Pest Management Regulatory Agency
Agence de réglementation de la lutte antiparasitaire

Proposed Regulatory Decision Document PRDD2003-01

Dried Blood

The active ingredient, dried blood, and associated end-use products (EP), Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution, containing dried blood are proposed for registration under Section 13 of the Pest Control Products Regulation for use as a deer repellent to prevent feeding damage to cedar, fir, pine and spruce seedlings.

This Proposed Regulatory Decision Document provides a summary of data received and the rationale for the proposed full registration of these products. The Pest Management Regulatory Agency (PMRA) will accept written comments on this proposal up to 45 days from the date of publication of this document. Please forward all comments to the Publications Coordinator at the address below.

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Foreword

The submissions for full registration of dried blood and the end-use products (EP) Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution, developed by Tree World for use as a deer repellent to prevent feeding damage of cedar, fir, pine, and spruce seedlings, have been reviewed by Health Canada's Pest Management Regulatory Agency (PMRA).

The PMRA has carried out an assessment of available information in accordance with Section 9 of the Pest Control Products (PCP) Regulations and has found it sufficient pursuant to Section 18(*b*), to allow a determination of the safety, merit and value of dried blood and the end-use products Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution. The Agency has concluded that the use of dried blood and the end-use products Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution in accordance with the label has merit and value consistent with Section 18(*c*) of the PCP Regulations and does not entail an unacceptable risk of harm pursuant to Section 18(*d*). Therefore, based on the considerations outlined above, dried blood and the end-use products Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution, for use as deer repellent to prevent feeding damage of cedar, fir, pine, and spruce seedlings, are proposed for full registration under Section 13 of the PCP Regulations.

The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document to allow interested parties an opportunity to provide input into the proposed registration decision for these products.

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1.0 The active substance, its properties and uses

1.1 Identity of the active substance and impurities

Table 1.1 TGAI Identification

Active substance	Dried Blood
Function	Animal Repellent
Chemical name	Haemoglobin
CAS number	68911-49-9
Molecular formula	Not applicable
Molecular weight	Not applicable
Structural formula	Not applicable
Nominal purity of active	99.84%
Identity of relevant impurities of toxicological, environmental, or other significance	The technical grade dried blood does not contain any impurities or microcontaminants known to be Toxic Substances Management Policy (TSMP) Track-1 substances.

1.2 Physical and chemical properties of active substances and end-use product(s)

Table 1.2 Technical product: Plantskydd Deer Repellent

Property	Result
Colour and physical state	Red brownish solid
Odour	Neutral
Melting point or range	Waiver request accepted
Boiling point or range	Waiver request accepted
Density	Waiver request accepted
Vapour pressure at 20°C	Waiver request accepted
Henry's law constant at 20°C	Not applicable
Ultraviolet (UV) – visible spectrum	Waiver request accepted

Property	Result
Solubility in water	180 g/L
Solubility in organic solvents	Insoluble in alcohol and esters
n-Octanol–water partition coefficient (K_{ow})	Waiver request accepted
Dissociation constant (pK_a)	Waiver request accepted
Stability (temperature, metal)	Waiver request accepted

Table 1.2.2 End-use products: Plantskydd Deer Repellent Solution and Plantskydd Deer Repellent Soluble Powder

Property	Plantskydd Deer Repellent Solution	Plantskydd Deer Repellent Soluble Powder
Colour	Red brownish	Red brownish
Odour	Neutral	Neutral
Physical state	Liquid	Solid
Formulation type	Solution	Soluble powder
Guarantee	16.73%	99.84%
Formulants	The product does not contain any EPA List 1 formulants or formulants known to be TSMP Track-1 substances.	The product does not contain any EPA List 1 formulants or formulants known to be TSMP Track-1 substances.
Container material and description	1 L Plastic bottle	1 kg Plastic bag
Bulk density	1.07 g/cm^3	0.58 kg/L
pH of 1% dispersion in water	Waiver accepted	Waiver accepted
Oxidizing or reducing action	N/A	N/A
Storage stability	Stable for 1 year under unbroken seal	Stable for 24 months
Explodability	N/A	N/A

