**1**

Hello everyone, today I present you my thesis topic and my progress in it.

**2**

Nowadays, it seems important to focus the agricultural evolution around resilience in view of the future challenges that cultures will face.

The climate change seems at first sight to spare our regions, but it is obviously not the case.

Summer crops will have to withstand more and more frequent and important droughts.

Possible solutions are the genetic improvement of crops or the adoption of less capricious crops.

**3**

My subject concerns the root development of sorghum as a more resilient alternative to drought.

Sorghum is, already at this moment, the fifth most cultivated cereal in the world. Its use in Europe is not yet widespread, but it is becoming more and more important as can be seen on the graph of yields in France.

Sorghum can be used for many purposes. Sorghum can be used for many purposes.

It can be consumed directly, used as fodder or for industrial purposes such as biofuel.

The interest in sorghum is due to its characteristics. It tolerates a lack of water and requires little fertilization.

**4**

Understanding water flow in roots requires putting together many different factors.

The root architecture defines the accessible water stock for the plant. Secondly, the anatomy of the root influences the hydrauclic conductivity within the plant. In addition to this, other chemical and biological factors and the interactions between all these different components are important.

It is necessary to relate all these characteristics in order to understand the water uptakes dynamics at the plant level.

Currently, there is a lack of knowledge about water uptake.

This is due to a lack of data at this level because the collection of data at the root level is very restrictive.

Field data have the advantage of representing reality. But this makes it difficult to isolate the effect of a particular factor. Moreover, it requires a lot of work and specific equipment.

Experiments under controlled conditions can isolate the effect of a factor but do not represent real variables such as competition. Moreover, the growth is affected by the container and the substrate used.

It is then necessary to take into account the constraints that each study applies on the root system to remain critical on the results.

**5**

To begin collecting results, it was necessary to select genotypes for study. This choice was influenced by the varieties tested by the CIPF.

Indeed, the CIPF has already been testing sorghum crops for several years.

Since 2020, they publish results with, among other things, the preparation of the crop, the weather conditions and the yield in dry matter.

The CIPF kindly offered to recover the remaining roots from their 2022 harvest and it appeared that six genotypes tested this year were already tested last year. These are the six varieties that were selected for the project.

This makes it possible to compare the results of two years and to relate them to the weather of these same years to have a first outline of the impact that the weather can have on the outputs.

I have made a first graph comparing the yields of the six selected varieties according to the years but I still have to add the results of 2022 which are not yet available.

**6**

So at this point, the roots of the six genotypes have been harvested, washed, and then scanned, and it remains to analyze them. More data will be obtained later using a rhizotron to see the development of the roots.

**7**

Next, the SmartRoot software will be used on the scans to get quantitative data on the roots.

It will then be possible to characterize the root architecture and to inject them into the models.