anses French agency for food, environmental and occupational health & safety — Investigate, evaluate, protect	**Comparative assessment report Products containing glyphosate Examination of alternatives in forestry**	**Validated on 15/09/2020**

Article 50 of Regulation (EC) No 1107/2009 sets out the regulatory requirements for performing the comparative assessment of plant protection products containing candidates for substitution.

Each Member State specifies the procedures for examining the dossiers in question on its territory. In line with this, the Ministerial Order of 23 July 2015 lists the information to be submitted in the case of products containing a substance that is a candidate for substitution, as well as the analysis steps leading to the substitution or not of the use in question.

This report has been drawn up for the specific case of implementing a comparative assessment in accordance with point 50.2 of the aforementioned Regulation, i.e. for an application not concerning a product containing one or more candidates for substitution. Member States may in exceptional cases apply these general provisions when non-chemical prevention or control methods exist and are in general use in the Member State. The analytical criteria of 50.1 are then applied to compare these methods and the products concerned.

Case in question and background

This report concerns the implementation of a comparative assessment for applications for new marketing authorisations (MAs) currently being examined, as well as applications for MA renewal, following renewed approval of the active substance glyphosate with effect from 16 December 2017.

In a letter co-signed by the Ministers of Agriculture, Ecology and Health dated 18 November 2018, ANSES was asked to implement the provisions of Article 50.2 and of Annex IV of Regulation (EC) No 1107/2009.

Then, in a letter dated 12 December 2018, ANSES asked the National Forestry Office (ONF) to provide information to enable the examination of alternatives, their uses, and the practical or economic disadvantages for uses in publicly managed forests.

This current document has been drawn up for forest uses, based on information from the references cited in the annex, which came from the ONF's contribution of 13 February 2019, discussions of the MA Monitoring Committee at its meeting of 30 January 2020 (Minutes from the meetings of the MA Monitoring Committee on 30 January 2020 (PV CSAMM)), the contribution of the specialist expert from the Ministry of Agriculture's Directorate General for Food (DGAL) of March 2020 (Expert DGAL, March 2020), and information provided following the survey conducted by the National Forest Ownership Centre (CNPF) and the Centre for innovation and education on forest stand renewal (RENFOR) on the use of glyphosate in private forests among various organisations in the sector (CNPF – RENFOR survey, 2020).

Use designation, crops concerned and use status

According to the National Plant Protection Uses Catalogue in force, five uses correspond to weed control in forests. The table shown below lists the situations concerned.

Name of use[1] (national catalogue)	Full scope of use (crops or crop groups covered)	Scope concerned by the comparative assessment	Status of use	Description of use
Trees and shrubs* Weed control* Field-grown nursery	All woody species of hardwoods and softwoods produced in ornamental and forest nurseries	Forest nursery	Minor	Destruction of weeds on land used for open-field cultivation of young woody plants, for planting and multiplication before transplantation to their final location
Trees and shrubs* Weed control* Open-ground planting	All woody species of ornamental hardwoods and softwoods, poplar plantations, willow plantations, palm groves, Christmas tree plantations, seed orchards, foliage and cut branches, cultivated cork-oak forests, artificial truffle orchards, afforestation of agricultural land, short and very short rotation coppices	Seed orchards for forest production	Minor	Maintenance of land where woody plants are permanently planted in their final location
Forest* Weed control* Before planting	Species of hardwood and softwood trees in stands, except for plants identified under "Trees and shrubs"	Entire scope	Minor	Encourage stand renewal on a cleared plot, before planting
Forest* Clearing			Minor	Encourage stand renewal, for good seedling development or planting, on a plot with existing trees
Forest* Destruction			Minor	Destruction of live standing trees, invasive woody species or stumps

Table 1 - Description of the uses in question

The uses relating to "trees and shrubs" include more "artificial" crops, which are closer to agriculture in terms of tillage, fertilisation and final plantation density.

Only the part of the "trees and shrubs" scope of uses that corresponds to forest uses (seed orchards and forest nurseries) will be analysed here, which excludes the other crops.

Use in the case of a change of situation from grassland to forest is also possible. This practice is considered to be included in the "11015911 General treatments*Undergrowth clearing" use of the National Plant Protection Uses Catalogue, and will not be included in this assessment. It should also be noted that this situation is encountered before a stage of vegetation is identified as a forest.