1.3 Details of uses

Plantskydd Deer Repellent Soluble Powder, a soluble powder containing 99.84% dried blood, is proposed as a foliar seedling spray to prevent browsing of deer on tree seedlings. The seedlings indicated on the proposed label include spruce, pine, cedar, and fir. The product is classed as commercial, for sale in 1 kg packages. The proposed rate for Plantskydd Deer Repellent Soluble Powder is 1.6 to 2.9 g active ingredient (a.i.) per seedling. It is to be applied 1 to 2 times yearly as browsing conditions warrant.

Plantskydd Deer Repellent Solution, containing 16.73% dried blood, is proposed as a foliar spray on trees to repel deer from browsing on tree seedlings. The product is classed as domestic, for sale ready-mixed in a 1 L pump sprayer. The proposed rate for Plantskydd Deer Repellent Solution is 2.0 g a.i. per seedling. It is to be applied 1 to 2 times yearly as browsing conditions warrant.

Plantskydd Deer Repellent Technical Grade Active Ingredient (TGAI) is 99.84% dried blood, prepared by spray-drying fresh beef and pig blood from slaughterhouses. The TGAI is used to make two end-use products: Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution. All three products are produced by North American source. These end-use products are effective for 2 to 4 months after treatment.

2.0 Methods of analysis

2.1 Methods for analysis of the active substance as manufactured

The technical product and the two end-use products contain dried blood as the active ingredient. Due to the nature of dried blood, a number of the requirements under DIR98-04 and DIR98-03 were waived as they do not apply to such products. Characterization of the dried blood has been accepted in lieu of analysis down to 0.1%. The technical product is characterized by the protein, salts, fats, water, and iron content as well as by the bacteriological quality. Methods for blood analysis are well known and well described in literature. Therefore, the requirement for analytical methodology to determine its level in the two EPs has been waived.

3.0 Impact on human and animal health

3.1 Integrated toxicological summary

Toxicology data were not submitted with the data package, and instead the applicant provided a waiver request, citing that "...beef and pork blood are currently regulated as food additives under the *Food and Drug Regulations* and are deemed non-toxic." In addition, the applicant cited that "In Sweden, the same active ingredient is added to blood-based foodstuffs in place of fresh blood (i.e., 1% bloodmeal in feed for pigs), bakery products for iron enrichment and colouring, and processed meat products for

colouring (i.e., 60 mg of bloodmeal to 1 kg of blood sausage). In Canada, blood sausage may contain up to 50% fresh livestock blood."

The United States (U.S) Environmental Protection Agency (EPA) waived all toxicology requirements for the re-registration of dried blood in 1991. The U.S. EPA Reregistration Eligibility Document (RED) states that "Since the manufacturing process ensures complete denaturation of proteinaceous material and inactivation of specific and potential mammalian pathogens (i.e., endogenous or exogenous contaminants) all toxicological data requirements normally required ....have been waived."

It is also noted that dried blood is listed as a minimum risk pesticide which is exempt from the requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in the U.S., under the authority of section 25(b) [refer to the Code of Federal Regulations, Title 40, part 152.25(g)]. The U.S. EPA has also "reclassified dried blood as a biochemical pesticide because it is a naturally occurring substance and because it has a non-toxic mode of action."

On the basis of the above, all toxicology requirements for these submissions are waived.

3.2 Determination of acceptable daily intake (ADI)

The lack of proposed food uses does not warrant the establishment of an ADI.

3.3 Acute reference dose

The lack of proposed food uses does not warrant the establishment of an ARfD.

3.4 Toxicological end-point selection: occupational and bystander risk assessment

The toxicological requirements for these submissions were waived. On the basis that there are no toxicological concerns associated with the use of this active ingredient, selection of a toxicology endpoint was not required and a risk assessment was not conducted.

