LET'S IDENTIF-AI THOSE STICKY BASTARDS!

AI-based detection of thrips and whitefly species on sticky traps in greenhouses and vertical farms

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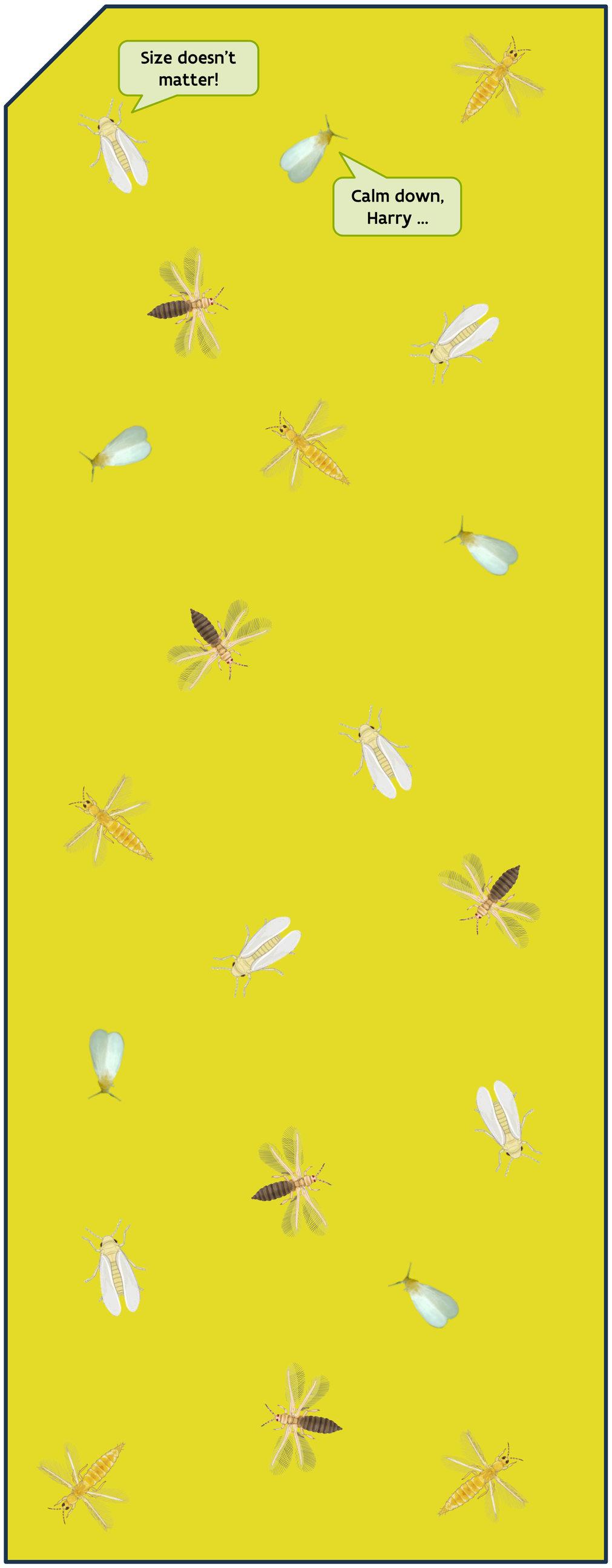

SMALL SIZE, BIG IMPACT !

With a production value of **> 500 million euro** in 2021, the **Flemish ornamental horticulture sector** is a **blooming business.**

Unfortunately, the presence of **pest insects** such as **thrips** and **whiteflies** can potentially **ruin complete cultivations** due to **direct crop damage** and **disease transmission** ...

Early pest detection and local treatment are **key** to avoid major damage. This is currently done using **(yellow) sticky traps** & frequent **human inspection**.

Can **artificial intelligence (AI)** replace this costly human inspection step?!