NB: the "14205908 Forest*Weed control" use is temporary and equates to the "0401017 Forest*Clearing" use.

Situation regarding glyphosate use in forestry

According to information provided by the ONF (letter dated 13 February 2019), glyphosate has historically been used only marginally, on less than 1% of the areas managed by the ONF.

[1] Guidance note DGAL/SDQPV/2015-253 of 10 March 2015. Certain uses or use designations are currently under review and will be adopted in future MA decisions.

Forests occupy 31% of the country, and public forests in France represent 4.6 million hectares in metropolitan France out of a total of 17 million, i.e. a quarter of the surface area. The ONF states that in public forests, glyphosate is mainly used when preparing for planting and natural renewal, in timber production situations, particularly in oak stands. Renewal ground is often covered with brambles, which are effectively removed with glyphosate. The ONF's use in 2018 only concerned about 200 ha, and corresponded to a quantity of 1,200 litres of formulated product containing glyphosate.
Private forests, on the other hand, are fragmented, with 3 million owners and an average area of about 2 hectares per owner (CNPF, February 2020). Due to the large number of "smallholders", glyphosate use is very rare in private forests. Although it is difficult to obtain precise data, an assessment carried out for example in the Landes, one of the forests most concerned, estimated that just 0.2% of the area was treated with glyphosate.
Alternative solutions are in high demand among private forest stakeholders. Joint work on the search for alternatives is being carried out within the Forestry GTF (sector-specific technical group), under the aegis of the Ministry of Agriculture. Herbicide use is declining sharply in forestry, with experts and contractors using very little. The progressive increase in certification of private forests, by organisations such as the Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC), is also contributing to a reduction or phasing out of plant protection product use, as these standards advise against or prohibit such products.
A more detailed analysis of uses is presented below.

1. *"Trees and shrubs*Weed control*Field-grown nursery" use*
Forest nursery scope

Upstream of the forest-timber sector, and therefore excluding actual forest management, it is necessary to examine the situation of nurseries producing forest seedlings.
Concerning public forests, the ONF has a production nursery in Normandy that grows 1.3 million seedlings annually, including 800,000 sessile oaks, mainly for the renewal of public forests in the north-eastern quarter of France. The "Trees and shrubs*Weed control*Field-grown nursery" use concerns this nursery of about 3 ha, located on fertile soil where weeds grow easily to the detriment of seedling development. A product containing glyphosate is sprayed before cultivation (sowing of the acorns) each year in March/April. This use accounts for an annual consumption of around 60 litres of glyphosate products, used in three different ways:

- after soil preparation and about one month before sowing;
- on seedbeds during the dormancy period;
- for border and fence maintenance (note that this use is covered under the "General treatments*Weed control*Uncultivated areas" use).

There are also private forest nurseries, representing 700 to 800 ha in France. Their situation regarding weed control is considered comparable to that of the ONF.

2. *"Trees and shrubs*Weed control*Open-ground planting" use*
Seed orchards for forest production scope

The particular case of "seed" orchards was raised. They represent about 300 hectares for public forests (ONF), half of which is in production at national level, and are used to collect tree seeds in order to select the best candidates for planting. In practice, fertilisation is necessary after floral induction. For this fertilisation to benefit the trees, the soil must be bare, which is why glyphosate is used.
Although not mentioned at the MA Monitoring Committee meeting, there are also seed orchards for private forests, mainly for maritime pines, and their situation regarding weed control is comparable to that specified for the ONF.

*3. "Forest*Weed control*Before planting" use*

This use falls within stand regeneration, mostly in production situations, and therefore has economic implications. The plot is either totally or partially cleared for the future planting area (Expert DGAL, March 2020).

"Blanket" application of glyphosate is used strategically in the following cases:

- in the absence of preparatory work before planting, in situations where the plots are small, steeply sloping or mechanisation is not possible, or where climate conditions rule out the use of mechanical tools;
- prior to preparatory work, mainly in the presence of perennial grasses or bracken, which directly compete with future plantings for water resources. This is because the tools available for tillage and mechanical weed control tend to multiply perennial grasses rather than eliminate or control them.

Estimates of this glyphosate use give a range of 5 to 10% of the total area concerned, i.e. from 500 to 3,600 ha (Expert DGAL, March 2020).

