

# Um físico, uma bióloga e um informático entram num laboratório

## A fenotipagem de plantas como contributo interdisciplinar para a segurança alimentar no contexto das alterações climáticas

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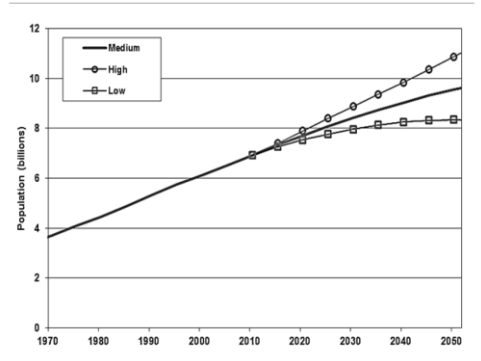
### Física / Engenharia

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Conceição Proença  
Guiomar Evans  
**José Augusto**  
Manuel Abreu  
Margarida Pires

### Informática / Ciências da Computação

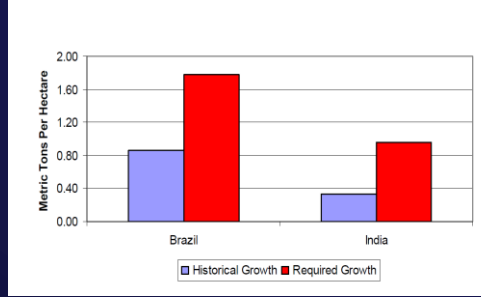
Ana Barradas  
João Batista  
Pedro Mariano  
Sara Silva

Figure 11  
Estimates and projections of total world population, 1970-2050 (medium-, high- and low-fertility variants for 2015 and later)



United Nations (2014) Concise Report on the World Population Situation in 2014. Department of Economic and Social Affairs, Population Division, United Nations, New York

Raw Sugarcane Yield Growth per Year (Historical Yield Growth versus Required Yield Growth)

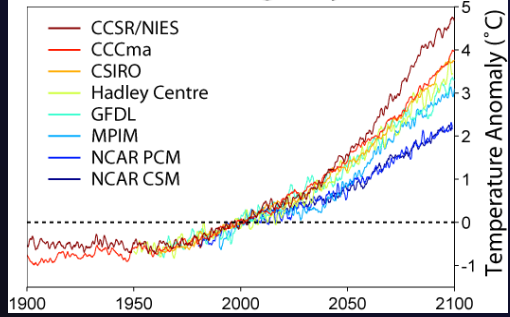


Kruse J. (2010) Estimating Demand for Agricultural Commodities to 2050. Global Harvest Initiative.

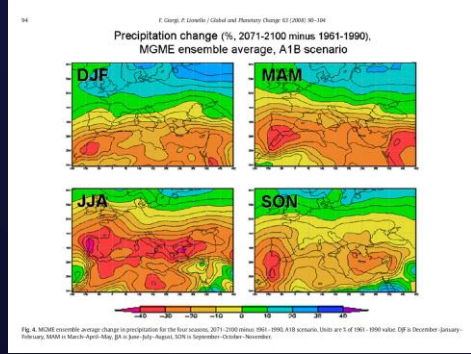


<https://www.crops.org/about-crops/breeding/>

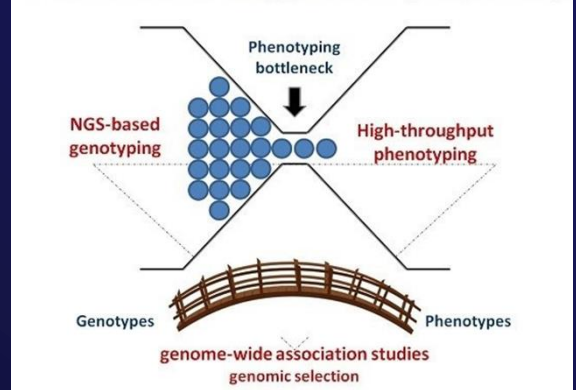
### Global Warming Projections



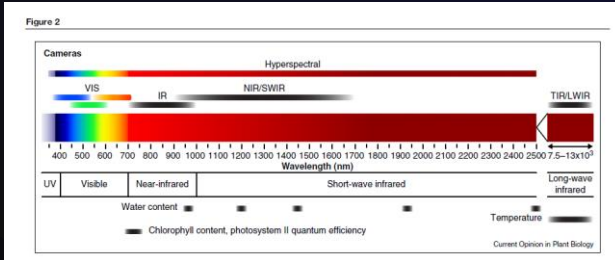
[https://commons.wikimedia.org/wiki/File:Global\\_Warming\\_Predictions\\_Map.jpg](https://commons.wikimedia.org/wiki/File:Global_Warming_Predictions_Map.jpg)



### The 3 cornerstones to unlocking genetic diversity in vegetable crops



D'Agostino, N.; Tripodi, P. NGS-Based Genotyping, High-Throughput Phenotyping and Genome-Wide Association Studies Laid the Foundations for Next-Generation Breeding in Horticultural Crops. *Diversity* 2017, 9, 38.



