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Saurian Fauna in Agricultural Landscapes of Yavatmal District: A Literature Review

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Abstract
Saurian fauna (lizards) plays vital roles in both natural habitats and farmlands. Because they rely on surrounding temperatures and specific microhabitats, lizards are sensitive indicators of environmental health, land changes and human impact. In the semi-arid Vidarbha region of Maharashtra, agricultural areas are changing rapidly due to modern farming, habitat loss and chemical pesticide use. This review looks at literature and observations of five key lizard families (Gekkonidae, Scincidae, Agamidae, Varanidae and Chamaeleonidae) across Yavatmal District and nearby areas. It highlights how lizards control pests, transfer energy in the food web and cycle nutrients, while addressing the threats of pesticide build up and habitat destruction. Ultimately, this paper points out missing research areas to guide future field studies and conservation efforts in agricultural ecosystems.

1. Introduction

Reptiles are an essential part of nature, playing an important role in terrestrial and water-based food chains. Within this group, lizards (Suborder: Sauria) have adapted well to living in diverse environments, from dense forests and scrublands to farmlands. In Maharashtra, the variety of landscapes from the Western Ghats to the semi-arid Deccan Plateau supports a rich lizard population. Common families like geckos (Gekkonidae), skinks (Scincidae), garden lizards (Agamidae), monitor lizards (Varanidae) and chameleons (Chamaeleonidae) live in specific spots like trees, leaf litter, burrows, rocks and field margins. Because lizards rely on surrounding heat to regulate body temperature and stay within small home areas, they are quick to react to environmental changes. Their population numbers and health show us how healthy a habitat is, how much it has been broken up, or how badly it is affected by chemicals. While nearby districts in Vidarbha such as Buldhana and Amravati have studies on local reptiles, there is little focus on how farming affects lizards in Yavatmal District. This review looks at the types of lizards found in Yavatmal, their roles in the ecosystem, their value as biological indicators and the human threats they face.

2. Study Area Profile and Microhabitat Characteristics

Yavatmal District is located in the southeastern part of the Vidarbha region in Maharashtra, featuring a terrain and climate that support diverse saurian populations

Landscape Zone	Micro-Habitat Examples	Saurian Ecological Guilds
Protected / Forest Zones	Tipeshwar Wildlife Sanctuary	Varanidae, Agamidae, Gekkonidae
Scrublands & Grasslands	Plateau & Rocky Edges	Agamidae, Gekkonidae
Agroecosystem Fields	Cotton, Soy & Field Margins	Scincidae, Gekkonidae, Agamidae

Geographically, Yavatmal District is dominated by the central-southern plateau region, interspersed with undulating hills, monsoon-fed dry deciduous forests, open scrublands, and river basins. Protected landscapes, such as the Tipeshwar Wildlife Sanctuary, provide core habitats with minimal human interference, enabling natural territorial and foraging behaviours. Surrounding these core zones, agricultural land forms an extensive matrix where cultivated crops (primarily cotton, soybean, and pulses) interface with natural vegetation, farm boundaries, stone piles, and irrigation channels.

Seasonal Shifts and Activity Patterns

Saurian activity in the semi-arid climate of Vidarbha exhibits strong seasonal shifts:

- **Monsoon Season (June - October):** Elevated ambient humidity and increased insect abundance trigger high activity, foraging, and breeding among resident geckos, agamids, and skinks.
- **Winter Season (November - February):** Lower environmental temperatures prompt behavioural thermoregulation, where lizards restrict activity to sunny morning periods and sheltered microrefugia.
- **Summer Season (March - May):** High temperatures drive many species to seek subterranean burrows, deep rock fissures, or shady vegetation to avoid desiccation and heat stress.

3. Taxonomic Composition and Regional Comparison

Surveys across the Vidarbha region demonstrate significant saurian diversity across natural and agricultural settings.

Family Representative	Taxa/Common Names	Primary Microhabitats	Ecological Adaptation & Status
Gekkonidae	*Hemidactylus spp.* (House & Rock Geckos)	Wall crevices, rock faces, tree bark, field huts	Nocturnal insectivores; adhesive lamellae for vertical mobility.
Agamidae	*Calotes versicolor* (Oriental Garden Lizard)	Bushes, agricultural crop canopies, trees	Diurnal perching predators; highly visible in field margins.
Scincidae	*Eutropis spp*. (Skinks)	Ground leaf litter, loose soil, rock piles	Fossorial/terrestrial; sensitive to soil moisture and pesticide application.
Varanidae	*Varanus bengalensis* (Bengal Monitor)	Burrows, large trees, agricultural borders	Apex reptilian predators; regulated under wildlife protection schedules.
Chamaeleonidae	*Chamaeleo zeylanicus* (Indian Chameleon)	Scrub forests, dense agricultural hedgerows	Specialized arboreal insectivores; vulnerable to vegetation clearance.

