Best Project Ideas

30 Biotech Project Ideas for BSc 2026-27

JANUARY 15, 2026 | JOHN DEAR

Choosing a good biotechnology project for your BSc can feel overwhelming. You want something interesting, doable with undergraduate resources, and valuable for your learning and resume.

This article is written **for students** and provides a clear, practical guide plus **30 detailed biotech project ideas** you can pick from, adapt, and complete during

your BSc. Each idea includes a short overview, clear objectives, basic materials and methods you can use in a college lab, expected outcomes, and real-world scope.

These *Biotech Project Ideas for BSc* are selected to balance feasibility and learning value. They cover microbiology, molecular biology, environmental biotechnology, food biotechnology, plant biotechnology, bioinformatics, and simple bioprocessing topics. Most projects can be adjusted in complexity depending on your available time, equipment, and supervision.

Before the project ideas, there are short sections on how to choose a project, how to plan and document it, safety and ethics, and how to prepare a lab report or presentation. Read those first if you want to pick and execute a project efficiently.

Must Read: 30 Digital Electronics Project Ideas 2026-27

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How to choose a good project

1. **Match resources:** Check what equipment, reagents, and lab access your college provides. Pick projects that fit those limits.
2. **Balance novelty and feasibility:** Aim for a project that's not trivial but achievable in your time frame.
3. **Learning outcomes:** Choose a topic that will teach you lab techniques and theoretical knowledge you want to use later.
4. **Supervisor expertise:** Pick a topic where your supervisor can give useful guidance.
5. **Scope planning:** Define a clear, narrow objective — a specific hypothesis or question you'll test.

Planning and documentation tips

- **Write a project proposal** with title, introduction, objectives, methods, timeline, and expected outcomes.
- **Keep a lab notebook** (dated entries) with raw observations and data.

- **Define measurable endpoints** (e.g., enzyme activity, percent inhibition, colony count).
- **Use controls** and repeat experiments (biological and technical replicates).
- **Analyze data** with basic statistics (mean, SD, t-test if applicable).
- **Prepare clear figures and tables** for results.

30 Detailed Biotech Project Ideas for BSc 2026-27

Below are **30 project ideas** tailored to undergraduate students. Each idea contains: **Overview**, **Objectives**, **Materials & Methods (basic plan)**, **Expected Results**, and **Scope/Applications**. You can shorten or expand methods depending on lab facilities.

Idea 1 — Isolation and Identification of Soil Microbes with Antibiotic Activity

Overview: Screen soil samples to isolate bacteria or actinomycetes that produce antibacterial compounds.

Objectives: Isolate microbes from soil, test them against indicator strains (e.g., *E. coli*, *S. aureus*), and identify promising isolates.

Materials & Methods: Collect soil, serially dilute, plate on nutrient and actinomycete media, pick colonies, perform cross-streak or agar well diffusion against indicator organisms, Gram stain, basic biochemical tests, optionally 16S rRNA sequencing if available.

Expected Results: Identification of isolates with inhibition zones. Characterization of basic morphology and biochemical properties.

Scope: Discovery of natural antibiotics, basic screening for antimicrobial research

Idea 2 — Effect of Probiotics on Yogurt Shelf-Life and Quality

Overview: Compare probiotic-enriched yogurt with commercial starter-only yogurt for taste, pH, and shelf life.

Objectives: Determine whether adding probiotic strains changes fermentation, acidity, and sensory quality.

Materials & Methods: Prepare yogurt with standard starter vs starter + probiotic strains (e.g., *Lactobacillus acidophilus*). Measure pH over time, microbial counts, and conduct a simple sensory panel.

Expected Results: Probiotic yogurt may show different acidification rates, viable counts over storage, and sensory attributes.

Scope: Food biotechnology, functional foods, dairy technology.

Idea 3 — Production and Assay of Amylase from Local Microorganisms

Overview: Isolate amylase-producing bacteria (e.g., *Bacillus* spp.) and measure enzyme activity.

Objectives: Screen isolates for amylase production and compare enzyme activity under different temperatures or pH.

