**Piano di Attività**

**Titolo Assegno: Studio degli effetti fisiologici e fenotipici dell’interazione tra piante e batteri promotori della crescita.**

**Plant growth promoting bacteria: physiological and molecular mechanisms underlying the effects on plant phenotype**

Plant phenotype is influenced by the complex network of symbiotic and pathogenic relation between host and microorganisms. The symbiotic interactions are so vital for the host plant that and mycorrhizal and bacterial association are known to be an essential step for the colonisation of the merged lands occurred 450 million years ago. From that period on, plants have evolved together with their associated microbiome. A paradigm shift in the study of plant physiology is considering the plant as an holobiont encompassing both the host and the associated microbiome. Despite the rising interest in this field of study, several aspects of plant microbe interactions have not yet been fully investigated especially in crop plants

Plant Growth Promoter Bacteria, (PGPB) colonise all plant compartments including physllosphere and endosphere. They exploits plant exudates for growth and there several evidences of an active recruitment of beneficial microorganism by the host plants.

The main beneficial effects are dependent on: phosphate solubilisation, nitrogen fixation, modification of hormonal balance (e.g. production of growth promoting IAA and auxins; or reduction of growth inhibitors, such as ethylene by l’1-aminocyclopropane-1-carboxylic acid (ACC) dehaminase), production of signalling molecules (e.g. salycilic acids, jasmonates, strigolactone and VOCs), production of siderophores, antagonisms against pathogens.

Recent studies, focusing on the modelling of the microbiota (microbiome engineering) associated with plants, opened the path to unleash the potentiality of functional microbe and PGPB, improve crop quality, yield and resistance to both biotic and abiotic stresses. In fact, due to their enormous potential in encouraging the growth and health of crops, PGPBs have now become an essential component in sustainable agricultural production practices.

The current study aims at isolating, identifying and characterising potential beneficial microbes for their use in horticultural crops. The physiological and molecular basis of the phenotypic effects will also be investigated. Finally, experiments of microbiome engineering will be performed. Microorganisms with complementary mode of action will be applied at different times to different plant organs to achieve a functional synthetic community able to increase plant productivity, resistance and resilience to biotic and abiotic stresses.

Position Duties:

60% – Laboratory analysis. Bacterial and fungi purification, strain typing and functional characterisation. Microbiome description by NGS analysis. Plant gene expression by qPCR. Monitoring of plant enzymatic activity.

30% – Field and greenhouse works (in Bologna). Assess physiological and productivity performances of tree (bud differentiation, fruit set, trunk diameter, shoot length and canopy development, yield, root development, starch allocation in different organs). Collect and analyse environmental conditions (climatic data) and agricultural inputs (irrigation, fertilisation). Communicate with grower and technicians for the correct management of the experimental plots.

The selected applicants will be supported by a senior research assistant

10% – Train and supervise bachelor and master students and trainees. Supervision includes planning, assigning, and approving work. Assist other faculty and technicians in carrying out cooperative experiments.