings remains limited. This study aims to document grass species used by munias at Abhera Biological Park, quantify species-wise foraging preferences, and assess the conservation value of native grasses in an urban context.

Materials and Methods

- **Study area and GIS mapping:** Abhera Biological Park is situated in Kota district, south-eastern Rajasthan, India (approximately 25.13° N, 75.88° E). The region experiences a semi-arid climate characterized by hot summers, monsoon rainfall, and mild winters. A GIS-based location map was prepared using QGIS 3.x, illustrating the position of the park within Rajasthan and India, along with major habitat features such as grasslands, wetlands, and woodland patches.
- **Study species:** The study focused on four munia species commonly recorded within the park: Indian Silverbill (*Euodice malabarica*), Scaly-breasted Munia (*Lonchura punctulata*), Red Avadavat (*Amandava amandava*), and Tricoloured Munia (*Lonchura malacca*).

Grass species recorded

Nine grass species were identified as food resources during foraging observations: *Apluda mutica*, *Echinochloa colona*, *Eragrostis pilosa*, *Eragrostis tenella*, *Eragrostis unioides*, *Eriochloa procera*, *Isachne globosa*, *Ischaemum rugosum*, and *Oryza rufipogon*.

Behavioral observations

Foraging behavior was documented using focal-animal sampling. Individual birds or flocks were observed for short intervals, and each confirmed feeding bout was treated as a single observation. Observations were conducted during early morning and late afternoon hours when foraging activity was highest. The grass species utilized and relative feeding intensity were recorded.

Data analysis

Foraging observations were summarized for each grass species and munia species. Percentage contributions were calculated to describe relative use. A chi-square goodness-of-fit test was applied to examine whether grass utilization differed significantly from random expectation.

Results

A total of 280 foraging observations (Table 1) were documented during the study period. Among the grasses recorded, *Ischaemum rugosum* contributed the highest proportion of feeding records (25%), followed by *Eragrostis pilosa* and *Apluda mutica*. All four munia species were observed feeding on *Ischaemum rugosum*, indicating its broad importance as a food resource.

Species-wise analysis revealed both overlap and differentiation in grass use. Indian Silverbill frequently utilized *Apluda mutica* and *Eragrostis pilosa*, whereas Scaly-breasted Munia showed higher use of *Echinochloa colona* and *Eragrostis tenella*. Red Avadavat was more closely associated with wetland-edge grasses such as *Isachne globosa* and *Oryza rufipogon*. Tricoloured Munia relied heavily on *Ischaemum rugosum* and *Eriochloa procera*. The chi-square test indicated significant non-random grass utilization ($\chi^2 = 96.4$, $df = 8$, $p < 0.001$).

Discussion

The findings demonstrate selective foraging behavior among munia species within an urban biological park. The consistent use of *Ischaemum rugosum* across all species suggests that this grass plays a key role in supporting granivorous birds.

High seed output and prolonged seed availability may explain its widespread selection.

Differences in secondary grass preferences indicate resource partitioning among species, which may reduce competition. The association of Red Avadavat with wetter grass species highlights the importance of maintaining habitat heterogeneity within urban parks. These results reinforce the value of native grass assemblages for sustaining avian diversity in modified landscapes.

Management and Conservation Implications:

Urban grassland management practices can strongly influence food availability for granivorous birds. The results of this study suggest that conserving native grass species, particularly *Ischaemum rugosum*, is essential for maintaining munia populations. Management interventions such as reduced mowing frequency during seed-setting periods and preservation of wetland-edge grasses are likely to benefit urban bird communities.

Conclusion

The present study provides field-based evidence on grass species utilization by munia birds within Abhera biological park kota, Raj.. The consistent use of *Ischaemum rugosum* by all four munia species highlights its critical role as a key food resource in managed urban grasslands. Species-specific variation in the use of other grasses suggests selective foraging and partial resource partitioning, which may facilitate the coexistence of multiple granivorous bird species within a relatively small habitat.

These findings underscore the importance of native grass diversity in sustaining granivorous bird communities in urban protected areas. Grassland management practices that prioritize aesthetic landscaping or frequent mowing may inadvertently reduce seed availability and negatively affect bird populations. In contrast, conservation-oriented management that retains native grasses, allows natural seed maturation, and maintains habitat heterogeneity can significantly enhance urban avian biodiversity.

Overall, this study emphasizes that urban biological parks can function as important refuges for grassland birds when ecological requirements are incorporated into management planning. Long-term monitoring of grass–bird interactions, combined with adaptive grassland management, will be essential for conserving granivorous birds in rapidly urbanizing semi-arid landscapes

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References

Ali, S., & Ripley, S.D. (1983). Handbook of the Birds of India and Pakistan. Oxford University Press.

