Exploring Molecular Tools for Evaluating Seed Quality

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Session: New technologies in seed testing

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Exploration background

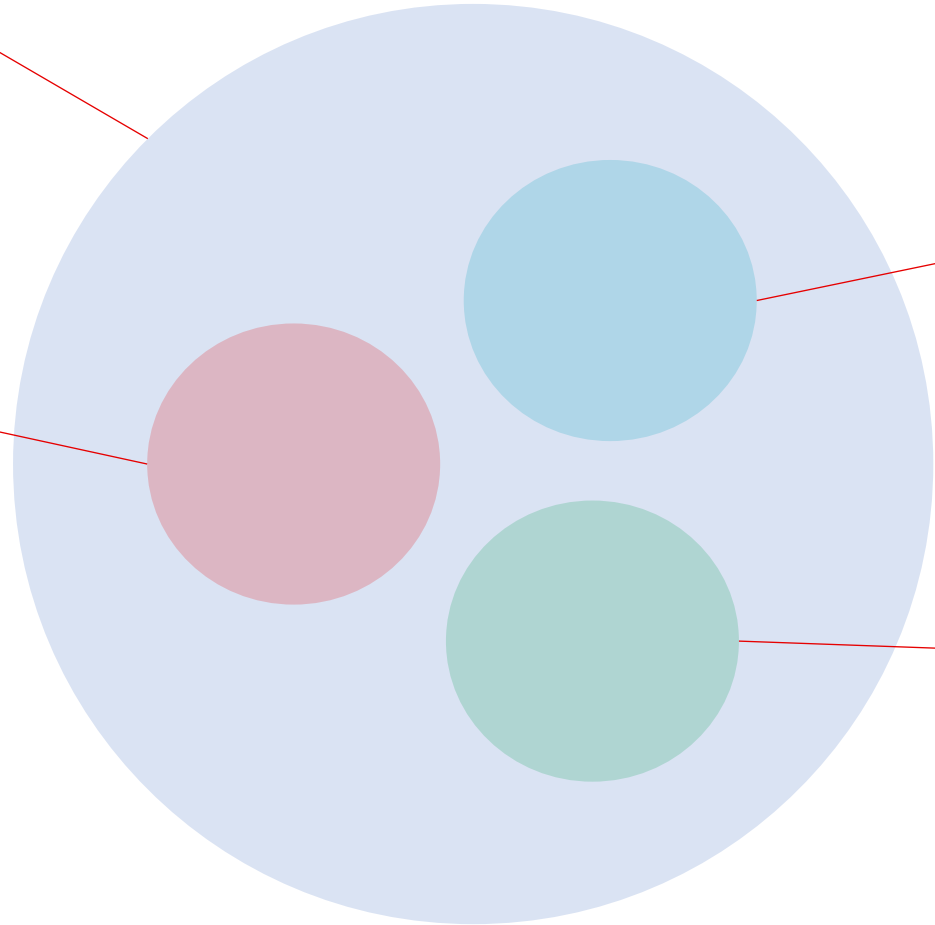
Main objective:

Identify new technologies and tools in molecular biology that could improve accuracy, efficiency, and overall seed quality testing

Mixed research methodology (under discussion):

- Literature review (so far)
- Data collection
- Expert surveys and interviews
- Competitive analysis

