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NEW

Argold®

Herbicide

Discover gold on every green

BASF

We create chemistry

TECHNICAL GUIDE

Note from the team:
Introducing Argold® Herbicide

Dedicated to investing in the research and development for a complete, quality turf solution, BASF are excited to share a new Winter grass *(Poa annua)* management solution, Argold herbicide. For over 150 years, we have developed innovations that focus on current and pressing challenges. Controlling Winter grass *(Poa annua)* populations and their seedbank remains a key objective for turf managers, especially on highly maintained turf surfaces, as the demand for consistently pure and uniform greens continues to grow.

Argold herbicide offers a new powerful active ingredient for turf managers, striving for aesthetic and uniform surfaces. BASF, together with experienced distributor sales and technical teams, have focused on bringing an exceptional new tool to the market for the Australian Turf Industry. We are excited to introduce Argold herbicide, with both pre- and early post emergent activity against Winter grass *(Poa annua)*, to superintendents and turf managers across the country. We look forward to watching Argold herbicide reinvigorate the fight against one of the toughest weeds and anticipate its ongoing success as we bring new technologies and innovations to compliment this program in the near future.

BASF Professional and Specialty Solutions Team

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Argold®
Herbicide

Introducing Argold herbicide

Argold herbicide introduces a powerful new active ingredient for turf managers striving for aesthetic, uniform surfaces. As a highly effective solution for managing Winter grass *(Poa annua)* in high-performance turf, Argold herbicide offers both pre- and early post-emergent control. Its low application rates and flexible program structure allows for effective weed management without compromising playability or premium surfaces.

Argold herbicide is the new gold standard in Winter Grass (*Poa annua)* management for greens of envy, setting a new benchmark for herbicide programs on premium surfaces. It delivers high performance, while maintaining exceptional turf quality when label and technical guidelines are followed.

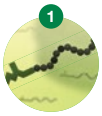
Active ingredient	Cinmethylin 750 g/L
Mode of action	Group 30 herbicide Inhibition of fatty acid thioesterase (FAT), which irreversibly disrupts cell membranes and damages emerging plant tissue. In pre-emergent treatments, seedlings quickly become unable to survive and grow.
Formulation	Emulsifiable concentrate (EC)
Situation	Highly managed turf surfaces including but not limited to: Golf course greens, tees and bowling greens
Target weed	Winter grass *(Poa annua)*
Tolerant turf species	Creeping Bent grass *(Agrostis stolonifera)* Couch grass *(Cynodon dactylon)* Hybrid couch grass *(Cynodon dactylon x Cynodon transvaalensis)*
Application rate	0.35 - 0.5 L/ha
Spray interval	4 - 6 weeks
Water volume	800 L/ha + 2 - 5 mm overhead irrigation
Pack Size	1 L

Argold herbicide
The science behind

Argold herbicide is a Group 30 herbicide. Its active ingredient, cinmethylin, functions by inhibiting fatty acid thioesterase, an enzyme critical to fatty acid biosynthesis in plants. This disruption impairs the formation of essential lipids, leading to cell membrane damage and ultimately plant death. The uptake of cinmethylin is mainly through the roots of germinating weeds where it disrupts the development of weed growing points, roots and shoots.

Mode of action

Argold herbicide disrupts vital cell membrane processes. Emerging weed plant tissue is adversely impacted, disrupting germination and weed emergence.



Intermediate fatty acid chains bind 16 to 18 carbon atoms to Acyl carrier proteins in plant cell plastids.

Fatty acid chain elongation is terminated by the enzyme family Fatty Acid Thioesterase (FAT).

The released fatty acid chains are then exported to the endoplasmic reticulum, where they are further processed and assembled into the lipids that make up the cell membranes.

Argold herbicide specifically targets the FAT enzyme, blocking its ability to release fatty acid chains from their Acyl carrier proteins.

Fatty acids never make it to the endoplasmic reticulum, and the assembly of lipids into cell membranes is disrupted.

When fatty acid storage is depleted, weed seedlings quickly become nonviable and fail to grow.

Fatty acid biosynthesis occurs in all plants to generate essential components of membranes and signalling molecules.