Materials & Methods: Use starch agar plates (iodine test) for screening; grow positive isolates in liquid media, crude enzyme extraction, perform DNS assay for reducing sugar to measure activity.

Expected Results: Identification of high-producing strains and optimal activity conditions.

Scope: Industrial enzyme production, applied microbiology.

Idea 4 — Biodegradation of Vegetable Waste Using Composting Microbes

Overview: Study decomposition rate of vegetable waste with/without added microbial inoculum.

Objectives: Compare decomposition (mass loss, temperature, pH) and nutrient content of compost piles treated with inoculum vs control.

Materials & Methods: Prepare small compost bins, add uniform vegetable waste, inoculate one set with compost starter (or soil microbes), monitor temperature, moisture, pH, and weigh periodically. Analyze basic nutrient content (NPK) if possible.

Expected Results: Faster decomposition and improved nutrient profile in inoculated compost.

Scope: Environmental biotechnology, waste management.

Idea 5 — Extraction and Antioxidant Assay of Plant Leaf Extracts

Overview: Test antioxidant capacity of local plant leaves using DPPH or ABTS assays.

Objectives: Extract phytochemicals and compare antioxidant activity of different species.

Materials & Methods: Collect leaves, dry and powdered, extract with methanol or ethanol, measure antioxidant activity using DPPH assay (spectrophotometer), calculate IC50.

Expected Results: Rank plants by antioxidant potency; report IC50 values.

Scope: Phytochemistry, nutraceuticals.

Idea 6 — Molecular Detection of a Bacterial Gene Using PCR (Non-pathogenic Strains)

Overview: Amplify a target gene (e.g., 16S rRNA or stress-related gene) from a non-pathogenic bacterial isolate to learn PCR techniques.

Objectives: Design primers, perform DNA extraction, and run PCR and gel electrophoresis.

Materials & Methods: DNA extraction (boiling or kit), PCR with standard primers, agarose gel electrophoresis, documentation by gel photo.

Expected Results: Clear bands at expected sizes; learning DNA amplification protocols.

Scope: Basic molecular biology skills training.

Idea 7 — Bioethanol Production from Fruit Waste (Small-Scale)

Overview: Ferment sugar-rich fruit waste to produce ethanol using yeast.

Objectives: Optimize fermentation time and sugar concentration to maximize ethanol yield.

Materials & Methods: Prepare mash from fruit waste, inoculate with *Saccharomyces cerevisiae*, monitor fermentation by measuring specific gravity or ethanol with simple dichromate method, compare yields.

Expected Results: Quantify ethanol yield and determine optimal conditions.

Scope: Renewable biofuels, waste valorization.

Idea 8 — Study of Heavy Metal Tolerance in Native Bacteria

Overview: Isolate bacteria from polluted soil and test tolerance to heavy metals (e.g., lead, cadmium).

Objectives: Determine minimum inhibitory concentrations (MIC) of metals for isolates.

Materials & Methods: Serial dilutions of metal salts in agar or broth, growth measurement, plating to determine viability.

Expected Results: Data on tolerance levels and potential bioremediation candidates.

Scope: Environmental biotech, bioremediation.

Idea 9 — Effect of Salinity on Seed Germination and Seedling Growth

Overview: Study how different salt concentrations affect germination and early growth of a crop or local plant.

Objectives: Measure germination percentage, root and shoot length under 0, 50, 100, 150 mM NaCl.

Materials & Methods: Petri dish germination assay, daily monitoring, statistical comparison.

Expected Results: Reduced germination and growth with increasing salinity; calculate tolerance threshold.

Scope: Plant physiology, stress biology, agricultural biotechnology.

Idea 10 — Microalgae Growth and Lipid Estimation for Biodiesel Potential

Overview: Cultivate a microalgae species (e.g., *Chlorella, Scenedesmus*) and estimate biomass and lipid content.

Objectives: Measure growth rates under different light or nutrient conditions and estimate lipid via solvent extraction.

Materials & Methods: Batch cultures in flasks, monitor optical density, harvest biomass, lipid extraction (Bligh & Dyer or Soxhlet), quantify gravimetrically.

