

# The phenotypic spectrum of crop roots

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## Introduction

The inherent morphology of plants is predetermined by the genetic code that generates seemingly endless variations of organizational patterns. As such, plant morphology is an unresolved mystery to plant biologists, who seek to understand the molecular mechanisms by which such predetermined patterns emerge as a consequence of genes, environments and the interactions of both. A quantitative understanding of the functions that patterns fulfill enable a new unimproved potential for plant breeding as well as characterize current climate models on a finer spatial scale. We present a case study on common bean (*P. vulgaris*) roots.

## Observation

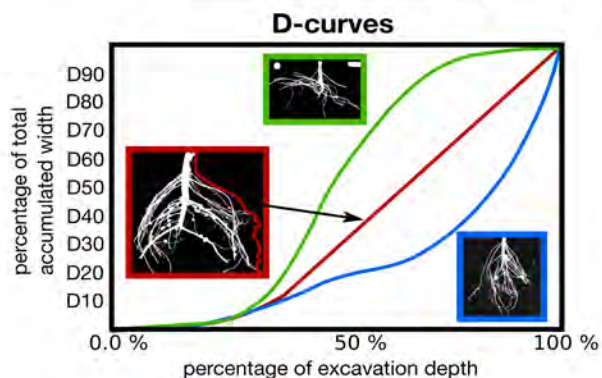


**Observation:** 1 genotype + 1 environment  
= many root architectures

**Problem:** Which architecture is representative?  
Which architecture is noise?

**Approach:** Characterize classes between all root architectures using shape descriptors to characterize the whole root system

## Methodology



**DS-curve:** Function of the tangent angle to the x-axis along a D-curve

## Analysis