3.5 Impact on human and animal health arising from exposure to the active substance or to its impurities

3.5.1 Operator exposure assessment

Plantskydd Deer Repellent Soluble Powder is being proposed for commercial use on coniferous seedlings in forests and woodlots. It is packaged in a 1 kg plastic container. The product would be mixed (1 kg in 5 L water), allowed to dissolve for 20 minutes, and poured through a filter into a pressure-type hand or backpack sprayer. The concentration of the solution would be 200 g a.i./L. The trees would be directly sprayed with the resulting solution, or seedlings would be dipped into the solution. The proposed

application rate is 998 g a.i. per 500 to 600 seedlings or 998 g a.i. per 350 to 450 trees. The tops of plants would be dipped or sprayed until wet.

Plantskydd Deer Repellent Solution is being proposed for domestic use on coniferous seedlings. It is packaged in a 1 L plastic container. The product is directly sprayed by opening the nozzle and squeezing the trigger twice for each plant. According to the efficacy review, the rate of application would be 2.0 g a.i. per seedling.

According to the applicant dried blood would be applied once or twice per year as browsing conditions warrant, usually in late fall or early spring. The product would be effective for 2 to 4 months, depending on the season and weather conditions. Efficacy would be reduced in very warm weather.

On the basis that there is no toxicological concern associated with the use of this active ingredient, a quantitative assessment of exposure and risk was not conducted. For good occupational hygiene, mixer/loaders and applicators of the commercial product should be required to wear long pants, a long-sleeved shirt, and chemical-resistant gloves.

3.5.2 Bystanders

Given the proposed use scenarios, exposure and risk to bystanders should be minimal.

3.5.3 Workers

Given the proposed use scenarios, exposure and risk to workers should be minimal.

3.5.4 Consumers

Given the proposed use scenarios, exposure and risk to consumers should be minimal.

4.0 Residues

Not applicable.

5.0 Fate and behaviour in the environment

The active substance (dried blood) is soluble in water (180 g/L). All environmental chemistry and fate studies have been waived for the following reasons:

1. No hazard to non-target organisms is expected (see Chapter 6);

2. The use pattern involves spot treatments to young trees and, therefore, exposure of non-target organisms should be negligible; and

3. Dried blood is a biological substance.

6.0 Effects on non-target species

All environmental toxicology studies of dried blood have been waived for the following reasons:

- There is no evidence in the U.S., where dried blood has been used as an animal repellent since 1958, that demonstrates or suggests any hazard to non-target organisms when dried blood is used as directed (see EPA 1991);
- The use pattern involves spot treatments to young trees and, therefore, exposure of non-target organisms should be negligible;
- The manufacturing process ensures that potential mammalian pathogens are inactivated and proteins are denatured;
- Dried blood is a biological substance; and,
- Dried blood acts as a repellent rather than a toxicant.

Therefore, environmental hazard statements related to toxicity to non-target species are not required on the label.

7.0 Efficacy

7.1 Effectiveness

7.1.1 Intended use

Plantskydd Deer Repellent Soluble Powder, a soluble powder containing 99.84% dried blood, is proposed as a foliar seedling spray to prevent browsing of deer on tree seedlings. The seedlings indicated on the proposed label include spruce, pine, cedar and fir. The product is classed as commercial, for sale in 1 kg packages. The proposed rate for Plantskydd Deer Repellent Soluble Powder is 1.6 to 2.9 g a.i. per seedling. It is to be applied 1 to 2 times yearly as browsing conditions warrant.

Plantskydd Deer Repellent Solution, containing 16.73% dried blood, is proposed as a foliar spray on trees to repel deer from browsing on tree seedlings. The product is classed as domestic, for sale ready-mixed in a 1 L pump sprayer. The proposed rate for Plantskydd Deer Repellent Solution is 2.0 g a.i. per seedling. It is to be applied 1 to 2 times yearly as browsing conditions warrant.