Expected Results: Conditions that maximize biomass and lipid percentage.

Scope: Bioenergy, algal biotechnology.

Idea 11 — Investigation of Enzyme Immobilization Using Alginate Beads

Overview: Immobilize an enzyme (e.g., crude amylase or invertase) in sodium alginate beads and compare activity/stability to free enzyme.

Objectives: Test reusability, thermal stability, and activity retention of immobilized enzyme.

Materials & Methods: Mix enzyme with sodium alginate, drop into $CaCl_2$ to form beads, assay enzyme activity over cycles and at different temperatures.

Expected Results: Immobilized enzyme shows improved stability and reusability.

Scope: Industrial biocatalysis and process biotechnology.

Idea 12 — Detection of Food Adulteration in Milk (Water, Starch, Detergents)

Overview: Use simple chemical tests to detect common milk adulterants.

Objectives: Teach qualitative assays and evaluation of milk quality.

Materials & Methods: Use lactometer for density, tests for starch (iodine), detergents (foam test), urea (urease kit or chemical test), report percentage adulteration estimation where possible.

Expected Results: Practical demonstration of adulterants and simple testing methodology.

Scope: Food safety and quality control.

Idea 13 — CRISPR Concept Demo Using Simulated Data (Bioinformatics)

Overview: If wet lab CRISPR is not allowed, perform an in silico CRISPR design and off-target analysis.

Objectives: Learn guide RNA design, target selection, and off-target prediction.

Materials & Methods: Use free online tools (Benchling, CHOPCHOP) and publicly available genome data, present design rationale and predicted outcomes.

Expected Results: Well-documented gRNA designs and off-target assessment.

Scope: Modern molecular techniques, bioinformatics.

Idea 14 — Effect of UV Radiation on Bacterial Survival

Overview: Expose non-pathogenic bacteria to UV and measure survival rates.

Objectives: Create survival curves and determine D-value (dose that reduces population by 90%).

Materials & Methods: Plate count method after controlled UV exposures with known distances/time, plot log survivors vs exposure.

Expected Results: Quantitative UV sensitivity curves.

Scope: Sterilization, microbial physiology.

Idea 15 — Simple DNA Barcoding of a Local Plant Using 16S/ITS/MatK (If permissible)

Overview: Sequence a standard barcode region (such as rbcL or matK for plants) to identify a plant species.

Objectives: Extract plant DNA, amplify gene region, and interpret sequence for species identification (use online BLAST).

Materials & Methods: DNA extraction from leaf, PCR, clean-up, and sequencing (or simulated if sequencing not available), BLAST analysis.

Expected Results: Confirmation of species identity and experience with DNA barcoding workflow.

Scope: Biodiversity studies, taxonomy.

Idea 16 — Study of Antibacterial Activity of Honey or Herbal Extracts

Overview: Test natural substances (different honey samples or herbal extracts) against bacteria.

Objectives: Compare antibacterial potency and report MIC or inhibition zones.

Materials & Methods: Agar well diffusion or broth microdilution; prepare extracts; test against standard bacterial strains.

Expected Results: Ranking of samples by antibacterial activity.

Scope: Natural product screening, ethnopharmacology.

Idea 17 — Compost Tea: Microbial Diversity and Plant Growth Effects

Overview: Prepare compost tea, analyze microbial content (culture-based) and test its effect on seedling growth.

Objectives: Examine whether compost tea improves seedling vigor and which microbes are present.

Materials & Methods: Brew compost tea, perform serial dilutions and plate counts for bacteria/fungi, conduct a pot trial with seedlings and measure growth.

Expected Results: Increased growth in treated seedlings and enumeration of microbes.

Scope: Sustainable agriculture, microbial inoculants.

Idea 18 — Bioplastic Production from Starch and Glycerol: Properties and Degradation

Overview: Make simple starch-based bioplastics and test tensile properties and biodegradability.

Objectives: Produce films with varying plasticizer ratios and measure mechanical strength and degradation in soil.

Materials & Methods: Use potato starch, glycerol, heat and cast films; perform simple tensile tests (weights, elongation) and bury samples to observe degradation over weeks.

