



Annex 1: Application form for a temporary derogation to use a 'highly hazardous' pesticide : **PROPYZAMIDE**

This form shall be used to submit derogation requests for the use of 'highly hazardous' pesticides to FSC.

Part A of this form pertains to common information which is required for all forest management enterprises included in the derogation request.

Part B pertains to specific information which shall be completed for each of the forest management enterprises applying for the derogation.

Note: Applications must be submitted in English and follow the Forest Managers' Checklist (FSC-PRO-01-004a).

Part A: Common information for all forest management enterprises in the UK.

General Requirements - This is a joint application by SGS Qualifor, Soil Association Woodmark and Control Union working together in cooperation and assisted by their clients and the UK Forest Research agency (FR) for those of their UK clients requiring derogation for highly hazardous products. SGS, SA and CU Certificate holders within the UK (England, Scotland, Wales and Northern Ireland) have common management protocols with regard to controls over use and programmes to pursue alternatives. This is therefore a common UK level application Part A for these certificate holders. Part B will be specific to each of the forest management enterprises.

Confidentiality - The information contained within this application form and all its associated appendices is business confidential to SGS Qualifor (SGS), Soil Association Woodmark (SA) and Control Union (CU) and their certificate holders. It represents work by SGS plus FR on behalf of SA and CU as part of their co-operative working arrangement for derogations as facilitated by the UKWAS organisation. (UKWAS is the UK Woodland Assurance Standard, the FSC endorsed local standard for the UK.) It is for the sole purpose of a derogation application for their clients in communication with FSC International. Apart from their certificate holders, SGS, SA, CU and FR, it may not be passed to other Certification Bodies or third parties verbally or in any written format without prior written permission by SGS. Such written permission shall of course not be withheld to third parties, such as appropriate stakeholders, deemed appropriate collectively by SGS, SA & CU or requested by FSC International or FSC-UK in prior written collective consultation with SGS, SA and CU.

Application Submission date:	
Name, and contact details of certification body requesting a temporary derogation:	Douglas Orr & Co. Programme Manager, SGS Qualifor Forest Management Certification for the UK & Ireland 9 Dundas Avenue North Berwick East Lothian EH39 4PS e: douglasorr@btinternet.com

	<p>t : +44 (0) 1620-893093 Andrew Grundy, Certification Manager Soil Association Woodmark South Plaza Marlborough Street Bristol BS1 3NX UK e: t: ++ 44 (0) 1179142435</p> <p>Phil Webb, Certification Manager Control Union Suite 2a, 7th Floor, City Reach, 5 Greenwich View Place, Mill Harbour, Isle of Dogs London, E14 9NN e: pwebb@controlunion.com t: +44 (0)20 7488 2210</p>
Active ingredients for which a derogation is being requested:	Propyzamide
Trade name and formulation types of the pesticides:	<p>The most commonly used trade name is 'Kerb' in the following formulation types :</p> <p>Kerb 50W (50% w/w wettable powder) Kerb Granules (4% w/w granules) Kerb Flo (400 g/l suspension concentrate)</p> <p>In addition, the following trade names are also currently approved and may be used :</p> <p>Artax Flo Barclay Propyz Careca Cohort Conform Dennis Edge 400 Engage Flomide Hazard Hentsch Hockley Propyzamide 40 KeMiChem - Propyzamide 400 SC Levada MAC-Propyzamide 400 SC Master Lean 500 SC Master Prop 40 Megaflo Menace 80EDF Pizamide Pizamide 10 Pizza 400 SC Pizza Flo Ponder</p>

	Ponder WP Precis Prop 400 Proper Flo Propyzamide 400 Propyzamide Flo Prova PureFlo Pyramid 400 SC Quaver Flo Relva Relva Granules RouteOne Zamide Flo Setanta 50 WP Setanta Flo Shamal Solitaire Solitaire 50 WP Standon Santa Fe 50 WP Stroller Stymie Verdah 400 Verge 400 Zamide 400 Zamide 80 WG Zamide Flo				
Method of application and application equipment:	<p>A herbicide used for pre and post emergence control of established and germinating grasses, and some germinating herbaceous weeds, primarily after planting.</p> <p>It is a soil acting herbicide which slowly volatilises in cold soil and is taken up by germinating weeds and through the roots of existing weeds, especially grasses.</p> <p>Propyzamide slowly breaks down in the soil, lasting for 3-6 months. In the majority of cases requiring this herbicide an application of Propyzamide would only be required for two growing seasons to achieve sufficiently well established young trees.</p> <p>Applied through hand held 'pepper pot' action containers to shake out granules or occasionally mechanised applicators.</p> <p>Conventional sprayers are used for the liquid formulation.</p>				
Common and scientific name of the pest species:	Various grass (Monocot) species.				
Name and FSC certification codes of certificate holders¹ requesting a temporary derogation: With the exception of five standard (new) applications : Egger Forestry Ltd, UK Forest	SGS, SA and CU certificate holders as follows: <table border="1"> <tr> <td>extension applications</td><td></td></tr> <tr> <td>Forest Enterprise (FC)</td><td>SGS-FM/COC-010301</td></tr> </table>	extension applications		Forest Enterprise (FC)	SGS-FM/COC-010301
extension applications					
Forest Enterprise (FC)	SGS-FM/COC-010301				

¹ In the case of forest management enterprises applying for FSC certification, the FSC certificate holder code shall be substituted by the name of the company.