Fahlgren N, Gehan MA, Baxter I () Lights, camera, action: high-throughput plant phenotyping is ready for a close-up. *Current Opinion in Plant Biology* 24: 93 – 99

**The Phenotyping Bottleneck**  
We need high throughput phenotyping systems adapted and available to phenotype the national germplasm.



**EMPHASIS-PT – Collaboration Agreement (12 parties) (12 January 2022)**

- Phenotyping networks (EPPN, IPPN, EMPHASIS) are excellent tools to foster collaboration and capacity building, and to provide very specific phenotyping solutions. But they cannot substitute national facilities.



**PORTUGUESE ROADMAP OF RESEARCH INFRASTRUCTURES – 2020 Update**

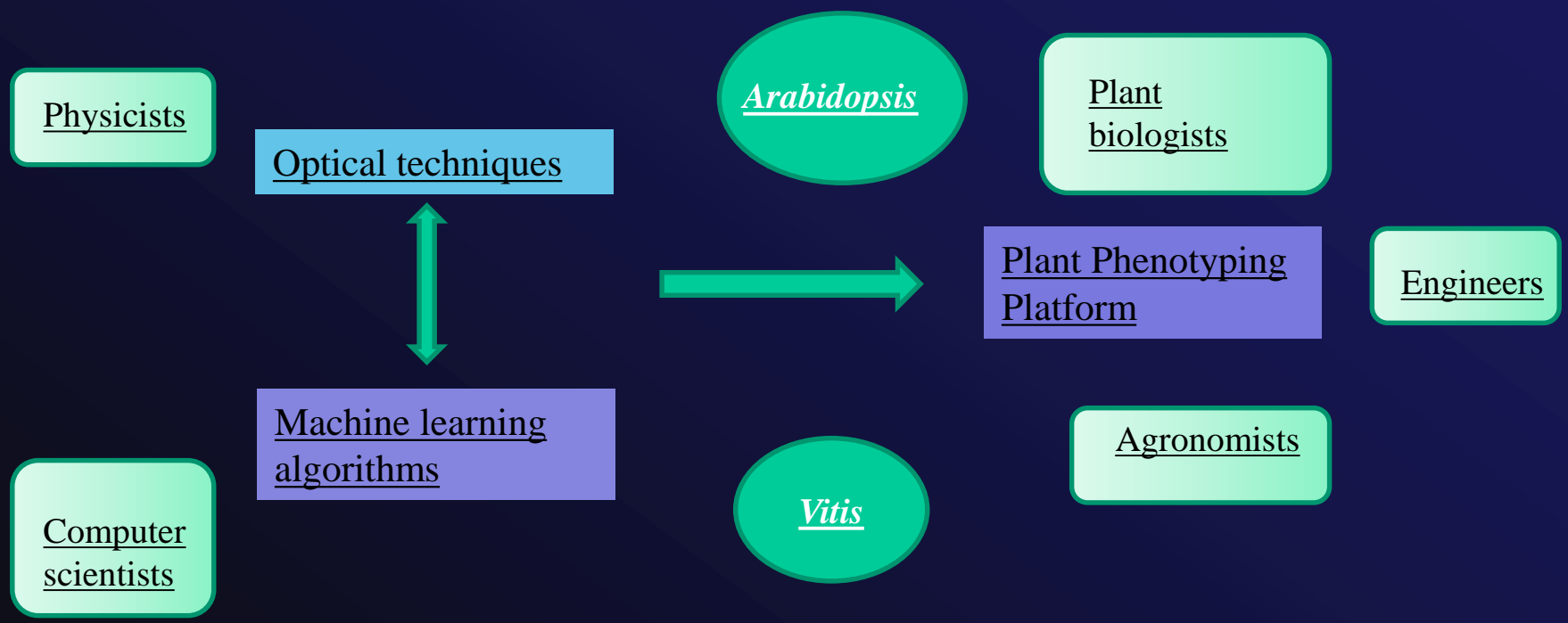
FCT – Fundação para a Ciência e a Tecnologia

