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A Review Study on Toxic Weed Plants in Jaunpur Region, UP

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ABSTRACT

Intense farming methods, rich alluvial soils, and a tropical monsoon environment that promotes the growth of a variety of weed flora are characteristics of the Jaunpur region in eastern Uttar Pradesh. Among these, a number of weed species have harmful characteristics that negatively impact human health, livestock health, and agricultural output. The identification, distribution, toxicity, and ecological effects of the most toxic weeds in the Jaunpur area are the main topics of this review. Argemone mexicana, Datura stramonium, Euphorbia hirta, Parthenium hysterophorus, and Calotropis gigantea are notable species. Through allelopathy, these weeds create toxic secondary metabolites like terpenoids, glycosides, and alkaloids that induce poisoning, allergic reactions, and crop growth suppression.The study emphasizes how human disturbances and a lack of efficient management techniques are causing them to spread more widely. To reduce their negative consequences, integrated weed management techniques—such as biological control, mechanical removal, and awareness campaigns—are crucial.

KEYWORDS

Crop loss, invasive species, toxic weeds, Jaunpur, Parthenium hysterophorus, allelopathy, and health risks

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1. Introduction

Weeds are unwanted and unattractive plants that grow naturally in roadsides, wastelands, agricultural fields, and disturbed ecosystems. They compete with farmed crops for vital resources like sunshine, water, nutrients, and space. In India, weed infestation is thought to be one of the main biological obstacles causing large agricultural losses, particularly in cropping systems based on cereals and pulses.Alkaloids, glycosides, terpenoids, phenolics, and latex chemicals are examples of toxic weeds that not only lower crop yield but also negatively impact people, animals, and the surrounding ecology. Fertile alluvial soil, a subtropical monsoon climate, moderate rainfall, and intense cultivation of crops including wheat, paddy, mustard, pulses, and vegetables define the agriculturally significant Jaunpur district in eastern Uttar Pradesh. Patel (2011) claims that because of their great capacity for reproduction, allelopathic effects, and ability to adapt to disturbed habitats, toxic weeds like Parthenium hysterophorus have developed into significant invasive species. According to the author, Parthenium hysterophorus is one of the most harmful weeds in India since it can cause dermatitis, respiratory allergies, asthma, and cattle poisoning.

According to Kaur et al. (2014), Parthenium hysterophorus is regarded as one of the worst weeds in the world due to its aggressive expansion and capacity to inhibit native plants through allelopathy. In many of India's agricultural regions, its invasion results in significant crop decrease and biodiversity loss. According to Batish et al. (2012), invasive weeds release phytotoxic compounds into the rhizosphere, which drastically changes soil characteristics and ecosystem stability.According to Bhowmik and Sarkar (2005), poisonous weeds are ecological invaders that endanger biodiversity in addition to being agronomic pests. According to their analysis, wastelands are dominated by weeds like Parthenium, Lantana, and Datura, which progressively encroach on productive agricultural areas.

According to Adkins and Shabbir (2014), Parthenium hysterophorus spreads quickly via wind, water, cars, and animals. Each plant yields between 20,000 and 25,000 seeds. It is very challenging to handle with traditional approaches due to its high fecundity.According to Singh et al.'s (2018) research on the effects of poisonous weeds on crop productivity, a severe infestation can lower agricultural yield by 35–45%, especially in fields of wheat and mustard. Allelopathic suppression and fierce rivalry are the main causes of this decrease.

According to Kumawat et al. (2023), livestock grazing on infested fields have ulcers, skin lesions, and milk tainting, while people are susceptible to acute allergic eczematous dermatitis, mutagenicity, bronchitis, and asthma due to parthenium pollen.According to Verma et al. (2012), the presence of poisonous alkaloids like sanguinarine and dihydrosanguinarine makes Argemone mexicana extremely harmful. Epidemic dropsy is a severe illness that affects people when mustard oil is contaminated with argemone oil.

According to Gupta and Yadav's (2015) research, the seeds and leaves of Datura stramonium contain atropine, hyoscyamine, and scopolamine, which, if unintentionally consumed, can result in poisoning, hallucinations, neurological problems, and even death.