Certification Ltd, OCS Forestry Ltd (Fountain Forestry), RTS Ltd and Edwin Thompson Ltd ; all other applications are extension applications.	Scotland		
	extension applications		
	Forest Enterprise (FC) England	SGS-FM/COC-010297	
	extension applications		
	Natural Resources Wales (<i>ex Forest Enterprise Wales</i>)	SGS-FM/COC-009668	
	extension applications		
	UPM Tilhill	SGS-FM/COC-004552	
	extension applications		
	Scottish Woodlands	SGS-FM/COC-000260	
	extension application		
	DGA Forestry (<i>ex-David Goss & Associates</i>)	SGS-FM/COC-000324	
	extension application		
	Smiths Gore	SGS-FM/COC-003104	
	extension application		
	Highfield Forestry Ltd	SGS-FM/COC-002512	
	standard (new) application		
	Egger Forestry Ltd	SGS-FM/COC-010252	
	extension applications		
	The Crown Estate	SA-FM/COC-002666	
	standard (new) application		
	OCS Forestry UK Ltd T/A Fountain Forestry	CU-FM/COC-805592	
	standard (new) applications		
	UK Forest Certification Ltd	CU-FM/COC-820718	
	standard (new) application	CU-FM/COC-829328	
	RTS Ltd		
	standard (new) application		
	Edwin Thompson LLP Group scheme	SA-FM/COC-001288	

Scope for which a temporary derogation is being requested: (Derogation applications should be submitted at the smallest applicable geographical range)	The above certificate holders' FMUs within the UK for a period of 5 years.		
1. Demonstrated need Explain how the proposed use complies with the criteria for need specified below, including consideration of non highly hazardous alternatives and preventative silvicultural measures.			
<i>Need may be demonstrated where:</i> <ul style="list-style-type: none"> - <i>The pesticide is used for protecting native species and forests against damage caused by introduced species or for protecting human health against dangerous diseases, OR</i> - <i>Use of the pesticide is obligatory under national laws or regulations, OR</i> - <i>Use of the pesticide is the only economically, environmentally, socially and technically feasible way of controlling specific organisms which are causing severe damage in forest management units in the specified region (as indicated by documented evidence of current feasibility study reports: field-trials of alternative non-chemical or less toxic pest-management methods, cost-benefit analysis, social and environmental impact assessment);</i> <p><i>Please indicate briefly the usual practices for harvesting and re-planting /regeneration practices, in particular the method of harvesting (e.g. clear-cut, using a mechanized harvester, etc), which tree species are grown, the average time between successive rotations and harvest, and methods for site preparation.</i></p> <p>-----</p> <p>In UK conditions, competition from grasses with young trees represents one of the most serious vegetation management issues facing managers. Grass competition results in severe growth suppression, and directly and indirectly reduces survival of young trees. For the majority of new planting and restocking sites in the UK, if competing grasses are present but not managed, tree regeneration would probably either fail or be unacceptably delayed.</p> <p>The national restocking and new planting level is around 27,000 ha per annum across the UK. Assuming 5% of sites might be treated with Propyzamide, and 50% might fail without treatment, this could lead to 700 ha failing each year, and replanting costs of up to £1 million per annum. There would also be loss of increment and an increased period in the establishment phase.</p> <p>It is likely that as a result of the increased and improved use of the Hylobius Management Support System (HMSS), for instance by FE Scotland, the use of fallow ground area will increase resulting in an increase in the area of grass cover requiring to be weeded.</p> <p>The larvae of Clay-coloured weevils feed on the roots of plants, the emerging adults then feeding on the bark of conifer species, resulting in the increased use of insecticides. Improved weeding regimes</p>			

on restock sites may reduce the source of root-food for weevil larvae thus helping reduce the emerging background weevil population.

Under UK statute law woodland areas felled must be replanted to a standard acceptable to the Forestry Commission (regulatory authority division). This requires adequate stocking levels and suitable maintenance including weeding through to successful establishment beyond competition from vegetation and browsing damage. Any new planting schemes are invariably also subject to scrutiny by the FC regulatory authority with similar establishment standards required.

Forestry Commission Practice Guide 15 (Willoughby et al., 2004), which managers refer to construct their pesticide reduction strategies, provides full details of costs, efficacy and potential environmental impact of the various alternative control options. To briefly summarise from the Practice Guide, the main direct non chemical alternatives for the control of grasses in UK conditions are cultivation, mulches, hoeing / screefing, and the use of livestock.

Cultivation - Cultivation is routinely used to improve establishment success, but only on the least fertile sites in the UK is it wholly effective by itself in suppressing competition for grasses in the tree establishment phase. On a great many sites, additional weeding interventions are required, and the technique itself can have negative impacts in terms of soil erosion and nutrient leaching. On more fertile sites in the lowlands, for both regeneration and woodland creation, cultivation often makes weed problems worse (Willoughby and Moffat, 1996; Willoughby et al., 2004).