*4. "Forest*Clearing" use*

This covers the use of herbicides to promote stand renewal, either through planting or natural regeneration. Work can be carried out at any time during the development periods of the trees and plant species present, but successful establishment of a new forest depends on its healthy development during the first three to four years of regeneration, whether natural or through planting (Expert DGAL, March 2020).

The ONF states that the active substance glyphosate is used when natural stand renewal is obstructed by large brambles that smother the vegetation. This is an easier and more efficient method than the mechanical alternative of combing and uprooting brambles with towed implements. Nevertheless, excavator tools are becoming more common. They are used to manage brambles before planting and, if necessary, to prepare the land for natural regeneration.

According to the National Forest Ownership Centre (CNPF), glyphosate is used when clearing plantations (maritime pine, Douglas fir, black locust) during the first one or two years of a stand's life, for weed control only around the young plants, assessed to be 0.02% to 0.04% of the area of the plot treated in the case of a poplar plantation (PV CSAMM). If brambles are present, however, the proportion of the treated area of the plot may range from 10% to 50% (CNPF – RENFOR survey, 2020). In addition, the frequency of plot treatment is related to the rotation (period between planting and felling) of the species, which can be anywhere from 20 years for poplar or 60 years for softwoods to 150 years for oak (PV CSAMM).

The DGAL expert also indicated that the areas treated with glyphosate for this use would be small, given the substance's low selectivity on plants.

Mechanical soil preparation (MSP) is also used by some private forest managers before planting to control the dynamics of competing vegetation and limit the need to clear weeds from around seedlings. A prepared planting hole (*potet travaillé*) is an example of an MSP technique. It can be dug with tools (buckets, reversible scarifier, etc.) fitted to a mini excavator (CNPF – RENFOR survey, 2020).

According to the survey of private forest operators (CNPF – RENFOR survey, 2020), a particular method of clearing, i.e. spot treatments on stump sprouts (between 30 cm and 1 m high), is used in natural regeneration, the first year after final felling. Only stumps with sprouts are treated (mainly hornbeam and sweet chestnut). This spot treatment concerns less than 10% of the plot area.

5. Forest*Destruction use

This use covers two techniques (Expert DGAL, March 2020):

- When reforesting in a non-saleable hardwood stand, standing trees used to be either girdled at human height with a chainsaw, or scratched or damaged with an axe, then a product containing glyphosate was sprayed or brushed on the trunk. With growing demand for hardwoods as fuel and the difficulty in managing standing dead trees in reforestation, this use has almost disappeared in forestry;
- Spraying or brushing hardwood stumps that produce vigorous sprouts, e.g. sweet chestnut trees, to prevent the development of sprouts in softwood stands. With the mechanisation of preparatory and maintenance work, this method has also practically disappeared.

Examination of non-chemical alternatives under Article 50.2

1. Identification of non-chemical alternatives in general use

1.a. Are non-chemical methods of prevention or control available for the claimed uses?

The contributions were analysed and provided the following answers to the question posed.

- Yes, for the situations identified below (1.b) concerning the following five uses:
  - Trees and shrubs*Weed control*Field-grown nursery: forest nursery scope
  - Trees and shrubs*Weed control*Open-ground planting: seed orchards for forest production scope
  - Forest*Weed control*Before planting
  - Forest*Clearing
  - Forest*Destruction

- No technical deadlocks were identified for any of these uses.

1.b. If so, which ones? Are they in general use?

The idea of "general use" requires a distinction to be made between the following two situations:

- public forests, which concern large areas managed centrally by the ONF;
- private forests, which account for 75% of French forestry land but are extremely fragmented, with an average area of 2.7 ha.

For the "Trees and shrubs*Weed control*Field-grown nursery" use, forest nursery scope, mechanical alternatives exist, but are not in general use. The ONF notes that in the case of production nurseries, the only alternative to using products containing glyphosate would be hand weeding at emergence. It is difficult to see a return to manual maintenance when preparing for planting because of the arduous and unattractive working conditions, the lack of labour, the high cost, and the considerable health risks (more frequent cases of Lyme disease, irritations due to processionary caterpillars, etc.) (PV CSAMM).

Methods are currently being researched and developed: a harrow can be used to remove competing vegetation from well-established seedlings or young plants. Towed auto-steer harrows can also be used. Another possible practice is intercropping, especially with mustard. This analysis also applies to private forest nurseries. Because these methods are at the research stage, they cannot be considered as being in general use (PV CSAMM).

