Selective herbicides used to kill broad-leaved weeds in turf were developed from agricultural chemicals. Much of the first part of this article deals with the search for weed control in cereals, which are members of the same botanical family as grasses; the Gramineae. Therefore, the situation in amenity is the same as in agriculture, in that we are trying to control unwanted dicotyledonous plants in a monocotyledonous crop.

The use of chemicals to kill vegetation is not new; the first examples in history date back to around 1200BC when conquering armies, in what we now call the Middle East, used salt and ash to wipe out their enemy’s crops. In effect, these were chemicals used to spite others; the beneficial use of chemicals took much longer to emerge.

In mid-nineteenth century Germany, a mixture of sulphuric acid and iron sulphate was used in possibly the first selective weed control experiment in European agriculture. However, it was not until later in the 19th century that the early beginnings of the herbicide industry started to have an impact on agricultural practices.

The first products to come to market were copper salts that were found to provide a degree of selective weed control in cereal crops and boost the yield. About a dozen other metal salts including such efficacious offerings as iron sulphate and sodium nitrate soon followed to add to the product portfolio!

The finer, upright leaves of the cereal plants have a waxy coating and therefore retain less of the chemical than the leaves of broad-leaved weeds; which are rounder, have a greater surface area and are often horizontally oriented.

The discovery and development of selective herbicides for turf.

By Graham Paul
Sprays, being located in the base of the plant and protected by older leaves, whereas those of broad-leaved plants are exposed to attack by chemicals.

Broad-leaved weeds present a ronder, wider, horizontal target

These early selective herbicides were slow to be accepted due to the high cost of the active ingredients and their relatively poor cost/benefit. Herbicide formulation technology the performance was erratic and the salts could be detained by heavy rainfall before the full effect was seen.

The long-term use of certain metal salts, e.g. copper sulphate, could lead to the build-up of toxic residues in the soil that would eventually reduce the crop vigour.

However, one positive noting that emerged from these early agrochemicals was that they established the concept of chemical weed control and encouraged research into more reliable means of achieving its.

In the 1930's a team of scientists working forICI at the Rothamsted Experimental Station were working on a project to eradicate weeds in cereal crops by spraying with sulphuric acid and other acids.

The report published by G.E. Blackman and W.G. Templeman in 1936 showed up to 90% control of Common Chickweed and Procumbent Chickweed. By careful mixing of two or more active ingredients in a single product, manufactur- ers had been able to extend the weed spectrum in a bid to provide a complete answer to weed problems in one spray application.

One early example of this was ‘Superspot’ (now withdrawn) from May & Baker, which combined 2,4-D and mecoprop to control 18 out of the 22 commonly occurring turf weeds in the UK. It served the amenity market for some 40 years before disappearing in 2009 having been superseded by the newer products such as the 2 way mixers with dicamba, MCPA and mecoprop-P, which offer a slightly broader weed spectrum.

The suffix -P that appears after mecoprop denotes the use of an isomeric form of this molecule.

When certain chemicals are manufactured, the end product can be a mixture of two stereoisomers of the HBN herbicides.

Without going into great detail, the best way to illustrate stereoisomers is to look at your left and right hands. They are mirror images of one another, having the same number and type of atoms, but arranged differently. The chemicals are known as: -

4) The disfigurement of leaves
a) Inhibits cell elongation
b) Inhibits DNA replication
b) Interferes with photosynthesis
c) Causes uncontrollable growth

d) Causes uncontrolled growth

6) In the report published by G.E. Blackman and W.G. Templeman in 1936, what weed species were involved in their studies?

a) Chamomile and Wild Rocket
b) Cleavers and Wild Rocket
c) Corn Marigold and Wild Oats
d) Charlock and Wild Radish

References:
Broad leaved weeds present a rounder, wider, horizontal target

These early selective herbicides were slow to be adopted by farmers due to the high cost of the active ingredients and their relatively poor cost/benefit ratio. Modern formulation technology the performance was eroded and the salts could be washed away by heavy rainfall before the full effect was seen.

The long-term use of certain metal salts, e.g. copper sulphate, could also produce a build-up of toxic residues in the soil that would eventually reduce the crop vigour. However, one positive thing that emerged from these early agrochemicals was that they established the concept of chemical weed control and encouraged research into more effective and safer methods.

For example MCPA and mecoprop differ only in the replacement of one hydrogen atom (H) in MCPA with a methyl group (CH₃). MCPA is generally more effective on the deeper rooting weeds such as Dandelion, Dock and Cushion and mecoprop is better controlled by many smaller leaved weeds such as White Clover, Black Medick. When certain chemicals are manufactured, the end product can be a mixture of two stereoisomers of the same chemical.

