International Civil Aviation Organization

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Agenda Item 3: Global, Regional and National Guidance/Best Practices on Wildlife Hazard Management

GRASS HEIGHT MANAGEMENT AT AIRPORTS FOR WILDLIFE HAZARD MITIGATION: EVALUATING *STYLOSANTHES HAMATA* AS AN ALTERNATIVE TO TRADITIONAL GRASSES

(Presented by India)

SUMMARY

This paper presents vegetation management which is crucial for reducing wildlife hazards at airports. Traditional grasses grow rapidly, creating maintenance challenges and attracting birds, and increasing bird strike risks. *Stylosanthes hamata* (Caribbean Stylo) offers a viable alternative due to its soil-stabilizing, nitrogen-fixing properties and competitive displacement of grasses. Studies at Thiruvananthapuram International Airport show *S. hamata* successfully covering bald patches, reducing mowing needs. However, flowering attracts bees and birds, necessitating intelligent mowing strategies. Properly managed, *S. hamata* provides a uniform, low-maintenance cover that enhances aviation safety while minimizing ecological concerns.

1. INTRODUCTION

1.1 Airport vegetation management plays a crucial role in mitigating wildlife hazards. Uncontrolled grass growth not only presents maintenance challenges but also attracts various bird species, increasing the risk of bird strikes. Thiruvananthapuram International Airport host approximately 25 grass species, each exhibiting different growth rates, heights, and ecological interactions. Among them, *Panicum repens* (Fountain grass) is particularly problematic, growing up to 20-25 cm per week during the monsoon season. The presence of varied grass species results in an uneven landscape with different "tables" (grass height levels), leading to an unsightly appearance and potentially harboring wildlife. Furthermore, bald patches in airport grasslands become hotspots for ground-nesting birds like Red-wattled Lapwings (*Vanellus indicus*) and foraging pigeons (*Columba livia*). These species pose a significant risk to aviation safety due to their frequent movements across active runways. An alternative to conventional grasses is *Stylosanthes hamata* (Caribbean Stylo), a leguminous dicot with several ecological and practical advantages. This paper evaluates *S. hamata* as a sustainable solution for airport ground cover management, considering its growth characteristics, competitive advantages, and potential wildlife interactions.

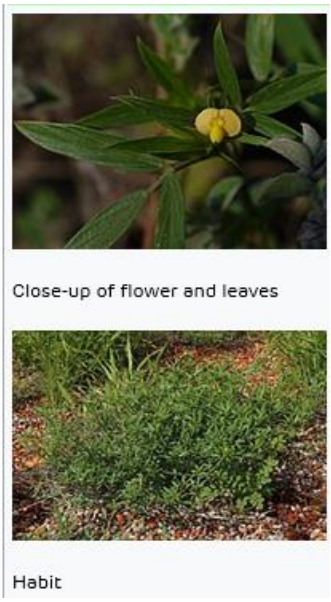

Fig 1: Stylosanthes hamata (Caribbean Stylo)

2. DISCUSSION

2.1 Challenges of traditional grasses at airports

2.1.1 Rapid growth during monsoon: During the monsoon season, grasses exhibit accelerated growth, necessitating frequent mowing. For example, *Panicum repens* (Fountain grass) can grow 20–22 cm in a single week during rainy season, increasing maintenance efforts and costs. The diverse grass species at airports make it difficult to maintain a uniform height, which affects both aesthetics and operational safety.

2.1.2 Attraction to Insects and Birds: Some grass species like *Rottboellia cochinchinensis* (Itch grass) produce seeds that attract birds, while others support insect populations, which in turn attract avian predators. For instance, flowering grasses like *Aristida funiculata* (Broom grass) attract pollinators like honeybees (*Apis florea*), leading to an increase in insectivorous bird species such as Bee-eaters (*Merops spp.*) and Drongos (*Dicrurus spp.*). Similarly, seed-producing grass provides food for pigeons, further exacerbating the risk of bird strike.

2.1.3 Bald Patches and Wildlife Encroachment: Areas where grass fails to regenerate create bald patches, which serve as nesting or roosting sites for species like Red-wattled Lapwings and Rock Pigeons. These species prefer open ground for nesting and are often seen in unmaintained patches at airports. Their presence near runways increases the likelihood of aircraft-bird collisions.

2.2 *Stylosanthes hamata* as an Alternative

2.2.1 Growth Characteristics: *S. hamata* is a nitrogen-fixing legume with deep roots, making it effective for soil stabilization. It is highly competitive with other grasses and can successfully displace them over time. Field observations at Thiruvananthapuram International Airport showed that *S. hamata* replaced existing grasses and colonized bald patches within three years. Unlike rapidly growing grasses, *S. hamata* typically reaches a height of 50 cm if left uncut but maintains a manageable height of 25–30 cm when grown in close spacing. This characteristic significantly reduces the frequency of mowing required during the monsoon season.

