

CRISPR-Based Strategies for Viroid Detection

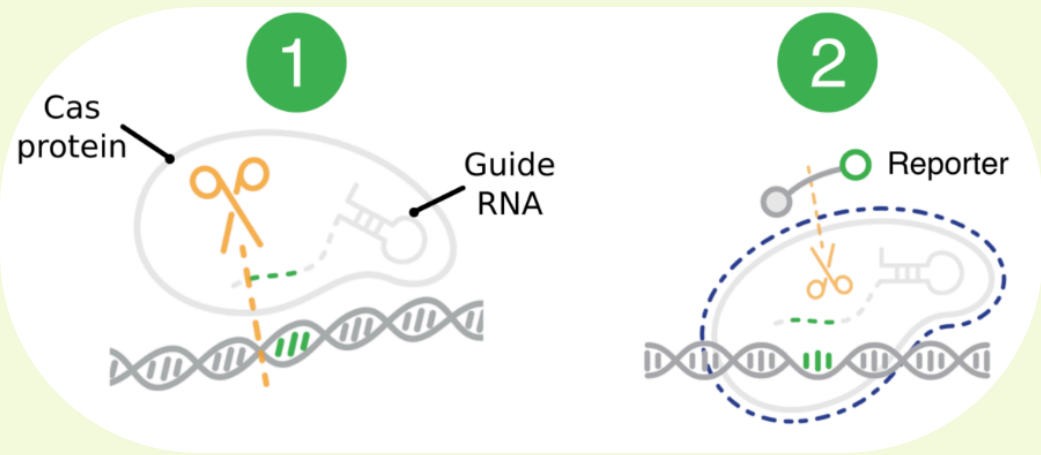
“Towards Point-of-Care Diagnosis”

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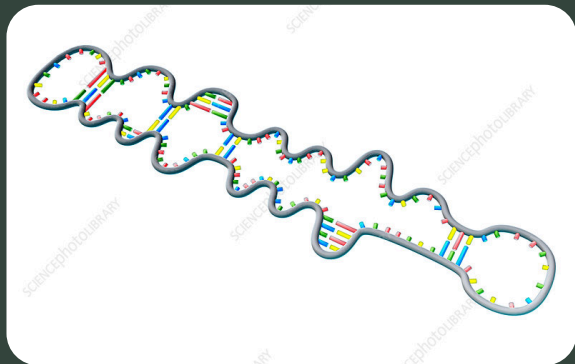
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CRISPR in Diagnostics

“CRISPR systems offer programmable, sequence-specific detection of nucleic acids, enabling rapid and sensitive diagnostics.”



Viroids and the Need for Rapid Detection



Smallest infectious agents
Viroids are tiny, circular, non-coding RNA molecules.