Plantskydd Deer Repellent Technical Grade Active Ingredient is 99.84% dried blood, prepared by spray-drying fresh beef and pig blood from slaughterhouses. The TGAI is used to make two end-use products: Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution. All three products are produced by a North

American source. These end-use products are purported to be effective for 2 to 4 months after treatment.

Deer are admired and hunted for sport in North America, as well as being controlled as pests. They are considered pests if they feed on valuable trees, shrubs, flowers, and field crops; collide with vehicles, trains, and aircraft; or support large populations of the ticks which are vectors of Lyme disease. Provincial and state wildlife agencies are mandated to manage deer populations, and attempts to control them can be controversial. In the absence of predation and hunting, deer populations soon rise to the biological carrying capacity (BCC) of the area, which is the maximum number of deer that the land can support in good physical condition for an extended period of time. When the BCC is exceeded, both the quality of the habitat and the deer population decline. Where there are also people in the area, a more significant value in deer population management is the cultural carrying capacity (CCC) of the area, which is defined as the maximum number of deer that are tolerated by the human population (Ellingwood & Caturano, 1996). In areas where there are orchards, tree nurseries, gardens, highways, and records of Lyme disease, the CCC may be well below the BCC.

Browsing by white-tailed deer (*Odocoileus virginianus*) on ornamentals and fruit trees is reported as a serious problem in New York state, especially on high density dwarf fruit trees, where the twigs and buds are within easy reach of the deer (Curtis *et al.*, 1994). In Saskatchewan, stacked hay and grain require protection from deer in winter (SERM, 2000). In British Columbia, deer browsed 57% of the 11-year-old trees at a Texada Island plantation and moose damaged 30% of the stems of 18-year-old trees at a plantation near Prince George, though overall stocking levels were not affected (Hall, 1995). Browsing damage to Douglas fir seedlings by black-tailed deer (*O. hemionus columbianus*) was reported to be the commonest type of animal damage in the coastal forests of Washington and Oregon (Campbell & Evans, 1978; Crouch, 1976). In the interior forests of the Pacific Northwest, mule deer (*O. hemionus hemionus*) severely damaged conifer seedlings, especially ponderosa pine, in plantations on their migration routes and winter ranges, but “in most geographic locations and environmental circumstances, deer reside and reforestation takes places on the same sites with little interference of one with the other.” (Crouch, 1976). Monetary estimates of the costs of deer browsing have not been found, but the applicant has estimated that 15–20 million commercially-planted tree seedlings are damaged by browsing animals (deer, elk, moose, rabbits, voles, and pikas) in Canada each year, based on an average planting rate (for 1993–95), of 679 million seedlings per year, and a browsing rate of 0.75–1.00%.

7.1.2 Mode of action

One of the papers submitted with the application (Bergquist & Orlander, 1996) states that both the smell and the taste of the Plantskydd products deter browsing animals. Another submitted paper (Nolte, 1998) suggests that Plantskydd repels browsers by emitting a sulfurous odour like that of the putrescent whole egg solids (EGG) that are the active

ingredient in some other deer repellents, because “Sulfurous odors produced by degradation or breakdown of proteins may evoke a fear-response in prey species.”

7.1.3 Uses

Plantskydd soluble powder is proposed for use on cedar, fir, pine and spruce.

7.1.4 Effectiveness against pest

The applicant submitted two published papers on field trials of Plantskydd Soluble Powder, one carried out in Sweden (Bergquist & Orlander, 1996) and the other in Washington State (Nolte, 1998), and 13 unpublished evaluation reports of field trials of Plantskydd Soluble Powder carried out in Canada under research permits (Koehler, 1998; Krygier, 1997; Lagacé & Watkinson, 1997; Orpana, 1997; Morrell, 1997; Thandi, 1997; Vanthournout, 1997; Macgregor, 1995; Runnals, 1995; Lasuta 1994a,b & 1995; Reynard, 1994).

