



Short Communication

Effect on Livestock of most Invasive/Obnoxious weeds of Bhojpur District of Bihar (India) and their Management

Ravi Krishna Singh^{1*} and Sunita Kumari Sharma²

¹Department of Zoology, V.K.S.U., Arrah, Bihar, India

²L.N. College Bhagwanpur, Vaishali, Bihar, India

ravidav.9.rk@gmail.com

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Abstract

Invasive species, or non-native organisms, pose a significant threat to global biodiversity, ecosystems, and economies. This review provides a comprehensive analysis of invasive species, their impact on native biodiversity, and the mechanisms behind their success. Invasive species compete with native species for resources, disrupt ecosystem function, and alter habitats, potentially leading to the extinction of native species. This review highlights the ecological, economic, and social impacts of invasive species and emphasizes the urgent need for effective management strategies. It examines invasion pathways, factors influencing their emergence and spread, and the competitive dynamics between invasive and native species. Various assessment methods, including ecological surveys, modeling, and genetic analysis, are discussed to understand and mitigate the impacts of invasions. This review also examines international efforts and policies to manage invasive species and suggests future research directions to improve conservation strategies. By addressing these issues, this review aims to contribute to the protection of native biodiversity and the maintenance of ecological balance.

Keywords: Invasive Species, Biodiversity Threat, Ecosystem Disruption, Management Strategies, Conservation.

Introduction

The spread of invasive weeds has emerged as a major ecological and economic concern in livestock-based production systems, particularly across tropical regions^{1,2}. These plant species, introduced outside their native habitats, disrupt local ecosystems and significantly reduce grazing efficiency. On a global scale, economic damages associated with invasive flora are estimated to exceed \$100 billion annually, with livestock productivity losses forming a substantial component^{2,3}. Among these weeds, *Lantana camara* is considered one of the most destructive due to its aggressive colonization, allelopathic interactions, and toxic effects on animals^{2,4}. Though native to Central and South America, it has spread extensively and now occupies large tracts of land in India, including pasturelands, roadside areas, and forest margins^{1,5}.

The plant's toxicity is mainly attributed to triterpenoid compounds, notably lantadene A and lantadene B, which interfere with normal liver function by inducing cholestasis^{6,7}. These toxins are most abundant in leaves and immature fruits, particularly during flowering periods⁷. The toxic action involves obstruction of bile flow, resulting in accumulation of photosensitizing pigments such as phylloerythrin, which subsequently leads to dermatological lesions^{6,8}. Affected animals commonly exhibit jaundice, reduced appetite, constipation, and skin damage, especially on lightly pigmented areas⁹.

Differences in susceptibility among species have been widely documented. Goats are particularly vulnerable due to their browsing nature, followed by cattle, sheep, and buffalo^{1,10,11}. Toxic doses vary across species, with goats requiring relatively lower intake levels to exhibit severe symptoms^{6,7}. Mortality rates may become substantial if exposure continues without intervention^{8,9}.

Bhojpur district in Bihar represents a typical agrarian region where livestock play a central role in rural livelihoods. The district receives approximately 1,100 mm of rainfall annually and supports a large livestock population dependent on common grazing lands¹². Over recent years, farmers and veterinarians have increasingly reported cases of livestock illness associated with lantana ingestion, though systematic investigations in this region remain limited^{11,12}.

This study was therefore undertaken to evaluate the prevalence, clinical impact, biochemical alterations, and practical management of lantana toxicity in livestock, with a focus on developing sustainable control strategies.

Materials and Methods

Field investigations were conducted across five administrative blocks of Bhojpur district Arrah, Jagdishpur, Piro, Shahpur, and Barhara over a one-year period (January–December 2022).

These sites were selected based on documented weed infestation and livestock density.

Sampling and Survey Methodology: A structured multistage sampling approach was adopted in accordance with standard epidemiological methods^{13,14}. Twenty-five villages were selected, and a total of 350 livestock-owning households were surveyed using a validated questionnaire. Information collected included herd size, grazing patterns, occurrence of symptoms, and farmer awareness regarding toxic plants.

Clinical Evaluation of Animals: Animals showing recent exposure to infested grazing areas and presenting clinical signs such as dermatitis, icterus, or digestive disturbances were examined. In total, 185 animals representing multiple species were evaluated using standard veterinary diagnostic procedures¹⁵.

Laboratory and Toxicological Analysis: Samples of *Lantana camara* leaves were collected and analyzed using high-performance liquid chromatography (HPLC) to determine lantadene concentrations following established protocols¹⁶.

Biochemical Investigations: Serum samples from affected and control animals were analyzed for key liver function indicators, including bilirubin, AST, ALT, GGT, and ALP, using standardized biochemical methods¹⁷.

Intervention Strategy: A community-based control program was implemented in selected villages. This included mechanical removal of weeds, introduction of competitive fodder species (*Stylosanthes hamata*), improved feeding practices, and farmer training programs^{18,19,20}.

Data Analysis: Statistical analysis was performed using SPSS software. Comparative tests including t-test and chi-square were applied, with significance determined at $p < 0.05$.

Results and Discussion

Extent of Infestation and Prevalence: The weed was widely distributed across all study blocks, occupying nearly one-fourth of available grazing land. The highest density was observed in Jagdishpur. Overall, 15.7% of surveyed livestock herds reported cases consistent with lantana toxicity^{11,12}.

Clinical Manifestations: The most frequently observed signs included photosensitization, jaundice, constipation, and reduced appetite^{9,15}. Mortality was recorded in a proportion of cases, with goats showing comparatively higher fatality rates.

Biochemical Findings: Affected animals exhibited significantly elevated bilirubin and liver enzyme levels, confirming hepatic dysfunction consistent with toxin-induced cholestasis^{6,17}.

Impact on Productivity: Substantial reductions in milk yield and growth rates were observed in affected animals. These declines persisted even after recovery, indicating prolonged physiological effects^{10,11}.

Outcomes of Management Intervention: Implementation of integrated management strategies resulted in: i. Significant reduction in weed coverage, ii. Marked decline in toxicity cases, iii. Improved farmer awareness, iv. Noticeable improvement in livestock productivity.

Discussion: The present investigation confirms that *Lantana camara* is a major constraint to livestock health in Bhojpur district. The prevalence levels recorded are comparable with findings from other regions of India^{2,4,5}. The higher vulnerability of goats aligns with their feeding behavior and physiological sensitivity^{1,8}.

Clinical observations and laboratory findings strongly support liver dysfunction as the primary pathological outcome of lantana ingestion^{6,17}. The reduction in productivity underscores the economic burden imposed on smallholder farmers, who rely heavily on livestock for income¹².

The success of the intervention highlights the effectiveness of combining mechanical, biological, and educational strategies. Community participation played a key role in achieving sustainable results, emphasizing the importance of localized solutions^{18,19}.

Conclusion

The study demonstrates that *Lantana camara* significantly affects livestock health and productivity in Bhojpur district. Its toxic effects result in liver damage, decreased milk production, impaired growth, and mortality. However, integrated management approaches involving weed control, improved feeding, and farmer education can substantially mitigate these impacts. Strengthening extension services and promoting community-based interventions are essential for long-term sustainability.

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