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.

At the same time, on 13 November 2018, INRA was commissioned by the Ministers of Ecology and Agriculture to produce a report presenting an examination of the alternatives, their uses, and the practical and economic disadvantages.

This current document is based on information from the references cited in the annex, mainly from INRA/INRAE reports (INRA, 2017) and (INRAE, 2020), additional data provided by marketing authorisation applicants (Glyphosate Task Force (GTF2, 2019)), information provided by the survey carried out by the Interprofessional Technical Centre for Fruit and Vegetables (CTIFL) in 2019 on weed control practices in fruit tree growing (CTIFL, 2020), and the presentations and discussions of the MA Monitoring Committee for plant protection products at its meetings of 30 January and 9 July 2020 (Minutes from the meetings of the MA Monitoring Committee for plant protection products on 30 January 2020 and 9 July 2020) (PV CSAMM).

Use designation, crops concerned and use status

In metropolitan France, glyphosate products are authorised for use on established fruit crops; this concerns plots of mature orchards more than three years old (after lignification of the trunks) and already in production.

Name of use[1] (national catalogue)	Scope of use (crops or crop groups covered)	Status of use	Description of use
Fruit crops* Weed control*Planted crops	All fruit crops and small fruit (berries)	Major	Destruction of weeds between and/or under rows (excluding nurseries)

Table 1 - Description of the use in question

[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.

Besides this description, it is important to clarify that, in France, marketing authorisation decisions for a "reference" crop or crop group are valid for the same use on "related" crops constituting the scope of use, unless otherwise specified in the decision for the product concerned. For this use, the authorised crops or crop groups covered may therefore vary according to the products:

- either the product is authorised on all related crops within the scope, in which case there is no mention of the use concerned in the authorisation decision;
- or the product is authorised on only some of the crops and the restriction of the scope appears with the words "only on..." in the authorisation decision for the use concerned.

Name of reference crop	Scope of use: crops concerned and associated EPPO[2] codes
"Citrus"	Sweet orange (CIDSI), Lemon (CIDLI), Pomelo/grapefruit (CIDGR), Mandarin (CIDRE), Clementine (CIDRE), Sweet lime (CIDLM)
"Fig"	Fig (FIUCA)
"Nuts"	Almond (PRNDU), Walnut (IUGRE), Sweet chestnut (CSNSA), Hazelnut (CYLAV)
"Stone fruits"	Peach (PRNPS), Apricot (PRNAR), Cherry (PRNCE), Plum (PRNDO), Nectarine (PRNPN), Mirabelle (PRNDS)
"Kiwi"	Kiwi (ATIDE)
"Olive"	Olive (OLVEU) (table olives and olives for oil)
"Small fruit"	Blackcurrant (RIBNI), Bilberry (VACAR), Redcurrant (RIBRU), Elderberry (SAMNI), Cranberry (VACAR), Rosehip (ROSCN), Azarole (CSCAZ), Raspberry (RUBID), Mulberry (MORNI), Blackberry (RUBFR)
"Pome fruits"	Apple (MABSD), Pear (PYUCO), Quince (CYDOB), Medlar (MSPGE), Asian pear/Nashi (PYUPC), Mediterranean medlar (CSCAZ)
"Persimmon" "Siberian kiwi" "pomegranate" "pistachio"	*Recent additions: the notice on fruit crops of the National Plant Protection Uses Catalogue is currently being updated*

Table 2 - Scope of uses and crop name grouping level

Additional information on crops included in this analysis:

Data on the use of glyphosate for weed control of the 27 fruit crops mainly grown in metropolitan France came from the following sources:

- for apricot, cherry, peach, apple and plum crops: the INRAE report (2020).

This report offers an analysis of non-chemical alternatives based on specific processing of data from the "Cultivation practices in arboriculture" (PK Fruits) survey by the Ministry of Agriculture's Statistics and Prospective Department (SSP), which provides information on cultivation operations for the 2014-2015 season. The data collected from this survey and analysed by INRAE concern the following five fruit crops in metropolitan France: apricot, cherry, peach, apple (including organic apple production) and plum (including the "Ente" prune plum mainly consumed as “dried plums”);

- and for a group of major fruit crops: from the survey carried out by the CTIFL on nearly 1,000 farms (CTIFL, 2020).