Crop damage
Viroid infection causes stunting, leaf distortion, yield loss

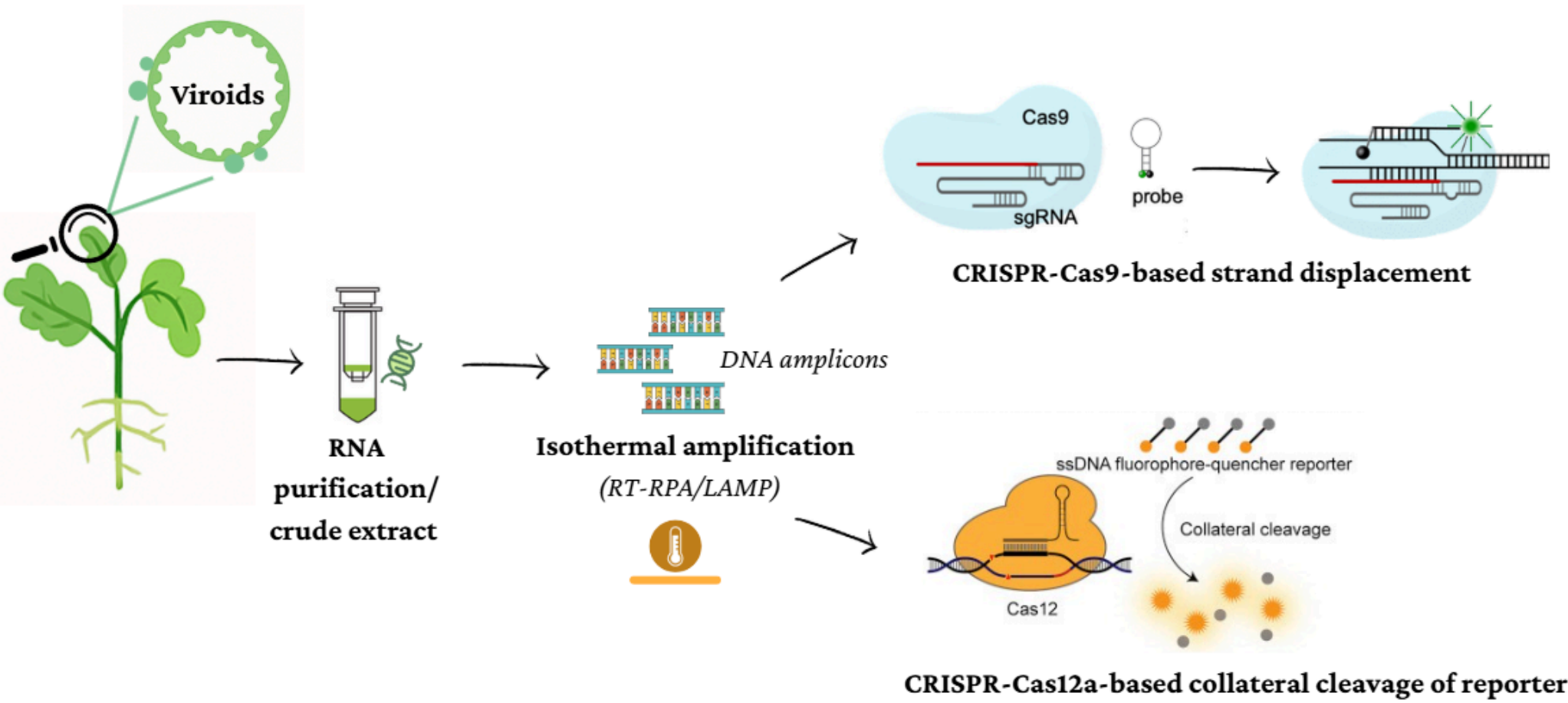


Current lab detection
Accurate methods like RT-PCR require laboratory equipment

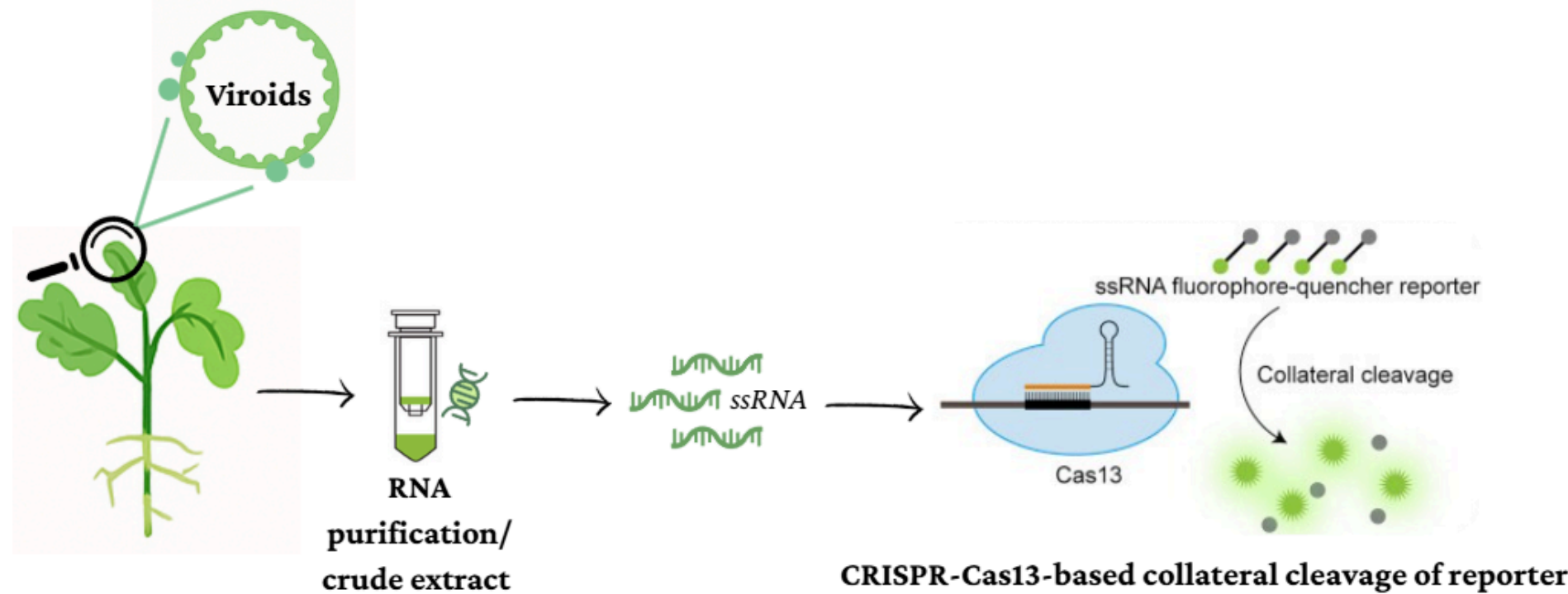


Need for rapid field tests
Early diagnosis is critical to prevent spread and crop loss.

CRISPR-Based Detection Strategies

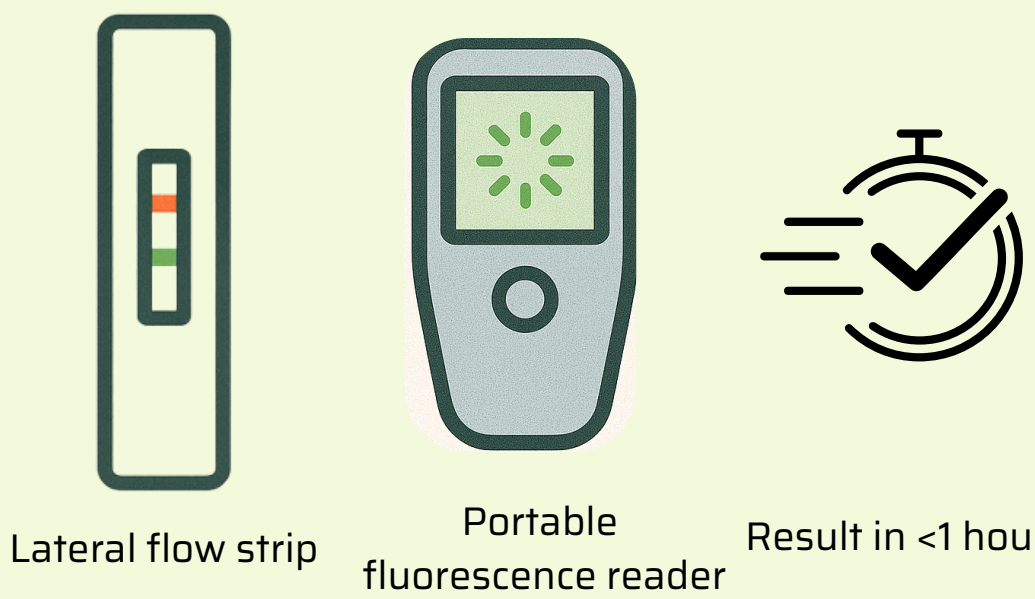


Detection after isothermal amplification (Cas12a + Cas9 approaches)



Direct RNA detection without amplification step (Cas13a/d approaches)

Point-of-care (POC) detection



Conclusion

- CRISPR technologies enable rapid, sensitive, and specific viroid detection.
- Cas12a/Cas13a/Cas9 platforms adapt to both amplification-based and amplification-free workflows.
- Combined with POC tools (e.g., lateral flow strips, portable readers), allowing on-site diagnosis in <1 hour.
- A powerful step toward field-ready diagnostics in plant health