



## Temperature Gradient Plate

### GRD1

Temperature gradient plate for seed germination efficacy testing

### GRD1 LH

Temperature gradient plate with integral light hood for seed germination efficacy testing. Custom light hoods available on request.

# GRD-1

## 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. Heating one edge of a square aluminium plate and cooling the other results in a temperature gradient across the entire plate.

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Temperature range: +5 to 30°C (cold edges)

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Temperature range: ambient +5 to 45°C (hot edges)

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Removable perspex grid divides working area into 196 mini-incubators

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Multi-channel Squirrel data logger (included as standard) for recording time and temperature

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Over temperature protection is provided on each edge by fixed temperature cut-outs

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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.

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



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

Bespoke light hoods including full spectrum LED's are available on request.

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.

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](mailto:salesdesk@grantinstruments.com) or call +44 (0) 1763 264 741 for further information.

# GRD-1

## Applications

### 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 Kebeab & 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 Kebeab & 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. Therefore, the GRD1 can provide 196 different thermal environments. The effects of constant and alternating temperatures at two thermoperiods were quantified in several species by Kebeab & 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 Kebeab & 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:

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|------------------------|---|
| 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).   |

# GRD-1

## Technical specifications



|  |                  | GRD1                       |
|--|------------------|----------------------------|
|  |                  | Temperature gradient plate |
| Dimensions   | h x d x w<br>mm  | 1030 x 1020 x 1020         |
| Weight   | kg               | 300                        |
| Temperature range                                      | cold edges<br>°C | +5 to 30                   |
|  | hot edges<br>°C  | +5 to 45                   |
| Stability  | ±°C              | 0.5                        |
| Setting resolution                                     | °C               | 1.0                        |
| Display  |                  | Digital                    |
| Display resolution                                     | °C               | 1.0                        |
| Time/temperature recording<br>via Squirrel data logger |                  | .                          |
| Working area   | mm               | 760 x 760                  |
| Electrical power                                       | 230V 50Hz<br>W   | 2050                       |
| EMC (emissions)  |                  | Class A                    |
| Weight   | kg               | 300                        |





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The specifications listed in this brochure are subject to change by the manufacturer and therefore cannot be guaranteed to be correct. If there are aspects of the specification that must be guaranteed, please provide these to our sales team so that details can be confirmed.

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Please contact us if this literature doesn't answer all your questions.