

7. Industrial Biotechnology (including secondary agriculture)

Stage	Technology Readiness Level	Definition
Ideation	TRL-1	Literature survey; problem identified; hypothesis defined and formulated
Proof of Principle	TRL-2	Lab scale analytical experiments initiated. Basic principles observed from plate/flask studies. Parameters yet to be optimized.
Proof of Concept demonstrated	TRL-3	Concept proven at lab scale flask level. Optimization of parameters at lab scale (flask level)*.
Proof of concept established	TRL-4	Concept proven from lab scale to Bioreactor level experiments under optimised conditions at less than 100L. Necessary approvals to be obtained for using GMOs (RCGM/GEAC)
Early stage validation	TRL-5	Process development (including downstream processing) for isolation/enhancement/extraction of the product at bioreactor level at less than 100 L
	TRL-6	Stability of the product and repeatability of the process to obtain consistent product. Complete technology package developed. Obtaining all the regulatory and environmental clearances for Industrial scale up with respect to standard guidelines, if applicable.
Late stage Validation	TRL-7	Pilot Scale demonstration of the technology (100 L or 100 Kg Scale); Technology demonstration in actual environment
Pre-commercialization	TRL-8	Late stage technology development (Scale up to 1000 L or 1000 Kg)
Commercialization and post market studies	TRL-9	Obtained all the regulatory clearances for market entry and ready for commercialization

- Demonstration of Technology (for the development of PoC) will be considered as TRL-3 in cases like Bioremediation (where the same is not possible at lab scale) and TRL-7 will be demonstrated at multiple sites.