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Impact of *Leptochloa chinensis* invader in the field of paddy

Mazher Farid Iqbal^{1*}, Samiullah¹, Farwa Batool¹, Ishtiaq Hassan², Muzzammil Hussain¹, Muhammad Hamid Rafiq¹, Aamer Sajjad¹, Qaiser Mahmud³, Ahmad Rafiq⁴ and Sehar Muddassir⁵

¹Adaptive Research Farm, Gujranwala Zone

²Director General Agriculture (Farm & Training) Punjab-Lahore

³On Farm Water Management, Agriculture Department Punjab, Pakistan

⁴Punjab Agriculture Extension Department, Gujranwala

⁵Department of Botany, University of Agriculture, Faisalabad, Punjab-Pakistan

*Corresponding author E. Mail: mazherfareed2004@gmail.com

KeyWords

Abundance, *Leptochloa chinensis*, Paddy, Weed, Kot Nainan

ABSTRACT

The present investigation has been planned to evaluate the abundance of *Leptochloa chinensis* invader in the field of paddy at Adaptive Research Farm, Kot Nainan during 2024. The paddy crop Kissan Basmati (Aromatic) was planted with Mechanical Rice Transplanter (MTR) in the month of July. The study aims to evaluate the abundance of different weeds in the presence of *Leptochloa chinensis* (LC) in the paired comparisons. The result of our experiment showed that maximum *Leptochloa chinensis* (LC) invader abundance 51 plantsm⁻² (60%), 67 plantsm⁻² (70%), 71 plantsm⁻² (80%) were recorded in the three plots in its invader quadrats. The study showed that the LC is a serious weed in mechanically transplanted rice which suppressed the abundance on all the other plants in the community in its invader range compared to non invader quadrats. At the end it is concluded that the farmers of this region are advised to manage this invader in their paddy crop with the consultation of staff of Adaptive Research and Extension Department.

Introduction

Rice is one of the most important cereals in the world, after wheat, and is a staple food for more than half of the world's population (Xu et al., 2021). In Pakistan, it is cultivated in an area of 3.3 million ha with a total production of 8.4 million tons and an average yield of 2,524 kg ha⁻¹ (Govt et al., 2021). The invader *Leptochloa chinensis* L (LC). commonly known as red sprangletop belongs to narrow leaved weed with Poaceae family and classify it to be a C4 plant (Rudov et al., 2020). *Leptochloa chinensis* L. is native to tropical Asia and widely distributed in South and Southeast Asia, Australia, and Africa. The plant is distributed geographically in China, Korea, Japan, Bangladesh, Philippines, Pakistan, Cambodia, India, Malaysia, Myanmar, Sri Lanka, Vietnam and Thailand (Caton, 2010). The invader is summer annual grass that can attain up to 120 cm height, having hollow, cylindrical, erect stems, and linear smooth 10-30 cm long leaves. The plant reproduces both sexually and asexually (De Guzman et al., 2019). *Leptochloa chinensis* is known to be an invasive weed in Southeast Asia (Ahmed et al., 2023). The LC plants compete with native plant species, and cause great loss in biodiversity. In order to detect the effects of the invader on biodiversity and evaluate its suitable habitats and ecological distribution, we investigated the abundance in three pairs of invader and non-invader quadrats in three locations of paddy fields at Adaptive Research Farm, Kot Nainan during Kharif 2024.

