

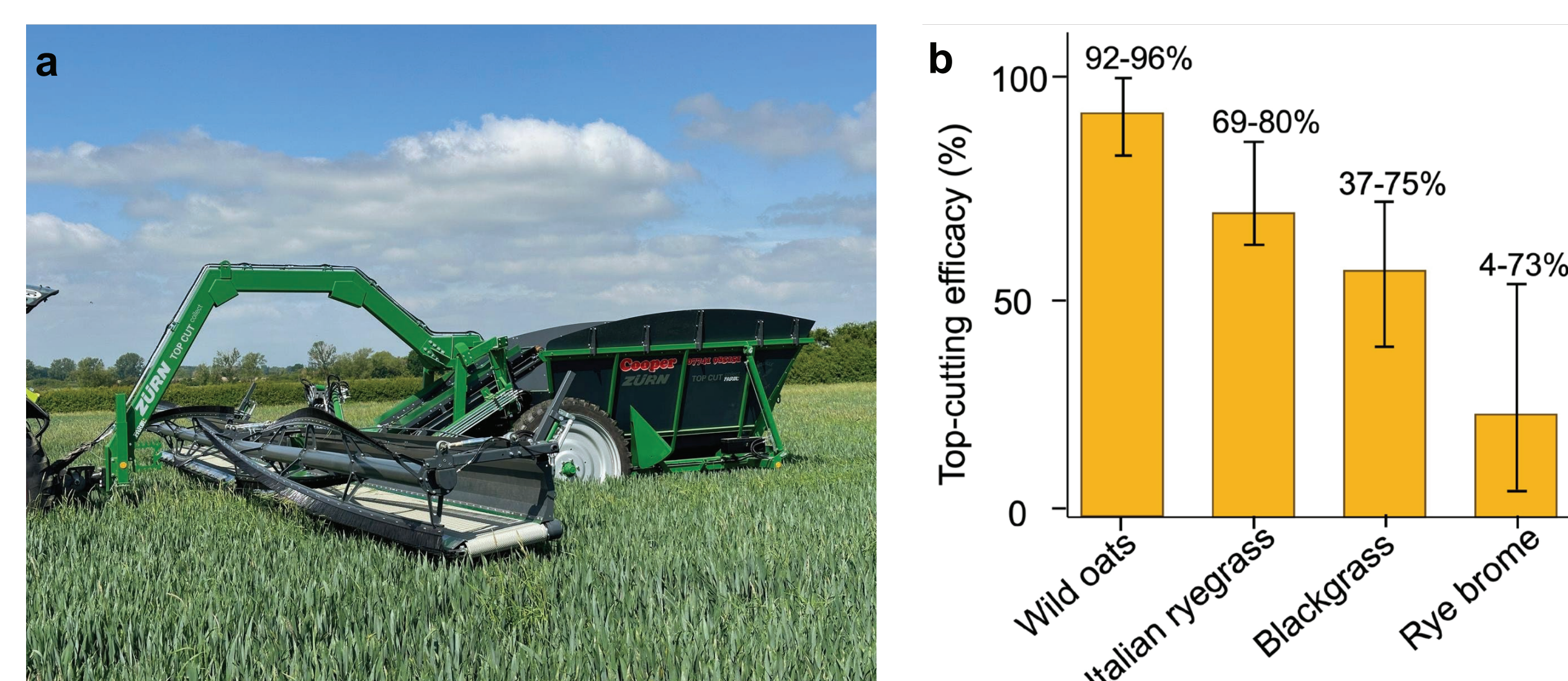
# REDUCING WEED SEEDBANKS FOR LONG-TERM WEED CONTROL

Long-term weed control depends on reducing the soil seedbank, not just managing emerged above-ground weeds. Each year, weeds shed seeds that replenish the seedbank, allowing infestations to persist. Reducing annual seed inputs helps suppress weed populations and lowers the risk of herbicide resistance. Niab tested two seed-loss mechanisms:

## 1. Top cutting/weed-surfing

- Mechanical removal and disposal of seed heads growing above the crop canopy.
- Tested on black-grass (*Alopecurus myosuroides*), Italian ryegrass (*Lolium multiflorum*), rye brome (*Bromus secalinus*), and wild oats (*Avena fatua*) over two years
- Comparison of two wheat varieties (short and tall), different cutting timings and frequencies.
- Single cut at early flowering was ineffective (<39% seed head removal).
- Repeated cutting in early, mid, and late flowering was far more effective (Figure 1).
- Cutting timing is critical for high efficacy; depends on weed species and year.