Without going into great detail, the best way to illustrate stereoisomers is to look at your left and right hands. They are mirror images of one another, having the same number of fingers and thumbs but the position of the one is rotated 180° out of the plane in which the other is situated. Consequently, the arrangement of the fingers and thumbs on one hand is mirror image to that on the other, and are known as enantiomers or stereoisomers. If we start with the + isomer as the (+) form, then the opposite is the (-) form. The suffix -P that appears after the name of a herbicide indicates which isomer it is. The ‘P’ is for ‘palm’ which is the isomeric form of this molecule. 2,4-D is the (+) isomer known as mecoprop-P so we can reduce the amount of chemical toxicity, a process that occurs in both grasses and broad-leaved weeds. Selectivity is achieved by this group because grasses can rapidly break up the herbicide as soon as it enters the plant and before it reaches the target.

The mode of action of asulam is not fully understood but researchers believe that selectivity occurs from rapid degradation of the chemical in the same manner as the HBN herbicides.

The rate of discovery of new herbicides slowed during the latter part of the 20th century with increased public concern about environmental and health issues.

By crossing pesticide legislation and food surpluses also helped to apply the brakes. European Commission granted a number of licenses and these were to be harmonised internationally and the pesticides in the UK.

It resulted in the removal of two thirds of the chemicals known as the ‘c’ and ‘iso’ isomers; i.e. both left and right handed forms of the same chemical.

For example MCPA and mecoprop are two phosphonic esters of 2,4-D and their physical and chemical properties will be virtually identical.

The chemical structures of the phenoxy herbicides are very similar but small differences can dramatically change the spectrum of weeds they control.

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The mode of manufacture of mecoprop produces a mixture of two molecules with mirror image symmetry – the (-) and (+) isomers. Selective herbicides came a little later, borrowing the technology from the larger agricultural market.

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James de Havilland takes a closer look at the intricacies of current machinery

The anatomy of...
Vredo Super Compact Overseeders

Timing is key to overseeding success. Grass seed applied through any form of overseeding equipment should germinate just fine in the right conditions. The key to success, however, remains in ensuring the germinating seeding then survives. On golf courses, this is allowed the luxury of a rest before it is played and tightly mown. Overseeding can be carried out through a wider time frame. But year-round play makes overseeding golf greens a real challenge.

As is so often the case, it can be dangerous to make sweeping generalisations, this applying particularly to the subject of overseeding. But when it comes to accurately placing fresh seed into an existing green, there is generally a consensus when it comes to timing; the optimum period will typically be between late August and then on through September. The job can also be carried out in October, but the later into the autumn the job is done the higher the risk of frost or late season fungal attack.

The steel flat fingers that run alongside the cutting discs help ensure a clean slice is cut into fine turf, and also help ensure an even depth is maintained across the full width of the machine.

Viewed from the side, the depth of slit can be clearly gauged by the amount of disc protruding through the fingers. The toothed wheel drives the metering unit.

Pictured on the assembly bench at the Vredo factory, the workings of the metering drive can be seen. A key design aim is to ensure low seed rates of small seed, to include Bent grass, can be accurately maintained.

The flutes of the metering unit are partially covered by a flap, the aperture of which is adjusted to seed the seed and desired application rate.

Metered seed is drip between the slit-cutting discs via tubes. Note inter-disc scrapers, the chain supports allowing the scraper to move out of the way and subsequently eject an object as the disc space opens up.

Although shown in a ryegrass winter sports turn sward, the slit cut by the seeder is ‘closed’ by the unit’s roller. On a golf green, the slits typically only show during an early morning dew.

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As to the actual Super Compact unit, its design follows the established Vredo seeding principle; a pair of angled discs cut a V-shaped slit into the turf into which metered seed is placed.

The idea behind the system is that the roller at the rear of the unit seals the slits. So although an overseeded green can be played on immediately the job is completed, the closed slit also helps to seal in moisture. This helps to provide good seed to soil contact, with users suggesting this results in good germination rates. Vredo suggest germination can be as high as 95%.

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It is also fair to say there are those who prefer to overseed in conjunction with sand slitting or other aeration methods, adding seed at the same time as the sand allowing two jobs to be done at once. Others prefer a direct overseed, with an emphasis upon minimal visual impact and allowing a green to be put back into play almost as soon as the equipment leaves the green. As always there will be a play off between getting the job done and minimising disruption.

If the latter is the goal, the choice of ‘straight’ overseeding equipment on offer will include the Vredo models offered by Campey Turf Care Systems.

A reason for taking a look at the Super Compact model featured here is that it has been purpose developed to suit overseeding golf greens and that the first models have now been in use in the UK long enough to be considered.

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The Super Compact is offered in trailed and mounted versions, the build of the unit allowing the chosen model to be converted...
between the two. In trailed form, weights are added to help ensure the discs penetrate the turf, the aim being to allow trailed units to be operated behind a light tractor that may not have the lift capacity for the seeder in its mounted form.