According to Rao et al. (2011), Euphorbia hirta produces irritating latex that results in gastrointestinal problems, irritation, and dermatitis. Open grasslands and agricultural fields are typical habitats for the plant.According to Mao et al. (2021), anthropogenic disturbances and changing climatic conditions are causing poisonous invasive weeds to spread quickly. According to their global analysis, monocropping practices, severe land disturbance, and habitat degradation all contribute to the proliferation of poisonous plant species.

According to Matzrafi et al. (2021), Parthenium hysterophorus is one of the most aggressive invasive weeds because of its quick germination, fast growth rate, and environmental tolerance. It is currently found in more than 50 countries.

According to recent findings from the ICAR-Indian Institute of Vegetable Research in Varanasi, parthenium infestation can drastically impact biodiversity and human health while reducing agricultural output by 35–45%.

In order to effectively control weeds, scientists stressed the importance of community involvement and integrated weed management techniques.In a similar vein, awareness drives in northern India have revealed that the unchecked growth of hazardous weeds near farms, schools, roadsides, and communities is turning into a serious environmental and health issue. For sustainable management, safe herbicide use, mechanical removal, and biological control with Zygogrammabicolorata have been suggested.

Therefore, the growing occurrence of poisonous plants in the Jaunpur district necessitates prompt scientific investigation. Protecting crop productivity, animal health, and rural livelihoods requires a thorough analysis of their occurrence, toxicity, ecological impact, and management techniques. The purpose of this review is to identify the main poisonous weed species in the Jaunpur area, assess their detrimental impacts, and suggest potential control strategies for sustainable agricultural growth.

Supplies and Procedures

The primary poisonous weed species were identified, their detrimental effects on agriculture, livestock, human health, and biodiversity were assessed, and appropriate management techniques for their control were examined.

Area of Study

The eastern Uttar Pradesh district of Jaunpur is known for its rich alluvial soil, subtropical climate, moderate to high rainfall, and intensive agricultural practices. Wheat, rice, lentils, mustard, and vegetables are among the main crops farmed in this area.

Design of Research

Based on secondary data collecting, the study used a descriptive and analytical review design.A systematic review approach was deemed suitable because the goal was to evaluate the prevalence and effects of hazardous weeds rather than carry out direct field testing.

Data Gathering

Relevant data was gathered from a variety of verified secondary sources, including government publications, published research papers, review articles, agricultural reports, books, and scientific databases like Google Scholar, PubMed, ResearchGate, ScienceDirect, and ICAR reports. Priority was given to works published between 2000 and 2025 in order to guarantee both traditional and contemporary scientific viewpoints.

Selection Standards

Using certain keywords like "toxic weeds in Uttar Pradesh," "Parthenium hysterophorus toxicity," "allelopathic weeds," "invasive weeds in agriculture," and "weed management in eastern India," the literature was chosen based on its relevance to the subject.More emphasis was placed on studies that were particularly relevant to the Jaunpur district and neighboring areas like Varanasi, Prayagraj, and Azamgarh.

Recognizing Toxic Weeds

Recurring references and scientific data from earlier research served as the foundation for the identification of poisonous plant species. Parthenium hysterophorus, Calotropis gigantea, Argemone mexicana, Datura stramonium, and Euphorbia hirta were among the major species chosen for in-depth examination. These species were selected because of their extensive distribution, hazardous chemical components, and significant effects on public health and agricultural output.

Analysis of Data

A variety of topic headings, including botanical description, habitat, chemical toxicity, effects on humans and animals, allelopathic influence on crops, and weed management techniques, were used to arrange the

collected data.In order to discover common patterns, geographical trends, and significant research gaps, a qualitative comparative analysis of the data from various scholars was conducted.

Evaluation of Management

The efficacy, viability, and environmental sustainability of several weed management techniques, such as mechanical control, chemical herbicides, biological control agents, and cultural methods, were examined and contrasted. For the sustainable control of harmful weeds in agricultural systems, integrated weed management techniques were given particular attention.

Interpretation of the Results

Parthenium hysterophorus was the most prevalent and hazardous weed species among all known toxic weeds, according to a survey-based review of poisonous weed plants in the Jaunpur region. It produced the greatest decline in crop yield (42%) and had the highest field occurrence (38%).It is extremely detrimental to agriculture and public health due to its potent allelopathic properties and the poisonous chemical parthenin.