Key research concept



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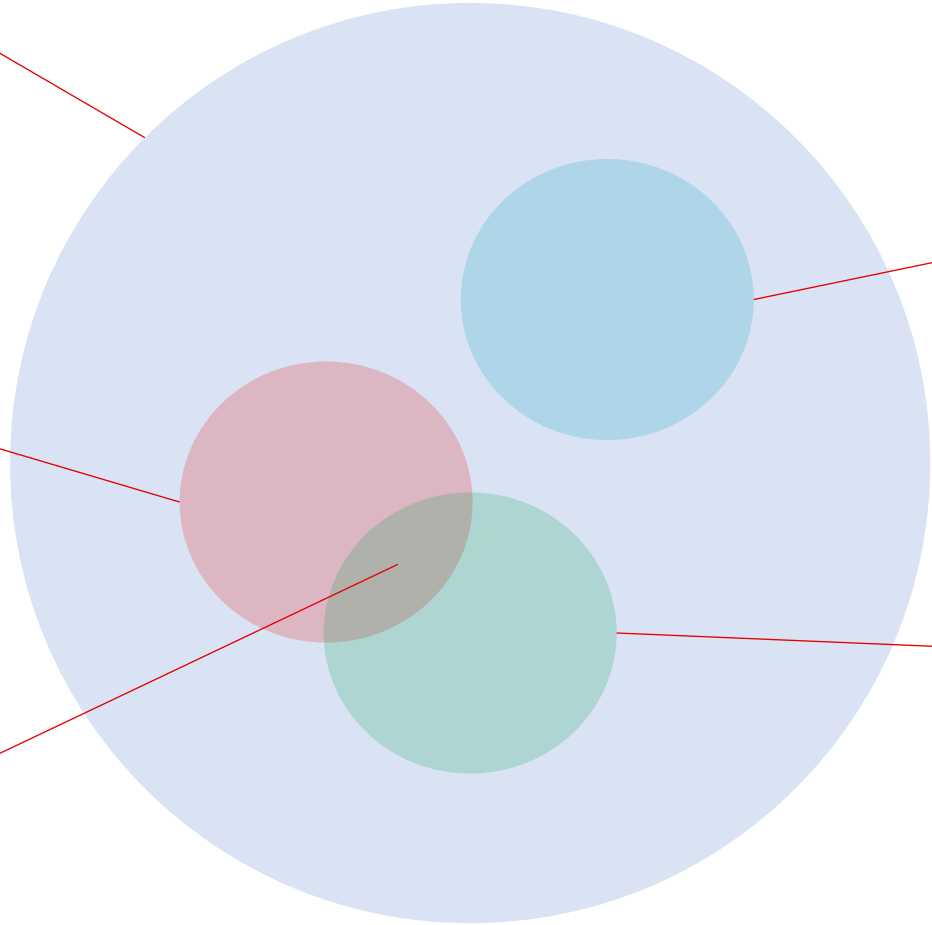

Potential for Germination testing?

- Semantic research:
  - >300 scientific papers focused on molecular mechanisms of seed germination in the last 6 years
  - 15 scientific papers at least one highly influential citation
- Relationship between Abscisic acid (ABA) and gibberellic acid (GA) – and many more
- Expression of ABA/GA metabolic genes during plant development or different abiotic stress
- qRT-PCR assays on particular genes

Practical use for Species and Variety testing

- Semantic research (results from the last 6 years):
  - 33 scientific papers on PCR
  - 29 scientific papers on SSR
- Almost no highly influential citations
- Genetic (Varietal) purity / Hybrid purity / Fingerprinting / Molecular characterization
- Development for plant breeding

Pathogen detection has the lead

- Semantic research (results from the last 6 years):
  - 45 scientific papers on direct seed testing
  - <1400 scientific papers on pathogen detection
- High sensitivity / high specificity
- Method comparison / multiple targets
- Capacity is key (HTS)

Promising possibilities for Vigor testing

- Semantic research (results from the last 6 years):
  - 22 scientific papers on direct seed testing
- Seed ageing & damage repair processes
- Germination, ageing & priming processes
- qRT-PCR assays on particular genes

Solid progress for GMO detection

- Semantic research (results from the last 6 years):
  - >100 scientific papers on GMO testing
- Speed and capacity of the tests
- Method comparison / multiple targets (even pathogens)
- Geographical origin of the seed
- Options for all cases: PCR, RT-PCR, Multiplex PCR, dPCR

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Thank you