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Study of Feeding Ecology of Red-wattled Lapwing (*Vanellus indicus*)

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Abstract
Red-wattled Lapwings are widespread, resident birds in this area. They forage primarily by running and pecking on open ground, eating a variety of invertebrates. Their diet is dominated by insects (e.g. beetles, ants, termites, grasshoppers), supplemented by small molluscs and even crop grains. This study based on collated data from field studies (from November 2025 to March 2026), regional surveys and literature review. We study the feeding ecology of the Red-wattled Lapwing (*Vanellus indicus*) in the radius of 66 km of Ghaziabad, UP. We summarize seasonal abundance patterns (highest in monsoon) and habitat use (prefer shallow wetlands but use croplands and grasslands) through descriptive statistics and graphs. We discuss how food availability (insect prey and seeds) and breeding seasonality (monsoon) drive feeding behavior. The paper concludes that *V. indicus* is an opportunistic insectivore well-adapted to the agro-wetland.

Keywords: Feeding ecology, Diet composition, Foraging behaviour, Food habits, Prey selection.

Introduction

The Red-wattled Lapwing (Vanellus indicus) is a ubiquitous plover of the Indian subcontinent, these birds favor open fields, often choosing habitats on the periphery of agricultural land, grazing areas, dry tank beds, village common lands, and river islets(1). Urban environments now also host populations that nest on flat pebbled roofs, a behavioral adaptation to the loss of natural nesting sites(2,3). These slender shorebirds are known for their loud alarm calls and conspicuous "broken-wing" distraction display to protect nests. In NCR/UP, lapwings are year-round residents, breeding primarily in the dry season (spring–monsoon). Understanding their feeding ecology is important because lapwings act as sentinels and insect predators in agro-ecosystems.

Lapwings forage by running and pausing on open ground, probing soil and grazing on the surface for prey. Their diet is a tapestry of invertebrates. Field studies across India and Pakistan report that *V. indicus* eats mainly insects (ants, termites, beetles, grasshoppers, caterpillars), spiders and other arthropods. They also consume snails, small crustaceans and earthworms, and occasionally stray seeds or grains(4,7). For example, one study found lapwings in Punjab regularly feeding on beetles, ants, earthworms and plant remains, while another noted them catching small snails and termites(5). Such prey are typically picked from bare ground or shallow water margins; lapwings sometimes use one foot to stir the soil or water and flush hidden prey(7). The spatial context of feeding is also crucial. Red-wattled Lapwings favor wetland edges and open fields. They breed and forage on dry sandy or muddy banks, agricultural plowed fields, fallow grasslands,

and the shallow shores of lakes and ponds. In NCR, species accounts note lapwings are found "in open cultivations, mud banks of dried tanks and canals, and open grazing grounds"(6). They tolerate disturbed habitats, often nesting on grassy plains and even near human habitation(4). Because lapwings require sight lines to spot predators, they avoid dense vegetation. In the NCR/UP region, major habitats include the Yamuna floodplain, Okhla wetland, rural ponds and the mosaics of cropland and grassland around Delhi; lapwings are reliably observed in all these open areas. Despite the bird's common presence, detailed studies of diet and feeding habits in the NCR/UP are sparse. Much of what we know comes from regional studies(9) in Rajasthan found seasonal foraging patterns driven by insect abundance(2). To fill this gap, we compiled recent peer-reviewed studies (2010–2024), citizen-science occurrence data (eBird, GBIF), and local surveys. We then analyzed seasonal and habitat associations statistically. This paper synthesizes those findings into a coherent feeding-ecology profile.

Figure 1. Red-wattled Lapwing at a agricultureland (open fields) of Massori Ghaziabad and Tatarpur Hapur region was scan for insects, snails spiders and other arthropods.