It is important to remember that the rate of fatty acid synthesis varies depending on developmental stage, tissue type, and environmental conditions. It's not constantly high everywhere.

Fatty acid biosynthesis, and the impact that Argold herbicide has on this process, is particularly pronounced in newly emerging weeds. In these plants there is an abundance of young, actively growing tissues (including emerging leaves, shoots, and germinating seeds) which require new cells and membranes. Without adequate supply of fatty acids, the weed becomes nonviable.

In mature tissues of more established weeds, the demand for fatty acids is lower because membrane turnover slows down. In this case Argold herbicide has a less significant opportunity to detrimentally impact the weed in which the end result is immediate plant death. Instead, Argold herbicide concentrates its impact on emerging tissue of the weed seedhead.

Value to turf managers | Features and benefits

- New powerful active ingredient for the turf industry.
- Weed management tool to help achieve aesthetic uniformity on premium surfaces.
- Winter grass *(Poa annua)* management solution with pre- and early post-emergent activity.
- Flexible application programs which can be tailored to individual site goals and high performing turf.
- High efficiency while maintaining playable surfaces.
- Safe for use on premium surfaces, including greens, when label and technical directions are followed.

Factors that optimise a successful Argold herbicide program

Considering the highly complex nature of the target weed, Winter grass *(Poa annua)*, tailoring an Argold herbicide program requires careful planning to address pre-application considerations, accurate application and placement, and evaluation of success – both visual and non-visual results.

Key factors that optimise a successful application program include:

Timing is everything: optimise success by targeting susceptible weeds early

- Targeting pre-emergent control, or newly establishing weeds should commence from early autumn (or when new weed germinations are frequently noticed). Typically, Winter grass *(Poa annua)* germination begins when soil temperatures fall below 21°C for several consecutive days.
- Late season application programs commencing from late winter, or those targeting perennial biotypes, may only achieve weed suppression.

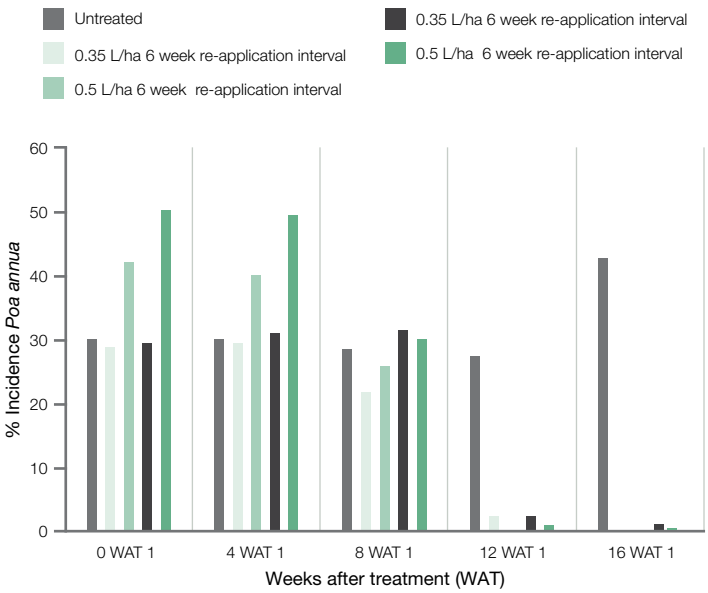


Figure 1: Argold herbicide autumn program on Bent grass (Agrostis stolonifera)