Expected Results: Data on formulation effects and degradation timeline.

Scope: Green materials and applied polymer science.

Idea 19 — Investigation of Antifungal Activity of Plant Extracts on Crop Pathogens

Overview: Test plant extracts against common fungal pathogens (e.g., *Aspergillus* spp., *Rhizopus* or local plant pathogens).

Objectives: Measure inhibition zones or growth suppression in vitro.

Materials & Methods: Prepare extracts, use poisoned food technique or disc diffusion, record mycelial growth inhibition percentages.

Expected Results: Identification of extracts with antifungal potential.

Scope: Agricultural plant protection, botanical fungicides.

Idea 20 — Comparative Study of Yeast Strains for Bread Leavening and Flavor

Overview: Compare commercial baker's yeast and wild/alternative yeast strains for leavening, texture, and sensorial attributes.

Objectives: Measure CO_2 production, bread volume, crumb structure, and taste.

Materials & Methods: Prepare doughs with different yeasts, measure rise (volume), bake, document texture and conduct a small sensory panel.

Expected Results: Differences in leavening rates and flavor profiles.

Scope: Food biotechnology, fermentation science.

Idea 21 — Rapid Test Development: Colorimetric pH Indicator Strips from Natural Dyes

Overview: Make pH indicator strips using natural dyes (e.g., red cabbage) and test sensitivity.

Objectives: Create low-cost pH indicators and calibrate color change with pH.

Materials & Methods: Extract pigments, impregnate filter paper strips, dry, and test in buffer solutions of known pH; record color scale.

Expected Results: Functional low-cost pH strips with color reference chart.

Scope: Educational tools, low-resource diagnostics.

Idea 22 — Biofilm Formation Study on Different Surfaces

Overview: Evaluate biofilm formation of a non-pathogenic bacterium on glass, plastic, and stainless steel.

Objectives: Quantify biofilm biomass using crystal violet assay and compare surfaces.

Materials & Methods: Incubate bacteria with coupons of different materials, wash, stain with crystal violet, solubilize stain and measure absorbance.

Expected Results: Ranking of surfaces by biofilm propensity.

Scope: Medical device hygiene, industrial cleaning.

Idea 23 — Soil Enzyme Activity as an Indicator of Soil Health

Overview: Measure activities of soil enzymes (dehydrogenase, phosphatase) across different land-use soils.

Objectives: Relate enzyme activities to soil organic matter and microbial health.

Materials & Methods: Collect soil samples, perform colorimetric enzyme assays, measure organic carbon and compare.

Expected Results: Correlations showing healthier soils have higher enzyme activities.

Scope: Soil ecology and environmental monitoring.

Idea 24 — Biotransformation of Simple Organic Compounds by Fungi

Overview: Use a safe filamentous fungus to transform an organic substrate (e.g., conversion of simple phenols).

Objectives: Demonstrate fungal metabolism and detect changes by TLC or simple color tests.

Materials & Methods: Incubate substrate with fungal culture, extract at intervals, analyze by TLC.

Expected Results: Evidence of new spots on TLC indicating biotransformation.

Scope: Biocatalysis, environmental detoxification.

Idea 25 — Use of Bioinformatics to Predict Secondary Metabolite Gene Clusters

Overview: Analyze a bacterial genome (publicly available) to predict biosynthetic gene clusters for secondary metabolites using antiSMASH or similar tools.

Objectives: Identify potential natural product pathways and discuss possible products.

Materials & Methods: Use online genome analysis tools, interpret results, and prepare a report linking gene clusters to compound types.

Expected Results: A mapped set of potential biosynthetic clusters and biologically plausible metabolites.

Scope: Genomics and drug discovery.

Idea 26 — Enrichment and Identification of Nitrogen-Fixing Bacteria from Legume Rhizosphere

Overview: Isolate bacteria from rhizosphere of legumes and test for nitrogenase activity via acetylene reduction (if available) or growth on nitrogen-free media.

Objectives: Identify potential plant-growth-promoting rhizobacteria (PGPR).

