Gravitational force – rather than being swept up by air currents in unstable conditions, most likely mid-morning to late afternoon.

**STABILITY**

Stability refers to the atmosphere’s ability to resist or assist vertical motion of air. A stable atmosphere will resist upward motion of air; an unstable atmosphere will assist it, while a neutral atmosphere will neither assist nor resist it. A neutral atmosphere is therefore best for spraying since droplets will fall solely under gravitational force – rather than being swept up by air currents in unstable conditions or concentrated within stable inversions.

Smoke plume generating devices are available to help determine stability. A rough smoke behavioural guide is shown below.

**THERMAL DRIFT**

Thermal drift occurs as a result of unstable meteorological conditions. Chemical droplets can be carried on thermal eddies and deposited some distance from the target site.

**DELTA T**

Delta T is becoming one of the standard indicators for acceptable spray conditions. It is indicative of evaporation rate and droplet lifetime. Delta T is calculated by subtracting the wet bulb temperature from the dry bulb temperature. The diagram below relates air temperature and relative humidity to values of Delta T. When applying pesticides, Delta T should ideally be between 2 and 8.

**WEATHER GUIDELINES FOR PESTICIDE SPRAYING**

- Read the product label and follow all label instructions.
- Spray when wind is steady and ideally 3–15 km/h.
- Avoid variable or gusty wind conditions.
- Avoid calm conditions - small droplets may remain suspended for long periods.
- Spray when wind blows away from sensitive areas.
- Avoid spraying in temperatures above 28°C.
- Aim to spray when Delta T is between 2 and 8 and not greater than 10.
- Do not spray when inversion conditions exist.
- Aim to spray when the atmosphere is neutrally stable.
- Most chemicals require a rain free period – check the label.
- Be aware of local topographic and convective influences on wind speed and direction.
- Record on-site weather conditions at spray time.

**WEATHER INFORMATION**


Information specific to ground sprayers is available at the Bureau’s Registered Users Internet site. Please email webdev@bom.gov.au or phone (03)96694984 for information about accessing this site.

Seven day computer generated forecasts of temperature, humidity, precipitation and wind are available for any location around Australia through the Bureau’s SILO web site for a small annual fee. For details, please visit the SILO home page: http://www.bom.gov.au/silo/products/MeteoGrams.shtml

**DELTA T** diagram courtesy of NUFARM LTD.

**WEATHER FOR PESTICIDE SPRAYING**

**WIND**

Wind values mentioned in Bureau forecasts and observations refer to the average wind over a 18-hour period at a height of 10 metres - crop level winds may be different. On weather maps wind is strongest where isobars (lines joining points of equal pressure) are close and light where isobars are far apart. Wind speed and direction may differ significantly from that anticipated from the weather map. This is because wind at ground level tends to flow in much the same way as water flows in a stream. Local wind may be deflected or blocked by obstacles and become chaotic in speed and direction. Daily variations of wind speed occur, generally with a minimum early in the morning increasing to a maximum sometime between late morning and mid afternoon. A sea breeze during the day and a katabatic wind at night may completely mask ‘weather map’ inferred wind. Local convective cloud also has the potential to generate gusty wind. 

**TEMPERATURE AND HUMIDITY**

Temperature. In meteorology, air temperature and humidity are measured in the shade at 1.25m above the ground. On hot days ground temperature may be up to 20°C higher. Volatile herbicides exposed to high temperatures and low humidities are inclined to vapourise, releasing damaging vapour even when the observed air temperature is measured to be within acceptable limits for spraying.

Humidity affects evaporation rate. Humidity of greater than 45% is often recommended for spraying – but very high humidity can suppress droplet evaporation, leading to extended life and unacceptable spray drift. On the other hand, if humidity is too low, droplets – especially small ones – quickly evaporate leading to a high risk of drift. In extreme cases where humidity is low and temperature high, pesticides convert to crystalline form and settle on the target, only later being activated by additional moisture. Late take up of pesticide may lead to unacceptable residue levels.

Optimal temperature and humidity conditions frequently occur in the early morning and into mid morning when conditions are not too hot nor too dry (see in Delta T section).

Temperature Inversions are layers of air in which temperature increases with height (as opposed to the normal decrease with height). A cold drainage wind (katabatic) can contribute to the strength of inversions (A) and add to the risk of drift.

Inversions frequently form in the late evening and strengthen overnight (being strongest near sunrise) before being smoothened by mid morning as the air near the ground heats up.

Inversion layers are stable (see stability section) and are characterised by calm, light or variable winds that make it difficult to predict the movement of the droplets both vertically and horizontally. This leads to problems with spray droplets (mostly drift complaints) falling outside of the inversion layer.

Within inversion layers droplets may rise and be trapped at some higher level before being carried out of the target area (B). On the other hand droplets may remain suspended at a lower level and drift off target in light winds (C).