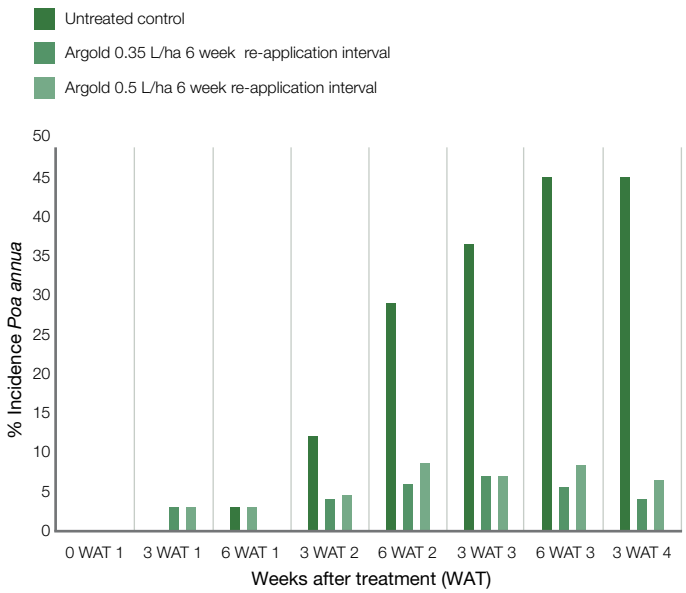


Figure 2: Argold herbicide autumn program on Hybrid couch grass (Cynodon dactylon x C. transvaalensis)

Application timing will guide the weed symptoms: Here's how to read them

- Successful programs will target pre-emergent or early post emergent plant growth stages when Argold herbicide achieves the biggest disruption to tissue production.
- Post emergent applications, targeting established weeds or perennial biotypes, will disrupt the tissue production of the weed seedhead. It is important to note the plant may still exist for a period of time, however, in an impaired state, a *green skeleton.*
- Understanding the initial weed population (%), average growth stages, and dispersal in the host turf population is critical for maintaining a playable surface and predicting weed control outcomes. Table 2 outlines typical symptoms of control.

Table 2: Typical Symptoms of Control

Pre-emergent treatments	Root and shoot growth of sensitive plants is inhibited and often the weeds never emerge. Where they do emerge, leaves show yellowing and discolouration, before the plant withers and dies due to pruned roots and compromised ability to persist.
Early-post emergent treatments	Immature plants at earlier growth stages typically continue to yellow, become necrotic, and regress. Yellowing is typically observed from 3 weeks after application.
Post emergent treatments	Established plants at later growth stages, or perennial biotypes, may seemingly recover from the yellowing, however, typically fail to produce a seedhead. These plants become a *green skeleton* with decreased biomass and seed set. Death of the plant may not be observed in a single seasonal program.

Note: Treatment effect may be expedited following heavy rainfall.

Figure 3: Typical yellowing of Winter grass (Poa annua) following Argold herbicide application

Build an Argold herbicide application program that aligns with surface needs and seasonal practices

- Typically, 3 applications of Argold herbicide are required to yield significant population decline of susceptible weeds.
- Visual population decline is not the sole indicator of program success and pre-emergent weed management is typically occurring simultaneously.
- A maximum of 4 applications per year are permitted. Program scheduling should align with other considerations of the label and typical cultural or maintenance practices. For example, Argold herbicide is not permitted for use in conjunction with Trinexepac Ethyl products and must not be simultaneous with maintenance practices which extensively disturb the soil profile.
- Figure 4 depicts a possible program design with applications at 6-week re-application intervals, scheduled around typical PGR and spring renovation periods. This may be flexibly tailored to include shorter re-application intervals, or a slightly later program commencement accommodating autumn renovations, dependent on the site-specific goals and population dynamics.

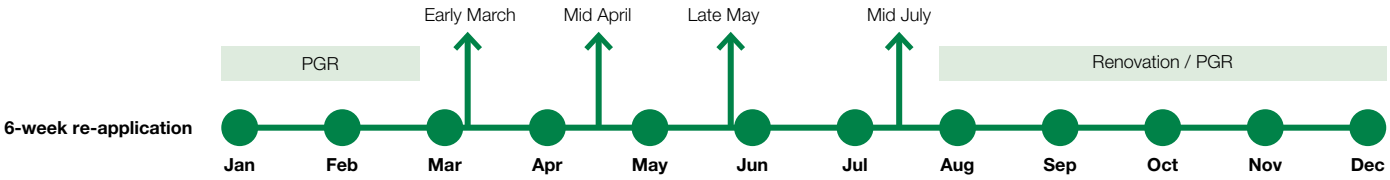


Figure 4: Example scheduling of an Argold herbicide program considering seasonal PGR applications and spring renovations