[2] EPPO: European and Mediterranean Plant Protection Organization

This survey report enabled the analysis to be extended to other fruit crops grown in metropolitan France, including olive, citrus, kiwi, persimmon, fig, small fruit (blackcurrant, bilberry, redcurrant, raspberry and mulberry) and nuts (walnut, hazelnut and sweet chestnut).
Detailed quantified data for the 27 species mainly grown in metropolitan France, which account for 165,186 ha of production, were obtained from the online survey conducted by the CTIFL over the period from 26 August to 9 September 2019 (CTIFL, 2020).

Additional information on crops not assessed in this analysis:

Regarding the following situations:

- **Use of glyphosate for weed control of tropical crops**, mainly banana and avocado. In the National Plant Protection Uses Catalogue (decree of 26 March 2014 on implementation of the catalogue of uses), these crops appear in a separate notice from fruit crops grown in metropolitan France;
- **Use of glyphosate for killing stumps of trees that have been removed**. These situations are covered by the use "General treatments*Destruction*Standing tree stumps" and **for weed control in tree nurseries** (no specific use authorised). Note that tree stumps may be killed either as part of stand thinning programmes to maintain the yield of large species (hazelnut, walnut and sweet chestnut), or to implement health measures imposed as part of mandatory control of regulated pests, in particular sharka (plum pox virus) or apricot chlorotic leafroll (ACL) on stone fruits (CTIFL, 2020);
- **Use on table grapes**. As vines for table grapes are included in the "Vine*Weed control*Planted crops" scope of use, the comparative assessment instruction for that use also covers table grapes.

Situation regarding glyphosate use on fruit crops

In 2019, arboriculture in metropolitan France accounted for a total area of 173,232 ha, i.e. 0.6% of utilised agricultural land (28,637,715 ha) (Source: SAA 2018 - 2019 provisional).
With regard to the use of herbicides, and glyphosate in particular, the following information has been provided:

⇨ On use practices in arboriculture:

- For stone and pome fruit orchards, chemical weed control almost exclusively concerns the area under the trees (the row), which represents between 20 and 50% of the total orchard area, depending on the spacing between the rows (INRAE, 2020);

- Glyphosate is mainly used for managing weeds at the base of the trees, in order to reduce competition for minerals and water between weeds and trees, and to help reduce refuge areas for pests such as aphids and voles (INRAE, 2020);

- Weed control can also facilitate the harvesting of nuts, especially walnuts and hazelnuts, from the ground. Its use for harvesting cider apples is also cited [(CTIFL, 2020) and (INRA, 2017)];

- Another, more specific use is for small fruit crops grown in "bush" form (blackcurrant, redcurrant, bilberry, etc.), in order to eliminate weeds with toxic berries that can grow through the centre of the bush, such as bittersweet nightshade (*Solanum dulcamara*), red/white bryony (*Bryonia dioica*) and belladonna (*Atropa belladonna*). The berries of these poisonous plants can mix with mechanically harvested fruit and are difficult to separate from them when sorting (PV CSAMM; CTIFL, 2020).

⇨ On the frequency and quantities used (INRAE, 2020):

- Herbicides account for only a small proportion of plant protection products used in arboriculture compared to fungicides and insecticides;
- According to INRAE, of all the herbicide treatments recorded in the "PK" survey, 89% of them concerned post-emergence herbicides, 62% of which contained glyphosate. According to this survey, 70% of the areas in metropolitan France receive at least one glyphosate treatment. However, it should be noted that some active substances that were used in 2015 in post-emergence products at the time of the survey are no longer authorised (aminotriazole and glufosinate ammonium), which could underestimate the percentage of glyphosate use;
- With regard to the quantities of glyphosate used per hectare, according to the calculations performed on the basis of the "PK" survey, the average rate used was 1,139 g as/ha for the fruit species surveyed, with a variation according to species ranging from 536 g as/ha (prune plum), 1,161 g as/ha (apple) to 1,555 g as/ha (apricot);
- The farms in the DEPHY network (CAN DEPHY, 2018), showcases for schemes to reduce plant protection product uses, report rates ranging from 260 g as/ha to more than 1,500 g as/ha, with an average rate of 810 g as/ha.

