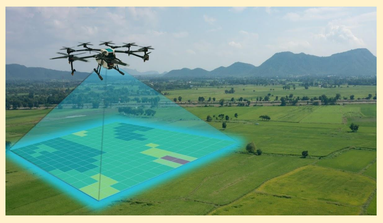
Potential For Pre-Harvest Prediction Of Potato Storage Disorders



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The Message

Discovering the best sensing technologies as pre-harvest prediction method of drought induced potato storage disorders.

1. Introduction

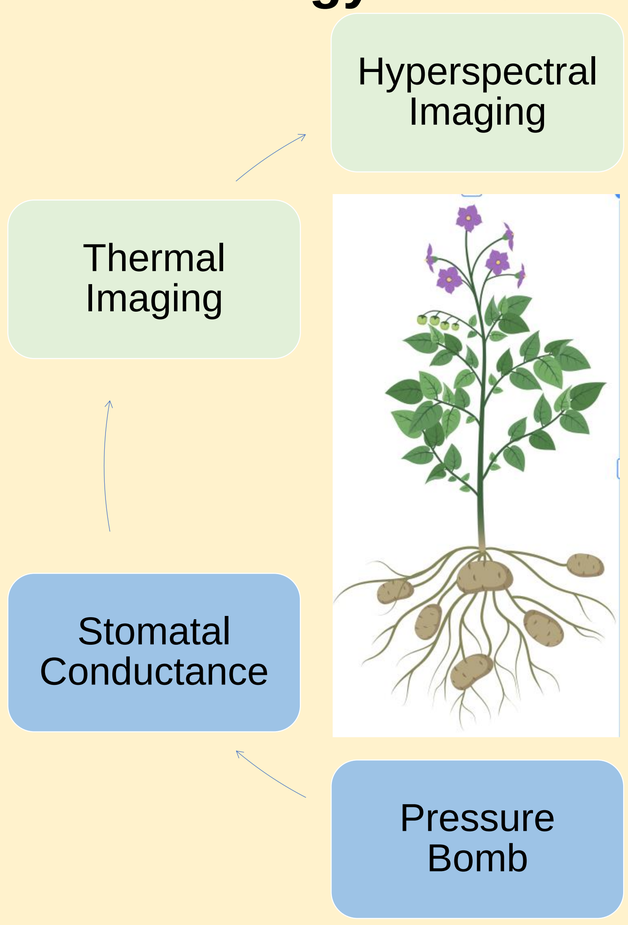
1. Drought stressed potatoes are prone to internal physiological disorders, causing financial losses, and food waste.

2. Sensing technologies are non-destructive methods used to detect crop water stress while in the field.

3. There are different types of sensing technologies e.g. hyperspectral imaging (HI), sun-induced inflorescence (SIF), and thermal imaging (TI).

4. This study aims to introduce a methodology for pre-harvest prediction of drought-induced disorders that occur during storage.

2. Methodology Phase 1: Comparison Experiment



Selection Criteria

- Easy Navigation
- High Correlation
- Feasibility
- Device compatibility
- Affordability
- Durability
- Portability
- Speed
- Simple

3. Methodology: Phase 2

1. 4 x 2 factorial randomised design.

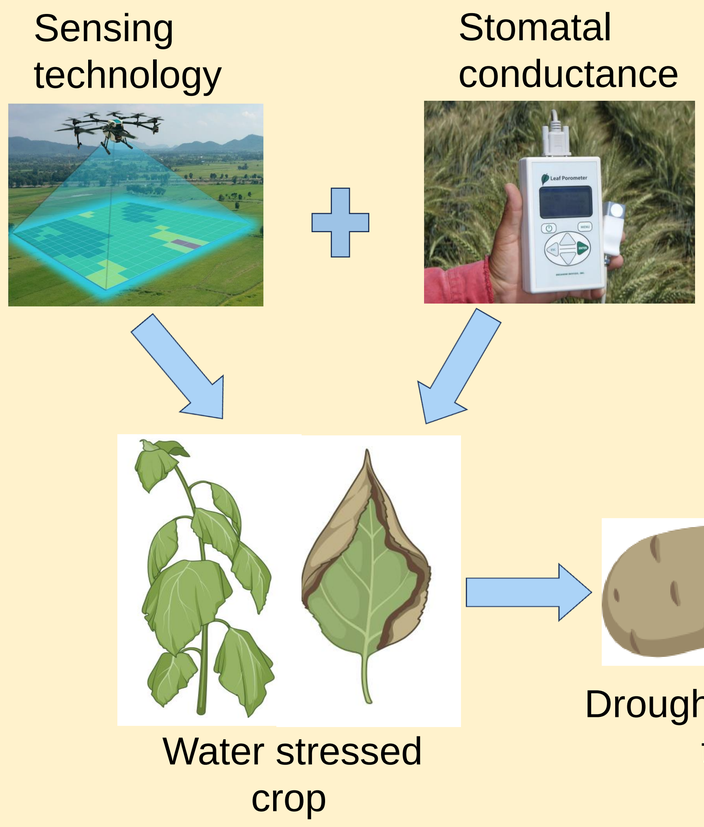
2. Four varieties (Nectar, Challenger, Russet Burbank and Markies) and two irrigation schemes (irrigation and no irrigation).