Materials and Methods

This study was carried out at Adaptive Research Farm, Kot Nainan during 2024 using an ecological line transects method (Iqbal et al., 2019; Iqbal et al., 2020). The recommended dose of phosphorus was applied in the form of DAP @ 125 Kg ha⁻¹ along with potassium in the form of SOP @ 125 Kg ha⁻¹ was spread manually in the field just before planking. Transplanting of Kissan basmati rice was completed with mechanical rice transplanter in the month of July, 2024. Zinc Sulphate (33% crystalline) was also broadcasted @ 15 kg ha⁻¹ in transplanted rice at 15 DAT (days after transplantation). The nitrogen was broadcasted in the form of urea fertilizer @ 250 kg ha⁻¹ at 35 Days after transplantation (DAT) and 75 DAT. Three plots were selected in at the Farm in A & B block area. In each location, 03 places were selected (03 replicates per plot); and at each place, three pairs of invader and non-invader quadrats (100x100 cm) were setup (3 replicates per plot). The 03 spaces in each plot were present in the farm radius. In order to diminish potential confounding effects of habitat heterogeneity on comparisons between invader and non-invader quadrats (i.e., the effects of the invader), the quadrats with and without *Leptochloa chinensis* were less than 2 m apart in each pair, and the quadrats in different pair were spaced at least 5 m (Iqbal et al., 2020; Zhao et al., 2020). The non-invader quadrats were setup at second vegetations, and the invader quadrats were dominated by *Leptochloa chinensis* (Arifa Zereen et al., 2014). In total, we had nine pairs

of quadrats with and without *Leptochloa chinensis* (3 plots × 3 replicates). The impact of invasion of LC was evaluated on the basis of abundance of different plant species between invader and non-invader quadrats in the natural ecosystem of the paddy fields (Iqbal and Feng, 2020; Qureshi et al., 2018).

Results and Discussion

The result of our experiment showed that maximum *Leptochloa chinensis* (LC) invader abundance 51 plantsm⁻² (60%), 67 plantsm⁻² (70%), 71 plantsm⁻² (80%) were recorded in the three plots in its invader quadrats. The study showed that the LC is a serious weed in mechanically transplanted rice which suppressed the abundance on all the other weeds in the community in its invader range compared to non invader quadrats (Figure-1). Our results are in line with the researchers who reported that LC is major threat to the diversity of direct-seeded rice at its highest density 25 weed m⁻². Estimated economic threshold of LC was 1.70 and 1.73 plants m⁻² causing 6.73% and 6.08% yield losses. It must be controlled at and beyond this density to avoid significant losses in grain yield (Abugho, 2020; Hayyat et al., 2023).

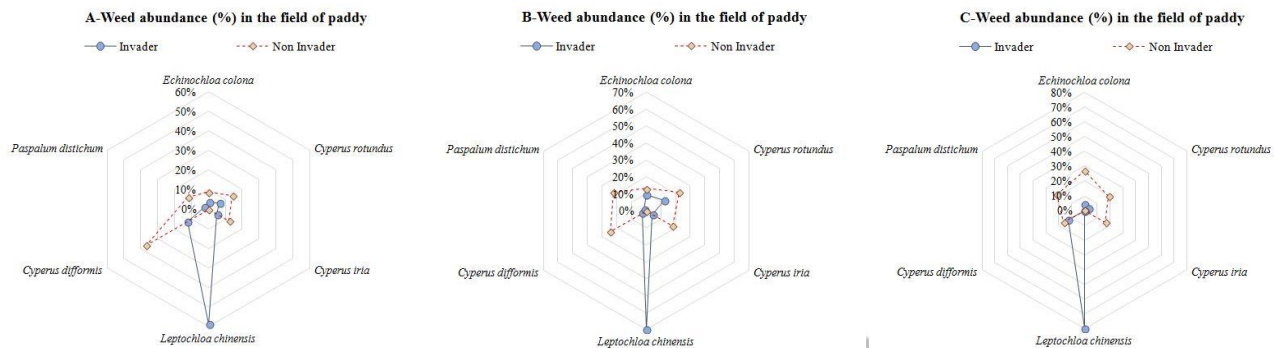


Figure 1 showing the impact of *Leptochloa chinensis* (LC) on the native weed abundance in the paddy fields during 2024

Conclusion

It was concluded that the *Leptochloa chinensis* is a serious weed threat in mechanically transplanted rice which suppressed the abundance on all the other plants in the community in its invader range compared to non invader quadrats. The farmers of this region are advised to manage this invader in their paddy crop with the consultation of Adaptive Research; Punjab Agriculture Extension Department to avoid huge loss to their crops.

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