

# Slow down

**I**n the turfgrass context, a growth retardant is a chemical which in some way reduces or slows down normal grass growth, thus reducing the need for mowing to maintain a neat and tidy turfgrass area which is visually acceptable to golfers. When first marketed for amenity use, growth retardants were heralded as a panacea for the landscape manager, and even as a cure-all for the time-consuming and expensive process of grass cutting.

However, despite certain advantages which may be gained from growth retardants, currently only a small proportion of amenity grassland is being managed chemically by growth retardants. In this article, Neil Baldwin, of the Sports Turf Research Institute, explains the mode of action of growth retardants, describes the situations in which their use is appropriate and explains how to use them to their maximum effect.

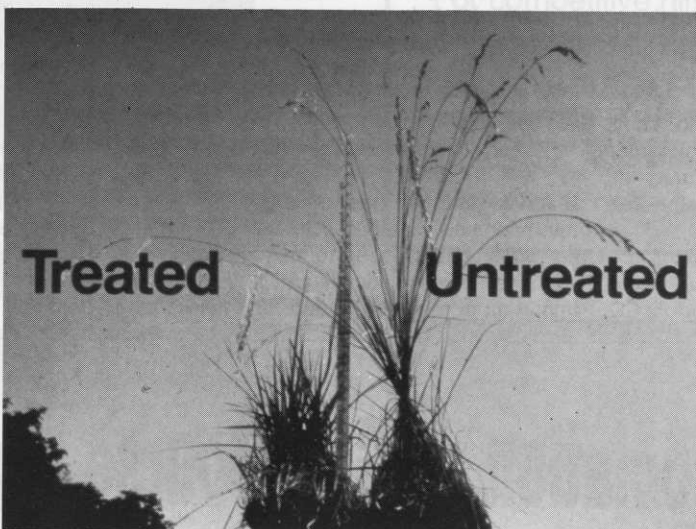
The way in which growth retardants work, ie. how they influence plant growth, depends very much on the active ingredient they contain. One or more of the growth retardants currently available, are based on three active ingredients, namely maleic hydrazide, mefluidide and paclobutrazol. Maleic hydrazide works through foliar absorption, inhibiting plant cell division, thus producing a slower growing grass plant. Mefluidide, although distinct chemically from maleic hydrazide, also works via foliar absorption, and by slowing down leaf growth, but in addition it inhibits seed-head production of the grass sward. Paclobutrazol is effective in a completely different way, being root absorbed and it inhibits grass growth by preventing the production of the plant growth hormone gibberelic acid.

The effectiveness of growth retardants depends very much on the situations in which they are used. The growth retardation achieved by these chemicals may, in ideal situations, be considerable. In field trials, conducted by the Sports Turf Research Institute in the early 1980s, maleic

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## NEIL BALDWIN of the Sports Turf Research Institute examines turfgrass growth retardants for the golf course

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### Advantages

- Significant cost savings over conventional mowers for specific situations.
- Highly suited to difficult/dangerous areas to mow.
- Drought resistance of sward may be improved.
- Season long control may be achieved from 2-3 applications.
- Minimises yield of unwanted clippings produced by mowing.
- May be integrated with mowing to produce the desired effect.

### Disadvantages

- Trained and qualified operators needed for application.
- Unsuitable for high quality, fine turf or large open areas.
- Do not give the high quality visual appearance of mowing.
- No single growth retardant available to suit all situations.
- Lack of use experience by many amenity managers.
- Being classified as pesticides there may be opposition to use of chemical sprays.

hydrazide, mefluidide and paclobutrazol reduced grass growth by up to 25%, 60% and 45% respectively, dependent on the grass species present. The duration of grass growth suppression also varies according to the chemical applied. Both maleic hydrazide and mefluidide are con-

sidered relatively quick acting with up to 12 weeks and eight weeks suppression of grass growth achievable respectively. Generally, little or no effect of paclobutrazol is observed 10-15 days after application, but growth inhibition has been recorded up to 14 weeks thereafter and occasion-

ally treatment effect is carried over to the following season. However, each growth retardant has differing effects according to the botanical composition of the sward. Maleic hydrazide tends to inhibit coarser grasses, leaving the finer species, in particular fescues, to thrive. Mefluidide has long lasting effects on annual meadow-grass, bents, perennial ryegrass and crested dogs tail and in the shorter-term, will suppress the growth of fescue, Timothy and smooth-stalked meadow-grass. Paclobutrazol tends to have lesser effect on deep rooted, coarser grass species. Thus, it is necessary to have an appreciation of the grasses present on the part of the golf course to be treated to achieve maximum results.

