Seeds are important, not only as one of the most common sources of food worldwide. For plants, they are even more essential as they allow them to persist during unfavourable seasons, after which they start to germinate. Not surprisingly, such vital processes as growing whole seedling from small embryo inside of seed need to be controlled by a complex gene expression program. But running any program requires energy, and seeds need to be very economical because they rely on a limited amount of storage materials to produce a whole new plant. In plants, most gene expression regulation occurs on a so-called transcriptional level which means is based on the decision to transcribe a specific gene in DNA, creating mRNA that later will be translated to protein. Several lines of evidence suggest that seeds use a slightly different strategy. They produce many mRNAs in advance during their maturation when they are still provided with energy from a mother plant. Those mRNA molecules are somehow stored for later use when needed to supply proteins during germination. We know that because even if we use specific drugs blocking transcription, seeds of many plants can start the germination process. To make things even more complicated, when seeds store mRNAs for later germination program, there is still a maturation program at play. At least some of the mRNAs from that program need to be removed during seedling establishment. During germination, seeds need to manage mRNAs belonging to two different programs: one need to be activated, the other removed. Such regulation is called posttranscriptional because simply, it happens after those mRNAs were transcribed from their genes. Activation and removal of specific mRNAs require special enzymatic machinery. Our preliminary data, as well as others, revealed that if we mutate some of the genes that encode those enzymes, seeds show defective behaviour of germinating faster or slower. Unfortunately, we still do not know many aspects of how seed store mRNAs and how to remove or activate them.

We need to remember that seed does more than mere germination. Even more interesting is how the seed decides not to germinate despite excellent conditions to do that. That property of seeds is called dormancy and evolved to deal with environments that often change conditions. For example, few sunny days in the spring may cause all seeds to germinate but their seedlings could be killed by the unexpected freeze the next night. For this reason, some seed wait longer before they decide to perform irreversible germination. Some seeds may wait even the whole summer because conditions for an entire time are suboptimal. Finally, some start to germinate despite those stresses but others will acquire stronger dormancy and wait until next spring. Again, our preliminary data offer some clues that dormancy loss, germination upon stress condition, and reestablishment of dormancy may be at least partially regulated not only by transcription but also by processes regulated on mRNA level.

In my project, I will study how seeds of the model plant *Arabidopsis thaliana* regulate their germination in normal and stress conditions using posttranscriptional mechanisms. I will also find out what differs dormant and non-dormant seeds on the level of their mRNAs. To do this, I will first look at how mRNAs are generally stored, activated and removed in seeds during germination and upon different conditions. Some genes are more important in the regulation of seed germination and dormancy, so I will also focus on them. Finally, to understand how seed achieves posttranscriptional control of their mRNAs, I will use specific drugs blocking transcription and different mutants in genes related to mRNA degradation and modification. The results of my work will provide a better understanding of how seeds regulate their gene expression during development in adaptation to the environment. It is not a mere academic problem as our agriculture relies on seed properties, and we need to understand them deeply to seek future improvements.