Support turf safety through careful placement and irrigation practices

- Host turf safety is maintained by keeping clear separation between the Argold herbicide treated zone and the host turf root zone. Therefore, ensuring a healthy host turf root zone exists prior to initial applications is essential. If the root zone is pruned, or compromised, then applications should not go ahead.
- Weed control is optimised by achieving precise product placement in the weed seedbank, typically in the upper thatch.
- Calibrated irrigation, measured in mm not minutes, and confirmed with catch cans across the surface, is recommended prior to application.
- Immediate, accurate post application irrigation (2-5 mm) will:
    - Reduce product volatilisation – where a substance turns into a gas or vapor and escapes into the air;
    - Reduce risk of host turf leaf burn;
    - Ensure optimum product placement.
- Figure 5 highlights the key considerations and aims of immediate post application irrigation:
    - Creating clear separation between the Argold herbicide treated zone and the host turf root zone;
    - Precise product placement in the weed seedbank.

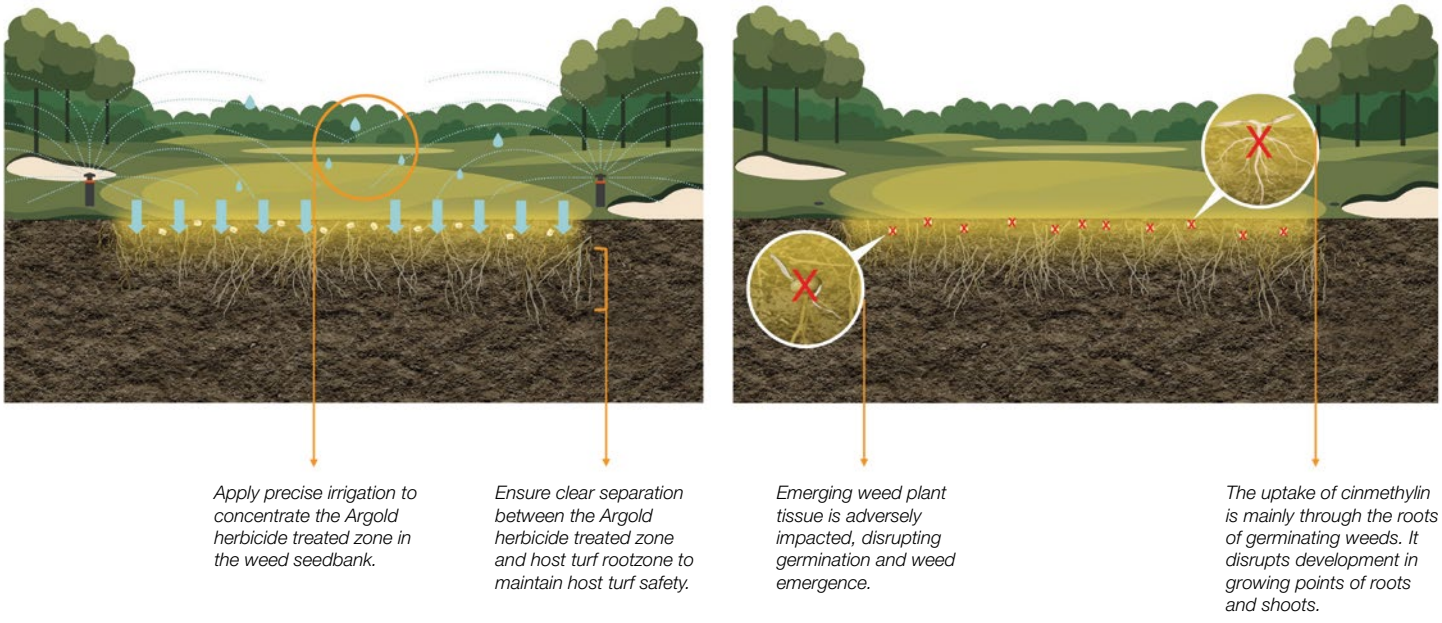


Figure 5: Recommended Argold herbicide product placement

Tailor your program with a dual acceleration strategy

Application programs must be tailored, considering the goals of the surface, and the population dynamics of Winter grass *(Poa annua)* characteristic of the site. While the label flexibly allows a dual acceleration strategy, technical advice aligns with a conservative approach whereby applications begin at the lowest label rate, 0.35 L/ha, and longer re-application interval, 6-weeks.