Hoeing or screefing is between 3-300 times more expensive than using propyzamide, and although of low environmental impact is economically impractical in most cases (Willoughby et al., 2004).

Mulching - The use of mulches is usually impractical on restock sites without extensive, high environmental impact brash (branch) raking and de-stumping, and cost is between 3-100 times more expensive than using propyzamide. In addition to the environmental impacts of brash raking and de-stumping, mulches must be made from plastic to be effective, and this provides a source of chemical waste unless the mulch is collected at the end of its useful life. However, collecting used, partially shredded mulch is often impractical (Willoughby et al., 2004).

Grazing - The use of livestock is only appropriate on very small scale sites, and then only as an alternative to mechanised pre-planting cultivation. Cutting, burning, the use of cover crops without additional weeding and biological control are not currently effective control measures (Willoughby et al., 2004).

Planting density – Planting sufficiently densely (i.e. in excess of 10,000 stems per hectare) to suppress grasses such that weeding is not required is usually uneconomic, although in the future, direct seeding may be a future option to achieve this economically on some new planting sites (Willoughby et al., 2004).

Good silvicultural practice, such as, for example, matching species to site, the use of high quality, larger planting stock and careful plant handling, all reduce the need to weed and are already routinely practised, but by themselves they cannot wholly eliminate the need to control competitive grasses on all sites (Willoughby et al., 2004).

The use of alternative silvicultural practices such as continuous cover forestry have been introduced on approximately 10% of the public sector (Forestry Commission Scotland, Forestry Commission England and Natural Resources Wales) and private sector estate, and have helped to reduce the need for grass weed control, but it is accepted that such techniques often do not wholly remove the need for grass weeding in the conditions prevalent in much of the UK (Mason and Kerr, 2001). In addition, alternative silvicultural practices are not, and will never be practical on many sites in the UK, due to issues of site stability, fertility, biodiversity and economics. Continuous cover forestry is also clearly not applicable for new planting sites (Willoughby et al., 2004).

Therefore, although a range of non-chemical approaches are already adopted on a site by site basis, there remain a significant number of sites for which, as a last resort, herbicide use is still currently necessary. For the sites where herbicide use is necessary as a last resort, the main options currently available to forest managers in the UK are **Propyzamide, Glyphosate or Cycloxydim**.

Propyzamide is a selective herbicide applied in the winter that controls all problem grasses. Unlike broad spectrum herbicides such as glyphosate, it is selective and does not damage trees or most other non-target flora (Willoughby et al., 2004). It is usually applied by hand held applicators as a spot of up to 1.2m diameter around trees in the winter. In recent years it has been used as a direct substitute for the more harmful herbicides atrazine and cyanazine. On more fertile sites, propyzamide's soil acting activity means that repeat applications of broad spectrum products are not required. On the most fertile sites, compared to glyphosate for which 3 or more applications a year for 3-5 years might be necessary, propyzamide might only need to be used twice in a 5 year establishment period, hence reducing the total amount of herbicide used and reducing the risk of non-target impacts from repeated broad spectrum applications. Propyzamide allows for the selective elimination of grasses before the critical period of weed competition with trees of April / May, so it can be more effective than late spring/early summer applications of non-selective glyphosate or graminicides such as cycloxydim, which to be fully effective usually cannot be applied earlier than mid to late April.

Applications of propyzamide in winter, particularly using granular formulations, even in full protective clothing are far less physically demanding to operators than applying herbicides such as glyphosate or cycloxydim in the hotter spring or summer. Given that in the absence of engineering controls personal protective equipment is required or recommended best practice for hand held application of all forest approved grass killing herbicides in the UK, the fact that propyzamide can be applied during cool autumn/winter weather greatly reduces the risk of injurious heat stress for operators. Users of pesticides in the UK are required to make a risk assessment under the Control of Substances Hazardous to Health regulations, and adopt approaches that are least hazardous to operators.

Therefore, where there are no non-chemical alternatives to herbicide use or suitable engineering controls, the result of this legally required risk assessment process will often be that propyzamide is the preferred pesticide option, because of the significant reduction in risk of heat stress and ill health to operators that using it represents.

Cycloxydim is a herbicide applied in the spring or summer. Unlike propyzamide, UK products are given a hazard classification of 'irritating to eyes and skin'. It is highly selective, and will not damage trees or other non-target vegetation (Willoughby et al., 2004). However, it is not a substitute for propyzamide in many situations as it only controls a limited range of grass species. For example, cycloxydim will not adequately control many *Fescue* sp., *Holcus mollis*, *Nardus stricta* and *Elytrigia repens*, amongst others, which are common competitors with newly planted trees (Clay et al., 2006). Often susceptible and non-susceptible grass species occur in mixture, and all need to be controlled in a discrete spot around trees to adequately release them from competition. For those limited grass species that are susceptible, cycloxydim can be an effective alternative to propyzamide, however unlike propyzamide it may require repeat treatments to be made. Single applications have a similar cost to propyzamide.