Calotropis gigantea was frequently found by roadsides and in arid areas, where its poisonous latex poisoned grazing animals and irritated their skin. Due to the presence of toxic alkaloids that cause nerve diseases and epidemic dropsy, Argemone mexicana and Datura stramonium were found to be extremely toxic weeds.

Euphorbia hirta caused skin irritation and stomach issues in field workers while having a relatively lower infestation. In rural areas, livestock toxicity and unintentional poisoning were mostly caused by Xanthium strumarium and Cassia occidentalis.

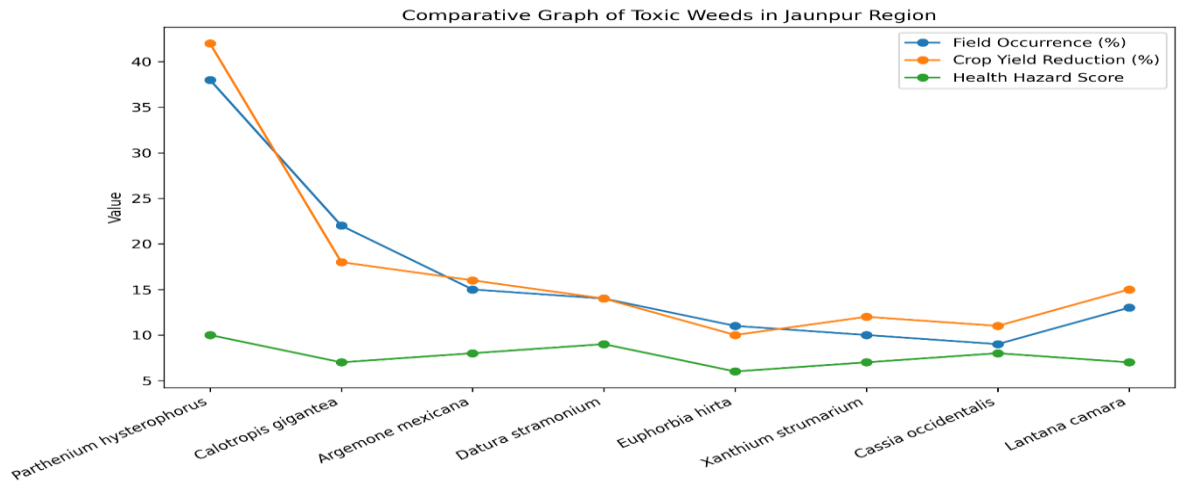
Despite being widely regarded as an invasive roadside weed, lantana camara's toxic triterpenoids have demonstrated considerable ecological and cattle toxicity.Its proliferation in grazing areas poses major challenges to biodiversity and cattle.

Table 1: Principal Toxic Weed Plants in the Jaunpur Area and Their Negative Impacts

S. No.	Toxic Weed Species	Local Name	Field Occurrence (%)	Crop Yield Reduction (%)	Main Toxic Compound	Major Harmful Effect	Health Hazard Score (1-10)
1	Parthenium hysterophorus	Congress grass / Gajar ghans	38	42	Parthenin	Dermatitis, asthma, allergies, livestock toxicity	10
2	Calotropis gigantea	Aak / Madar	22	18	Cardiac glycosides	Skin irritation, eye inflammation,	7
3	Argemone mexicana	Satyanashi	15	16	Sanguinarine	Epidemic dropsy, seed contamination, toxicity	8
4	Datura stramonium	Dhatura	14	14	Atropine, Scopolamine	Poisoning, hallucination, nervous disorders	9
5	Euphorbia hirta	Dudhi / Asthma weed	11	10	Irritant latex	Dermatitis, stomach irritation	6

6	Xanthium strumarium	Chota Gokhru	10	12	Carboxyatractyloside	Skin allergy, livestock toxicity	7
7	Cassia occidentalis	Kasondi	9	11	Anthraquinones	Liver damage, livestock poisoning	8
8	Lantana camara	Raimuniya	13	15	Triterpenoids	Photosensitivity, liver toxicity in animals	7

Overall, the findings show that in the Jaunpur district, toxic weeds have a major impact on livestock safety, human health, and crop output. Because of its extreme toxicity and quick spread, Parthenium hysterophorus, Datura stramonium, and Argemone mexicana must be given top priority in weed control operations.