For the "Trees and shrubs*Weed control*Open-ground planting", seed orchards for forest production scope, the only identified alternative to glyphosate is to carry out subsoiling as close as possible to the root, followed by the application of fertiliser in the subsoil furrow. However, this solution is not in general use. The ONF questions the equivalence of this method's effectiveness with the use of glyphosate, especially regarding migration of the fertiliser to the tree roots from the subsoil furrow. This analysis applies to seed orchards in private forests (CNPF, February 2020).

For the "Forest*Weed control*Before planting" use, alternatives were identified: manual work, i.e. the use of brushcutters with blades adapted to the vegetation, whether this is annual and perennial grasses, ferns, herbaceous and semi-woody dicotyledonous species, or woody plants. This work is carried out on plots where mechanisation is not possible (small surface area, steep slope, etc.), but is not considered to be in general use. Along with other techniques that could be described as agronomic, such as mulching or burning forest waste in preparation for planting, the use of ground-cover plants or individual protective sleeves is reserved for low-density plantations of precious hardwoods and is therefore not considered to be in general use (Expert DGAL, March 2020).

On the other hand, "conventional" mechanised operations can be considered practices in general use in both situations (Expert DGAL, March 2020).

More recently, research work has led to the development of tools fitted to mini-excavators (CNPF, February 2020; DGAL expert, March 2020). As their use in private forests is limited, this alternative cannot be considered to be in general use (CNPF – RENFOR survey, 2020).

For the "Forest*Clearing" use: for both public and private forest management, this use only concerns the first few years, corresponding to establishment of the stand, whether through planting or natural regeneration.

For this use, several non-chemical alternatives were identified: manual work using brushcutters, or mechanised operations involving different tools (flail-trimmers, mulchers, disc harrows).

The voluntary phasing out of glyphosate use by the ONF has led to these methods becoming widespread. They have therefore been classified as being in general use, with the exception of tools mounted on mini-excavators, whose use in private forests remains limited (CNPF – RENFOR survey, 2020).

For the "Forest*Destruction" use, mechanisation of work is an alternative to chemical operations; it is widespread and can be considered to be in general use (Expert DGAL, March 2020).

The information presented can be summarised as follows.

Name of use	Non-chemical methods	Description	General use?	Sources
Trees and shrubs* Weed control* Field-grown nursery *Forest nursery scope*	Hand weeding at emergence	Hand weeding at emergence	No	MA Monitoring Committee meeting minutes ONF
	Mechanical weed control	Spike harrow with optical detection of the planting row for well-established seedlings or seedbeds over one year old	No	
Trees and shrubs* Weed control* Open-ground planting *Seed orchard scope*	Mechanical operation	Subsoiling along the row	No	MA Monitoring Committee meeting minutes
Trees and shrubs* Weed control* Open-ground planting	Mechanical operation	Subsoiling carried out as close as possible to the root, followed by the application of fertiliser in the subsoil furrow	No	CNPF - RENFOR survey, 2020
Forest* Weed control* Before planting	Manual work	Brushcutters with blades adapted to the vegetation: herbaceous, semi-woody, woody. Used on plots where mechanisation is not possible (small surface area, steep slope, etc.)	No	MA Monitoring Committee meeting minutes CNPF - RENFOR survey, 2020 DGAL expert, March 2020
	Agronomic techniques	Burning forest waste, mulching, individual protective sleeves, ground-cover plants	No	
	Mechanised operations on mini-excavators	Reversible scarifier	No	
	"Conventional" mechanised operations	Heavy-duty mulchers, stump grinders, shallow or deep tillage tools, tools on excavators	**Yes**	
Forest* Clearing	Mechanised operations on mini-excavators	Reversible scarifier, *Régédent* pickaxe-harrow, mountain scarifier, etc.	No	MA Monitoring Committee meeting minutes ONF CNPF - RENFOR survey, 2020 DGAL expert, March 2020
	Manual work	Brushcutters with blades adapted to the vegetation: herbaceous, semi-woody, woody. Used in maintenance	**Yes**	
	"Conventional" mechanised operations	Flail-trimmers, mulchers, disc harrows	**Yes**	
Forest* Destruction	**Mechanisation of the work**	Felling trees and shredding or grinding stumps. Manual shredding or cutting of sprouts.	**Yes**	DGAL expert, March 2020

Table 2 - Non-chemical alternatives and situation regarding their use

2. Consideration of major practical or economic disadvantages

For each of the non-chemical prevention or control alternatives in general use identified following point (1.b) in Table 2, the practical and economic disadvantages were examined to identify whether the obstacles to making them available to all the forest workers concerned could be considered to be major, and to set out the specific conditions for substituting glyphosate use by this alternative.

