Plant-Microbe interaction

- **Microbe** – microscopic organisms
    - Virus
    - Bacterium
    - Fungus
    - Nematode – roundworm
- **Positive interaction**
    - **Symbiosis** – long-term interactions between different biological species (benefits both)
        - **Rhizobium**
            - Nitrogen fixing bacteria associating with roots of legumes
            - Green manure
        - **Mycorrhiza**
            - Association of fungus and roots of plants
            - Fungus transfers nutrients to plants
        - **Ectomycorrhiza**
            - Surrounds roots
        - **Endomycorrhiza**
            - Penetrates intracellular cells of roots
            - Produces vesicular- arbuscular mycorrhiza VAM: collect food, nutrients exchange

- **Rhizosphere**
    - High microbial density
    - Induce plant growth, releases auxin and gibberellin
    - Keep moisture
    - Inhibit growth of soil pathogen
    - Decrease soil toxicity
    - Nutrient recycling
    - Ex. Trichoderma
- **Lichen**
    - Association of fungus + plant, algae
    - Metabolites leaked from both
    - Fungus surrounds algal cells to provide moisture. CO2
    - Air pollution indicator
    - Crustose : cover substrate like crust
    - Foliose: leafy form
    - Fruticose: shrubby form

- **Negative interactions**
    - **Parasitism/pathogen:** parasite benefits from host
        - Causes plant disease
            - How: nutrient competition, inhibition of plant metabolism, inhibition of vascular system, destroy plant cells for nutrients
            - Causes: fungal diseases(leaf spots, powdery mildew), bacterial disease(soft rot, leaf blight, wilt), viral diseases(ringspot, mosaic), nematode diseases(cyst, foliar), higher parasitic plant disease
            - 3 factors that cause disease: virulent pathogen, susceptible plant, suitable environment for a disease
            - How pathogens damage plants? : wounds, natural openings: stomata, hydrathodes, lenticels, direct penetration: cuticle, epidermal cells
            - Symptoms: leaf spot , leaf bright, mosaic, stem root