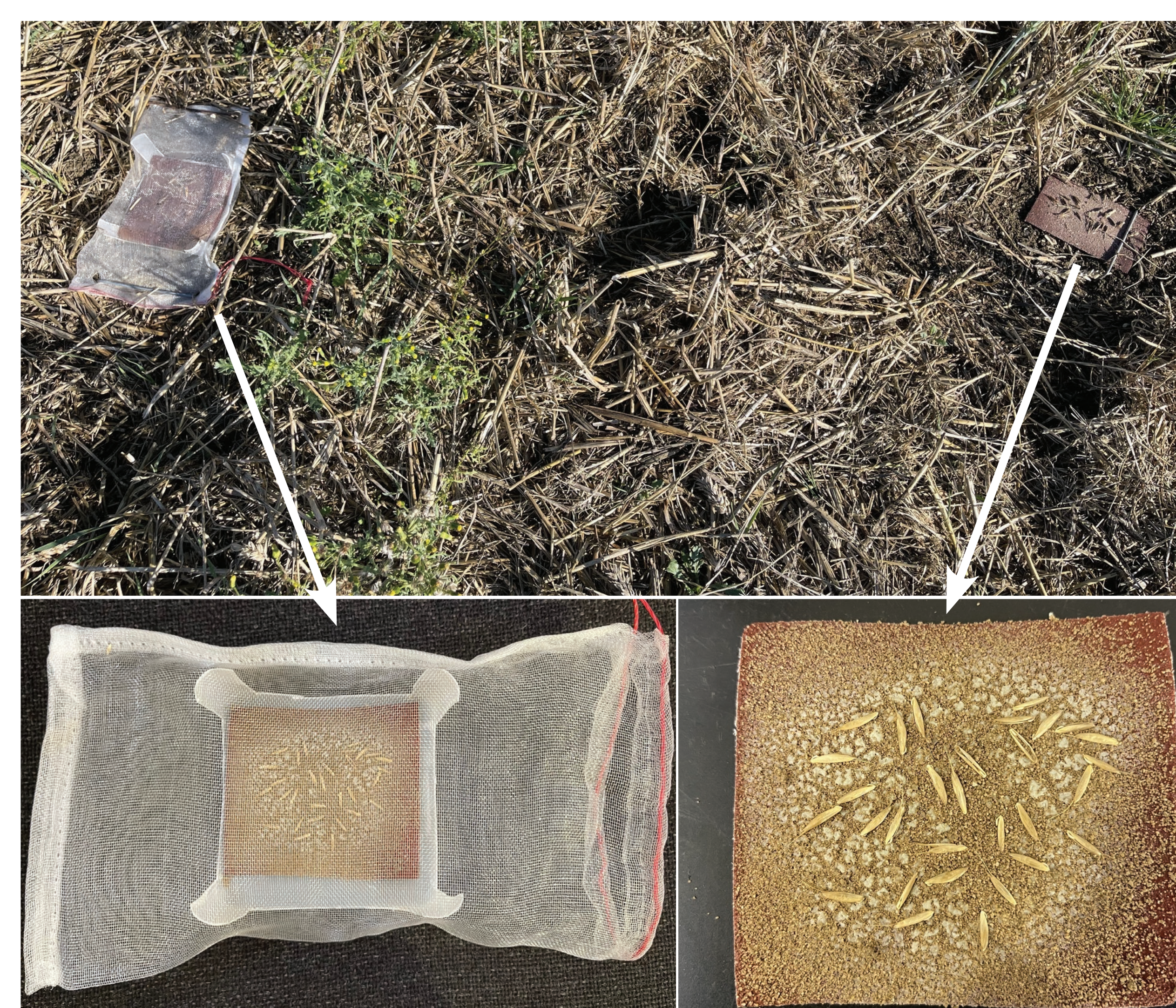
Figure 1. (a) Zürn's commercial Top-Cut Collect machine, and (b) top-cutting efficacies by species, averaged across wheat variety, cutting treatments, and seasons



## 2. Weed seed predation

- Measured weekly seed removal over two years in six fields (Figure 2).
- Compared long-term regenerative no till vs. conventional tillage.
- No till fields had consistently higher predation rates (76-79%) vs. conventional (46-52%).
- Effect varied by year, season, and species, but reduced soil disturbance always improved seed removal by predators.
- Predation was highest in spring (Figure 3).
- Reduced tillage, among other regenerative practices such as crop residue retention, cover cropping and reducing chemical inputs, can enhance weed seed predation.