Do the identified non-chemical alternatives in general use have major practical or economic disadvantages?

2.1 "Forest*Weed control*Before planting" use

Case of "conventional" mechanised operations	
Practical disadvantages compared to chemical weed control	- Soil compaction problems resulting from the use of heavy machinery (about 20 tonnes) (Expert DGAL, March 2020; Pôle RENFOR, 2020; PV CSAMM); - Method not suitable for small plots, especially where they are fragmented, or for steeply sloping plots, or for regeneration through planting on plots that have not been completely cleared (Expert DGAL, March 2020; PV CSAMM); - Feasibility varies depending on climate conditions (Expert DGAL, March 2020; PV CSAMM); - Ineffective or even harmful on perennial grasses (Expert DGAL, March 2020).
Economic disadvantages compared to chemical weed control	- For public forests, the increased cost due to use of the equipment is tolerated, since these mechanical alternatives have been implemented permanently; - For private forests, the situation is different. The small surface area of the plots, accessibility difficulties, or the need to use a service provider, generate additional costs that are not easily borne by the owners. For example, the estimated price for the use of a Maillard bident is €1,300/ha on average (variable according to vegetation and soil type), bearing in mind that the working speed is around 1 ha/day (Pôle RENFOR, 2020), whereas glyphosate weed control is estimated to cost €300 to €400/ha.

Table 3 - Disadvantages of alternatives in general use in weed control before planting

The uncertainties in the case of mechanisation of work for preparation before planting are as follows:

- Mechanisation is viewed negatively by society; it is seen as degrading the environment and causing soil compaction (PV CSAMM);
- Risk of abandonment of plots with too much competing vegetation leading to the development of wasteland, creating higher fire risk situations or landscaping problems (PV CSAMM);
- Compatibility with the National Low-Carbon Strategy (SNBC)*, particularly in terms of conservation and enhancement of carbon sinks and stocks [Ministry of Ecological and Inclusive Transition] (MTES, February 2020)].

*SNBC: The **National Low-Carbon Strategy** (SNBC), first adopted in 2015 and revised in 2018-2019, is a roadmap to combat global warming introduced by the French Act of 17 August 2015 on energy transition for green growth (LTECV) (point F1[2]).

In view of the information presented in Table 3, it seems that "conventional" mechanised operations have major practical disadvantages due to the inefficiency of the equipment in controlling perennial grasses, as well as major economic disadvantages due to the additional cost of mechanical weed control compared to chemical weed control, especially for private forest owners.

The plant health context should also be taken into account: declining and dying stands have been appearing in France for many years now, particularly with forests of lowland oak and beech, European silver fir, etc.

[2] SNBC – Point F1: With regard to forests, priority F1 stipulates ensuring over time the conservation and enhancement of carbon sinks and stocks in the forest-timber sector, as well as their resilience to climate stresses.

In addition, since 2018, bark beetle attacks have been causing extensive damage to spruce stands. The area that will have to be reforested between 2020 and 2025 was estimated in late 2019 to be 50,000 ha, bearing in mind that the epidemic is not over. These stands are often invaded by perennial grasses (*Carex brizoides*, moor grass on hydromorphic soil, hairgrass under spruce trees, etc.) and it will be necessary to renew them by planting other species that are better adapted to climate change (Expert DGAL, March 2020).
It is also interesting to note that carrying out weed control at the time of preparatory work for planting or regeneration through planting can significantly help limit clearing operations (Expert DGAL, March 2020; Pôle RENFOR, 2020).