Comparative herpetofaunal literature from adjoining Vidarbha districts highlights regional species richness. Studies in Buldhana District documented 14 saurian species spanning five families, while surveys in Amravati District recorded 16 species across Gekkonidae, Scincidae, Agamidae, Chamaeleonidae, and Varanidae. The taxonomic overlap indicates that Yavatmal's agricultural landscape maintains similar species potential, provided suitable microhabitats are preserved.

4. Ecological Roles and Bioindicator Function

Saurian fauna provides ecological services that contribute to agroecosystem function and environmental monitoring.

4.1 Biological Pest Control

Lizards act as primary natural predators of crop-damaging arthropods. Their diet includes grasshoppers, beetles, ants, termites, caterpillars, spiders, and other small invertebrates. By foraging along crop canopies and field edges, agamids and geckos help suppress pest populations without requiring chemical interventions.

4.2 Trophic Energy Transfer and Food Web Stability

In ecological food webs, saurian fauna forms a vital intermediate link. They convert arthropod biomass into energy accessible to higher trophic levels, serving as a main food source for raptors, small mammals, and snakes. The decline of saurian populations can disrupt local food chains, reducing prey availability for higher-order predators.

4.3 Bioindicator Capacity

Lizards possess specific biological traits that make them effective bioindicators:

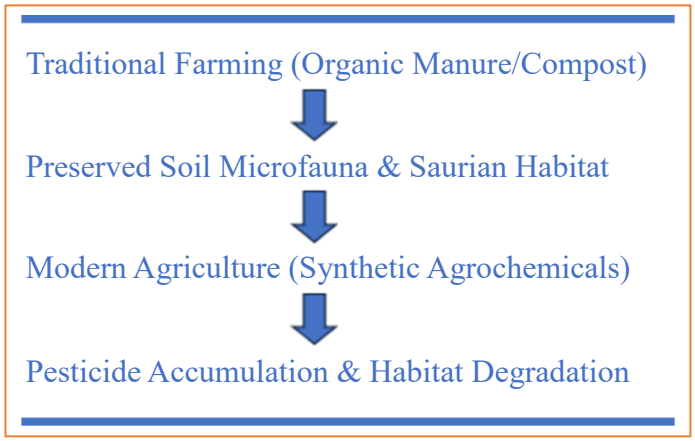
High Ectothermic Sensitivity: Relying on environmental heat forces lizards to respond quickly to thermal shifts caused by canopy clearance or land conversion.

Microhabitat Fidelity: Low dispersal capacity means local population declines directly signal site-specific habitat degradation.

Bioaccumulation Susceptibility: Consuming large quantities of insects from chemically treated fields exposes lizards to dietary bioaccumulation of toxic residues.

5. Anthropogenic Impacts and Agrochemical Threats

Traditional farming in Vidarbha historically relied on organic methods such as farmyard manure, compost and vermicompost maintaining soil structure and non-target organism populations. Modern agricultural practices in Yavatmal District have shifted toward intensive cultivation using synthetic fertilizers and chemical pesticides (organophosphates, synthetic pyrethroids, and herbicides).



5.1 Pesticide Bioaccumulation and Toxicity

Excessive agrochemical application poses direct and indirect threats to saurian fauna:

1. **Direct Physiological Toxicity:** Dermal exposure to sprayed chemicals and ingestion of contaminated insect prey led to neurotoxicity, impaired motor skills, suppressed immune function, and reduced reproductive success.
2. **Prey Depletion:** Broad-spectrum insecticides reduce arthropod abundance, causing localized food shortages for insectivorous species like skinks and geckos.

5.2 Habitat Fragmentation and Land Alteration

Mechanized tillage, removal of field border vegetation, clearing of rock piles, and burning of crop residues eliminate essential microhabitats. Fragmentation restricts movement, reduces genetic exchange between populations, and increases vulnerability to predation.

6. Critical Knowledge Gaps and Future Research Directions

While the ecological role of saurian fauna is recognized, specific research gaps persist in Yavatmal District:

- **Lack of Quantitative Baseline Data:** Systematic, seasonal density estimates using standardized survey methods (such as visual encounter surveys and line transects) are lacking for the region's agricultural habitats.
- **Ecotoxicological Assessments:** Limited empirical research exists measuring pesticide bioaccumulation levels within tissue samples of dominant farmland species (e.g., *Calotes versicolor* and *Eutropis* spp.).
- **Community-Based Conservation:** Strategies integrating saurian preservation into organic farming frameworks remain underdeveloped.

7. Conclusion

Saurian fauna serves as key bioindicators of ecosystem health within the agricultural landscapes of Yavatmal District. Shifts toward intensive agricultural practices, habitat clearance, and heavy reliance on chemical pesticides threaten these beneficial reptiles. Because lizards provide essential pest control, energy regulation and nutrient transfer, their conservation is directly tied to long-term agroecosystem stability. Implementing systematic field monitoring, reducing chemical inputs and maintaining semi-natural field borders will preserve saurian diversity and support sustainable agriculture in the Vidarbha region.

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