

8. Agriculture

Stages	Technology Readiness Level	Definition
Ideation	TRL 1	<ul style="list-style-type: none"> State the challenge that the industry or other users face, and the need for a new kind of innovation such as variety, practice, or other technology solution Estimate the value of the innovative solution compared to the existing variety, practice, or other technologies, and where the solution fits in the overall supply chain.
Proof of Principle	TRL 2	MARKER ASSISTED SELECTION Collection and analysis of donor genotypes, (screening by natural and artificial inoculation on the hotspots/screen houses) and validation of gene/QTL linked DNA markers for the particular trait of interest
		TRANSGENICS/ GENE EDITS Assembling the construct with the gene cassettes of interest, antibiotics markers etc. and its cloning, and standardization of transformation protocol
		BIO CONTROL Isolation, purification and taxonomic identification of microbial samples
		TISSUE CULTURE Selection of superior material followed by culture initiation, media standardization
Proof of Concept demonstrated & established	TRL 3-4	MARKER ASSISTED SELECTION Carrying out the crosses between the donors parents to generate the F1 and their molecular analysis
		TRANSGENICS/ GENE EDITS Generation of putative transformants with the gene of interest, PCR analysis
		BIO -CONTROL Optimization of media for mass multiplication and development of delivery systems for the selected efficient isolates
		TISSUE CULTURE Optimization of media for shoot multiplication and rooting
Late stage research	TRL 5	MARKER ASSISTED SELECTION Development of homozygous lines for gene of interest through marker assisted foreground and background selection
		TRANSGENICS/ GENE EDITS Integration and the expression analysis of the trans/cis- gene in the T1 generation
		BIO CONTROL <i>In vitro</i> evaluation and screening of local strains against target pathogens or insects

		<p>TISSUE CULTURE</p> <p>Optimization of conditions for hardening and establishment of plants inside greenhouse/ nethouse.</p>
Early stage validation	TRL 6	<p>MARKER ASSISTED SELECTION</p> <p>Phenotyping of the stabilized homozygous trait in the green house/ net house/field (hot spots) by putting selection pressure and background genome recovery using molecular markers</p>
		<p>TRANSGENICS</p> <p>Evaluation of the stable transgenic plants for their ability to express the trait of interest, their integrity and Bioefficacy studies (in the green house)</p>
		<p>BIO CONTROL</p> <p>Testing bio-efficacy of the formulations against select phytopathogens / insects inside greenhouse/net house, storage and shelf life and stability studies</p>
		<p>TISSUE CULTURE</p> <p>Establishment of tissue cultured plants in the field for evaluation on a limited scale and genetic fidelity testing</p>
Late stage validation	TRL 7	<ul style="list-style-type: none"> Conduct extensive field trials (Multi-location or hotspots) or other technology performance experiments to determine the potential yield, product quality
Pre-Commercialization	TRL 8	<ul style="list-style-type: none"> Produce certified planting materials or other kinds of technologies and ensure that these can be sourced or are workable for full-scale production. Also, operational efficiency, costs and returns or resource quality improvements that would result from the innovation are established
Commercialization	TRL 9	<ul style="list-style-type: none"> Commercial-scale production by producers or manufacturers occurs with delivery of products to producers, handlers, processors, distributors, or other supply chain participants to market outlets and for meeting user demand.