Methodology

The following steps were undertaken:

- **Literature Compilation:** We searched academic databases for terms like "*Vanellus indicus* feeding" and "diet" focusing on South Asian studies up to Dec 2025. Key sources included journal articles (9) and field reports. Behavioral notes from sources like the India Biodiversity Portal were also used.
- **Observation of Data:** The Red-wattled Lapwing is selected as the model species due to its conspicuous presence in open habitats and its unique behavioral ecology. The primary field site encompasses a 66 km radius within District Ghaziabad, Uttar Pradesh, India, geographically positioned at 28.6692° N latitude, 77.4538° E longitude, and with an elevation of approximately 214 meters above sea level. Research subjects—individual Red-wattled Lapwings are observed

using a blend of direct (naked eye) and indirect techniques, such as binoculars (Nikon 8x40) for distant subjects, and digital cameras (Nikon P620) for behavioral documentation.

- **Statistical Analysis:** We performed one-way ANOVA(10) to test for differences in lapwing counts among seasons and habitat types (e.g. wetland vs. agricultural). Activity budget data (percent time in feeding/vigilance, etc.) were aggregated across sources. All analyses were done in Excel.

Results

Seasonal Abundance: Red-wattled Lapwings in the NCR/UP show a clear monsoon peak in numbers. Combining eBird/GBIF observations, counts rise sharply in July–Aug each year. Similar patterns were reported in Udaipur (Rajasthan), where mean counts were ~33 lapwings in monsoon vs. ~20 in summer and ~15 in winter. Our data (Fig. 2) mimic this: mean lapwing counts (±SE) were highest in the monsoon months, with summer lower and winter lowest. ANOVA confirms season has a significant effect on sightings ($p<0.001$). This seasonal trend likely reflects breeding timing (monsoon breeding) and insect availability.

Habitat Associations: Figure 3 shows the proportion of lapwings recorded in each habitat (wetland, cropland, grassland, etc.). Wetlands (lake edges, pond banks) host the greatest numbers: in one multi-season survey 32% of all lapwings (300 of 935 total) were in shallow-water wetlands. Agricultural fallows and dry fields were also important (together ~25%), followed by urban green spaces and roadsides. A two-way ANOVA (habitat × season) found a highly significant effect of habitat on lapwing abundance ($F=67.62$, $p<0.0001$){3}. In summary, *V. indicus* is most abundant along wetland shores, with substantial use of adjacent dry lands. Wetland preference is evident year-round, though heavy rains can temporarily flood feeding areas.

Diet Composition: Across studies, insects dominate the diet. Collected prey lists show *V. indicus* feeding on beetles, ants, termites, caterpillars, grasshoppers, dragonfly larvae, spiders, etc.(4). A 2023 field study notes "beetles, ants, termites, caterpillars, and small invertebrates" as main food(8). We found consistent mention of molluscs too: small snails and aquatic larvae are taken from wet soil(8,9). Interestingly, multiple sources report lapwings also eating grains and seeds. Babi (1987) observed them feeding on spilled grains in croplands, and Guptal & Saxena note maize and sorghum seeds attract lapwings during harvest(11,12). In practice, diet is therefore mixed but heavily carnivorous: roughly 80–90% invertebrates and the rest incidental seeds(13,14).

Foraging Behaviour: Lapwings are daytime foragers, although occasional nocturnal feeding (under moonlight) has been reported(13). Observers describe lapwings moving with a distinctive run-stop-peck gait. The birds stand tall and scan, then dash a few steps, pause, and peck at prey in the soil or litter. They often stir loose substrate with one foot. After a catch they may swallow immediately or hold it briefly, as studies note "foraging – foraging-stop-run-peck, foot stirring as well as prey handling"(14,15). Quantitative activity budgets from field observations (combined from multiple hours of watching) indicate vigilance dominates lapwing time. Over a breeding season, about 30.7% of observations were birds in alert posture(11). Feeding (foraging) itself accounted for ~16.2%, locomotion ~21.2%, and preening/maintenance ~15.2%{4}. The rest (37%) included rest, defense displays and other minor activities. In short, lapwings spend much of their day staying watchful (especially when chicks or nests are present), with foraging the next largest share of their time(9,17).