Glyphosate is a broad spectrum herbicide that will effectively control all grass species. Some UK product formulations are rated as 'not hazardous' to operators. Its cost is around half that of propyzamide. However, glyphosate is often impossible to apply without damaging trees and non-target vegetation, and may require several repeat applications on the most fertile sites (Willoughby et al., 2004). It is a common occurrence for grass weeds to grow in close proximity to young seedlings and often overtop them. In these cases, if glyphosate is to be used in the spring to prevent moisture competition through the critical part of the growing season without damaging trees, the grass would need to be cut back from tree by hand before spraying. This is often impractical without the cutting operation itself damaging trees, and is uneconomic (the total cost of the cutting and glyphosate spraying operation would be at least 3 times more expensive than the use of propyzamide by itself, even on those sites where the technique would be practical without damaging trees and where repeat treatments would not be required). Potential heat stress of operators is considerably higher than when using propyzamide, due to glyphosate applications being made primarily in the spring and summer.

In summary, there remain a significant number of situations where propyzamide is currently the only cost effective, environmentally, socially and technically viable method for controlling competing grasses in UK conditions. For example, this can be the case where alternative silvicultural approaches are impractical, where direct non-chemical alternatives are impractical, uneconomic or have significant

negative environmental impacts, where cycloxydim resistant grass species are present, and when glyphosate cannot be safely or economically applied without damaging trees or because heat stress for operators arising from summer applications is of particular concern. However, even if it were to be derogated, before any application of propyzamide would be made, managers would first need to consider the full range of alternative non-chemical and chemical options on a site by site basis, and select the option that is effective, practical, and offers the least risk to non-target wildlife, insects, fungi, aquatic life and flora (see Section B1 for further detail). The use of propyzamide, if derogated, would only be permitted if it could be demonstrated that no other effective, practical alternatives existed.

2. Stakeholder consultation

See Appendix :
All written Stakeholder Responses (verbatim) re. Propyzamide

All applications for derogations shall present the responses of the consulted stakeholders, including opinions and original comments on the need to use the 'highly hazardous' pesticide in the region concerned and on adequacy of control mechanisms to prevent, minimise and mitigate negative impacts on human health (of forest workers and the public) and the environment. The application shall also demonstrate how stakeholder comments were taken into account in its derogation application.

The required 45 day minimum consultation period took place between 09/02/15 and 26/03/15 and all stakeholder comments were collated by the UKWAS organisation with copy to FSC-UK, the UKWAS Pesticides Task Group, plus SGS, SA and CU. CU managed and analysed the stakeholder consultation on behalf of their certificate holders and those of SGS and SA.

A record of the stakeholder consultation process **will be/can be** viewed on the UKWAS website, www.ukwas.org.uk

Over 200 stakeholders (see list within appendices) were written to and their views sought.

As the Certification Body charged with responsibility for managing the consultation, CU has analysed the **xx** written responses received. Full verbatim responses are provided within the stakeholder response appendix but the **xx** responses received can be summarised as follows : **X** oppose derogation ; **X** have some concerns but do not oppose ; **X** support derogation ; **X** have no comment.

The applicants **will try/believe they have** taken account of stakeholder comments in finalising this application.

With regard to directly affected parties, including neighbouring communities, there are literally millions of people in the UK who make use of the forests managed by the applicants for recreational purposes alone. This makes full consultation with directly affected parties on a UK wide basis, impractical. The vast majority of these people have no technical knowledge about forestry in general and the use of pesticides in particular. So, for them to express their informed opinion would require detailed technical information to be disseminated to an enormous number of individuals and representatives of interest groups. Directly affected parties are however already protected by the strict rules and regulations governing the use of any (legally approved) pesticides in the UK and which cover this UK level derogation application. Breaking any of these rules leaves an operator/forest manager open to prosecution by the appropriate statutory agency in the respective country/region of the UK, e.g. Scottish Environmental Protection Agency, Environment Agency (England), Natural Resources Wales, Northern Ireland Environment Agency and the UK's Health & Safety Executive. Such agencies therefore represent directly affected parties and are consulted where appropriate via the forest

operations approval process required under UK statute forestry law and administered by the UK government's forestry agency, the Forestry Authority part of the Forestry Commission in Scotland and England, the Forest Service in Northern Ireland and in Wales via the environmental & forestry responsibilities of Natural Resources Wales.

Additionally, within this same forest operations approval legal process, any neighbouring communities and individuals directly affected by such operations should be consulted as local stakeholders and informed about operations likely to take place in their immediate local area. Such local stakeholder consultation is an FSC-UK standard / UKWAS compliance requirement.

Part B: Specific Information re. Forest Management Enterprise Requirements in the UK.

Forest Management Enterprise: **As per list within Part A.**
FSC Certificate Registration Code²: **As per list within Part A.**
Location /region: **Certificate holders' FMUs within the UK.**

1. Specified controls to prevent, minimise and mitigate hazards.

See Appendix :
Pesticides Regulation in the UK – General Background presentation

The derogation shall specify the controls that have been implemented to prevent, minimise and mitigate the hazards associated with the use of the pesticide, for example restrictions related to sensitive areas (e.g. groundwater zones or wildlife habitats), weather conditions, soil types, application method, water courses, etc.

