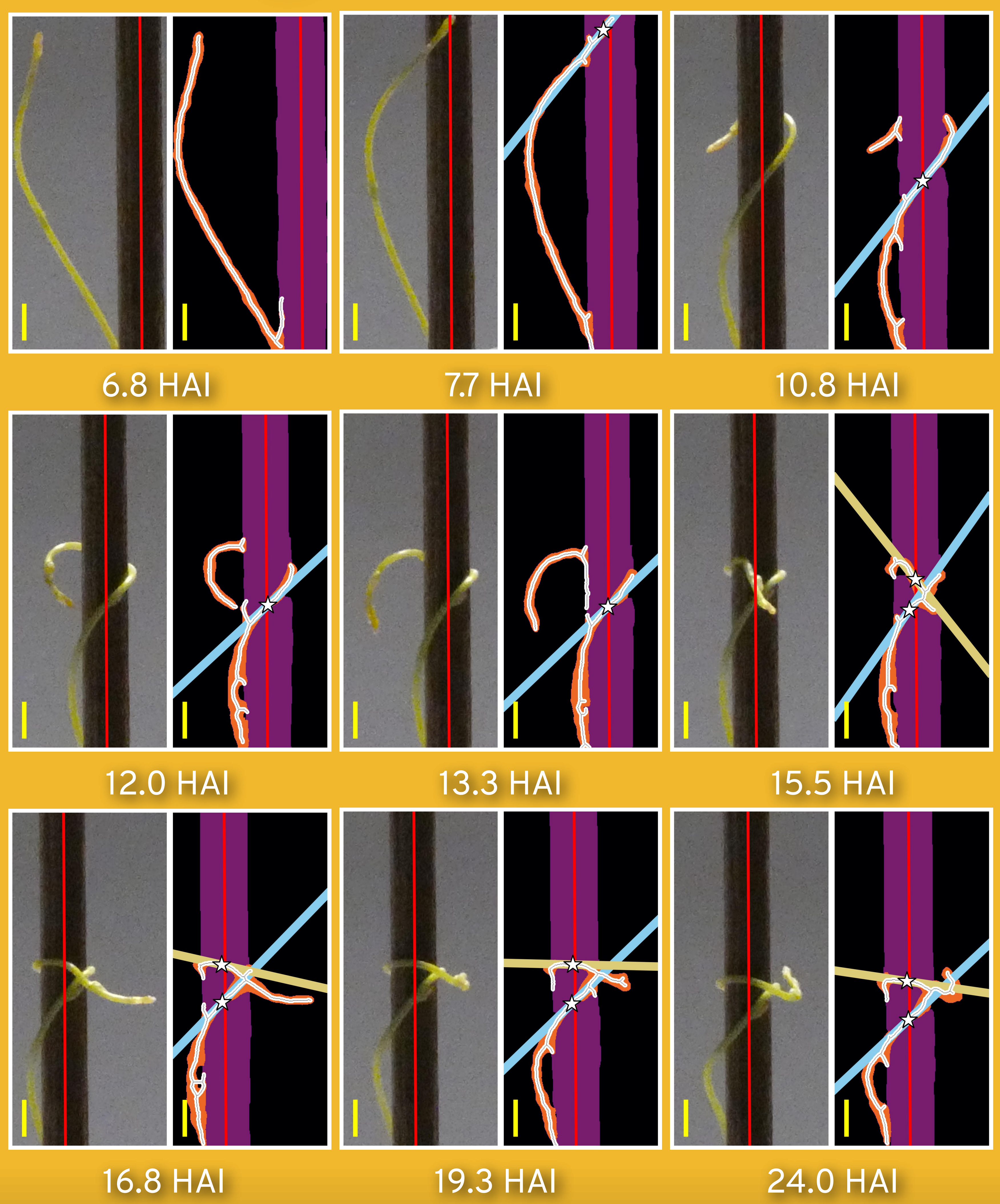


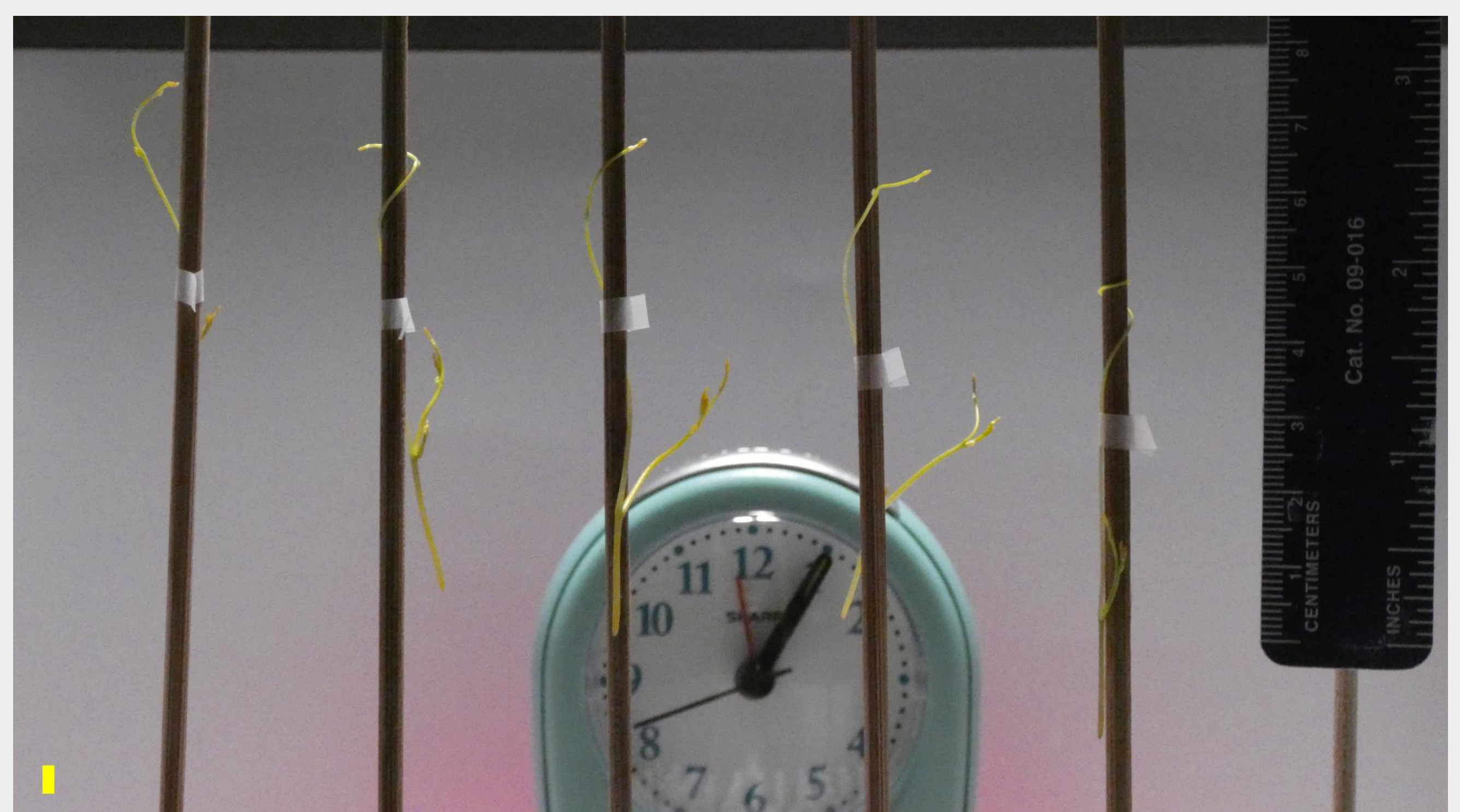
# Tracking the wiggle of a vampire plant



