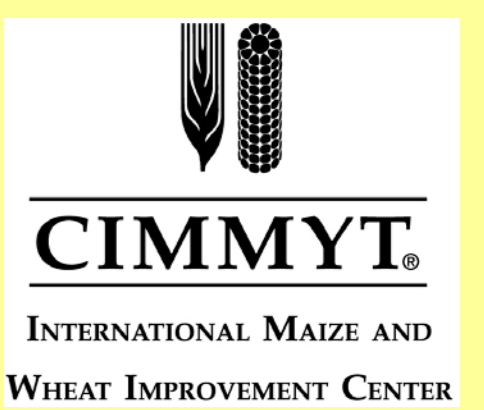


# Phenotyping tools to select for adaptive traits in drought environments



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## INTRODUCTION

- Wheat is the central pillar of food security worldwide, and the most important food crop in major parts of Central and West Asia and North Africa, where per capita wheat consumption is the highest in the world. However, drought continues to be a major limiting factor to wheat crop production worldwide, with often devastating consequences, especially in developing countries.
- The main goal of this project is to facilitate plant breeding for drought adaptation. This achieved by developing a understanding of the role of adaptive traits, and developing a package of high throughput non-invasive techniques to detect genetic variation for single and combined or complex drought adaptive (water use) traits under field conditions.
- The project involves four main activities, summarized in Figure 1.

## PROGRESS

- Wheat germplasm from ICARDA, Syria and CSIRO, Australia including contrasting lines for tillering, transpiration efficiency, stem water soluble carbohydrate and stay-green, were assembled. Seed was multiplied at ICARDA and CIMMYT between December 2008 and July 2009. Concurrently, ICARDA's germplasm was sent to Australia in October 2008.
- Trials have been sown in Australia for screen development, trait comparison and characterization of ICARDA's elite wheat germplasm; at Gatton, Queensland (27.55 S, 152.33 E), and Leeton, New South Wales (34.60 S, 146.40 E).
- Trials were sown in June 2009 in an alpha-lattice with three replications at Dera (8.40 N, 38.85 E), and Melkassa (8.40 N 39.33 E), Ethiopia for traits comparison.
- Subsets have been sent to Mexico and Morocco for screen development, trait comparison and characterization of ICARDA's elite wheat germplasm for drought adaptive traits.

## INTENDED SPECIFIC OUTCOMES

- Improved knowledge of the relative value of different drought-adaptive traits and trait combinations under contrasting drought patterns in different environments.
- Better understanding of the season-long physiological traits that underpin ICARDA's elite drought-adapted lines in contrasting drought environments, including their genetic diversity.
- Training courses and materials developed and used that increased the knowledge of GCP/NARs participants on the value of different traits in different drought types, and the new screening methods.
- A robust field-based, non-invasive, phenotyping screen was developed, to detect genetic differences in canopy water status, size and functionality.

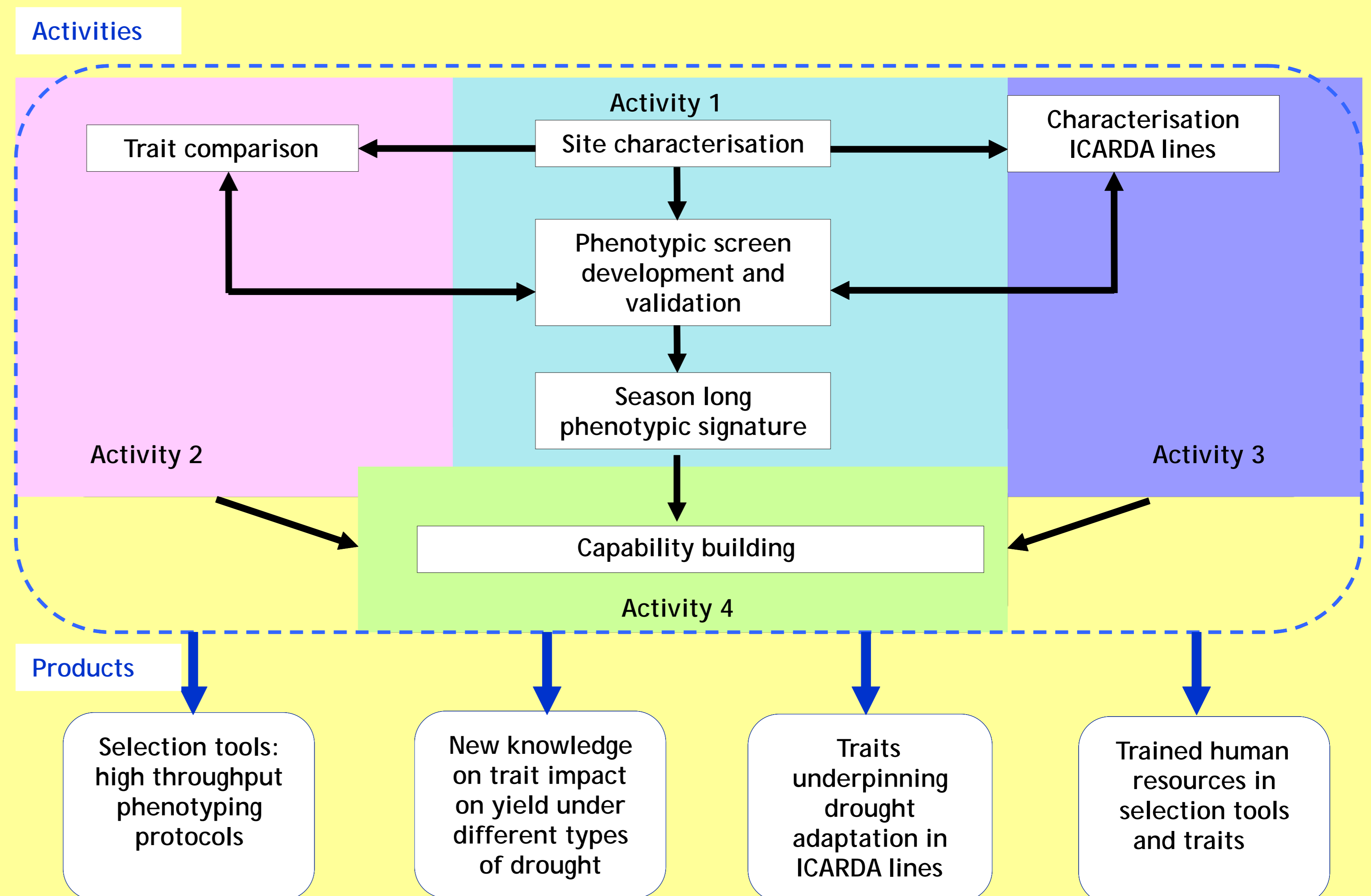


Figure 1. Diagram of activities and key products



Figure 2. Trial site at Gatton (27.55 S, 152.33 E), Queensland, Australia.



Figure 3. Trial site at Dera (8.40 N, 38.85 E), Ethiopia.