Bibby, C.J., Burgess, N.D., Hill, D.A., & Mustoe, S. (2000). Bird Census Techniques (2nd ed.). Academic Press.

Donald, P.F., Buchanan, G.M., Balmford, A., & Green, R.E. (2021). Grassland management and the conservation of seed-eating birds. *Journal of Applied Ecology*, 58, 1456–1468.

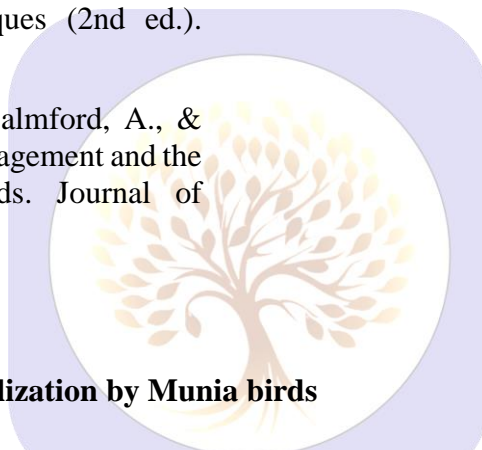
Marshall, A.J., & Morris, J. (2020). Seed availability and foraging strategies of granivorous passerines. *Avian Research*, 11, 32.

Singh, P., & Rahmani, A.R. (2022). Urban protected areas and bird diversity in semi-arid India. *Journal of Threatened Taxa*, 14(5), 20987–20998.

Ray S & Sainkhediya J Diversity of grasses in Nimar region of Madhya Pradesh. *Indian journal of plant sciences*. 2012. 1:2-3: 144-152.

SONU KUMAR, & Bairwa, O. P. (2025). Grasses Of Abhera biological park. <https://doi.org/10.5281/zenodo.14608055>.

SONU KUMAR, & Om Prakash Bairwa. (2025). Grasses of Ummedganj Pakshi Vihar Conservation Reserve UPVCR), Kota, Rajasthan". <https://doi.org/10.5281/zenodo.15608182>.



❖ **Table 1: Grass species utilization by Munia birds**

Grass species	Indian Silverbill	Scaly-breasted munia	Red Avadavat	Tricoloured munia	Total observation
<i>Apluda mutica</i>	18	6	4	5	33
<i>Echinochloa colona</i>	7	15	3	4	29
<i>Eragrostis pilosa</i>	16	10	4	8	38
<i>Eragrostis tenella</i>	5	14	2	3	24
<i>Eragrostis unioides</i>	12	6	2	2	22
<i>Eriochloa procera</i>	4	5	3	10	22
<i>Isachne globosa</i>	3	4	12	3	22
<i>Ischaemum rugosum</i>	20	18	15	17	70
<i>Oryza rufipogon</i>	5	2	10	3	20
Total observations	90	80	55	55	280

❖ **Figures:** Figure 1-5 Percentage contribution of different grass species to the combined foraging activity of four munia species—Indian Silverbill (*Euodice malabarica*), Scaly-breasted Munia (*Lonchura punctulata*), Red Avadavat (*Amandava amandava*), and Tricoloured Munia (*Lonchura malacca*)—at Abhera Biological Park, Kota, Rajasthan.