2.2 "Forest*Clearing" use

Case of manual work	
Practical disadvantages compared to chemical weed control	Need for multiple operations because of rapid regrowth of vegetation, especially perennials.
Economic disadvantages compared to chemical weed control	Additional labour costs due to working time (increase in the number and duration of passes). For example, the price of manual brushcutting can range from €350 to €1,600 excl. tax/ha (Pôle RENFOR, 2020).
Case of "conventional" mechanised operations	
Practical disadvantages compared to chemical weed control	Mulchers ineffective or even harmful on perennial grasses. For public forests, no other practical disadvantages were identified. For private forests, the method is poorly suited to small plots and is a disadvantage, especially during the key period of establishing a new stand.
Economic disadvantages compared to chemical weed control	For public forests, the increased cost due to use of the equipment is tolerated, since these mechanical alternatives have been implemented permanently; For private forests, the extra cost of mechanical weed control is considered a disadvantage. The estimated average price for the use of a flail-trimmer (for ferns) is between €300 and €500/ha, bearing in mind that the passes have to be repeated (Pôle RENFOR, 2020). However, this additional cost does not seem to be a major economic disadvantage once the forest is established, as operations then become less frequent. The additional cost also concerns maintenance related to dealing with hardwood sprouts. Manual alternatives are more expensive, such as mechanical pruners or brushcutters. Choosing not to use glyphosate would require three additional manual clearances over a period of 5 to 6 years, representing an additional cost of €1,500/ha (CNPF – RENFOR survey, 2020).

Table 4 - Disadvantages of alternatives in general use in clearing

In the case of the mechanisation of clearing work, the uncertainties identified are identical to those described for preparation for planting, with one specificity associated with this use: a lengthening of the regeneration period inducing a risk of loss of production.

In view of the information presented in Table 4, it seems that:
- Manual work has practical and economic disadvantages considered to be major, due to the rapid regrowth of vegetation and the need to repeat operations;
- "Conventional" mechanised operations, during the key period of establishing a stand, have major practical disadvantages due to the inefficiency of the equipment in controlling perennial grasses, as well as major economic disadvantages due to the additional cost of mechanical weed control compared to chemical weed control, especially for forest owners.

2.3 "Forest*Destruction" use

Case of mechanisation of preparatory work	
Practical disadvantages compared to chemical weed control	No major practical or economic disadvantages were identified.
Economic disadvantages compared to chemical weed control	

Table 3 - Disadvantages of alternatives in general use in destruction

It should be noted that this killing technique is less and less used in forests, mainly due to growing potential for use of these plant elements as firewood.

3. Consideration of minor uses and management of resistance

Is the use concerned:	**Yes/No**	**Justify**
by a minor use situation?	Yes	The uses are minor within the meaning of the National Plant Protection Uses Catalogue in force and in terms of quantities and frequencies of use of weed killers.
by management of resistance?	Not applicable	As it concerns non-chemical alternatives for prevention and control, an analysis of the chemical diversity of the active substances is not appropriate.

Table 7 - Minor uses and resistance

The classification of minor uses is one of the aspects to be taken into account, according to a requirement of Article 50.1 of Regulation (EU) 1107/2009. However, the analysis of uses cannot be reduced to this observation.
While the comparative assessments carried out for agricultural uses (viticulture, arable crops and arboriculture) concern areas of economic importance, relating to production with a view to harvesting crops, the situation of glyphosate uses in forests is unique.
This is because in addition to their economic function of producing wood or biomass (timber, industrial wood or fuel), French forests also have an environmental function, constituting a reservoir of biodiversity, as well as a social function, by allowing public access (700 million visits estimated each year - ONF). They also play a role in protecting water resources and protecting against natural risks (erosion, floods, landslides, etc.).
This being so, examining the possibility of limiting glyphosate uses to the situations identified as substitutable, including minor use situations, responds to the ministerial request.

4. Risk comparison

Are the identified alternatives significantly safer for human or animal health or the environment?

Regulation (EC) No 1107/2009 stipulates that the identified alternatives are significantly safer if a significant difference in risk has been established between the substitutable product and these alternatives for the use in question. Annex IV to this Regulation sets out the methodology for carrying out this risk comparison.