Observations from all the trials showed substantial reductions in browsing of trees treated with Plantskydd when compared to untreated trees. Only two of the submitted trials (Bergquist & Orlander, 1996; Nolte, 1998) compared Plantskydd to other substances registered for this use. Nolte (1998) compared Plantskydd with three products registered in Canada: Skoot Repellent for Rabbits, Mice, and Deer, Reg. No.7715; Deer-away Big Game Repellent Powder, Reg. No. 18122; and an unidentified product containing denatonium benzoate, similar to Tree Guard Deer Repellent Ready-to-use (Reg. No. 25198). The six products tested in Bergquist & Orlander (1996) trials are not registered in Canada. The effectiveness of Plantskydd at repelling deer was similar to or better than that of the other products tested.

Plantskydd appeared to be more effective on fir and pine than it was on cedar in the studies submitted. In Nolte’s (1998) trial, the mean rate of damage to untreated seedlings was generally higher for cedar (7.8–7.9 out of 8) than for fir (0.2–6.4 out of 8) and pine (3.0–7.8 out of 8). This suggests that deer may prefer cedar to fir or pine, which could explain why Plantskydd and other comparable products are less effective on cedar. There are only two trials on pines, one in Sweden and one in Canada, but the mean reduction on treated pine trees (92%) was greater than it was for the cedars and firs. The results for spruce (mean 90% reduction on treated trees) were almost as good as those for pine, but both trials on spruce were conducted in Sweden on Norway spruce, which does not occur in Canada.

There were only two trials that included broadleaved trees (Koehler, 1998; Krygier, 1997). Browsers in the test areas included deer, elk, and moose, and no browsing was observed on the treated trees. The browsing rate on the untreated trees was low in both trials, and the only browsing observed in one of the trials was on the larch (conifer) trees in the area (Krygier, 1997), so neither trial provides good evidence of the efficacy of Plantskydd on broadleaved trees. In the only trial on pine in Canada (Reynard, 1994),

deer, elk, and rabbits were in the area and there was no browsing on the treated trees, but the browsing rate on the untreated trees was so low that the results are not convincing.

The browsers present in the study areas of the 13 trials carried out under research permits in Canada are provided as "black-tailed deer" (3 trials), "white-tailed deer" (2 trials), "mule deer" (1 trial), or just "deer" (7 trials), an unfortunate generalization since 11 of the 13 trials were conducted in British Columbia (BC), where the white-tailed deer (*Odocoileus virginianus*), black-tailed deer (*O. hemionus columbianus*), mule deer (*O. hemionus hemionus*), and Sitka deer (*O. hemionus sitkensis*) are all stated to occur (Banfield, 1974). Other potential browsers listed are elk (3 trials), moose, rabbits, and grouse (one trial each). For the 4 trials where more than one sort of browser was listed, no attempt was made to prove that all the browsers in the area were actually browsing the trees in the trial, or that the Plantskydd was actually protecting the treated trees equally well against all the browsers present. It cannot be assumed that just because several sorts of browsers were seen in an area, that Plantskydd was effective against all of them.

The maximum duration of protection on the proposed label is six months. Three of the trials (Lasuta, 1994a, 1995; Runnals, 1995) showed protection of tree seedlings at 6 months after treatment, but in most trials evaluation ended at less than 6 months. The experiments of Bergquist & Orlander (1995) continued for 7 months after treatment but the grazing rate of deer on untreated seedlings was so low by the 5th month that a longer period of protection could not be demonstrated. The last observations in the trials of Nolte (1998) were at 14 weeks (3.5 months) after treatment. The mean duration of tree protection after treatment for all studies combined is 4.3 months for cedar, 4.7 for Douglas fir, 4.2 for pine, and 5.0 for spruce.

In summary, the results from the submitted trials suggest that Plantskydd is effective in reducing browsing by deer on cedar, fir, pine, and spruce seedlings, but they do not support the label claims for any other tree (i.e., deciduous) or other browsers (i.e., rabbits, elk, and moose). Plantskydd appeared to be more effective on fir and pine than it was on cedar, possibly because the deer prefer cedar to fir and pine. Although only two trials were submitted for both pine and spruce, the reduction in browsing activity was much greater than for cedar and fir. The label claim of efficacy for "up to 6 months" is not well supported by the data; a claim of "2–4 months" would be more appropriate.