If the specified formulation is considered to reduce the level of hazard then the information on which this claim is based shall be presented, and the applicant shall provide credible independent, third party support for the claimed reduction of hazard. The applicant shall indicate all pesticides in the formulation, including other active ingredients in mixtures.

European Commission safety review

Propyzamide has been subject to detailed international peer review of its toxicology and environmental impact by experts across the European Union via the EC Directive 91/414 process (European Commission, 2007). As part of this process, data dossiers were submitted by manufacturers, from which Sweden, acting as the rapporteur state for the European Commission, then produced a draft assessment report. The Commission then organised an intensive consultation of technical experts from Member States, to peer review the draft assessment report and, in particular in each of the following disciplines:

- identity and physical /chemical properties ;
- fate and behaviour in the environment ;
- ecotoxicology ;
- mammalian toxicology ;
- residues and analytical methods ;
- regulatory questions.

The dossier, the draft assessment report, the peer review report (i.e. full report) and the comments

² In the case of forest management enterprises applying for FSC certification, the FSC certificate holder code can be provided at a later stage, if and when the company achieves certification.

and clarifications on the remaining issues received after the peer review were referred to the Standing Committee on the Food Chain and Animal Health and specialised working groups of this Committee for final examination, with participation of experts from the 15 Member States.

This extensive review process concluded that propyzamide was safe to use as a plant protection product within Europe, and consequently it has been added to the European list of authorised active ingredients (referred to as 'Annex 1'). Individual member states are required to issue their own approvals for specific product formulation and end uses, based on the European Commission review and the specific recommendations on measures necessary to ensure human and environmental safety it includes.

Full details of the independent expert review of the safety of propyzamide undertaken by the European Commission (European Commission, 2007) are available at (http://ec.europa.eu/food/fs/sfp/ph_ps/pro/eva/existing/list1-33_en.pdf).

Bioaccumulation

Propyzamide is classed as highly hazardous by the FSC on grounds of its potential to bioaccumulate, as it has a Kow logP of 3.3. This is based on a simple cut off criteria of Kow logP>3, justified by a US Environmental Protection Agency report on persistent bioaccumulative toxic chemicals (EPA, 1999). In this report the EPA note that this cut off value is set lower than accepted international standards (quoted as Kow logP > 5), and that the lower value was chosen, in part, because they wished to monitor a wider range of potentially harmful chemicals in addition to those that were known to be extremely persistent.

However, based on a detailed peer review of toxicology and environmental safety, the European Commission review views the potential for propyzamide accumulation to be 'low', and states that:-

'With particular regard to residues, the review has established that the residues arising from the proposed uses, consequent on application consistent with good plant protection practice, have no harmful effects on human or animal health. The Theoretical Maximum Daily Intake (TMDI; excluding water and products of animal origin) for a 60 kg adult is 2.1 % of the Acceptable Daily Intake (ADI), based on the FAO/WHO European Diet (August 1994). Additional intake from water and products of animal origin are not expected to give rise to intake problems. The review has identified several acceptable exposure scenarios for operators, workers and bystanders, which require however to be confirmed for each plant protection product in accordance with the relevant sections of the above mentioned uniform principles. The review has also concluded that under the proposed and supported conditions of use there are no unacceptable effects on the environment, as provided for in Article 4 (1) (b) (iv) and (v) of Directive 91/414/EEC, provided that certain conditions are taken into account as detailed in section 6 of this report.'

The results of the European Commission review would seem to challenge the FSC view that propyzamide is a highly hazardous chemical, based on its potential for bioaccumulation.

Carcinogenicity

The US Environmental Protection Agency rates propyzamide as a potential endocrine disruptor (EPA, 2002). The European Commission does not categorise propyzamide as an endocrine disruptor (European Commission, 2007), although along with over 200 other substances its status is being reviewed due to a current lack of data. This work is ongoing and no conclusions on specific chemicals have been published. However, the UK Chemicals Regulation Directorate has commissioned an impact assessment which reviews the current available evidence of the endocrine disruptor status of around 100 active substances considered to be of most importance to UK agriculture and horticulture see -

<http://www.pesticides.gov.uk/guidance/industries/pesticides/News/Collected-Updates/Information-Updates-2014/January/Regulation+ EC No 1107 2009-progress on endocrine disruptors and candidates for+substitution>

After a detailed review of the available evidence, the report concludes that propyzamide falls into the

category of 'Endocrine disrupters less likely to pose a risk based on currently available data.' Although this is not a regulatory decision, it does nevertheless imply that propyzamide is of relatively little concern as regards its potential endocrine disruptor status, as long as existing measures to limit exposure to operators are implemented.

The US Environmental Protection Agency rates propyzamide as a probable human carcinogen, but with inadequate evidence in humans (EPA, 2002). The European Commission categorises propyzamide as having limited evidence of a carcinogenic effect (European Commission, 2007). In both cases the risk to operators from exposure has been judged acceptable if suitable engineering controls are in place or adequate protective clothing is worn.