## Decoding *Cuscuta* coiling with image processing

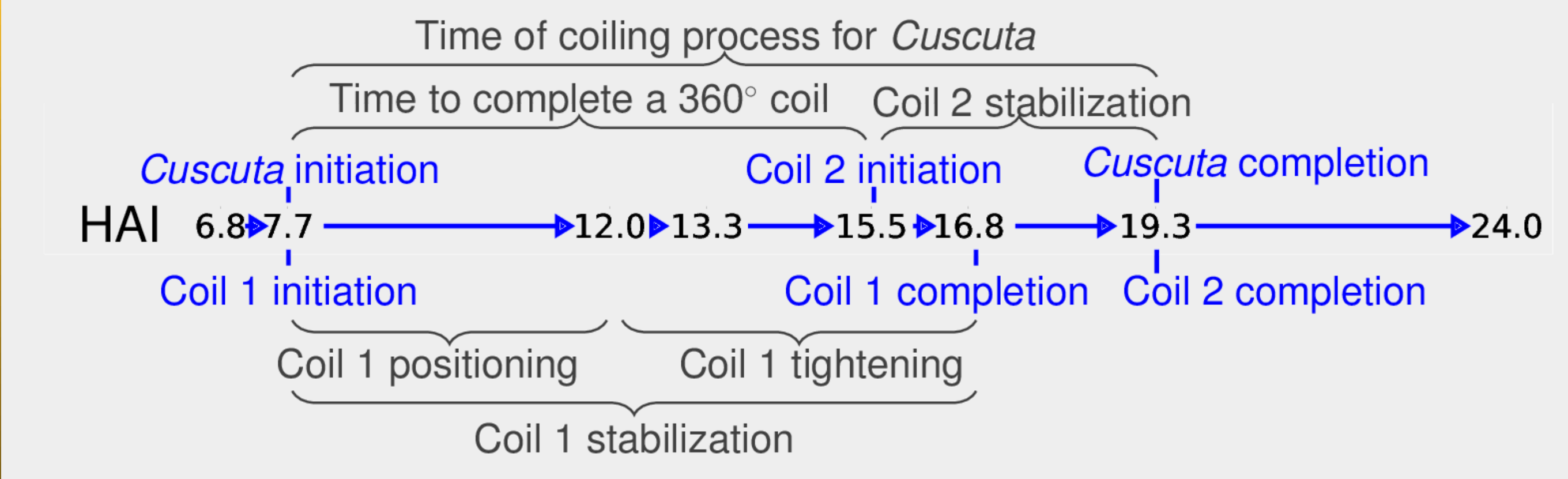
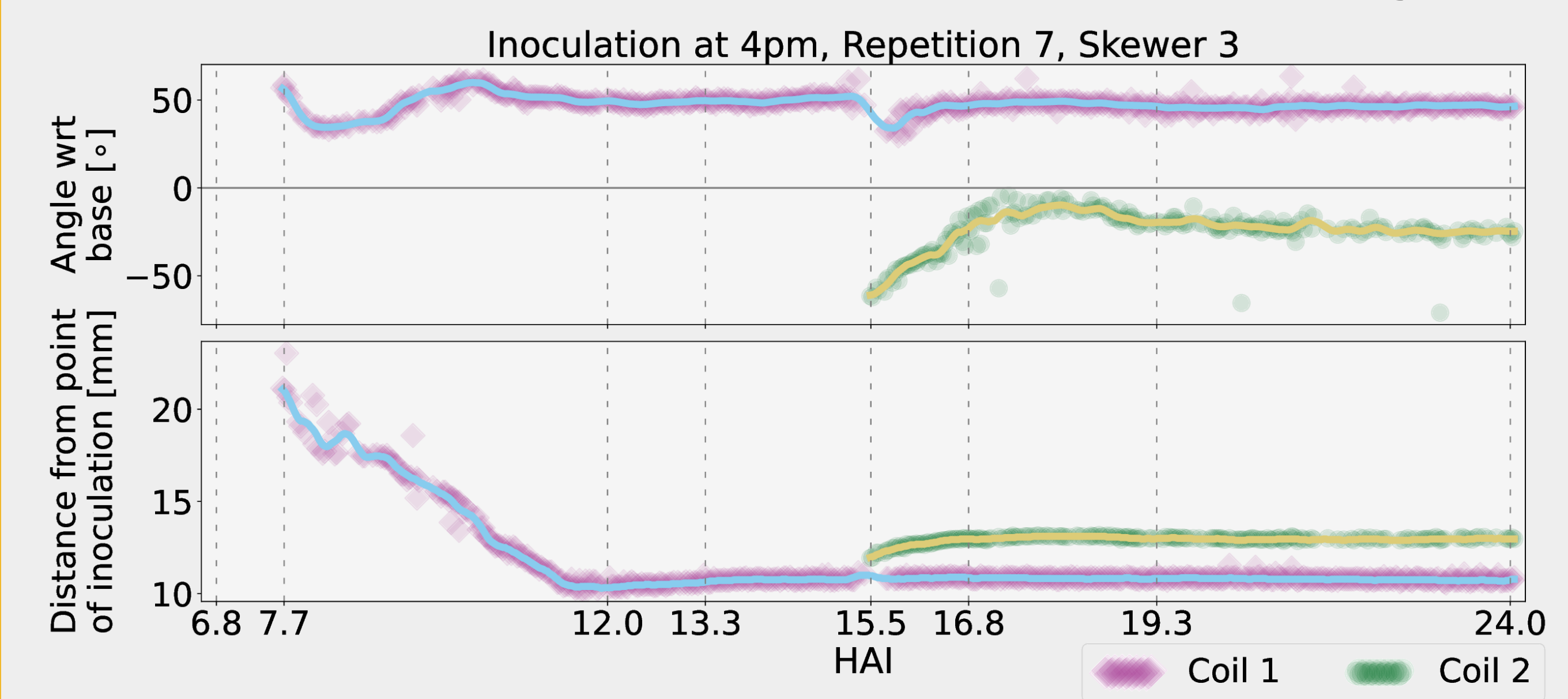
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### Materials and methods