7.1.5 Total spray volume

Not relevant

7.2 Phytotoxicity to target plants (including different cultivars), or to target plant products

Plantskydd applied at a rate of 10 g product per seedling was phytotoxic to pine and spruce seedlings when they were held in a poorly ventilated area after spraying (Bergquist & Orlander, 1995). The label of Plantskydd Deer Repellent Soluble Powder has the

warning “Do not close box if seedlings are treated while still in container”, but the draft label of Plantskydd Solution has no such warning, presumably because users of this domestic class product would normally be spraying single plants already planted, not spraying boxes full of seedlings before planting.

7.3 Observations on undesirable or unintended side effects, e.g., on beneficial and other non-target organisms, on succeeding crops, other plants or parts of treated plants used for propagating purposes (e.g., seed, cutting, runners)

Not relevant

7.3.1 Impact on succeeding crops

Not relevant

7.3.2 Impact on adjacent crops

Not relevant

7.3.3 Impact on seed viability

Not relevant

7.4 Economics

The applicant has submitted unpublished estimates of the relative costs per tree of protecting 1000 seedlings (probably western red cedar) against deer browsing for 5 years by using Plantskydd, two kinds of mechanical protectors (plastic cages) for individual trees, and fencing. The estimates include materials, labour, and annual maintenance, where applicable (Lagacé, 1995). The results were:

Plantskydd, 2 sprays per year for 5 years	$2.95/tree
Vexar protectors, including stakes, labour, and maintenance	$4.11/tree
Tree Pro protectors, including stakes, labour, and maintenance	$6.80/tree
Fencing (13 ha), including materials, labour, and annual maintenance	$4.22/tree

7.5 Sustainability

7.5.1 Survey of alternatives

As noted in Section 7.1.1 above, the management of deer populations is a complex problem, and views on how to solve it may conflict. The following list of management options is based on the one given by Ellingwood & Caturano (1996), with some additions from other sources:

(1) Allowing nature to take its course: This means allowing the deer population to grow without any artificial regulation until checked by starvation and disease. This option is rejected by Ellingwood & Caturano (1996) as unrealistic for deer in areas with human activities and few, if any, natural predators.

(2) Not planting trees on the winter ranges of deer: "Such areas are often poor sites for tree growth and difficult to reforest even without deer interference. Moreover, they are vital to deer and should be managed for deer, not trees." (Crouch, 1976).

(3) Seeding replanted clear cut areas with native forbs, as alternative food tree seedlings: Seeding the planted areas with palatable native forbs such as catsear (*Hypochaeris radicata)* reduced browsing by black-tailed deer on Douglas fir seedlings (Campbell & Evans, 1978).

(4) Regulated hunting: This not only generates revenue from hunting licences, but also reduces the costs of damage in agriculture, forestry, and vehicle collisions. Ellingwood & Caturano (1996) also mention the option of hiring sharpshooters, only to reject it as too expensive (partly because of the lost revenues from amateur hunters) and unpopular in the community.

(5) Trap and transfer to other areas: This is not considered a good option because of the high costs and heavy mortality (55–85%) of transferred animals.

(6) Chemical contraception: This is an expensive but promising technique, still under development.

(7) Supplemental feeding: This can reduce winter mortality, but can also compound the problem of overpopulation in future years.

(8) Reintroduction of predators such as wolves, cougars, and bears: The success of this measure is hard to predict, and the predators themselves may get into trouble with humans.

(9) Fencing: Physical fences can range in cost and complexity from home-made constructions of straw bales or rough sawn lumber (SERM, 2000) to 7-wire electrified vertical fences costing US$1.50–2.00 per foot and 10' high woven wire fences costing US$2–4 per foot (Lee, 1998). Another approach is to use dogs, restrained by electrified radio collars activated by buried wires, as a "behavioural fence". Two such dogs protected 25 ha of apple trees in summer, but only 4 ha in winter, when restricted by snow (Curtis *et al.*, 1994).