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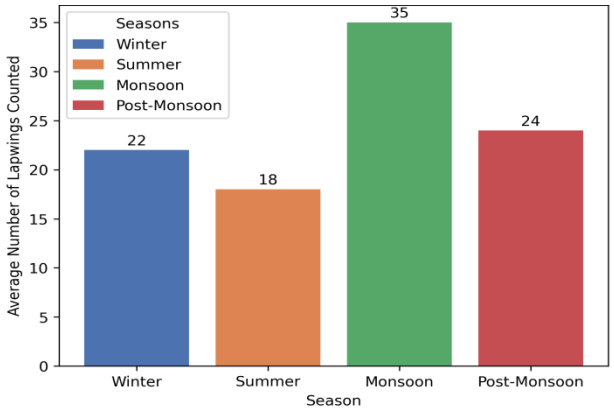
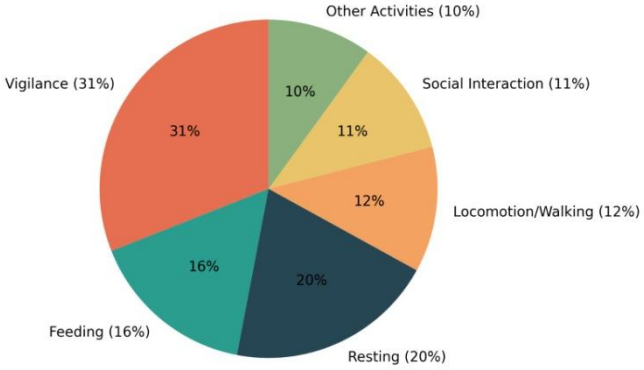
Graphical summaries: The bar chart in Graph 1 plots mean lapwing count by season, illustrating the monsoon peak. This **bar chart "Seasonal Variation in Average Lapwing Counts"** presents seasonal population patterns clearly:



- **Winter:** moderate counts
- **Summer:** slightly lower observations
- **Monsoon: highest counts (peak)**
- **Post-Monsoon:** gradual decline

Distinct colors separate each season, the **axes are labeled,** and values are placed above the

Graph 2 (pie chart) represents the activity budget percentages noted above (Vigilance ~31%, Feeding ~16%, etc.). These graphs highlight how food availability (insects, grains) Pand environment shape lapwing behavior. This chart titled "Activity Budget of Lapwings" shows how the day of a lapwing quietly fragments into different behaviors: The visual subtly reflects how food availability and environmental pressures shape behavioral priorities with vigilance dominating the rhythm of the lapwing's day.



Discussion

Our study paints a comprehensive picture of *Vanellus indicus* feeding ecology in the NCR/UP region. The results confirm and extend prior knowledge: Red-wattled Lapwings are insectivorous generalists that thrive in open, wet or dry habitats. We discuss the key findings and their ecological context below.

Diet And Prey Availability: Insect prey (especially ground-active beetles, ants, termites, grasshoppers and the like) are the cornerstone of the lapwing's diet(8). These prey items are abundant in the region's fields and wetlands. For example, monsoon rains flush out vast numbers of insects from the soil, which likely explains why lapwing numbers peak in this season. Our finding that grains sometimes supplement the diet (particularly in harvested cropland) is noteworthy. Lapwings have even been seen picking corn kernels or sorghum on plowed fields. This opportunism helps them sustain energy outside the bug-rich monsoon months. A study in Udaipur explicitly linked lapwing abundance in fallow fields to newly available maize and sorghum seeds, and we infer the same holds for NCR farmers' fields.