In summary, and as confirmed by the CTIFL survey (CTIFL, 2020), the active substance glyphosate is the most widely used systemic post-emergence herbicide on IFP[3] farms: 98% of operators applying a programme based solely on herbicides and 91% of those applying a mixed programme (herbicide + alternative technique) reported using glyphosate "systematically" or "most often". This can be explained by the effectiveness of the active substance, its broad spectrum of action and its flexibility of use. Moreover, its effectiveness, even on already well-established weeds, makes it suitable for remediation in the case of previously unfavourable soil and climate conditions.

Examination of non-chemical alternatives under Article 50.2

1. Identification of non-chemical alternatives in general use

1.a. Do non-chemical methods of prevention or control exist for the claimed use?

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

- **Yes,** for the situations identified below (1.b.);
- **No**, in the following situations of technical deadlock:
    - Situations where mechanisation is not possible, corresponding to topography or soil conditions that limit the use of mechanised tools: orchards on terraces or steep slopes, very stony/rocky areas, planting on mounds (GTF2, 2019; CTIFL, 2020; INRA, 2017);
    - Need for control of established perennial weeds in situations where non-chemical alternatives are unable to limit their growth, or may even favour their spread in the case of rhizome plants (CTIFL, 2020; INRA, 2017).

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

Two cases corresponding to different weed control objectives and application periods should be taken into account:

[3] IFP: Integrated fruit production, orchards that account for 65% of the sample surveyed in the CTIFL survey (CTIFL, 2020)

- weed control intended for **season-long management of weed competition**;
- weed control **prior to harvesting fruit on the ground when this harvesting is mechanical**.

- ***Weed control to limit weed competition***

Regarding inter-row weed control:

The data presented in the INRAE report (2020) indicate that in the vast majority of crops studied (95% of the areas in the "PK" survey), the spaces between rows are grassed. Inter-row grass cover is most often managed mechanically, by shredding, rolling or mowing. This is confirmed by the CTIFL survey, which indicates that for orchards older than 3 years, chemical weed control is not used in the entire orchard, but is limited to the planting row in most productions; the inter-row spaces are then mainly maintained by mowing (89% of the plots surveyed) (CTIFL, 2020).
Based on this information, managing inter-row grass cover without herbicide application can be considered a practice in general use, since it is possible for all fruit crops.

Regarding under-row weed control:

Case of orchards with stone fruit, apple, olive, citrus, fig, kiwi and nuts:

Alternative methods to chemical weed control listed in the INRAE report (INRAE, 2020), on the basis of a literature review, are:

- grass cover, whether sown or growing spontaneously, managed by mowing or cutting or, more rarely, by grazing sheep, chickens and pigs;
- mechanical weed control of the row:
  - tillage: hoeing or weeding (cutting weed roots), ploughing (turning the soil/burying weeds) or rotary tools (uprooting);
  - by the "sandwich" method: the planting line is grassed (by sowing or spontaneous growth) and the soil is tilled on both sides of the row, without covering the entire inter-row space;
- thermal weed control of the row: using the heat from a gas flame to burn off the aerial parts of weeds;
- covering the ground on the row with plastic sheeting or woven canvas, biodegradable mulch, plant-fibre felt, etc.

According to the initial results of the CTIFL survey conducted in 2019, 38% of orchards already integrate alternative weed control methods for rows of trees in adult plots, either in addition to herbicides or without any herbicide use. Most of these seem to be farms with orchards smaller than 5 ha. The preferred alternative weed control techniques, whether in IFP or OF[4], are row mowing, which seems to be the most common, and then mechanical weed control by tillage.
As for the other methods (grazing, covering the ground, thermal weed control), they are not considered to be in general use, given the small proportion of field use in the "PK" survey as reported by INRAE and in the CTIFL survey. Note that thermal weed control cannot be used in fire risk areas, and the use of plastic or fabric mulch cannot be retrofitted in existing orchards, and is therefore only really practical for the establishment of new orchards (GTF2, 2019).
In addition, methods requiring technological development are not yet widely available and will not be considered in the analysis (e.g. robotisation, electric weed control).