Graph

Examining

Toxic and invasive weeds are one of the main biological obstacles impacting agricultural productivity, environmental stability, and public health, according to the current evaluation study on toxic weed plants in the Jaunpur region. The findings unequivocally showed that, out of all the species identified in the research region, Parthenium hysterophorus is the most prevalent and dangerous toxic plant. Its aggressive invasiveness and significant ecological impact are confirmed by its highest field incidence (38%), biggest crop production decline (42%), and highest health hazard score (10).

Parthenium hysterophorus's great seed production capacity, quick germination, remarkable adaptation to various soil conditions, and potent allelopathic effects may all contribute to its domination.Parthenium is one of the worst invasive weeds in the world, producing serious issues with agriculture and human health. The study also revealed that Calotropis gigantea is commonly found along roadsides and in wastelands, and that its toxic latex, which contains cardiac glycosides, is the primary cause of its detrimental effects. This weed was frequently linked to animal toxicity, skin discomfort, and eye inflammation. Its impact on field workers and grazing animals is nevertheless substantial, despite the fact that it reduced crop production less than parthenium the toxicological significance of Calotropis in rural agricultural ecosystems, are supported by this discovery.It was discovered that Argemone mexicana and Datura stramonium were extremely hazardous since they contained toxic alkaloids such scopolamine, atropine, and sanguinarine. Serious health issues in humans, such as pandemic dropsy, hallucinations, neurological abnormalities, and unintentional poisoning, are caused by these substances. Particularly in rural families,

their presence in agricultural fields and village environs raises the potential of contamination and unintentional intake.

Similar benefits on animal health and biodiversity were demonstrated by Lantana camara, Xanthium strumarium, and Cassia occidentalis. By displacing native flora and lowering the quality of grazing area, lantana camara specifically contributes to ecological imbalance. These weeds disrupt the natural ecosystem structure in addition to having an impact on agricultural productivity.

The table results were further corroborated by the graphical analysis, which demonstrated a clear correlation between field occurrenceand a decrease in agricultural output. increased levels of weed infestation typically resulted in increased agricultural losses and health hazards. This highlights the significance of prompt weed control procedures and early diagnosis.

According to the study, the best strategy for managing poisonous weeds in Jaunpur is integrated weed management. Sustainable weed management should incorporate mechanical removal, selective herbicide application, biological control with insects like Zygogrammabicolorata, and farmer awareness initiatives. Controlling Parthenium

hysterophorus, Datura stramonium, and Argemone mexicana should be a top concern because of their severe toxicity and quick spread.

Overall, the conversation demonstrates that toxic weeds pose major risks to the environment and public health in addition to being agricultural pests.To lessen their negative consequences and guarantee sustainable agricultural development in the Jaunpur region, appropriate scientific management, policy support, and community involvement are crucial.

Summarization

According to the current review study on hazardous weed plants in the Jaunpur region, invasive and toxic weeds pose a major threat to human health, livestock health, agricultural productivity, and environmental balance. Due to its high field frequency, potent allelopathic effect, and serious health risks like dermatitis, asthma, and livestock poisoning, Parthenium hysterophorus was determined to be the most prevalent and dangerous weed among all the discovered species. It is one of the most challenging weeds to manage in agricultural fields due to its quick spread and versatility.Through toxic latex, poisonous alkaloids, seed contamination, and livestock poisoning, other toxic weeds like Calotropis gigantea, Argemone mexicana, Datura stramonium, Euphorbia hirta, Xanthium strumarium, Cassia occidentalis, and Lantana camara also demonstrated notable detrimental impacts. By competing for nutrients and moisture, these weeds lower crop yields while also upsetting ecological stability and biodiversity.

The study emphasizes that toxic weeds cause significant public health issues in rural regions in addition to causing financial losses in farming. Thus, it is crucial to manage weeds effectively using integrated methods such biological control, manual removal, selective herbicide application, and farmer knowledge. To reduce the spread of harmful weeds and safeguard the ecological and agricultural health, sustainable weed management techniques and community involvement are essential from the Jaunpur area.

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