Clonal plants form underground and aboveground networks, some of them existing for thousands of years. Where can you find such amazing networks? Everywhere around us: strawberries in a garden, clover in a lawn, horsetail in a field, plume thistle in a meadow, sedge on a beach, clubmoss in a forest, and many others. All the organisms, although of diverse origin and belonging to various taxonomic groups, have a similar plan of body architecture, which allows them to persist – a NETWORK. The clonal network is composed of two types of units, known as ramets. The mother ramet, develops from one zygote resulting from sexual reproduction. The mother plant, as a result of vegetative growth (often termed asexual reproduction) produces the second type of units – so-called daughter ramets or daughter plants. Ramets are linked by rhizomes or stolons. These underground and aboveground organs are very much like computer cables, which not only link individual units of the network but thanks to them the units can exchange resources, signals, and the microbiome. Clonal plants include the largest organisms on Earth (tree *Populus tremuloides* – colony named Pando), the oldest ones (shrub *Lomatia tasmanica*), but also exceptionally expansive and invasive ones (water hyacinth *Eichhornia crassipes*). Their life for hundreds or even thousands of years and continuous spread was possible thanks to optimal use of resources and sharing them within the network. This is a physiological process, partly explaining the evolutionary success of clonal plants.

In this grant proposal, I plan to verify the existence of another process, induced by the environment, which may increase the plasticity of ramets in the network and as a result allow them to adapt quickly to environmental conditions, without changes in genotype. This is an epigenetic process, well studied in sexually reproduced plants. It leads to changes in DNA, such as DNA methylation, which do not modify the sequence. The changes can be transient or stable, “remembered” by the plant and transmitted to the next generations. If the latter is true, then the daughter plants can inherit stress memory from the mother plant. Epigenetic variation makes it possible to store information about interactions of the mother plant with the environment and next their transmission to successive generations – daughter plants. That is why this research project includes experiments aiming to detect epigenetic changes in the offspring of mother plants subjected to drought stress or a fungal pathogen, but first to assess the fitness of daughter plants with the epigenetic change inherited from the mother plant.

Why is this study important? Primarily, its results will help us understand life strategies of clonal plants and use our knowledge about them to increase crop resistance to pathogens. All this is particularly important in the Anthropocene, because clonal plants have “discovered” ways to improve longevity, life in habitats with uneven distribution of resources, and communication between clones to protect them from herbivores and pathogens. Thus, clonal plants are a database that contains an evolutionary record of persistence not only here and now.