3. Field data collected on: stomatal conductance and imaging.

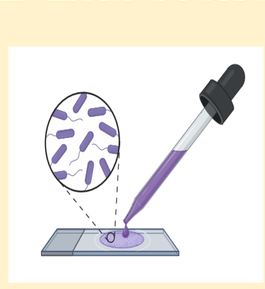
4. Lab data collected on: tuber starch distribution (insights into the physiological processes for quality assessment)

5. Type and time of storage tuber physiological disorder occurrence will be recorded.

3.1 Field Experiment

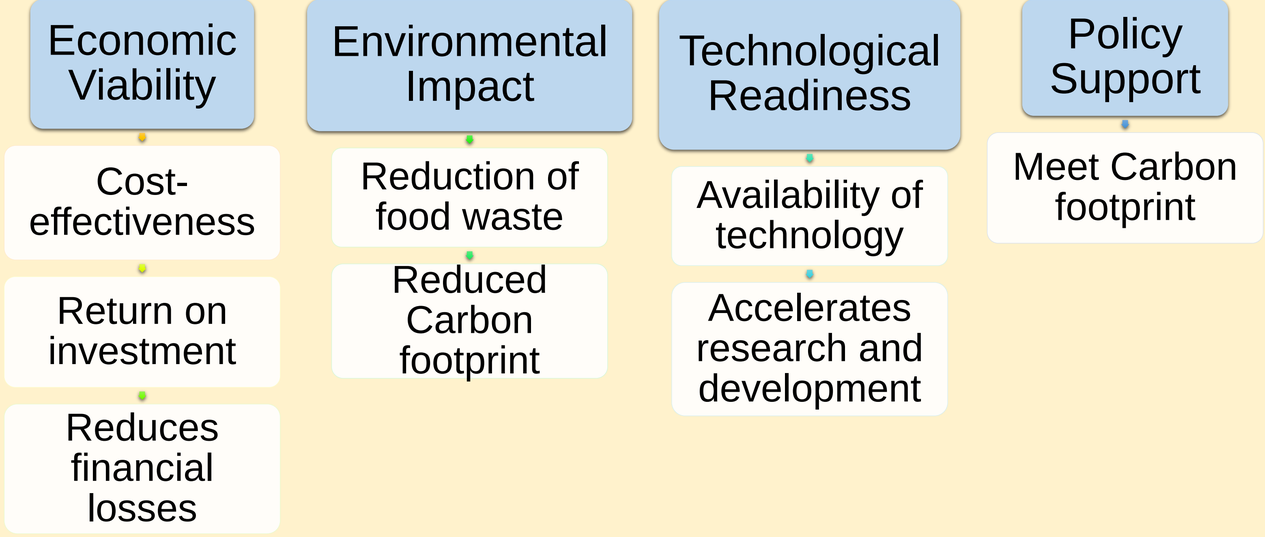


3.2 Laboratory Experiment



Starch test

4. Probable Outcomes



5. Conclusion

1. Addressing a critical gap in farmers' market decision-making, by accurately predicting the shelf life of potato tubers. It aims to provide a timely dispatch period for potato tubers which have a high probability of developing disorders.

2. Aiming to introduce a methodology for predicting drought-induced disorders that occur during storage.

3. Facilitating sustainable development for farmers while contributing to global sustainability efforts by reducing food waste.

Future work: Modeling and developing artificial intelligence (AI) systems capable of automatically detecting potato tuber shelf life based on water stress and drought induced disorders.

6. References

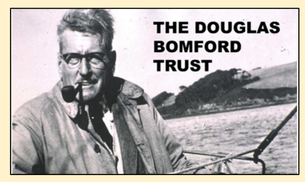
[1] Adesina, O. S., & Thomas, B. (2020). Potential Impacts of Climate Change on UK Potato Production. *International Journal of Environment and Climate Change*, *10*(4), 39–52. https://doi.org/10.9734/ijecc/2020/v10i430194

[2] Vasquez-robinet, C., Mane, S. P., Ulanov, A. V, Watkinson, J. I., Stromberg, V. K., Koeyer, D. De, Schafleitner, R., Willmot, D. B., & Bonierbale, M. (2008). *Physiological and molecular adaptations to drought in Andean potato genotypes*. *59*(8), 2109–2123. https://doi.org/10.1093/jxb/ern073

[3] Biorender

7. Acknowledgements

Harper Adams University



MIBTP Midlands Integrative Biosciences Training Partnership

UKRI Biotechnology and Biological Sciences Research Council