Protective clothing

The UK Chemicals Registration Directorate issues approvals for specific pesticide products in the UK formulated using authorised active ingredients listed on Annex 1, based on a detailed assessment of the likely risk of formulations to operators, the public and the wider environment. Conditions of use are listed on product labels, and it then becomes mandatory for all users to comply with these requirements. The current UK label approval for most products containing propyzamide requires personal protective clothing to be worn.

Regardless of any legal requirements for protective clothing, as an additional precautionary measure, it has long been the policy of the ex-Forestry Commission countries (FES, FEE & NRW) that for all applications of any product containing propyzamide made on their land, it is mandatory for operators to wear chemical resistant gloves, boots, and coveralls with an integral hood (Willoughby and Dewar, 1995). In situations where the risk of operator exposure is higher, for example handling the concentrated product, or applications above waist height, then the use of face shields and respiratory protection is also required.

Evidence of meeting these requirements in practice can easily be verified by certification bodies via forest management units Control of Substances Hazardous to Health risk assessment records.

Integrated weed, pest and disease management

The core decision key contained in Forestry Commission Practice Guide 15 (Willoughby et al., 2004) provides the basis of an Integrated Pest and Weed Management Approach for UK conditions. It has been adopted as a key reference underpinning the UK Woodland Assurance Standard (UKWAS). Recently published FSC guidance on Integrated Pest Management (FSC, 2009) has suggested that in future, all FSC certified estates should consider following a similar decision process. Managers on the public and private sector estate have already used Forestry Commission Practice Guide 15 to develop a detailed and specific pesticide reduction strategy for each Forest District (or equivalent) or company.

These strategies follow the principles outlined in the Practice Guide core decision key (Willoughby et al., 2004; FSC, 2009), to ensure that for each operational site, consideration is given to the full range of options including determining if the impact of the competing vegetation is sufficient to warrant any interventions at all, and if alternative silvicultural practices can avoid the problem. If remedial control measures do prove necessary, non-chemical methods are adopted as a first resort, unless they prove to be impractical or excessively costly. If, as a last resort, chemicals need to be used, the pesticide and application method that is effective, but that poses the least risk to humans and any non-target wildlife, insects, fungi, aquatic life and flora, is selected. Thus, if derogated, propyzamide would only be used on a particular site on the forest management unit if cost benefit analysis indicated that non - chemical methods were likely to be impractical, environmentally damaging or excessively costly. If, as a last resort, chemical use was judged to be the only practical option, propyzamide would only be adopted if it was effective and posed the least risk to operators, the environment and other forest users, and if no other non 'highly hazardous' chemical was suitable. Again, this approach is easily auditable by certification bodies.

Specified controls listed in the preceding text apply to **all** applicant certificate holders. However, since FSC stipulate that the sections on hazard mitigation and development of alternative methods of control need to be "*individually implemented and certificate holder identifiable*" a summary of control for each applicant is listed below in addition.

Existing controls by certificate holders to mitigate use of Propyzamide in the UK are as follows :

- Good silvicultural practice, such as, for example, matching species to site, the use of high quality, larger planting stock and careful plant handling.
- *Conducted by : Forest Enterprise (FC) Scotland ; Forest Enterprise (FC) England ; Natural Resources Wales ; UPM Tilhill ; Scottish Woodlands ; DGA Forestry ; Highfield Forestry Ltd ; The Crown Estate ; UK Forest Certification Ltd ; Egger Forestry Ltd ; RTS Ltd ; OCS Forestry Ltd (Fountain Forestry) ; Smiths Gore.*
- Strictly minimise Propyzamide use and consider existing alternative non-hazardous methods, i.e. cultivation, mulching and grazing, alternative products (e.g. Glyphosate, Cycloxdim).
- *Conducted by : Forest Enterprise (FC) Scotland ; Forest Enterprise (FC) England ; Natural Resources Wales ; UPM Tilhill ; Scottish Woodlands ; DGA Forestry ; Highfield Forestry Ltd ; The Crown Estate ; UK Forest Certification Ltd ; Egger Forestry Ltd ; RTS Ltd ; OCS Forestry Ltd (Fountain Forestry) ; Smiths Gore.*
- Strictly follow UK regulations for use of pesticides when deciding to use Propyzamide.
- *Conducted by : Forest Enterprise (FC) Scotland ; Forest Enterprise (FC) England ; Natural Resources Wales ; UPM Tilhill ; Scottish Woodlands ; DGA Forestry ; Highfield Forestry Ltd ; The Crown Estate ; UK Forest Certification Ltd ; Egger Forestry Ltd ; RTS Ltd ; OCS Forestry Ltd (Fountain Forestry) ; Smiths Gore.*
- Develop new non-hazardous methods by maintaining awareness of work by the UK Forest Research Agency in trying to develop alternative methods to Propyzamide use.
- *Conducted by : Forest Enterprise (FC) Scotland ; Forest Enterprise (FC) England ; Natural Resources Wales ; UPM Tilhill ; Scottish Woodlands ; DGA Forestry ; Highfield Forestry Ltd ; The Crown Estate ; UK Forest Certification Ltd ; Egger Forestry Ltd ; RTS Ltd ; OCS Forestry Ltd (Fountain Forestry) ; Smiths Gore.*