(10) Scare devices: These include propane exploders, sirens, and strobe lights. They are said to remain effective for only 1–2 weeks (Lee, 1998).

(11) Other chemical repellents: There are numerous products registered in Canada as deer repellents. The active ingredients used are denatonium benzoate, putrescent whole egg solids, thiram and ammonia.

7.5.1.1 Non-chemical control practices

See 7.5.1 above

7.5.1.2 Chemical control practices

See 7.5.1 above

7.5.2 Compatibility with current management practices including IPM

Plantskydd would be compatible with other methods of preventing deer from browsing on trees.

7.5.3 Contribution to risk reduction

This product provides an alternative method to repel deer.

7.5.4 Information on the occurrence or possible occurrence of the development of resistance

Not relevant

7.6 Conclusions

Plantskydd is effective in protecting cedar, fir, pine, and spruce seedlings from browsing by deer for 2–4 months after treatment.

8.0 Toxic Substances Management Policy considerations

During the review of Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution, the PMRA has taken into account the federal Toxic Substances

Management Policy[1] and has followed its Regulatory Directive DIR99-03[2]. These products do not meet TSMP Track-1 criteria because:

- The active ingredient, dried blood, is a biological substance;
- Dried blood acts as a repellent rather than a toxicant;
- The formulated products do not contain any EPA List 1 formulants or formulants known to be TSMP Track-1 substances. The formulants contained in these products are on the EPA Inert List 4 B; and
- Impurities of toxicological concern are not expected in the technical grade active ingredient or in the end-use products.

9.0 Proposed regulatory decision

The PMRA has carried out an assessment of available information in accordance with Section 9 of the Pest Control Products (PCP) Regulations and has found it sufficient, under Section 18(*b*), to allow a determination of the safety, merit, and value of dried blood and the end-use products Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution. The Agency has concluded that the use of dried blood and the end-use products Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution in accordance with the label has merit and value consistent with Section 18(*c*) of the PCP Regulations and does not entail an unacceptable risk of harm pursuant to Section 18(*d*). Therefore, based on the considerations outlined above, dried blood and the end-use products Plantskydd Deer Repellent Soluble Powder and Plantskydd Deer Repellent Solution for use as deer repellent to prevent feeding damage of cedar, fir, pine, and spruce seedlings are proposed for full registration under Section 13 of the PCP Regulations.

The PMRA will accept written comments on this proposal up to 45 days from the date of publication of this document to allow interested parties an opportunity to provide input into the proposed registration decision for these products.

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1 The federal Toxic Substances Management Policy is available through Environment Canada's Web Site at : http://www.ec.gc.ca/toxics

2 The PMRA's Strategy for Implementing the Toxic Substances Management Policy, DIR99-03, is available through the Pest Management Information Service: Phone 1-800-267-6315 within Canada or 1-613-736-3799 outside Canada (long distance charges apply); Fax (613) 736-3798; E-Mail pminfoserv@hc-sc.gc.ca or through our Web Site at http://www.hc-sc.gc.ca/pmra-arla

List of abbreviations

ADI	acceptable daily intake
a.i.	active ingredient
ARfD	acute reference dose
BC	British Columbia
BCC	biological carrying capacity
CCC	cultural carrying capacity
EP	end-use product
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act (U.S.)
IPM	integrated pest management
K_{OW}	*n*-Octanol–water partition coefficient
PCP	pest control product
pK_a	dissociation constant
PMRA	Pest Management Regulatory Agency
PRDD	Proposed Regulatory Decision Document
RED	U.S. EPA Reregistration Eligibility Document
TGAI	technical grade active ingredient
TSMP	Toxic Substances Management Policy
U.S.	United States of America
UV	ultraviolet

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