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Weed community of lowland rice system in northern Togo's Savannah region

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WEEEDS are the major biotic constraint for lowland rice production systems in Togo, particularly in the Savannah region, where rice cultivation follows traditional practices with very little mechanization or synthetic pesticide treatment. Weeding is a real challenge for farmers, who are mostly women. For better management, knowledge of weed community and major weeds is necessary.

Weed community surveys

Vegetation surveys were conducted in Northern Togo's lowlands during the growing seasons (July-September) of 2012 and 2013. Full floristic surveys were conducted in 33 lowland rice sites each year. Sites were selected for their importance in terms of rice production and accessibility. Most of them are cultivated by women who used little fertilizer and chemical pesticides. Rice fields have about a quarter of an hectare.

For each site, the presence and abundance of weeds were recorded by browsing the whole field in order to check off the maximum of species.

The species richness were calculated by Hill number N_a (Hill, 1973). Each site was characterised by the *total* (N_0), the *effective* (N_2) and the *dominant* ($N_{+\infty}$) number of species.

Weed species diversity

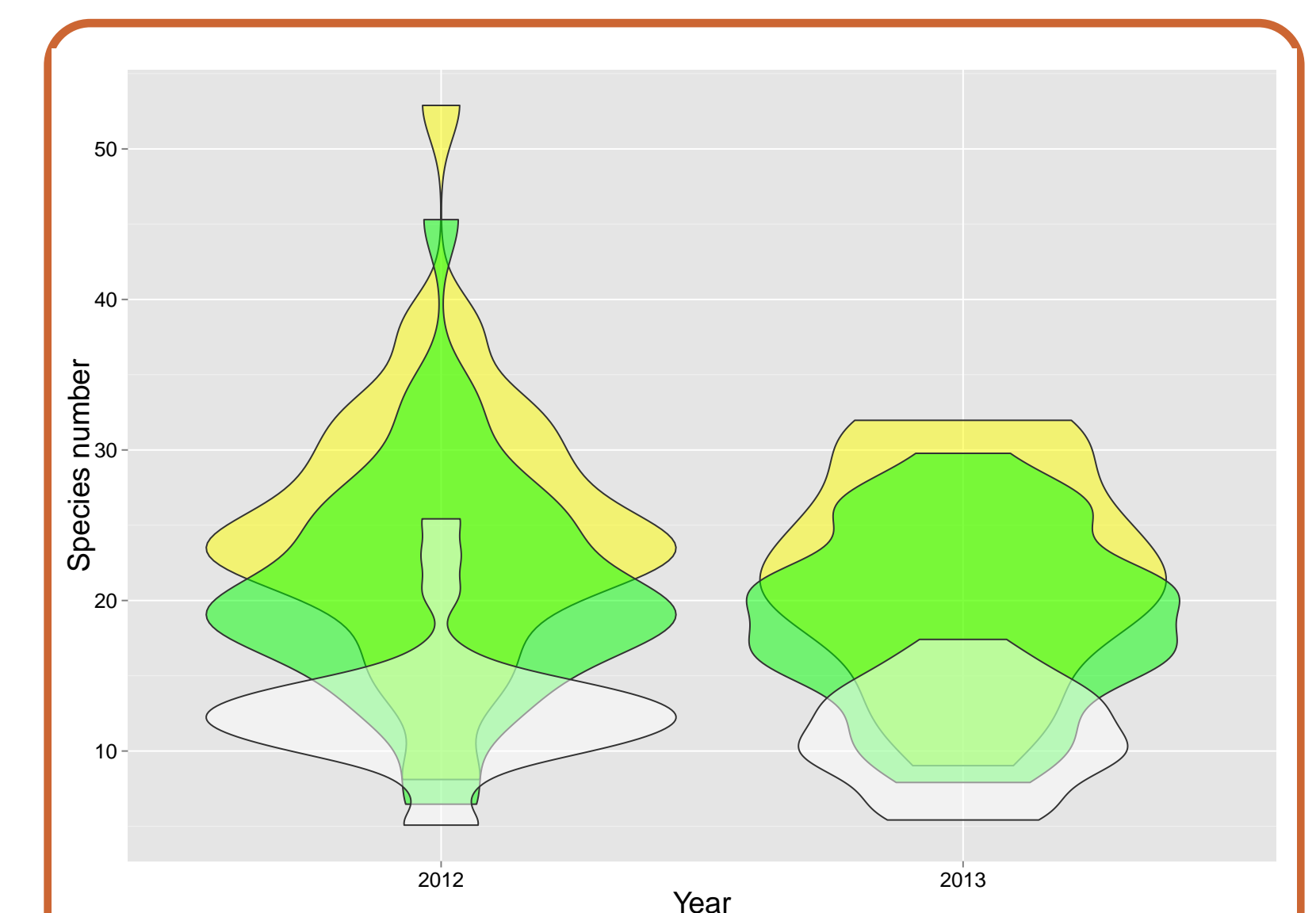
✿ A total of 125 weed species from 30 plant families were recorded in both surveys: 97 species in 2012 from 26 plant families against 103 weed species in 28 families in 2013. But only 75 species were present in both surveys.

✿ 39% and 34% of total species recorded in 2012 and 2013 belong to Poaceae and Cyperaceae families, respectively.

✿ The median species richness in these lowlands is quite similar for the two surveys: 24 species in 2012 (range: 8-53 species) versus 22 in 2013 (range: 9-32 species).

✿ The median effective species number is a little lower: 20 in 2012 vs 18 in 2013. The change is due to the dominant species number: the dominant weed species was almost twice as low as weed species richness (Figure 1).

Figure 1 Violin plots of the Hill number, N_a , for the two surveys of the weed community of lowland rice fields in the Savannah region.