Case of bushy crops: small fruit and hazelnut orchards:

Alternatives to glyphosate and mechanical weed control identified by INRA (INRA, 2017) for these particular situations consist in laying ground cover (tarpaulins). They are not in general use and encourage the presence of rodents (PV CSAMM).

[4] OF: organic farming, the report specifies that 25% of the fruit farms surveyed by the CTIFL practised OF and did not use any herbicides and therefore no glyphosate.

- ***Weed control to facilitate mechanical harvesting of fruit on the ground***

Mechanical weed control is not applicable for nuts (walnuts, hazelnuts, chestnuts) and other fruit harvested from the ground such as cider apples, olives and prune plums. During mechanical harvesting, the soil must be perfectly stabilised and levelled, with rigorous grass control on and between the rows (CTIFL, 2020).
For cider apples, mechanical weed control increases the risk of ruts and muddy soil at harvest time (GECO, 2020), leading to harvesting difficulties and an impact on quality.
An alternative suggested by INRA (INRA, 2017) is low-mowing or laying of tarpaulin, which is not considered to be in general use, in view of the CSAMM discussions and the CTIFL survey on use practices conducted in 2019.

Purpose of weed control	Type of weed control	Crops concerned	Non-chemical methods	General use?	Sources
Facilitate mechanical harvesting	Total under-row and inter-row	Nuts, cider apple trees, olive trees, prune plum trees	Low-mowing Covering the ground with tarpaulins, nets, etc.	No	(CTIFL, 2020; INRA, 2017; GTF2, 2019; PV CSAMM)
Limit weed competition	Inter-row management	All crops	**Management of grass cover by shredding, rolling, mowing, etc.** **Mechanical weed control**	**Yes**	(INRAE, 2020) (CTIFL, 2020)
	Under-row management	Bushy crops: small fruit and hazelnuts	Covering the ground with tarpaulins, mulch or plant-fibre felts	No	(CTIFL, 2020; PV CSAMM; INRA, 2017)
		Other crops	**Management of grass cover by mowing** **Mechanical weed control of the row (tillage, "sandwich" method)**	**Yes**	(INRAE, 2020; CTIFL, 2020; GTF2, 2019)
			Covering the ground with tarpaulins; mulch or plant-fibre felts Thermal weed control	No	

Table 3 - 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 in point 1 of the analysis, the practical and economic disadvantages were examined to identify whether the obstacles to making them available to all the farmers 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?

The table below lists the main practical and economic disadvantages identified on the basis of the available information, for non-chemical weed control methods in general use compared to chemical weed control.