For sequential applications, the program design supports end users to make progressive decisions based on symptoms and population decline. Users should consider the following when planning their application program:

- **Goals of the surface**
  - Is maintenance of a playable surface essential?
  - Is the pace of population reduction the priority?
- **Population dynamics / site specifics**
  - What is the average weed growth stage / time of season / overall population % / weed burden?
  - What is achievable (number of applications / expected outcome)?
  - Weed population dispersal (concentrated patches or evenly distributed)?

Dual program acceleration:

1. **Rate** – this accelerator should be used first based on the specifics of the site. It is recommended for initial applications to start conservatively, 0.35 L/ha and 6-week re-application interval, gauging continuity of symptoms after the initial application.
2. **Application interval** – this accelerator should be used last, after evaluating results of varying the rate. This accelerator will be useful with populations that are evenly dispersed throughout the host turf which can typically withstand a more aggressive strategy.

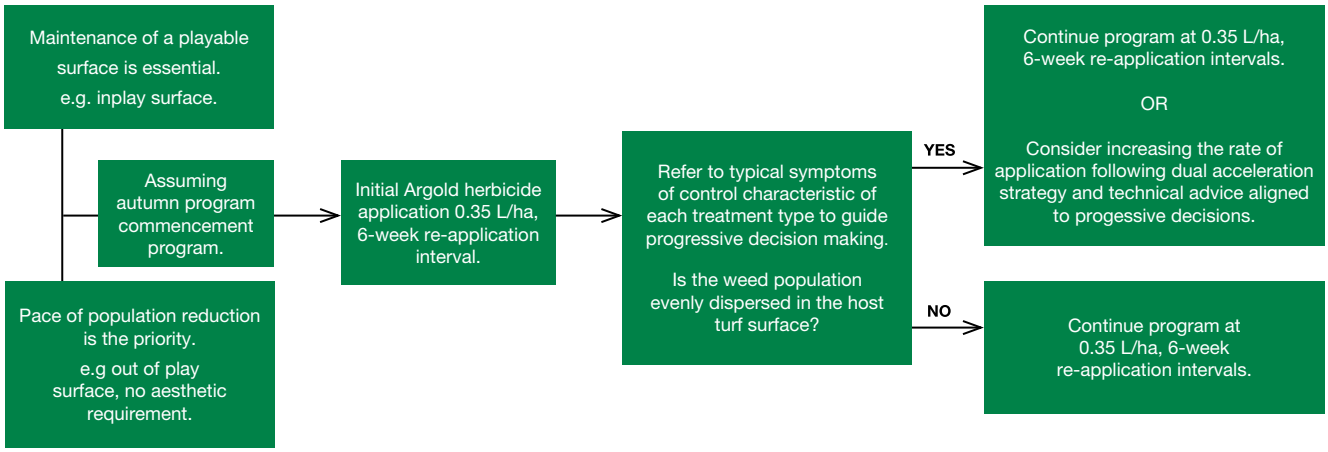


Figure 6: Suggested decision pathways for tailored application planning

Tailoring an Argold herbicide program

A tailored Argold herbicide program will consider and address the factors that optimise successful applications. Label particulars, technical recommendations, and therefore the program design, supports users to make progressive decisions based on symptoms, population decline and host turf health.

The **Best Practice Application Program Checklist** is designed to assist users by capturing key considerations to achieve a favourable program outcome. Completing this checklist for each surface helps reduce variability in outcomes, though some differences may still arise due to local or cultural factors.