The idea is to allow overseeding to be undertaken with as light a tractor as possible, front weights on the tractor possibly compromising the operation on some greens.

By offering the Super Compact in trailed form, overseeding can possibly take place with a lighter tractor, reducing the risk of compromising the green, particularly when overseeding in ideal damp conditions – check this and the paragraph below – this states it’s ideal in damp conditions.

Although the operating principle of the Vredo Super Compact is easy enough to understand - metered seed drops via tubes between the cutting discs, the resultant slit being closed by a rear roller – actually setting up the unit can take a while to get right. A key point is to ensure the unit runs level and that a close eye is kept on the resultant finish.

The narrowest 0.80 and lightest Vredo Super Compact is ideally suited to mounting on a tractor with a modest 510kg lift capacity, the narrow width allowing good contour following.

How long it will take to overseed a green will of course relate to the green’s size, but operators of the wider 1.20 models suggest a green can be completed in around 20 minutes, making it feasible to complete 18 holes in a day.

With regard to conditions, the Vredo needs to work on a dry surface – this says it needs dry surfaces – this needs checking, with morning dew being enough to potentially upset the ability of the machine to leave a good finish.

Sowing depths can of course be varied but a slit depth of between 3 to 4mm is typically seen as being ideal. At 35mm spacing, a single one-way pass is also normally about right, a counter pass the next season helping where a variety or species change is a priority.

With regard to prices, mounted models of the Super Compact are priced from £14,750, a trailed 1.60m Super Compact listing at £27,625 ex VAT.

This is a considerable investment but one that should be viewed in relation to the potential life of the unit. Most golf courses would struggle to wear a machine out in 20 plus years. The Vredo Compact range starts at £10,025 for a Compact 210 up to £14,545 for a Compact 222.

Steve Oultram, Golf Course Manager at Wilmslow Golf Club has been using a mounted Vredo SUPERCompact to mainly establish bent grass into the course’s 18 greens but has also overseeded with some fescue seed. A key reason for choosing the Vredo was its minimal surface disturbance and its speed; all 18 greens were seeded in a period stretching from 6am to 3pm.

“My first aim is to get a good rate of germination,” he says, adding. “Once the seed has germinated it needs to establish. By sowing in September we are able to mow the greens at a winter cutting height and have stopped verticutting and using wetting agents. This allows the young grass plants to establish over the autumn.”

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Happy snapping

BIGGA’s Golf Photographic Competition is back for 2011, so it’s time to dust down your trusty camera, go out on your golf course and get snapping!

BIGGA’s Golf Photographic Competition, back for its sixth year, creates an opportunity for members to display their artistic flair, while also earning some publicity for their club.

The winner will receive a full course profile in GI and a special prize, while the 12 best pictures will be selected for the 2012 BIGGA Calendar.

Digital pictures need to be high resolution, at the largest size capable by the camera, as it may ultimately be scaled up to A3 print size (42cm wide x 29.7cm high).

Please label your entries with captions – the name of the course plus a brief description (around 10 words). It would be great if you could also tell us the spec of camera it was taken on too.

Please note, cropping may occur if photos are to appear in the magazine or calendar. Also ensure digital photos do not show the time/date display!

Anyone wishing to enter should email them to tom@bigga.co.uk, entering ‘BIGGA PHOTO COMP 2011’ as the email subject header.

All entries need to be received by July 31, 2011, and only BIGGA members are eligible to enter.

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Promoting best practice in sports turf management
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Promoting best practice in sports turf management
Scottish Region

East of Scotland

The Spring Outing was played over Craigleith Golf Links on the 19th of April and the weather was sunny and calm just as it should be. The course was in good order, and the weather was perfect for the day. The results were as follows:

1. D. Wilson, Bents Park GC, 76 Nett.

West

By the way you read this the sun will be scorching the surfaces but it does mean that the golfers will be having a great time. The tournament went well and there were no problems. The golfers were in good order and the weather was perfect for the day. The results were as follows:

1. D. Wilson, Bents Park GC, 76 Nett.
3. M. Harvey's handicap has been reduced to 18.

Northern Region

As mentioned in the last issue the Autumn competition is to be held on October 26. This will be held at the local club and will be a 10-hole Stableford competition. The entry form will be sent out soon.

North East

On April 13 we played the Annual Spring Comp. at New Castle GC. This was the first time we had been there for many years, in fact I don't remember when we were last there, however, it was a good day and everyone had a good time. The course was in good condition and the greens were looking good. The weather was ideal for the day and we had a great time. The winners were:

1. Stuart Taylor
2. John Mair
3. M. Harvey
4. Simon Cowper

Good luck in June and see you all in July.