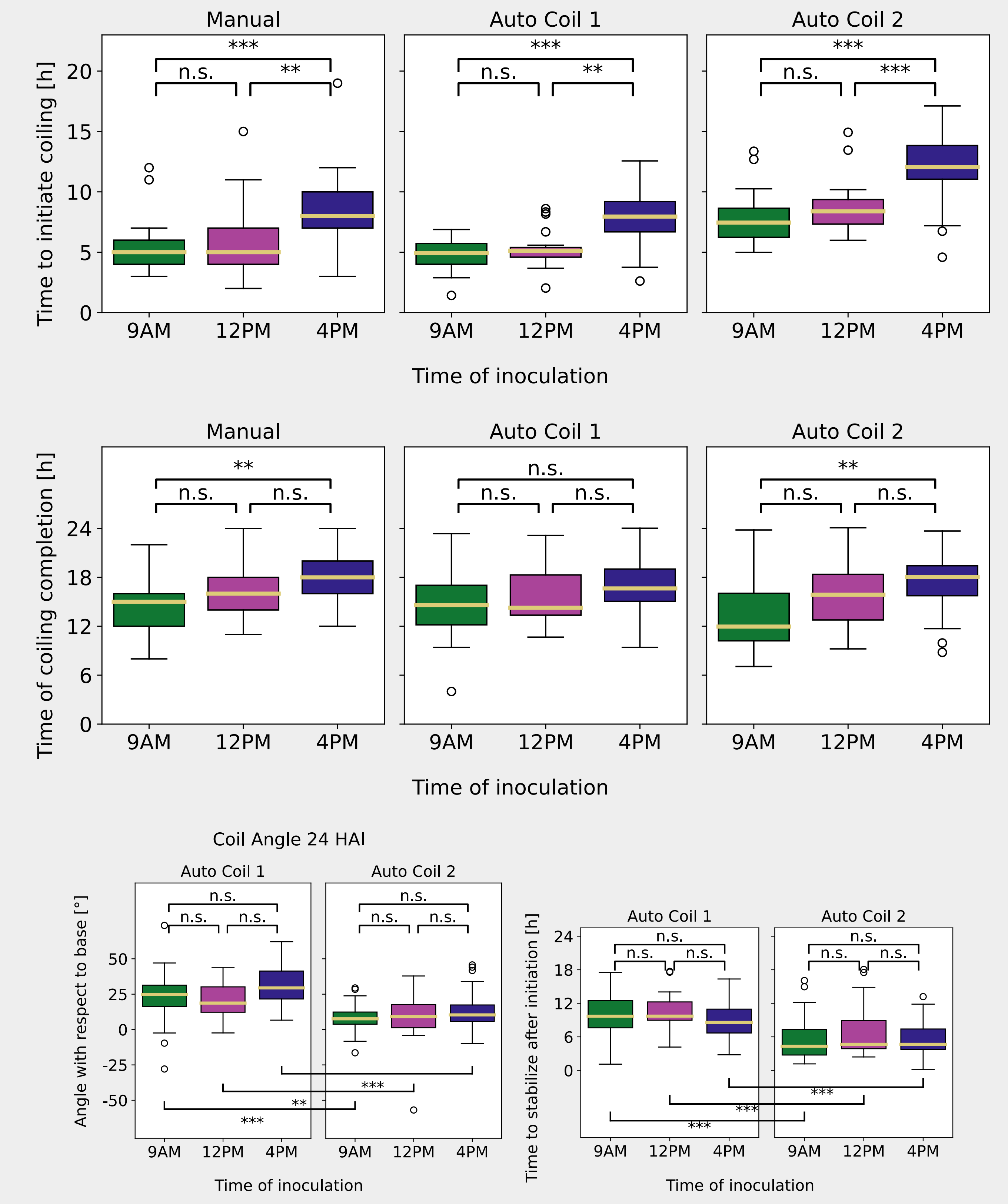
- Mature *Cuscuta* stem segments grown in greenhouse.
- Inoculated on skewers at 9AM, 12PM, and 4PM.
- 900 camera snapshots × 96 seconds = 24 hours.
- 5 skewers × 7 repetitions = 35 samples per time.
- **Manual** and **automated** observations:
  - ↳ Coiling success rates.
  - ↳ Initiation and completion times.

