Strong rationale ← AgriScience Primary Focus → Strong rationale

TRL	1	2	3	4	5	6	7	8	9	–
Description	Idea generated	Feasibility studies	Basic components validated through models or in the laboratory under controlled conditions	Partially-integrated components validated in the lab under controlled conditions	Integrated components validated in a simulated environment under controlled but realistic conditions	Pilot-scale prototype in a simulated environment under controlled but realistic conditions	Full-scale prototype in an operational environment under limited but realistic conditions	Final technology in an operational environment under all expected conditions across crops & regions	Final technology further refined and successfully deployed	Technology openly available on the market
Stage in Plant Genetics Improvement Continuum	**Foundational Science** Generating knowledge and tools to be used in germplasm enhancement			**Germplasm Enhancement** Applying foundational science to develop and characterize germplasm		**Variety Development** Applying the results of germplasm enhancement to refine and develop commercially-ready varieties		**Pre-Market Evaluation** Adaptation testing for registration and commercialization requirements (crop specific)		**Commercialization** Activities related to seed production/plant multiplication of varieties through release partnerships
Activity description	**Prerequisite Science** Feeds into germplasm enhancement. Involves gaining crop and/or trait specific knowledge, i.e., the biological basis of traits. • Plant physiology • Plant pathology • Entomology • Plant/seed chemistry **Discovery Science** Science that feeds into germplasm enhancement but can also serve as a foundation for activities outside of crop genetic improvement. • Phenomics • Transcriptomics • Metabolomics • Genomics • Epigenetics **Tool Development** Advancement of tools or novel techniques, that may have applications beyond the crop or research program • Robotics • Artificial intelligence • Marker development • Prediction models			**Preservation of Genetic Diversity** • Germplasm preservation • Germplasm collection **Introduction of Genetic Diversity** Introduction of genetic diversity into germplasm. • Crossing • Gene editing • Mutation breeding **Germplasm Evaluation** Characterizing germplasm and/or early generations resulting from a cross. Activities involved may include: • Phenotyping • Genotyping • Validating the effectiveness of a tool **Methodology Improvement** Work that can be directly applied to the germplasm enhancement of the crop, in the areas of phenotyping methods, crossing, or methods for improving efficiencies in the cycle		**Elite Germplasm/Lines** Assessment and enhancement of elite germplasm. Enhancement may involve: • Targeting genes with molecular tools and technologies to incorporate enhanced germplasm • Creating targeted crossings **Nursery** Testing of germplasm (early or elite lines) for trait validation. Tests may also involve: • Resistance validation • Agroecological studies • End point quality assessments **Replicated Trials of Early Breeding Materials** • Single -year/ multilocation trials for the purpose of preliminary agronomic testing • Broad adaptation **Replicated Trials of Advanced Breeding material** • Multi-year/location trials for the purpose of preliminary agronomic testing • Broad adaptation (GXE) • Resistance validation		**Adaptation Testing** Testing of candidate varieties for key traits important to producers and industry. May occur under parameters set by a crop-specific committee. • Broad adaptation (GXE) • On farm trials • Registration Trials • Merit Testing		**Licensing** • Exclusive/non-exclusive market access • Royalty management streams **Seed Increase or Plant Propagation** • Seed increase • Nuclear stock management **Marketing** • Knowledge transfer • Demonstration trials • Websites • Seed catalogues **Variety Performance Trials for Producers** • Standardized variety performance testing for farmers

Tool development
Advancement of tools or novel techniques such as robotics, AI, marker development, and prediction models

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