

Reliable assessment of vegetable freshness by nondestructive Vis-NIR spectroscopy — based on NMR-identified freshness makers —

成果の特徴

- The developed visible and near-infrared spectroscopy (Vis-NIRS) method can reliably assess the freshness of vegetables such as broccoli and komatsuna.
- Amino acids were identified as freshness marker metabolite candidates.

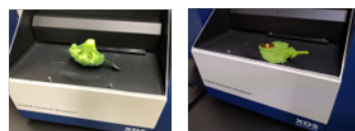
成果の内容

■ Broccoli & Komatsuna



- Indicator of freshness degrees
- Broccoli: cumulative temperature
- Komatsuna: cumulative CO₂ respiration

■ Vis-NIRS analysis



- Spectra: 400-2500 nm
- Chemometrics: PLSR analysis, etc.

■ NMR analysis



- ¹H-NMR measurement

Table 1 Freshness prediction ability of Vis-NIRS

| Vegetables | Wavelength (nm) | R ² 決定係数 (Training) | R ² 決定係数 (Test) |
|------------|-----------------|--------------------------------|----------------------------|
| Broccoli | 400-1100 | 0.682 | 0.693 |
| | 1100-2500 | 0.820 | 0.753 |
| Komatsuna | 400-1100 | 0.823 | 0.677 |
| | 1100-2500 | 0.780 | 0.678 |

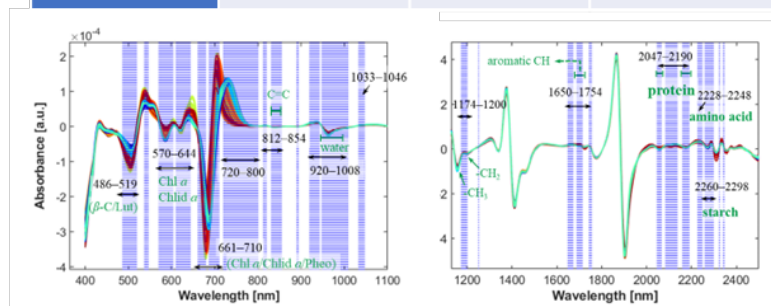


Fig. 1 Informative WLs selected for model building.

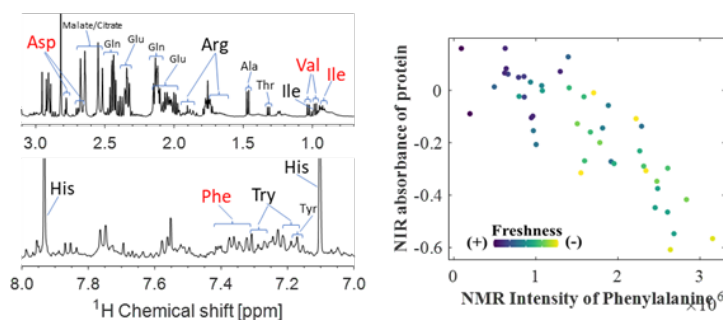


Fig. 2 Freshness markers identified by NMR.

想定される用途・連携希望先

The developed optical sensor method for assessing vegetable freshness is expected to be reliably applied in on-site post-harvest management.

参考 Xinyue Li, et al. (2024). *Postharvest Biology and Technology*, 211, 112810.

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