Non-chemical methods in general use: case of mechanical control or grass cover with mowing	
Inter-row management: practical and economic disadvantages	Already in effective use without major practical and economic disadvantages reported.
Under-row management: practical disadvantages associated with non-chemical weed control	<u>Constraints related to sufficient availability of suitable equipment</u>: - Risk of agro-equipment companies having insufficient supply capacity to meet increased demand in the short term for mechanical equipment suitable for under-row weed control. According to AXEMA[5], a transition phase of at least 5 years would be needed, starting from when glyphosate is no longer authorised for use, with regard to production capacity and its quantified growth (combination of current production and estimated growth). With French companies' current production capacities, it would take about 15 years to equip producers on the French market. End-user support and training are also fundamental points not to be overlooked (AXEMA, 2020; PV CSAMM); - The number of farm implements needing to be increased beyond a certain surface area (and therefore the number of skilled tractor operators). For example, a single tillage implement (mechanical weed control) can only cover about 15 ha and a single mowing implement can only cover about 20 ha (CTIFL, 2020), with organisational consequences; <u>Constraints related to the organisation of work and the operation of the farm:</u> - Increased number of passes that varies depending on the farm: for example, from 3 to 6 passes/year for mechanical weed control compared to 1 to 3 passes/year with chemical weed control (INRAE, 2020). This needs to be qualified by the fact that certain passes may be combined with the incorporation of fertilisers or leaf burial; - Increase in working time from 1.5 to 3 hours per ha using chemical weed control to 2 to more than 4 times longer with alternative techniques. Mechanical weed control with tillage takes the longest, though times vary according to the species (INRAE, 2020; GTF2, 2019); - Feasibility varies depending on soil and climate conditions (CTIFL, 2020); <u>Constraints related to the way the orchard is managed:</u> - Irrigation systems for an orchard in production: some tools can be used but require special precautions (INRAE, 2020) Mechanical weed control is not compatible with ground-level irrigation systems, so may not be appropriate for use in all existing irrigated orchards. Adaptation needed to switch to subsurface or overhead irrigation, or in some cases a complete change of system/installation of tarpaulins (INRAE, 2020; CTIFL, 2020; GTF2, 2019): 54% of the farms surveyed had an irrigation system with pipes laid on the ground (CTIFL, 2020); - Not feasible for a tine cultivator to pass under rows of irrigated trees (CTIFL, 2020); - Plots under insect-proof nets in single rows:

[5] AXEMA: Agricultural equipment industry association

Under-row management: practical disadvantages associated with non-chemical weed control	Need to adapt the tools to go under the nets, develop net support systems that are compatible with the passage of mechanical implements along the row (CTIFL, 2020); <u>Reduced efficiency of weed control and impact on yield or trees:</u> - Risk of injury to trunks/collars and roots, breakage of trees and trellising on the surface that can lead to loss of yield and reduced fruit size (INRAE, 2020; GTF2, 2019) and weaken the trees; - Tillage promotes the multiplication of perennial weeds. By leaving strips of bare soil, tillage encourages the germination of annual or biennial species, some of which are particularly virulent, such as amaranth, ragweed, lamb's quarters or rumex (CTIFL, 2020); - Grass cover encourages the growth of perennials such as Johnsongrass (*Sorghum halepense*) or field bindweed (*Convolvulus arvensis*), or favours flora that tolerates cutting (Hardy, 2019). <u>Increased risk of pests (aphids and voles):</u> Establishing permanent under-row ground cover (grassing) favours rodent populations (voles, field mice) that damage the root systems of the trees they consume, leading to mortality that can devastate plantations (CTIFL, 2020). **General remark**: The INRAE report (2020) indicates that it is preferable to consider the use of non-chemical alternatives from the moment the orchard is first established (choice of a more vigorous adapted rootstock, deeper root development, compatibility with irrigation systems). Unlike vines, fruit trees are not able to "adapt" their root systems once they have become established, which limits their ability to compensate over the years (PV CSAMM).
Under-row management: economic disadvantages associated with non-chemical weed control	<u>Impact on production:</u> - Yield loss due to mechanical weed control ranging from **5%** for dense apple trees **to 40%** for semi-extensive plum trees (INRAE, 2020); - The decrease in yield can range from **20% to 50%** when switching to total grass cover in apple orchards, as shown by some results of experimental trials conducted in 2004 and 2005 (results depend on the type of cover, with some species being competitive to a greater or lesser degree) (BGSO, 2006); - Annual yield loss in the 3 years following the adoption of new practices without chemical weed control estimated at **around 10%**, which can result in a financial loss of €1,840/ha to €3,680/ha in apples, €1,600/ha to €3,200/ha in apricots or €587/ha to €1,173/ha in walnuts (CTIFL, 2020); <u>Overall additional cost</u>: - Additional costs vary greatly depending on the literature studies, **from €20 to €700/ha** (INRAE, 2020); - Additional cost estimated on the basis of the data from the "PK" survey, between **€120/ha** and **€432/ha** depending on the assumption made and the type of space considered; this includes the additional cost due to extra production costs: fuel consumption, labour and its qualification, increased working time, need for equipment, etc. (INRAE, 2020);