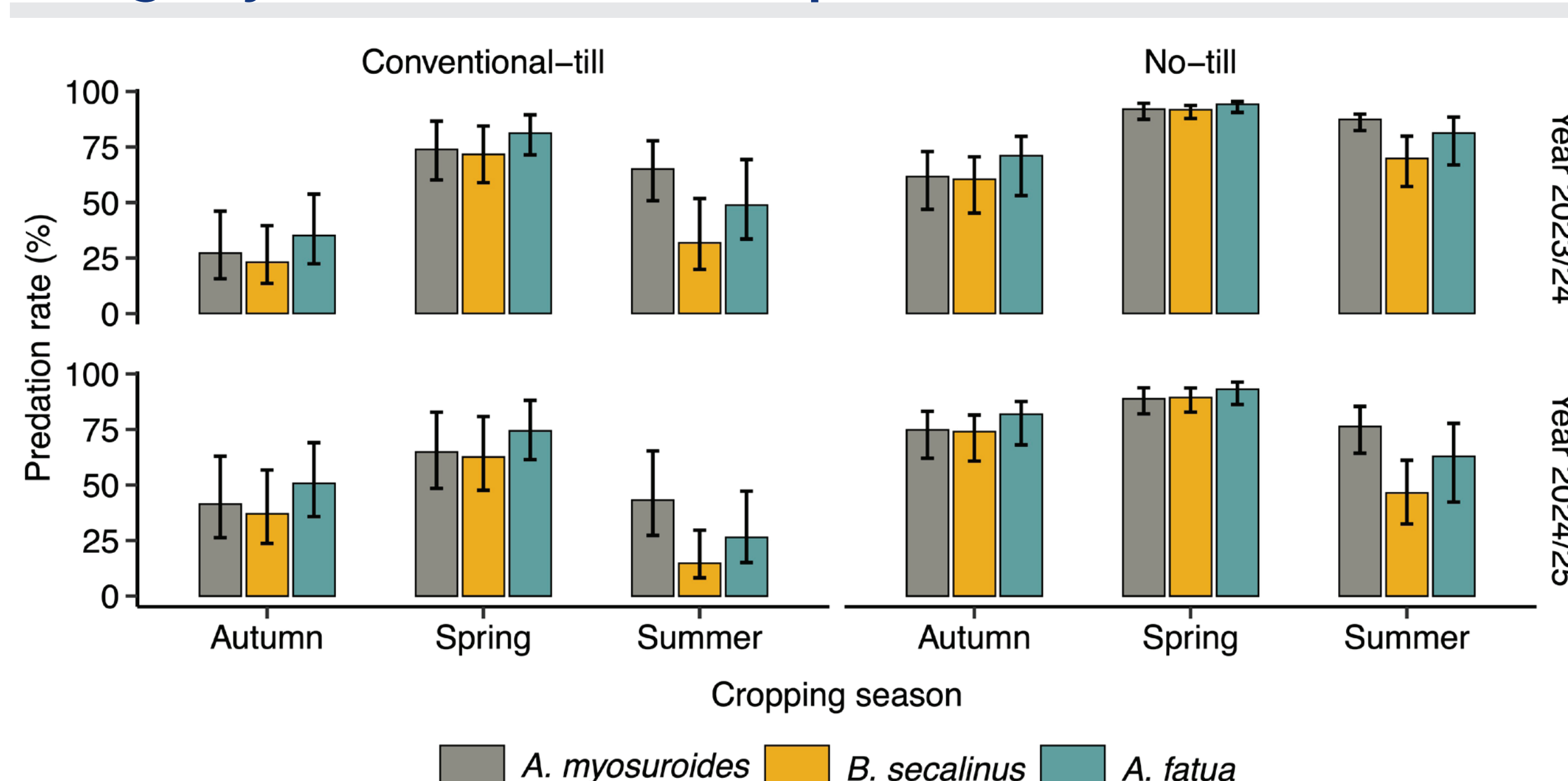
Figure 2. 'Seed cards' used to quantify predation rates in the field. The 'enclosed' card controls for seed losses not caused by predator removal



## Key messages

- Sustainable weed management must prevent seed production and shedding, not just control emerged weeds.
- Top cutting substantially prevents seed return to the seedbank, while predation removes many seeds that reach the soil surface.
- Used alone, neither method is 100% effective; together they offer an integrated, ecology-based approach.
- Reducing seedbank replenishment slows weed population growth, herbicide resistance, and supports resilient, sustainable weed management.
- To read the full papers, scan the QR code below.

Figure 3. Weed seed predation rates as influenced by tillage system, season, and species



This work is part of a PhD project by Jasper Kanomanyanga, funded by Syngenta and Niab and affiliated with the University of Lincoln. The work focuses on understanding and enhancing weed seed losses to support resilient integrated weed management in regenerative agricultural systems and ultimately slow the evolution of herbicide resistance.

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