**PhenoPlant-PT – a distributed Infrastructure - 11 partners**

# The INTERPHENO project

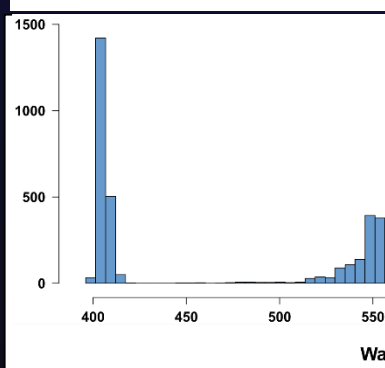
Fostering High Throughput Plant Phenotyping by an Interdisciplinary Approach

FCT Funded Project 240 K€

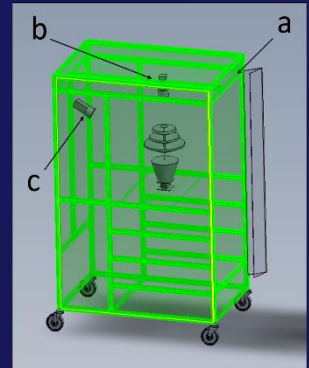
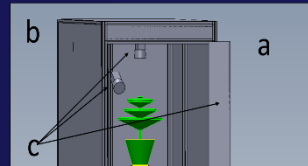




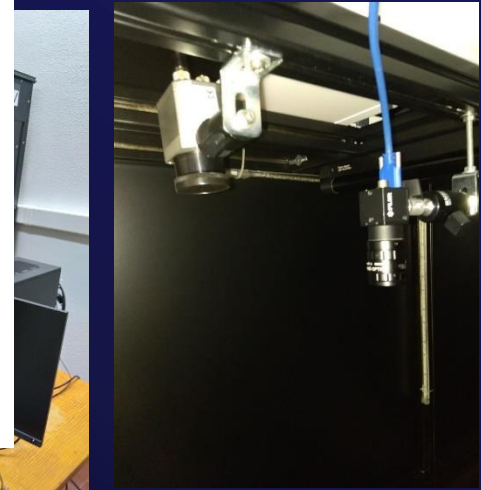
RGB	T1_col	0.94	0.97	0.95	0.96	0.94	
	T1_myb	0.97	0.99	0.97	1.00	0.99	
	T2_col	0.97	0.99	1.00	0.95	1.00	
	T2_myb	0.98	1.00	0.97	0.97	1.00	
	Thermal	T1_col	0.93	0.96	0.94	0.97	0.98
		T1_myb	0.93	0.94	0.90	1.00	0.99
Spectra	T2_col	0.87	0.88				
	T2_myb	0.87	0.91				
	T1_col	0.80	0.90				
	T1_myb	0.82	0.84				
LIF	T2_col	0.69	0.67				
	T2_myb	0.77	0.77				
	T1_col	0.54	0.56				
	T1_myb	0.55	0.59				
SFS	T2_col	0.56	0.60				
	T2_myb	0.52	0.45				
	T1_col	0.54	0.55				
	T1_myb	0.55	0.53				
	T2_col	0.44	0.57				
	T2_myb	0.55	0.61				
		DT	RF				



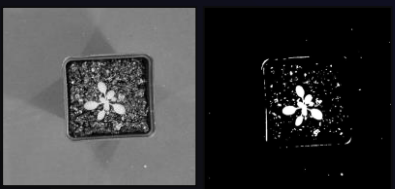
**Obrigado**



RGB and thermographic cameras (a) ... is not represented; c) Diffuse ... the solar spectrum, with UV range



Barradas, A.; Correia, P.M.P.; Silva, S.; Marques da Silva, J. Comparing Machine Learning from Leaf Reflectance Spectra in *Arabidopsis thaliana*. *Appl. Sci.* **2021**, *11*, 6552. <https://doi.org/10.3390/app11146392>



Top Area (cm <sup>2</sup> )	Top Radius (cm)	Top Perimeter (cm)	Top Roundness	Top Max Diameter (cm)	Top Hull Perimeter (cm)	Top Hull Area (cm <sup>2</sup> )	Top Compactness	Top Circularity	Top Skeleton Length (cm)	Top Density
45,501946	14,9488675	131,2597608	378,6458864	29,61477769	63,10922123	314,5635002	0,144651068	0,480796406	62,08524582	0,064813208
87,196089	21,0523677	193,6220261	429,9446156	38,6936152	87,68463104	494,5555604	0,176312018	0,45286496	100,7268441	0,062624639
42,533514	16,9174552	95,16477544	212,9221693	32,21155653	58,74385239	202,6675163	0,209868581	0,617285672	43,33032781	0,047305499
55,165228	23,3135150	124,6957019	281,8626612	46,42202953	89,57090153	158,0601569	0,349014131	0,71831587	58,36659829	0,032307253
72,943692	16,6186551	138,6369245	263,4936108	28,52613057	54,75573764	241,3729253	0,30220329	0,394957821	67,79795073	0,084070982