

## Metabolomics Overview

### Targeted vs Untargeted

- Targeted: quantify specific metabolites
- Untargeted: broad metabolite profiling
- Semi-targeted approaches

### Primary Metabolites

- Central metabolism (glycolysis, TCA)
- Amino acids, nucleotides
- Energy production molecules

### Secondary Metabolites

- Plant natural products
- Signaling molecules
- Defense compounds

### Metabolic Flux

- Dynamic metabolite changes
- Isotope tracing ( $^{13}\text{C}$ ,  $^{15}\text{N}$ )
- Pathway activity measurement