

## ***M. truncatula* protocol chapters**

### **Handling *Medicago truncatula* as a whole plant: growth, propagation, crossings, as well as abiotic stress and interactions with other organisms**

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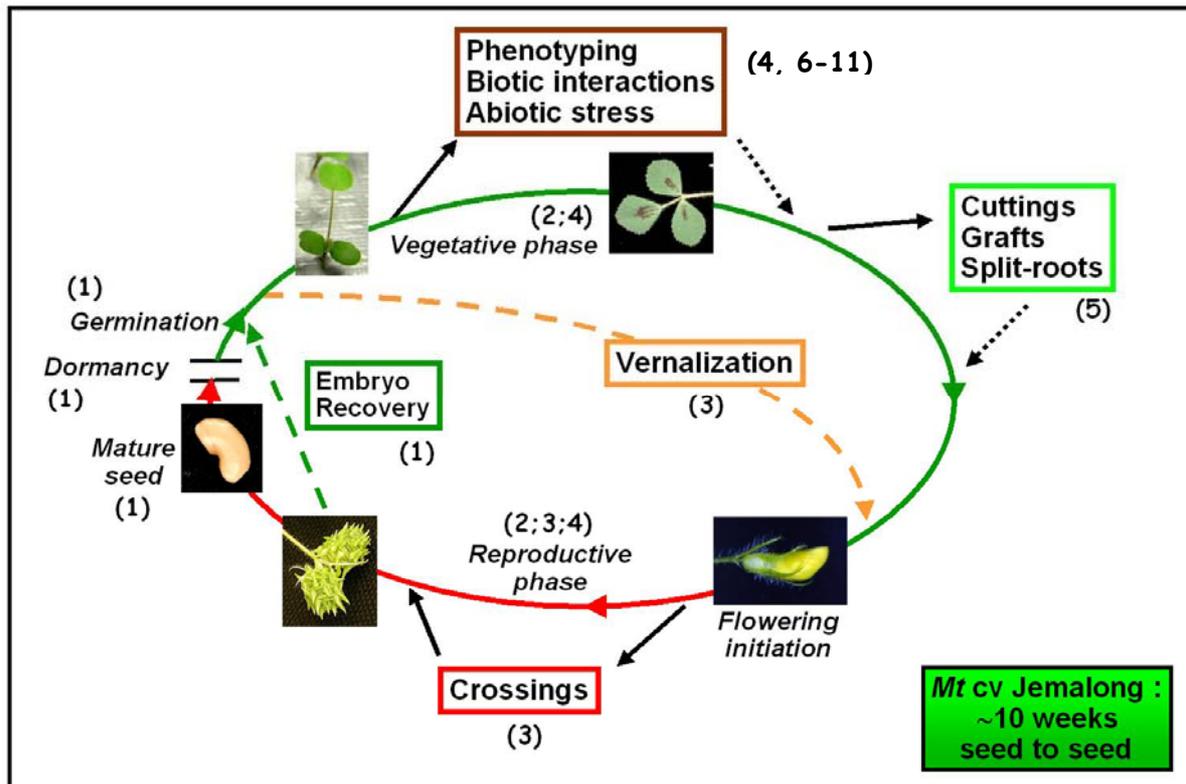
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#### **Overview** (E.-P. Journet)

This first section of protocols deals with procedures established to handle *M. truncatula* (*Mt*) plants in the laboratory and in the greenhouse. It addresses a variety of objectives such as growth and propagation of plants, crossings between genotypes, as well as studies on abiotic stress and interactions with a variety of other organisms (rhizobial and mycorrhizal endosymbionts, pathogens, and pests). Information is also provided for architectural phenotyping of shoots and roots (Figure 1).

Unless otherwise stated, all these protocols were established for A17, the most widely used *Mt* line, and other sibling genotypes derived from the Jemalong cultivar. Evidence suggests that many of these protocols and guidelines can also be applied with minor adjustments to the increasing number of other *Mt* accessions currently studied (e.g. R108-1, A20, DZA-315, F83005...).



**Figure 1 – *Medicago truncatula* life cycle and plant manipulations**

This scheme represents the sequence of *Mt* life cycle stages (*italicized*) and the various kinds of manipulations / experiments (boxed) that are described in the present protocol section. Bracketed numbers correspond to the relevant chapters (see below). For non-vernalized *Mt* cv Jemalong plants, the completion of the life cycle takes 9-10 weeks seed to seed in optimal growth room conditions, and up to 5000 seeds can be obtained from one plant within 4-5 months. Shortcuts in the life cycle can be achieved either by vernalization of germinating seeds or immature embryo recovery. *Medicago truncatula* is a robust model plant, tractable to many experimental approaches, whose shoots can be recovered, generate adventitious roots, and subsequently set seed.

Relevant chapters: (1): Seed storage and germination. (2): Growing *M. truncatula*: choice of substrates and growth conditions. (3): Vernalization, crossings and testing for pollen viability. (4): Phenotyping. (5): Cuttings and grafts. (6): Rhizobial inoculation and nodulation of *Medicago truncatula*. (7): Inoculation and growth with mycorrhizal fungi. (8): Inoculation and growth with root pathogenic fungi. (9): Inoculation and growth with foliar pathogenic fungi. (10): *Medicago truncatula* resistance to Oomycetes. (11): *Medicago truncatula* interaction with insects.