Best Practice Application Program Checklist

- ☐ **1.** Review label directions, technical materials and advice to plan commencement of the applications.
- ☐ **2.** Understand the site: cultural / maintenance practices, initial host turf health, program goals, weed population % and dynamics (growth stage and dispersal).*
- ☐ **3.** Take core samples to assess root depth of Winter grass (*Poa annua*) and host turf. Ensure samples are representative of the average AND weakest rooting areas present in the surface.
- ☐ **4.** Calibrate irrigation using catch cans, preparing to measure in mm not minutes.
- ☐ **5.** Consult weather forecast for suitable conditions. Complete a representative patch test on each surface monitoring effects for 7-14 days.*
- ☐ **6.** Calculate size of the target surface to ensure accurate application. Consult weather forecast for suitable conditions. Complete the first application at 0.35 L/ha with particular attention to avoid overlap and deliver precise irrigation. Monitor turf health and weed symptoms for the following 6-weeks.*
- ☐ **7.** Complete sequential applications aligning with tailored application programs (up to 4 sequential applications per year). Monitor turf health and weed symptoms to guide progressive decisions.*

Key Technical Recommendations

- Repeated applications at lower rates will enable host grass to grow in at a similar or equivalent rate to the weed removal, ensuring the quality and usability of the turf surface is maintained.
- Higher application rates and shorter re-application intervals typically achieve faster weed control than lower application rates and longer re-application intervals.
- If plants seemingly recover following application, consider increasing the application rate. If this is observed for two consecutive applications at 0.5 L/ha, consider implementing a reduction in re-application interval to 4-weeks. Sequential applications at 4-weekly re-application intervals should consider host turf health before application.*

***If any adverse turf safety effects are observed, discontinue further applications until the turf has fully recovered.**

Evaluating success of an Argold herbicide program

The success of an Argold herbicide program is not exclusively defined by visual results. Ongoing management of weed populations requires year on year **program continuity and consistency. Depending on the type of treatment applied, users can expect a combination of visual and non-visual results throughout the program (Table 3).**

Table 3: Visual and non-visual metrics for success of an Argold herbicide program

Pre-emergent treatments	Reduction of weed emergence Seedbank management in year-on-year seasonal programs
Early-post emergent treatments	Visual population reduction / decline and host turf grow in Persistent yellowing / tissue necrosis (browning) / plant death / intermittent bare ground or surface thinning as weeds regress Seedbank management in year-on-year seasonal programs
Post emergent treatments	*Green skeleton* – decreased biomass and seed set Seedbank management in year-on-year seasonal programs

Case study

Observing Change: A visual look at Winter grass (*Poa annua*) control with Argold herbicide

Initial applications of Argold herbicide were applied in early July to turf with an estimated 60–70% Winter grass *(Poa annua)* infestation. Three weeks after the first application, early yellowing of Winter grass *(Poa annua)* was visible. By six weeks, significant Winter grass *(Poa annua)* population management was evident.

Due to weather and scheduling constraints, the second application was made at an 8-week re-application interval, slightly later than the recommended 6-week re-application interval. Despite this delay, the treated areas showed strong recovery and regrowth of the host turf following the first two applications.

By mid-October, after two herbicide applications, the 0.35 L/ha rate achieved a 78% reduction in Winter grass *(Poa annua)* population, while the 0.5 L/ha rate achieved an 89% reduction.

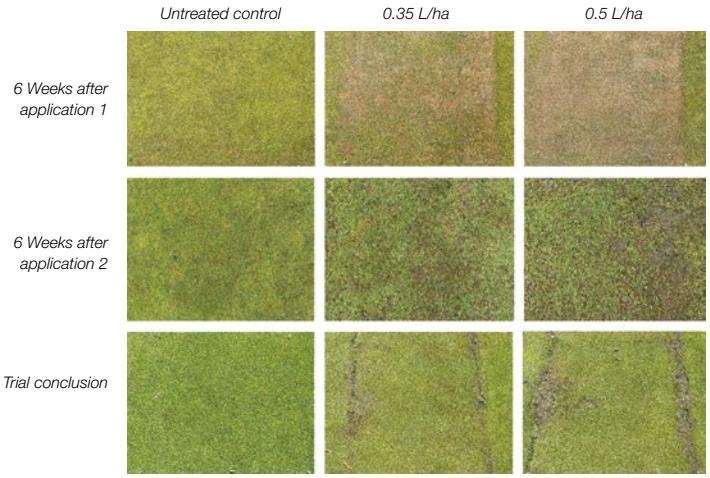


Figure 7: Visual population decline of Winter grass (Poa annua) following Argold herbicide applications.

Note: The defined, thinning edges of the plots is due to frequent overlap by the small plot sprayer during applications. These edges often receive more than 2X rates at each application.