This annex gives the following indications: "The properties of the active substance and plant protection product, and the possibility of exposure of different population subgroups (professional or non-professional users, bystanders, workers, residents, specific vulnerable groups or consumers) directly or indirectly through food, feed, drinking water or the environment shall be taken into account (*by the competent authorities*). Other factors such as the stringency of imposed restrictions on use and prescribed personal protective equipment shall also be considered. For the environment, if relevant, a factor of at least 10 for the toxicity/exposure ratio (TER) of different plant protection products is considered a significant difference in risk."
This shows that the idea of Regulation (EC) No 1107/2009 really is to assess and compare plant protection products. All the application guidance documents concern plant protection products, whether the active substance is a chemical or a micro-organism.
Although non-chemical alternative methods are cited in the Regulation, no method is given for assessing the risks associated with their use.
ANSES does not therefore have the tools or validated methodology needed for conducting an assessment to determine whether the non-chemical alternatives are significantly safer for human or animal health or the environment than a plant protection product.

5. Summary table

Can the use of glyphosate be substituted by an alternative non-chemical method?	**Yes / No**	**Justify**
Trees and shrubs* Weed control*Field-grown nursery *Forest nursery scope*	No	⇨ Identified alternative, not considered to be in general use: ➢ hand weeding and mechanical weed control
Trees and shrubs*Weed control*Open-ground planting *Seed orchards for forest production scope*	No	⇨ Identified alternative, not considered to be in general use: ➢ subsoiling as close as possible to the root, followed by the application of fertiliser in the subsoil furrow
Forest*Weed control* Before planting	No	⇨ Identified alternatives considered to be in general use: ➢ "Conventional" mechanised operations: For these alternatives, the practical or economic disadvantages are considered to be major for the following reasons: o ineffectiveness on perennial grasses o significant additional costs related to the use of equipment in private forests (considerable fragmentation of plots)

Forest*Clearing	No	⇨ Identified alternatives considered to be in general use: ➢ Manual work: For these alternatives, the practical or economic disadvantages are considered to be major **during the stand establishment period**, for the following reason: o multiplication of operations on perennials, generating additional labour costs ➢ "Conventional" mechanised operations: For these alternatives, the practical or economic disadvantages are considered to be major **during the stand establishment period**, for the following reasons: o ineffectiveness on perennial grasses o significant additional costs related to the use of equipment in private forests (considerable fragmentation of plots)
Forest*Destruction	Yes	⇨ Identified alternatives considered to be in general use: ➢ Mechanisation of the preparatory work: For these alternatives, the practical or economic disadvantages are not considered to be major

Table 8 - Summary table of the comparative assessment

General conclusion

Non-chemical alternatives exist for use in killing. Insofar as they can be considered methods in general use and do not have any major practical or economic disadvantages, **the substitution of glyphosate by non-chemical alternatives is considered possible** for this use.

For use in clearing, complete substitution of the use is not adopted, but **a major restriction is proposed**, limiting operations solely to the first few years of forest development (seedling and thicket stage, trees less than 3 metres high), due to practical and economic disadvantages considered to be major during this period.

On the other hand, for the other uses considered to be minor and that concern either very small areas (e.g. forest nurseries and seed orchards) or a very low frequency of use (every 20 to 150 years for weed control before planting), **substitution is not adopted**, for the following reasons:

- For weed control in forest nurseries and seed orchards in forest production, where there is no alternative in general use;
- For weed control before planting, due to the lack of a non-chemical method in general use for perennial grasses, and major practical or economic disadvantages identified for forest owners and managers.

Authorisations would therefore be granted for uses with a favourable conclusion after assessment.

Uses	Maximum rate and conditions of use
Product rate to be calculated according to the glyphosate content of the product based on a maximum rate of glyphosate not to be exceeded per hectare (see glyphosate opinion of 8 October 2004[3])	
Trees and shrubs*Weed control* Field-grown nursery *Forest nursery scope*	Conditions of use: According to the assessment conclusions and glyphosate opinion
Trees and shrubs*Weed control* Open-ground planting *Seed orchards for forest production scope*	Conditions of use: According to the assessment conclusions and glyphosate opinion
Forest*Weed control*Before planting	Conditions of use: According to the assessment conclusions and glyphosate opinion
Forest*Clearing	Conditions of use: Not to be used for forest maintenance, except during the stand establishment period (height less than 3 metres) Other conditions according to the assessment conclusions and glyphosate opinion
Forest*Destruction	Substituted use: withdrawal or refusal based on the comparative assessment

[3] Opinion to all holders of marketing authorisations for commercial products containing glyphosate (or N-(phosphonomethyl)glycine), French Official Journal No. 235 of 8 October 2004

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