FROM SELFIE TO DETECTION/IDENTIFICATION MODEL

Various **thrips** (*Frankliniella occidentalis* & *Echinothrips americanus*) and **whitefly** (*Bemisia tabaci* & *Trialeurodes vaporariorum*) species were reared inside cages at ILVO[1].

Different types of **yellow sticky traps (YST)** were positioned inside the cages and afterwards **photographed** using a **high resolution DSLR camera** (Sony a7 RIII).

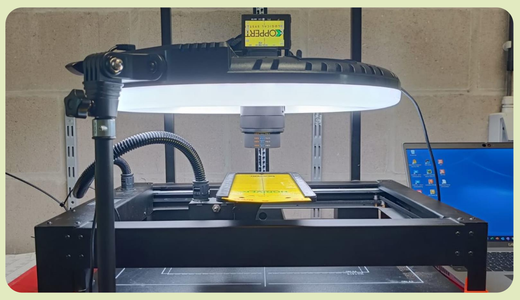

Figure 1: image acquisition setup

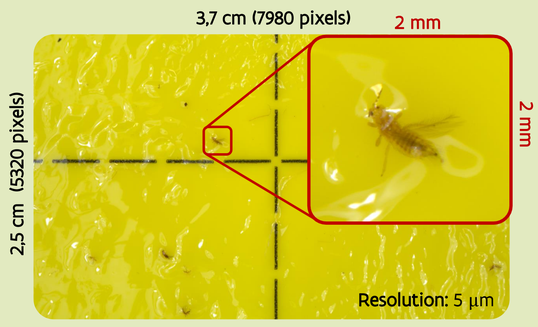

Figure 2: example of 1 high resolution image + zoom

All **pest images** were **corrected** and **semi-automatically labeled** using a dedicated Python™ script.

Different types of **deep learning (DL) models** are currently being trained and tested using the labeled images in order to obtain an **automated pest detection and identification system**.

F*CK YEAH, THIS LOOKS PROMISING !

A **first thrips model** using a **small dataset** (240 images/thrips species), looks **promising**:

➔ **precision:** 97% – **sensitivity:** 96% – **mAP@50:** 98% – **F1@50:** 97%

(prob: 0.7 – IOU: 0.5 – train-val-test: 60-20-20%)

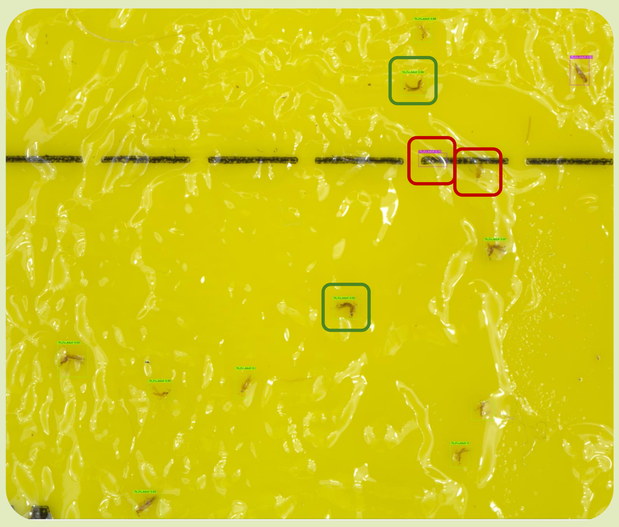

Figure 3: test image detection results

Figure 4: zoomed test image detection results
(Fo: *Frankliniella occidentalis* | Ea: *Echinothrips americanus*)

WOAH, WE'RE HALFWAY THERE ...

WORK-IN PROGRESS

1. **Extended model** – bigger dataset, more pest species & sticky trap types/colours
2. **Versatile model** – train/test the models under different light conditions/spectra
3. **Optimized system** – determine the minimal required image resolution

Acknowledgement:

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Images: Freepik Company S.L. (2024), DBCLS (2022), DoMyOwn (n.d.) & BioRender (n.d.)

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