

Temperature gradient plate

Highly efficient bi-directional temperature gradient system for investigating responses to temperature shifts of seeds, small plants, insects, micro-organisms or any small component or material. The design is based on the fact that a temperature gradient results if one edge of a square aluminium plate is heated and the opposite edge is cooled.

The gradient runs in one direction for part of the 24 hour cycle and can then be automatically switched to run at a right angle to its original direction for the remainder of the cycle, to provide all possible combinations of minimum and maximum temperatures.

- Temperature range (cold edges): +5 to 30°C
- Temperature range (hot edges): ambient +5 to 45°C
- Perspex grid divides working area into 196 mini-incubators
- Multi-channel Squirrel data logger (included as standard) for recording time and temperature
- Over temperature protection is provided on each edge by fixed temperature cut-outs



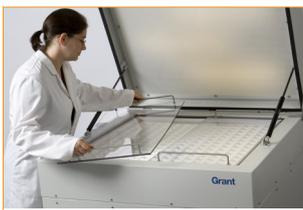
GRD1 temperature gradient plate shown with integrated Squirrel data logger and optional light hood

An adjustable timer controls the length of the two phases within the 24 hour cycle which automatically switches the gradient direction as programmed.

Multi-channel Squirrel data logger for recording time and temperature from five probes positioned underneath the plate – one in each corner and one in the centre – for post-cycle analyses on a PC.

Removable perspex grid effectively divides the working area into 196 miniature incubators, each with a different temperature regime – allows many samples to be tested without the need for separate controlled environment chambers.

Robust, fully integrated system. Fitted with wheels for easy maneuverability.



Developed from a design originating from Dr A. J. Murdoch and Professor E. H. Roberts of Reading University, Department of Agriculture.

The Gradient Plate can be customised to suit your application, please email salesdesk@grantinstruments.com or call +44 (0)1763 264 741 for further information.

Applications of the GRD1

Based on studies carried out at the University of Reading, UK:

- **Overcoming seed dormancy**

Dormant seeds often require moist storage (stratification) to help break their dormancy. The GRD1 can help to quantify temperature effects in seeds during warm stratification as carried out by Kebreab & Murdoch, (1999a).

- **Seed germination at constant temperatures**

The GRD1 allows germination tests to be carried out over a very wide range of temperatures for both dormant and non-dormant seeds. Interaction with other factors such as water stress and chemicals can also be studied and modelled as was done by Kebreab & Murdoch (2000).

- **Seed germination at alternating temperatures**

The GRD1 will operate with the temperature gradient for part of the day in one direction and then at right angles to that direction for the rest of the day. Thus the GRD1 can provide 196 different thermal environments. The effects of constant and alternating temperatures at two thermoperiods were quantified in several species by Kebreab & Murdoch (1999b).

With many plants, particularly small-seeded species, the GRD1 provides an extremely powerful tool (Murdoch et al., 1989). Optimum temperatures are easily identified and sufficient data is available to understand and model the responses to temperature. Interactions with dormancy-relieving factors may also be investigated.

- **Germination rates**

The GRD1 has been invaluable in such studies as the evaluation of thermal time required for germination. Examples include Ellis & Barrett (1994) and Kebreab & Murdoch (1999C).

- **Other applications**

Apart from the size constraints (the GRD1 is suitable for samples up to 30mm in diameter); uses are only limited by imagination. For example, parasitism of insects by nematodes has been tested by Ratnasinghe and Hague (1998). Our GRD1 and GRD1 LH are in use worldwide as critical tools in various fields, namely:

Seed Preservation	Kew Gardens and other establishments worldwide (particularly Australia and China) within the Millennium Seed Project Partnership.
Biofuel Research	Ceres, California USA.
Food Crop research	Scottish Crop Research, International Rice Research Institute (IRRI), Philippines.
Plant Pest Diagnostics	California Department of Food & Agriculture (CFDA).