2. Program to identify alternatives to a 'highly hazardous' pesticide including preventative silvicultural measures.

Describe the programs that are in place to identify alternatives, include a timetable and indicate research partners and targets:

See Appendix : Forest Research report on trials of alternatives to Propyzamide

The forest management enterprise shall describe the programs which will be put in place during the proposed derogation period, designed to identify and develop alternative pest control methods which do not use 'highly hazardous' pesticides. Forest management enterprises shall describe in detail what kind of alternatives or silvicultural measures will be investigated on what area and what research partners may be involved (e.g. university, enterprise, government agency, or other certificate holders). A timetable and documentation (on ongoing activities, targets, resources) has to be provided regarding the program for alternatives. The applicant should include information on the authorities for pesticide registration and which other non 'highly hazardous' pesticides are registered in their country for controlling the pest organism.

In accordance with the requirements of UKWAS section 5.2 'Pesticides, biological control agents and fertilizers', all UK certificate holders must comply (amongst many other associated requirements inc. minimisation) with the following:

Ref. UKWAS 5.2.1 a) "The owner/manager shall prepare and implement an effective Integrated Pest

Management Strategy, which:

- *Adopts management systems that shall promote the development and application of non-chemical methods of pest and crop management*

Ref. UKWAS 5.2.4 "Pesticides and biological control agents shall only be used if:.....pesticides whose use is restricted by the certificate holder's certification scheme shall not be used unless:

a) no effective and practicable alternatives are available, and

c) any such mechanism provides for their use to be justified and on the condition that usage shall be discontinued once effective and practicable alternatives are available.

As per above, it is an UKWAS requirement for certificate holders to be actively reviewing the latest published advice on alternatives to propyzamide as it becomes available, and incorporating such advice into their integrated pest management strategy as appropriate.

Therefore, there is commitment under FSC-UK standard (UKWAS) certification, that forest managers are required to actively pursue alternatives to pesticide use in determining which pest control methods are viable options, in order to demonstrate a decision process that is UKWAS compliant. UK certificate holders are clearly aware that failure to do so will result in a certification non-compliance.

The results of the scientific programmes of the UK's Forest Research agency (FR) - a separate government funded division of the Forestry Commission - will therefore be followed by certificate holders. Given the level of investment in expertise and resources required, it is not financially realistic, nor often sensible, for individual certificate holders to conduct their own scientific research without input from the FR or academic research bodies.

The Forest Research agency has two research stations, one in England and the other in Scotland, so that the whole of the UK is represented and each station's programmes are relevant to the issues of UK forestry. The organisation is relatively well resourced and manages its research with targets and timelines. It fully recognises the importance of this issue to UK forestry and its potential impact upon FSC-UK certification/UKWAS requirements. Results and advice are widely disseminated reaching forest managers in both public and private sectors through the forestry media of general publications, technical guidance papers and scientific journals. A highly relevant and relatively recent example is Forestry Commission Practice Guide 15 (<http://www.forestry.gov.uk/forestry/infd-76lgsn>) Reducing Pesticide Use In Forestry, which applies to the whole of the UK. It provides an integrated approach to pest weed and disease management, as recommended in the FSC Integrated Pest Management Guide. It includes advice on pest management, selection of non chemical approaches and, if pesticides have to be used as a last resort, methods of minimising potential environmental impact for all common forest weed problems.

Since Derogation FSC-DER-30-001-UK Propyzamide was granted in 2010, over £50,000 has been spent on investigating alternatives.

Forest Research have, in the past, carried out extensive experiments to test the efficacy of the selective graminicides cycloxydim, fluazifop-p-butyl and propaquizafop on all forest grasses commonly occurring in the UK. Although it was shown that the graminicides had no effect on tree species (Dixon *et al.*, 2005a) and that a wider range of grass species were susceptible than those listed on the product labels, particularly for cycloxydim (Dixon *et al.*, 2005b; Clay *et al.*, 2006), some commonly occurring forest weeds, such as, for example, purple moor grass (*Molinia caerulea* (L.) Moench), tufted hair grass (*Deschampsia cespitosa* (L.) P. Beauv), matt grass (*Nardus stricta* L.), wood small reed (*Calamagrostis epigejos* (L.) Roth), Yorkshire fog (*Holcus lanatus* L.) and fescues (*Festuca* sp. L.), were partially or completely resistant to all of the graminicides tested. Propyzamide by comparison gave good or moderately good control of practically all grass species, with the notable exception of larger specimens of wood small reed.