$N_a = (\sum p_i^a)^{1/(1-a)}$. In yellow, Total (N_0), in green, Effective (N_2) and in white Dominant ($N_{+\infty}$) number of species.

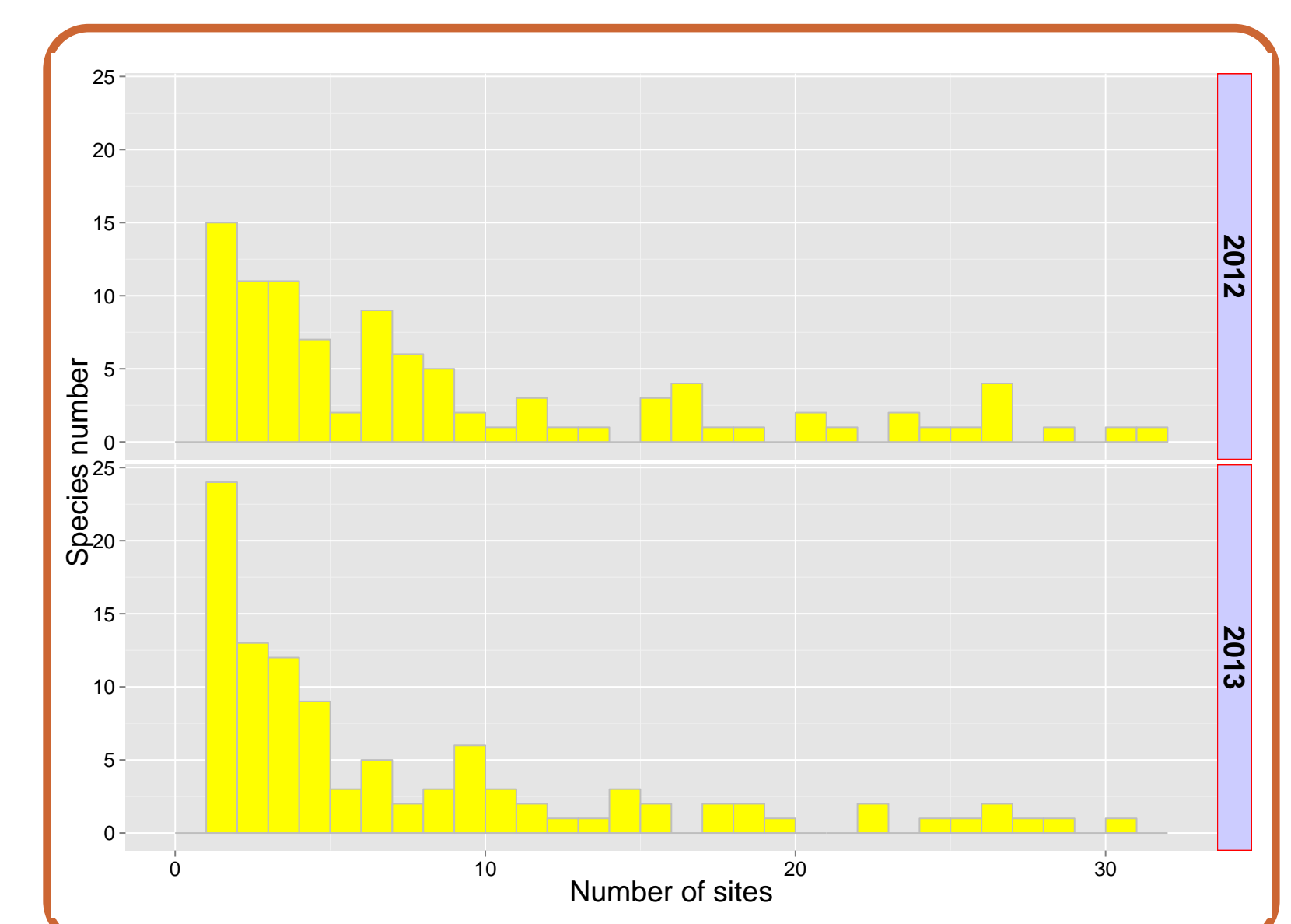
Weed community composition

✿ Most species were present in a small number of sites: only 8 vs 6 species were observed in more than 75% of sites in 2012 vs 2013 (Figure 2).

✿ Four species were among the most frequent species both in 2012 and in 2013: *Hyptis spigicera*, *Paspalum scrobiculatum*, *Ludwigia hyssopifolia* and the parasitic weed *Rhamphicarpa fistulosa*. These weed species are raising major problems and are usually recorded in hydromorphic and rain-fed lowland rice systems.

✿ Presence of upland rice crop weeds like Poaceae *Eragrostris spp.*, *Brachiaria spp.*, and broad-leaved species like *Commelina spp.* and *Cleome spp.* indicate a lack of water management due to the absence of bunding and levelling.

Figure 2 Frequency of weed species in the lowland rice fields in the Savannah region.



Focus — *Rhamphicarpa fistulosa*, a root facultative parasitic weed that is becoming a major biotic constraint in rice fields of northern Togo.



1. *Hyptis spigicera*
2. *Ludwigia hyssopifolia*
3. *Rhamphicarpa fistulosa*
4. *Eragrostris spp.*

The weed community of rice cropping systems in northern Togo is very diversified and varies by cropping season. This weed flora contains species frequently recorded in hydromorphic valley bottoms and rain-fed lowland areas. However, because of the lack of water management, we also found species belonging to upland rice systems. The weeds causing major problems in rain-fed rice systems all over the world are recorded in this weed community too.

References : Hill, M.O. (1973). Diversity and evenness : a unifying notation and its consequences. *Ecology* **54**, 427–473.

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