21 - The importance of phenotyping legumes at multiple levels in order to mitigate climate change scenarios and help address sustainable development goals.

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As global population is growing, and the world economy continues expanding, humanity needs to think of creative ways to address societal challenges of food security, sustainable production and climate change. Legume grains may be a powerful tool to address these challenges in a collective way. However, they are underutilized and their role on environmental diets is still overlooked in Europe. Phenotyping at multiple levels, e.g. for nutritional quality, resistance to stresses, yield, or N fixation ability, is a critical step in order to leverage legume utilization as new ingredients or as participants in novel diversified cropping systems. Here we will highlight the importance of legume phenotyping to help solve global problems of climate change and nutritional security, while addressing sustainable development goals. We report on different germplasm collections of chickpea, faba bean, grass pea, lentil, lupin, pea and vetch which have been phenotyped according to their physical and quality parameters, an important step for novel food and feed development. Significant differences in 100-seed weight were found, ranging from 31-50 g in chickpea, 41-105 g in faba bean, 5-36 g in grass pea, 2-5 g in lentil, 29-47 g in lupin, 9-31 g in pea and 4-6 g in vetch. When looking at protein content, the coefficients of variation between genotypes were in general lower than 12% and, while lupin seeds showed the highest average protein content (average of 36.4 %), chickpea seeds had the lowest (average of 20.2%). The ionome of each genotype was also characterized, where the concentration of key nutrients like iron, zinc, phosphorus, magnesium, among others were determined to help in the identification of outstanding genotypes. Besides their nutritional quality, the phenotyping of legumes into novel cropping systems and short supply chains is under way in scope of the H2020 TRUE project, and a few success examples of this will be showcased.