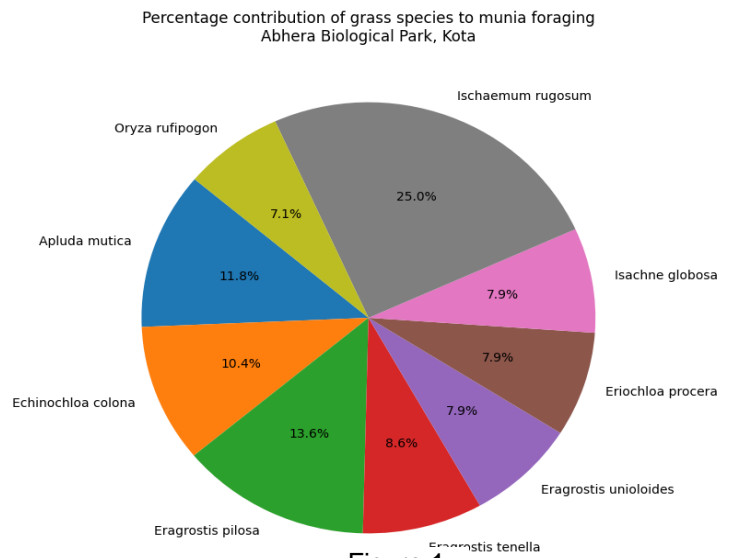


Figure 1

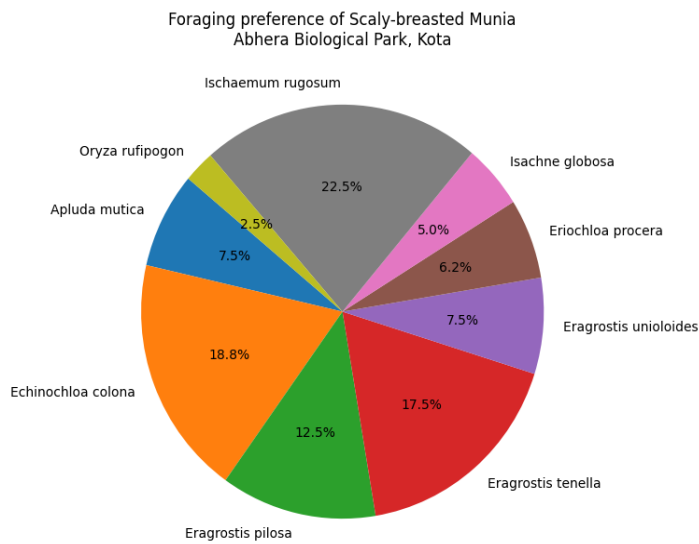


Figure 2

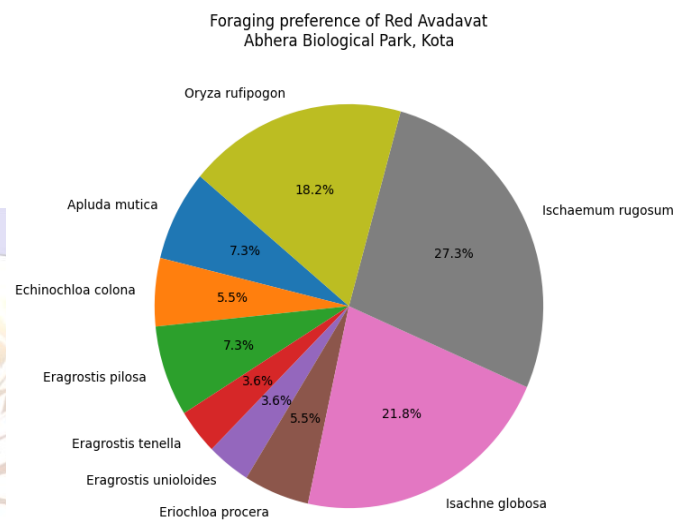


Figure 3

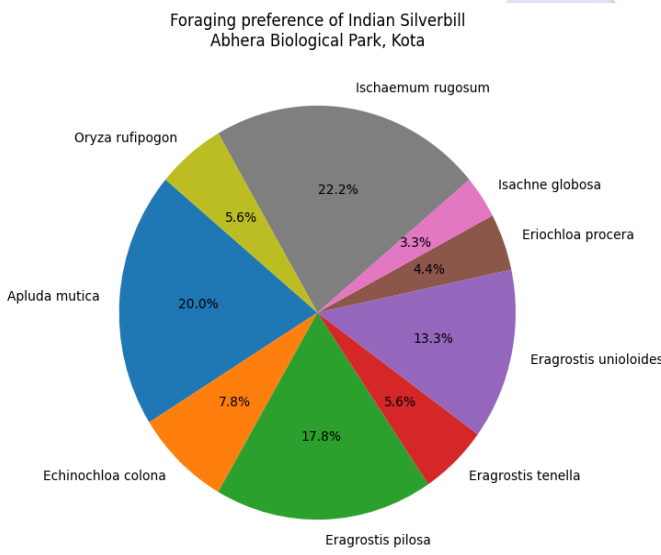


Figure 4

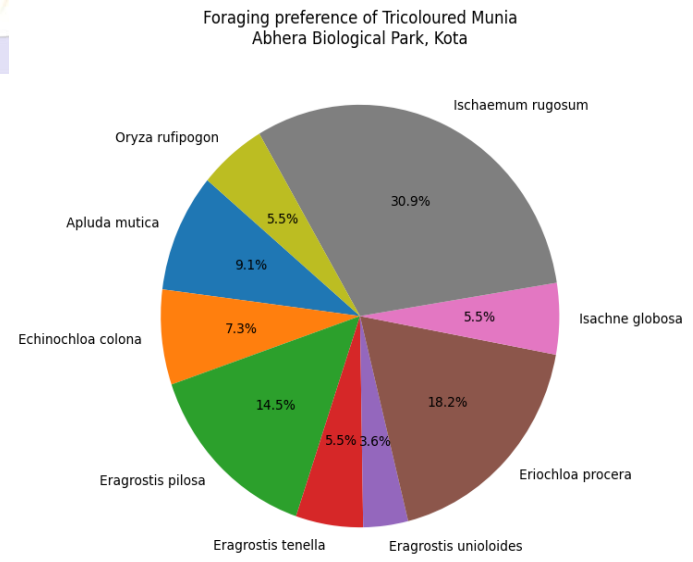


Figure 5