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FAQ's

How do I select a rate for my Argold herbicide application?

Application programs must be tailored, considering the goals of the surface, and the population dynamics of Winter grass *(Poa annua)* characteristic of the site. While the label flexibly allows a dual acceleration strategy, technical advice aligns with a conservative approach whereby applications begin at the lowest label rate, 0.35 L/ha, and longer re-application interval, 6-weeks.

For sequential applications, the program design supports turf managers to make progressive decisions based on symptoms and population decline.

Is a small plot test essential for every surface?

Argold herbicide has been tested on a range of turf cultivars without damage. However, some species and varieties are particularly susceptible to chemical products. As sensitivity may be related to local conditions it is advisable that a small test plot of turf is treated first to determine reaction to the product before treating entire surface.

Due to the variability of surfaces, even within the same site location, it is recommended that a small test plot of turf is treated on every surface.

When should I expect to see the effects of the application?

For early-post emergent treatments, yellowing is typically observed from 3 weeks after application. Typically, 3 consecutive applications are required to yield significant population decline of susceptible weeds.

It is important to note that the success of an Argold herbicide program is not exclusively defined by visual results, in some cases the visual results will be subtle, for example when perennial weed biotypes are treated this may result in a persistent *Green skeleton.*

What is a *Green skeleton*?

A *Green skeleton* is a Winter grass *(Poa annua)* plant which has been treated, likely in a post emergent application, though has not died immediately as a result. Although it still exists, a *Green skeleton's* tissue production has been disrupted, typically in the weed seed head. This plant will exist in an impaired state with reduced biomass and vitality for ongoing survival. It is likely this plant will subtly regress over time.

Is Argold herbicide suitable for use in conjunction with PGR, herbicide or renovation programs?

Argold herbicide is not permitted for use in conjunction with Trinexepac Ethyl products and must not be simultaneous with maintenance practices which extensively disturb the soil profile.

Applications of Argold herbicide should not be made to turf which has been stressed through disease, insect damage, frost, nutrient deficiencies, or other herbicide use.

Can I apply Argold herbicide to other surfaces outside of golf course greens, tees and bowling greens?

Argold herbicide can be applied to other highly managed turf surfaces of Creeping Bent grass *(Agrostis stolonifera)*, Couch grass *(Cynodon dactylon)*, and Hybrid couch grass *(Cynodon dactylon x Cynodon transvaalensis).*

In areas of higher cut situations, e.g. a golf course collar or similar, pre-emergent application timing is critical as this provides the most significant opportunity for Argold herbicide to impact the weed's fatty acid production (during germination and early establishment). Post emergent treatment of large, advanced Winter grass *(Poa annua)* plants in this situation is unlikely to yield favourable results.

Why is there variation in weed control symptoms throughout the surface?

A surface naturally includes a diverse population of weeds of different growth stages. Argold herbicide has greater capacity for impact in newly emerging plants because the rate of fatty acid synthesis is more rapid and more critical. By comparison, in mature tissues of established plants, the demand of fatty acid synthesis is lower because membrane turnover slows down. As a result, some variation in visual symptoms may exist after Argold herbicide applications.

The visual results of the application aren't obvious, is the product working?

It is important to note that the success of an Argold herbicide program is not exclusively defined by visual results. The expected results, both visual and non-visual, are directly related to the type of treatment (pre-emergent vs. early-post emergent vs. post emergent/perennial biotype).

Subtly visual or non-visual results include: ongoing reduction of weed emergence; management of seedbank year-on-year due to declining population and creation of *Green skeleton* plants which have decreased biomass and seed set, yet still may exist for a period of time following application.

The host turf has sustained minor damage from the Argold herbicide application, what is the recommended action?

If any adverse turf safety effects are observed, discontinue further applications until the turf has fully recovered. Although uncommon, minor transient discoloration may occur on the host grass after repeated applications, however, this should recover by 28 days after treatment.

For more information on Argold® Herbicide, visit **turf-solutions.basf.com.au** or call **1800 558 399**

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ALWAYS READ AND FOLLOW LABEL DIRECTIONS BEFORE USING ANY PRODUCT IN THIS FACT SHEET.