

## Leaf area expansion and dry matter accumulation during establishment of broad bean and sorghum at different temperatures and soil water contents in two types of soil in mediterranean Portugal

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### ABSTRACT

Crop establishment is a major factor determining crop productivity in the field and is strongly controlled by soil temperature and soil moisture. Fast leaf expansion and dry matter accumulation during crop establishment are required for an adequate establishment.

Leaf area expansion and accumulation of dry matter during the establishment of broad bean (*Vicia faba* L.) and sorghum (*Sorghum vulgare* L.) were studied at different soil temperatures and soil moisture contents in a Vertisol (Lisboa) and a Luvisol (Évora) from November 1993 to November 1996. Soil temperature was measured at 2 and 4 cm depth with thermocouples, air temperature was measured with a ventilated psychrometer and soil moisture was measured using the gravimetric method. Leaf area was estimated non-destructively. Above ground seedling dry matter was weighed after oven drying at 65°C. Data analysis was based on the thermal time concept.

For each crop no significant differences were found on leaf area at establishment in both soils under favourable water conditions, but significant differences were found on seedling dry matter. In moist soils, leaf area of both species increased linearly with accumulated temperature and dry matter increased exponentially with accumulated temperature.

Low soil water during establishment reduced leaf expansion and dry matter accumulation of both crops, mainly if it occurred before seedling emergence. In mediterranean type climates meteorological extremes of low rainfall associated to high temperatures are expected to be more frequent on the wake of global climate change, reducing crop establishment and productivity.