Materials & Methods: Collect root-associated soil, serial dilutions, plate on N-free media, characterize isolates, optional ARA test.

Expected Results: Isolation of diazotrophs and assessment of their growth-promoting potential.

Scope: Agricultural biotechnology, sustainable farming.

Idea 27 — Assessment of Antioxidant Content in Different Fruit Juices

Overview: Measure total phenolic content and antioxidant activity in fresh juices.

Objectives: Compare antioxidant values between fruits and correlate with phenolic content.

Materials & Methods: Prepare juices, Folin–Ciocalteu assay for phenolics, DPPH for antioxidant activity.

Expected Results: Ranking of juices by antioxidant properties.

Scope: Nutrition science, food analysis.

Idea 28 — Investigation of Cold Tolerance in Yeast Strains

Overview: Test growth of different yeast strains at low temperatures to find cold-tolerant strains.

Objectives: Measure growth kinetics at 4–15°C compared to 30°C.

Materials & Methods: Inoculate yeast in liquid medium, monitor OD over days at different temperatures.

Expected Results: Identification of strains with better cold-growth profiles.

Scope: Fermentation in cool climates, brewing science.

Idea 29 — Study of Microbial Fuel Cell (Small-Scale) Power Generation

Overview: Build a simple microbial fuel cell (MFC) using soil or wastewater microbes and measure voltage/current generation.

Objectives: Demonstrate electricity generation by microbes and test factors affecting output.

Materials & Methods: Two-chamber MFC with anode/cathode compartments, graphite electrodes, measure voltage with multimeter, test substrate types.

Expected Results: Detectable small voltages that vary with substrate and microbial community.

Scope: Renewable energy research and microbial electrochemistry.

Idea 30 — Comparative Study of DNA Extraction Methods from Plant Tissues

Overview: Compare yield and purity of DNA from plant leaves using CTAB, kit-based, and crude boiling methods.

Objectives: Determine which method gives best yield and PCR-quality DNA for your plant sample.

Materials & Methods: Apply three extraction protocols to same plant, quantify DNA with spectrophotometer, run gel, perform PCR amplification of a housekeeping gene.

Expected Results: Data on yield (ng/µL), purity (A260/A280), and PCR success rates.

Scope: Practical molecular biology technique optimization.

Final tips for executing any project

- **Pilot experiments:** Do small-scale tests before full experiments to optimize conditions.
- **Replicates:** Use at least three biological replicates when possible; replicate measurements reduce random error.
- **Controls:** Always include negative and positive controls.
- **Data logging:** Save raw data digitally and back it up.
- **Statistics:** Use simple statistical tests to compare groups (t-test, ANOVA) and present p-values when applicable.
- **Figures:** Use clear labels, units, and legends. A simple graph can communicate more than paragraphs of text.

Must Read: General Knowledge Project Ideas

Conclusion

This list of **Biotech Project Ideas for BSc** gives you a broad set of practical, student-friendly projects spanning microbiology, molecular biology, plant science, environmental biotech, food science, and bioinformatics. Each idea is designed to be adaptable: you can scale it up or narrow it to match available time, equipment, and your interests.

When selecting a project, prioritize clear objectives, safety, and reproducibility. Communicate early with your supervisor, plan a realistic timeline, and document everything meticulously. Completing one of these projects will strengthen your lab skills, understanding of scientific methods, and your ability to present data — all essential for a future career in biotechnology or further study.

If you want, I can convert any of these ideas into a full project proposal with step-by-step protocols, materials list with approximate costs, timeline, and a template report — tell me which idea you prefer and I'll prepare it for you.

Blog, Project Ideas

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I am a creative professional with over 5 years of experience in coming up with project ideas. I'm great at brainstorming, doing market research, and analyzing what's possible to develop innovative and impactful projects. I also excel in collaborating with teams, managing project timelines, and ensuring that every idea turns into a successful outcome. Let's work together to make your next project a success!

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Are you ready to make your big ideas happen? Let's connect and discuss how we can bring your vision to life. Together, we can create amazing results and turn your dreams into reality.

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