Fig 2: Sowing the seeds of *S. hamata* on newly leveled runway strip.

2.2.2 Soil Enrichment and Erosion Control: The nitrogen-fixing ability of *S. hamata* improves soil fertility, reducing the need for external fertilization. Additionally, its deep root system enhances soil stability, minimizing erosion and the formation of bald patches that could attract wildlife. This makes it particularly valuable for airport landscapes, where maintaining soil integrity is essential.

2.2.3 Competitive Displacement of Grasses: *S. hamata* demonstrates strong competitive growth, gradually outcompeting other grasses in airport environments. This trait helps standardize vegetation height and reduce the presence of problematic grass species like *Panicum repens* (Fountain grass). Airports with established *S. hamata* stands experience a more uniform vegetation structure, simplifying maintenance and reducing wildlife attraction. At Thiruvananthapuram International Airport wherever required, problematic grass species like *Panicum repens* (Fountain grass) are selectively removed to maintain the uniformity of grass height.

Fig 2: Selective removal of *Panicum repens* (Fountain grass) to maintain the uniformity of grass

2.2.4 Wildlife Considerations and Management Strategies: While *S. hamata* offers multiple advantages, its flowering and seed production phases require careful management to prevent attracting birds.

2.2.5 Seasonal Management of Flowering and Seed Formation: During its flowering season, *S. hamata* attracts large numbers of *Apis florea* honeybees, which in turn draw Bee-eaters and Drongos. Additionally, its seed pods are consumed by Rock Pigeons, increasing their presence at airports. To mitigate these risks, intelligent mowing strategies have been successfully implemented at Thiruvananthapuram International Airport. By mowing at specific intervals, the airport was able to reduced flowering and pod formation by 70%, thereby limiting bird attraction while preserving the benefits of *S. hamata*. An experiment on verious heights of *S. hamata* was conducted at Thiruvananthapuram International Airport and it was found that birds like Rock Pigeons were attracted to the area where the plant height was less than 10 Cm.

Fig 3: Rock Pigeons attraction experiment for low height Stylo and high height Stylo

2.2.6 Integration with Existing Airport Landscaping Plans: For optimal results, *S. hamata* should be integrated into airport vegetation management plans with clearly defined mowing schedules. Monitoring programs should assess bird activity and adjust mowing frequency as needed. By proactively managing flowering cycles, airports can maximize the advantages of *S. hamata* while minimizing bird strike risks.

2.3 **Case Studies: Indian Airports Implementing *S. hamata***

2.3.1 HAL Airport, Bengaluru: At HAL Airport, *S. hamata* successfully colonized bald patches within three years, leading to reduced mowing requirements and enhanced soil stability. The replacement of mixed grass species with a uniform *S. hamata* cover resulted in a more consistent landscape with fewer wildlife intrusions.

2.3.2 Bengaluru International Airport (BIAL): BIAL experienced a gradual but successful spread of *S. hamata* over five to six years. Today, it boasts one of the well-maintained *S. hamata* spreads among Indian airports. Intelligent mowing strategies ensure minimal bird attraction while maintaining the ground cover's ecological benefits.

2.3.3 Thiruvananthapuram International Airport: This airport has demonstrated an effective seasonal mowing approach to control *S. hamata* flowering. By reducing seed production, it successfully limits the attraction of Rock Pigeons and other avian species, thereby enhancing aviation safety.

2.4 **Conclusion**

2.4.1 Effective vegetation management at airports is essential for wildlife hazard mitigation. Traditional grasses present challenges due to their rapid growth, varied characteristics, and attraction to birds and insects. *Stylosanthes hamata* emerges as a viable alternative, offering advantages such as improved soil conservation, reduced mowing requirements, and competitive displacement of problematic grasses. However, careful seasonal management is necessary to mitigate potential bird attraction during flowering and seed formation. Intelligent mowing schedules, as demonstrated in Thiruvananthapuram International Airport, can help maximize the benefits of *S. hamata* while minimizing wildlife-related risks. By integrating *S. hamata* into airport vegetation management strategies, Indian airports can achieve a more uniform, aesthetically pleasing, and low-maintenance ground cover that enhances aviation safety. Future research should explore additional management techniques and assess long-term ecological impacts across various airport environments.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) evaluating the use of STYLOSANTHES HAMATA as an alternative to traditional grasses at airports where it is suitable; and

c) discuss any relevant matters as appropriate.

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