On the golf course, each area may be considered separately for its potential for controlling grass growth by application of a growth retardant. For large areas of grassland, such as golf fairways, gang mowing is often the easiest and most cost-effective way of restricting sward height. However, growth retardants have proved their worth in certain situations such as where the grass area in question contains many obstacles, for example such as around tree bases. Small, isolated areas, for example along fencelines, where mowing may be expensive and/or inconvenient are also suitable cases for growth retardant treatment. On low maintenance areas, such as embankments, growth retardants may be appropriate, as they are also for situations on the golf course, where mowing would be difficult or dangerous in practice. Also, growth retardants have a specialist use on erosion control areas where it is important to maintain a dense, uniform growth of deep rooted grass to resist soil erosion. Indeed, it is in these types of situations where growth retardants may be extremely cost effective. In comparative studies, reducing grass growth by spraying has been shown to be a quarter of the cost of maintenance using a rotary mower and one-fifth the cost of Flymo operation.



## Potential use area of growth retardants

• Pictures courtesy of Rhone-Poulenc Environmental Products

Users of growth retardants will notice they are sometimes formulated together with herbicides and are also recommended both alone and in mixtures. This is because in situations where growth retardants are being considered, there is usually a range of grass species present, together with non-grass species, such as broad-leaf weeds. Whilst mowing trims all vegetation present instantly to the required height, growth retardants have varying effects, according to the botanical composition of the sward. Paclobutrazol is available only as a mixture with the herbicide dicamba (proprietary name Holdfast D) to inhibit both grass and broad-leaf weeds. To achieve similar aims maleic hydrazide is available as a mixture with the herbicides dicamba and MCPA (Mazide Selective), although there are several maleic hydrazide only products such as Mazide 25, Regulox K and Royal Slo-Gro, to name but three examples. Currently mefluidide (Echo, Embark and Mowchem) is not formulated together with a herbicide as this chemical does give some suppression of broad-leaf weed species, although in situations where broad-leaf weeds are a problem, they may be controlled by tank mixing with Approved herbicide formulations. Certain growth retardants may also be tank mixed, paclobutrazol plus mefluidide or paclobutrazol plus maleic hydrazide are recommended where coarse grasses, such as cocksfoot, are dominant or in situations where suppression of grass seed heads is important.

To get the best results from growth retardants it is critical to follow the manufacturers recommendations for use carefully to achieve acceptable results. With maleic hydrazide the application rate is critical as a small over application may lead to severe scorching, whilst if under applied effectiveness is markedly reduced. Consequently, when combined with climatic effects such as rain after application, growth retardation by maleic hydrazide may be unpredictable. In contrast, mefluidide

is overall very reliable, providing it is used correctly. Mefluidide should be applied when the grass is dry, ideally eight hours elapsing before rainfall. Best results are obtained when mefluidide is applied in April-May when grass growth is strong. Mefluidide tends to make the sward greener and more lush in appearance, although some discolouration may occur if applied in very dry conditions. Paclobutrazol has its greatest effect when applied in early spring (February to March) prior to onset of grass growth, or in August-September to reduce the autumn flush of growth. Paclobutrazol is relatively inactive in dry conditions, but acts reliably when soil moisture is high. Generally, paclobutrazol is leached slowly although heavy rain after application may negate effects.

There have been several recent developments in growth retardant technology. A review of USA journals and periodicals has shown that the three growth retardants available in this country are also the mainstay of those available and used on turfgrass world-wide. However, there have been recent developments, particularly in the use of growth retardant, for the selective inhibition of annual meadow grass in fine turf, although it will be some time before this is available to the UK greenkeeper. Also, research is in progress evaluating ways of minimising the scorch problems associated with growth retardant applications.

Further information on growth retardants can be obtained from The National Turfgrass Council in a booklet called 'Growth Retardants', NTC Workshop Report No 7.

For those interested in the technical information on growth retardants, much is published in Volume 62, (1986) of the Journal of the Sports Turf Research Institute, pages 59-64, 155-171, 172-181 and 200-203. A brief summary of growth retardants may also be found in the STRI's publication Sports Turf Bulletin (1986) 152, pages 2-4.



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