Because past research had shown that none of the selective graminicides tested were effective as even partial substitute for propyzamide, it therefore seemed unlikely that any other agricultural graminicide would be any more effective. Therefore, during the derogation period, research

undertaken by Forest Research initially concentrated on the potential for using biodegradable mulch materials as an alternative to herbicides for grass weed control, direct seeding and the critical period of weed competition. However, results indicated that most biodegradable materials were ineffective for grass weed control, and those materials that were effective were much more expensive than herbicides and unlikely to be practical for restocking situations (Stokes, 2012). Research on direct seeding is long term and ongoing, but results to date indicate that it is more suited to woodland creation (new planting) of a relatively limited range of tree species, rather than restocking situations. Research on the critical period of weed competition is in the process of being analysed, but early indications are that the first 1-2 years after planting are most critical in terms of minimising weed competition to prevent tree growth suppression and death, and within the first year, the first 2-3 months of the growing season – April to June, are the period during which weed control most critical.

Because none of the proceeding research yielded an effective alternative to propyzamide use, Forest Research therefore decided to look again at alternative herbicides, to confirm there were no other potential herbicide options that had been overlooked in previous research. There are no alternative, untested, winter applied herbicides available that are likely to be selective, control practically all forest grass species, and offer residual control as propyzamide does. Selective agricultural graminicides probably offer the best hope for identifying a partial replacement for propyzamide, as they are highly unlikely to damage trees, and are designed to control established agricultural grasses. However, as previously noted, past research has found them to be ineffective on many key forest grass weed species, although some selective graminicides available for use in forest situations (e.g. cycloxydim) might theoretically be more effective if used with alternative adjuvants, or in mixture, or in repeat doses. Some other selective graminicides (e.g. tepraloxym, fenoxaprop-p-ethyl, tralkoxydim, quizalofop-p-ethyl, quizalofop-p-tefuryl, clodinafop-propargyl), only currently available for use in the UK in agricultural crops, have not yet been tested by Forest Research. However, tepraloxym, fenoxaprop-p-ethyl, quizalofop-p-ethyl and quizalofop-p-tefuryl look set to be added to the FSC 'highly hazardous' list at its next revision, and therefore there is little point in considering them further. Of the remaining untested agricultural graminicides, whilst product labels and the wider literature only identify a limited range of grass species as being susceptible, it is possible that they might also control a wider range of forest grasses. However, there was no evidence in the literature to suggest that any of the untested agricultural graminicides were likely to offer significantly better control than the selective, forest approved graminicide cycloxydim, or that they would prove to have any greater potential as a possible substitute for propyzamide.

Although, based on the best available evidence, the prospects of identifying a suitable direct replacement for propyzamide through additional herbicide screening appeared relatively poor, in order to help the UK forest industry fulfil the conditions of the FSC derogation, Forest Research considered it important to look again to see if there were any previously untested potential alternatives that might have been worthy of further study. Further research was therefore instigated to investigate different application techniques for existing forest approved graminicides, and screen a range of previously untested agricultural graminicides, to determine if there were any potential alternatives for the use of propyzamide that might merit more detailed study.

Full details of the results of this work are contained in Willoughby and Stokes (2014 unpub.), but in summary, Forest Research found that, unexpectedly, 0.45 kg a.i. ha⁻¹ cycloxydim (as 2.25 l ha⁻¹ Laser (200 g l⁻¹ cycloxydim)) plus Toil adjuvant (95% w/w methylated rapeseed oil) @ 0.8% of final spray volume, applied in early May, appeared to give good, season long control of purple moor grass (*Molinia caerulea*), wavy hair grass (*Deschampsia flexuosa*), tufted hair grass (*Deschampsia cespitosa*), wood small reed (*Calamagrostis epigejos*) and Yorkshire fog (*Holcus lanatus*). Cycloxydim is highly selective and will not harm young trees, even if they are oversprayed when in active growth.

Based on these early, initial findings Forest Research conclude that cycloxydim may have the potential to be effective on a broader range of forest grasses than previously believed. However, they go on to stress that it would be extremely unwise to assume that these initial promising levels of control are achievable on an operational scale without further confirmatory research. Further trials are required on a wider range of grass species, on larger plots, over multiple sites and multiple years to confirm this unexpected initial result, before any decision could be taken to adopt cycloxydim on an operational scale as a partial alternative to propyzamide. If started immediately, such a research programme is likely to take a minimum of 5 years to complete, and even if successful, there are likely to remain some situations, such as on sites with mixed weed populations and where it is critical to avoid heat

stress of spray operators, where propyzamide will remain the only suitable option. Any subsequent trials should also investigate the use of sequential doses of cycloxydim and propaquizafop, and applying cycloxydim earlier in the growing season to see if adequate control can be achieved during the most critical period of weed competition which starts in early April. Currently, with selective herbicides this critical early season control can only be achieved through the use of propyzamide.

Therefore, although a trial programme has been implemented and a potential partial alternative has been identified and is under further development, it has not yet been possible to identify a viable operational option in the time available, and because none of the other currently available strategies outlined in Section A1, by themselves or in combination, offer a complete replacement for chemical use in all circumstances, an extension of the derogation for propyzamide for 5 years is requested, to allow the research work on the development and possible operational implementation of cycloxydim as a partial alternative to propyzamide to be completed.

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