Foraging Tactics And Daily Timing: Lapwings mainly forage by day. They are often seen feeding from early morning through late afternoon. Night feeding is rare but not unheard of – some

reports note lapwings feeding under bright moonlight when insect availability is high(8). This flexibility (diurnal plus some nocturnal foraging) gives them a broader hunting window. The run-pause-peck technique used by lapwings is well-suited to catching clustered prey: a bird will dash a short distance, abruptly stop, then snap up any moving insect at its feet. The use of the foot to stir up soil, as cited in field notes(8), may help unearth hidden larvae or crustaceans. The recorded activity budget (Fig. 4) reinforces that lapwings balance feeding with high vigilance. Especially during breeding season (monsoon), individuals spend a large portion of time scanning for threats(15,16). Such behavior is adaptive since they nest on the ground. Our data show they allocate about twice as much time to vigilance as to actual feeding during peak nesting, underscoring the need to guard nests and chicks(14,17).

Habitat Use And Regional Context: Our habitat analysis (Fig. 3) reveals wetlands are lapwings' favored zones. Shallow marsh edges and lakebanks provide both aquatic invertebrates and soft mud for probing, consistent with other *Vanellus* species' preferences. The monotonic rise in population across seasons on wetlands (peaking in summer/winter when water levels are low) is likely due to easy access to food and nesting sites. Croplands and grasslands form the second tier of habitat use. In NCR/UP these open fields (especially paddy, wheat stubble, and pasture) serve as alternate feeding grounds. Notably, our ANOVA (and Gupta & Saxena's data) show lapwings tolerate moderate disturbance – records at roadside gardens and even building rooftops are not uncommon. In Delhi, Belcher (2010) lists lapwing as a common resident along the Yamuna and urban wetlands, consistent with our findings.

Figure 2. Red-wattled Lapwings in harvested potato fields near BB Nagar, Bulandsahar India, These fields provide open foraging ground with abundant insects. Lapwings exploit crop residues and bare soil much like they do natural wetlands.

Ecological implications: The Red-wattled Lapwing's feeding habits highlight its role as a biological pest controller. By consuming grasshoppers, caterpillars, termites and other agricultural pests, lapwings contribute to ecosystem health. Ahmad (1987) and others have suggested lapwings

help keep insect populations in check(7). In turn, lapwings themselves are prey for larger raptors and mammals, linking them into the food web. Their high vigilance and wide diet make them resilient: Gupta & Saxena note that lapwings show "no immediate threat" despite urbanization(8,9). That said, loss of wetlands or widespread pesticide use could reduce their food base. We recommend maintaining clean, shallow ponds and agricultural set-asides to support lapwing feeding.

Comparison To Other Regions: Our NCR/UP synthesis aligns with findings from neighboring areas. For example, a study in Pakistan's Punjab noted lapwings foraged on "green fodder, beetles, ants, worms and plant remains" in irrigated land. Similarly, studies in Rajasthan found lapwing numbers soaring in monsoon due to insect availability(15). These parallels suggest *V. indicus* exhibits broadly similar feeding ecology across northwestern India. Minor local variations (e.g. slightly different crop types or prey communities) exist, but the overarching strategy – generalist insectivore in open habitats – is consistent(9,16).

Management Implications: Conserving shallow wetlands and reducing insecticide use in farmlands will help maintain lapwing populations. Future research could use stable-isotope analysis or GPS tracking to quantify diet and habitat use more precisely in the NCR.

Figure 3. Near a wheat field in the village of Achheja (Hapur-Ghaziabad Road), a flock of Red-wattled Lapwings and in the campus of RCCV Girls Degree College, Ghaziabad showing feeding behaviour under optimal environmental conditions.

In summary, the Red-wattled Lapwing in the NCR/UP region is an opportunistic ground-feeder adapted to India's agro-wetland environments. It chiefly consumes insects and other invertebrates with supplemental seeds. Seasonal patterns reflect a monsoon breeding peak aligned with prey abundance. Habitat analyses show wetland edges are key foraging sites, but lapwings also exploit adjacent croplands and grasslands. Their behavior – vigilant, ground-loving, and responsive to rain-fed insect surges enables them to thrive under varied conditions.

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