

# **Plant Growth Regulators (PGRs)**

This article details a very serious issue in the legalisation of cultivation of cannabis for medicinal use in Australia. While not directly about ideal growing practices, this is a warning about less than ideal growing practices currently used by black market commercial cannabis growers all over Australia, and the world.

While this article cannot source some statements made, this is only due to the current unavailability of research possibilities into the chemical make-up of black market commercially supplied cannabis in Australia.

## **What is a Plant Growth Regulator (PGR)?**

The term 'Plant Growth Regulator' covers a broad range of synthetic and natural (organic) compounds that effect plant growth. Just a few of these pose a risk to consumers while others are non-toxic.

In very simple terms, chemical PGRs in the subclass of "Growth Retardants" such as Daminozide (Alar), Paclobutrazol (PBZ) and Chlormequat Chloride (CC) are potential toxins while other PGRs such as Jasmonates (subclass "Growth Inhibitor") and Triaccontanol (naturally found in alfalfa meal and classed as a "Plant Growth Stimulator") pose no risk at all.

## **The Problem With PGRs**

PGR based products halt the upward (apical) growth of a plant, thus giving cannabis growers control over the height of the plant and keeping nodes close and encouraging dense bud-set. This is desired for many indoor growers who wish to grow numbers of shorter plants, or growers who work in areas with limited ceiling height.

Additionally, PGR products can increase yields where cannabis plants are grown in less than ideal conditions. This means inexperienced growers, or growers who fail to optimise their environments, can achieve higher yields when using PGRs. These products are often popular with black market commercial growers. Large scale black market cultivators are responsible for large amounts of commercially available cannabis that consumers are unwittingly purchasing, which may contain these toxic chemicals.

In Australia especially, where PGR flowering additives first became available through hydroponics stores, large numbers of commercial cultivators use these product.

## **Identifying Chemical “Growth Retardants”**

Any product that inhibits or stops upward growth and/or induces early flowerset is a product that should be avoided. This applies to both registered and non-registered products. For instance, through sleight of hands registration several PGR “Growth Retardant” products are legally able to be sold through the retail sector. These include, but are not limited to, Yield Masta/Sudden Impact, U-Turn, Cyco Flower, and Bonza Bud, all which are sold in Australia, and marketed deceptively towards black market commercial growers.

While the aforementioned products are registered, don’t be deceived – they are registered only for use on ornamental crops (most countries have banned their use on consumable crops). For instance, Cyco Flower contains Paclobutrazol (PBZ) marketed with “APVMA approved PGR”, it’s APVMA resitration, 64027/1L/0110, 64027/0110, reads,

*“Active Constituent/s” 4g/L paclobutrazol. For growth control of container grown ornamentals.”*

This chemical active, along with Daminozide (Alar) and Chlormequat Chloride (CC):

1. Are classed as systemic pesticides.
2. Are scheduled poisons.
3. Have long withholding periods.
4. Are in many cases (and most countries) banned for use on food/consumable crops.
5. Are subject to strict regulations, pertaining to registration and use (crop type, application rates and time).
6. Are, in the case of Daminozide, rated as a “probably human carcinogen” and in the case of Paclobutrazol rated with, “This substance/agent has not undergone a complete evaluation and determination under US EPA’s IRIS program for evidence of human carcinogenic potential”.

## **Overview of currently used PGR’s in Australia**

### **Daminozide (Alar)**

Daminozide is considered a hazardous substance according to OSHA 29 CFR 1910.1200. The EPA lists Daminozide as a ‘probable human carcinogen’, and it’s combustion products include: Carbon Monoxide (CO), Carbon Dioxide (CO<sub>2</sub>), Nitrogen Oxides (NO<sub>x</sub>), and other pyrolysis products typical of burning organic material. Combustion may emit poisonous fumes. It is currently classified as a S5 Poison.

Daminozide is produced by reacting Succinic Acid Ahydride with unsymmetrical Dimethylhydrazine (UDMH, also known as 1,1-Dimethylhydrazine). UDMH is toxic, a carcinogen, and can be readily absorbed through the skin.

Prior to the 1989 'Alar Scare' in the US, five separate, peer reviewed studies of Alar and its chemical breakdown product, UDMH, had found a correlation between exposure to the chemicals and cancerous tumors in lab animals. In 1984, and again in 1987, the EPA classified Alar as a "probable human carcinogen".

The use of Daminozide in any consumable crop is, therefore, illegal. The dangers it poses when used to grow a short-term deciduous crop, which is then ingested via inhalation or extracted cannabinoids, are unknown.

Additional to the direct public health issues of using Daminozide, it inhibits the Gibberillin (GA) pathway at the late stages of Gibberellin Metabolism, reducing Terpenoid production in the forms of THC, CBN, and CBD. In more simple terms, the resin production of the plant is inhibited and reduces the quality significantly. This is a huge problem when people are currently sourcing black market commercial cannabis, that does not contain the Cannabinoid Profile that is required for medicinal use, and also possibly a known carcinogen that should not be there.

<http://www.epa.gov/aboutepa/daminozide-alar-pesticide-canceled-food-uses>

## **Paclobutrazol (PBZ)**

Paclobutrazol was developed by ICI Chemicals, and registered by the U.S. Environmental Protection Agency and by the State of California as an injectable Plant Growth Regulator for ornamental plants (not approved for food crops). Paclobutrazol inhibits the gibberellins metabolism like Daminozide, causing the plant to stop growing.

Paclobutrazol has long withholding periods, and in some cases, control of growth may persist for more than a year, which for a short-term consumable crop is not in the interest of public health. Due to the nature of it being banned for consumable crop usage, there is no data on the effects of Paclobutrazol on the human body, either directly or from ingestion, though some mouse studies exist.

[http://ofmpub.epa.gov/apex/pesticides/f?p=chemicalsearch:3:0::no:1,3,31,7,12,25:p3\\_xchemical\\_id:3208](http://ofmpub.epa.gov/apex/pesticides/f?p=chemicalsearch:3:0::no:1,3,31,7,12,25:p3_xchemical_id:3208)

## **Summary**

The use of PGR chemicals on black market, large scale commercial crops of cannabis in Australia is a huge public health issue, and one which could be solved by regulating and licensing growers within the country. Cannabis is said to be one of, if not the largest, consumable crops in the world. With a black market rampant with possibly toxic PGR's, and no way to test or regulate the supply to the increasingly large medical patient populous, it is imperative that now we focus on creating a regulated supply chain from experienced grower, to carer/provider, to patient (with a sample sent for analysis of Cannabinoids, Terpenes and possible toxins before final packaging).