### More data extracted automatically



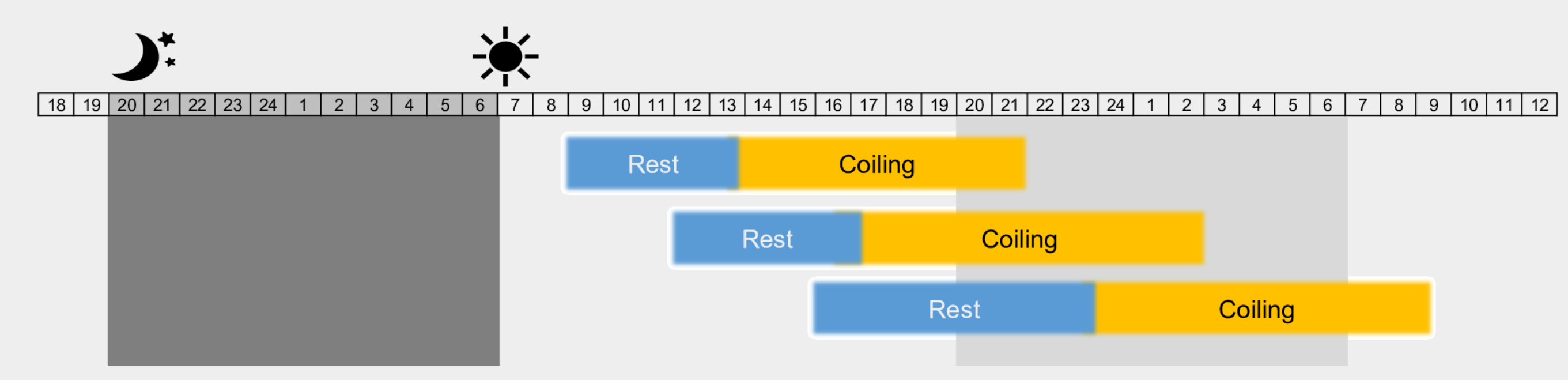
- Keep track of coil position and angle as a time series:
  - ↳ Observe **nuanced** coiling stages.
  - ↳ Consider Coil 1 and Coil 2 individually.
  - ↳ More **accurate** representation.
- Based on color contrast *Cuscuta* vs skewer.

### The early dodder gets the host



- *Cuscuta* inoculated in the **morning** coiled **better**:
  - ↳ Higher coiling success rate.
  - ↳ Coiling started sooner.
  - ↳ Coiling was completed sooner.
- However, once coiling initiated, coiling stages lasted the **same, regardless** of inoculation time.
- Inoculation time did **not** influence twinning speed, angle, position, or coiling stage durations.
- Nonetheless, Coil 2 is **more stable** than Coil 1.

### Circadian clock model and conclusions



- *Cuscuta* can tell time despite lacking photoreceptors.
- It prefers to act in the morning/early afternoon.
- Our pipeline is ready to collect more data:
  - ↳ Phenotype the wiggle as a whole.
- Improve parasitic plant control treatments.

### Acknowledgements

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Python, preprint, and videos  
[bit.ly/cuscuta](https://bit.ly/cuscuta) [QR below]