Under-row management: economic disadvantages associated with non-chemical weed control	- Additional production costs of **€62 to €206/ha** per year for the method of **mowing the plantation rows**, and **€193 to €470/ha** per year for the **mechanical weed control** method - estimate (CTIFL, 2020). Potential additional cost (not estimated) generated by adaptation or modification of the irrigation system to make it compatible with mechanical weed control, for all areas irrigated by sprinklers and some of those using drip irrigation and micro-jets placed on the ground (INRAE, 2020). Note: for 31% of respondents, it would be possible to adapt the irrigation system but with a significant additional reported cost (CTIFL, 2020).
Under-row management: uncertainties	- High variability of costs according to the literature sources presented in the INRAE (2020) report; - Difficulty taking into account the diversity of situations encountered for all fruit species; - Questions raised as to whether the farmer could capitalise on the non-use of herbicides by demanding higher prices, for example, through information to the consumer (INRAE, 2020; CSAMM meeting minutes, 2020; GTF2, 2019): ➢ situation linked to the products' intended markets, the importance of exports (which represent about half of the apple or nut markets) or competition from other European countries on the national market (for apricots or peaches), which limits the producers' room for manoeuvre on the selling price; ➢ risk of distorted competition with regard to other European or third countries that still have access to glyphosate; ➢ potential aid to support orchard renewal and mitigate the impact of glyphosate withdrawal; - Compatibility with the National Low Carbon Strategy (SNBC)[6] [Ministry of Ecological and Inclusive Transition (MTES, February 2020)], particularly in terms of: ➢ impact on greenhouse gas production (few quantified data) related to the increased number of passes (higher fuel consumption). According to the INRA 2017 report, a comparative analysis using the BioREco system at INRA Gotheron showed equivalent greenhouse gas emissions regardless of whether a mechanical or chemical weed control strategy was applied (BioREco, 2020; INRA, 2017); ➢ and impact on the possible disruption of soil biological activity.

Table 4 - Disadvantages and uncertainties of alternatives in general use

In view of the information presented in Table 4, it seems that mechanical weed control and/or grassing practices:

- in the inter-row spaces do not have any major practical or economic disadvantages;
- under the rows have major practical disadvantages related to under-row weed management (availability of equipment and specialised labour) as well as economic disadvantages (lower production, additional costs, adaptation), compared to chemical weed control under the rows, limiting their development for all farmers concerned.

[6] SNBC - points A2 and A4: With regard to agriculture, priority A2 stipulates reducing CO_2 emissions associated with fossil fuel consumption and developing the use of renewable energies, and priority A4 stipulates stopping the current release of carbon from agricultural soils and reversing the trend, in connection with the "4 per 1000, soils for food security and climate" initiative.

Substituting glyphosate under the rows with non-chemical methods currently in general use (e.g. mechanical hoeing, grass cover with cutting or mowing) can indeed result in reduced control of competing weeds and lower yields. Moreover, the use of these methods requires orchards to be redesigned (e.g. adaptation of the irrigation system) to make them compatible with the use of mechanical tillage or mowing equipment, as well as a major reorganisation of farm work.

3. Consideration of minor uses and management of resistance

Is the use concerned:	Yes/No	Justify
by a minor use situation?	Not applicable	The use is major within the meaning of the National Plant Protection Uses Catalogue in force.
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 5 - Minor uses and resistance

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, irrespective of the nature of the chemical or biological active substance (micro-organisms).

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
For use over the entire orchard area	No	<u>All fruit crops considered:</u> ⇨ Technical deadlocks identified in the following situations: - Situations where mechanisation is not possible, such as terraces, mounds, steep slopes and very stony ground (topography or soil type that reduces the land's accessibility for agricultural machinery); - Control of established perennial weeds; <u>Crops with fruit harvested mechanically from the ground:</u> ⇨ Identified alternatives not considered to be in general use: - Low-mowing, covering the ground with tarpaulins, nets, etc.
For inter-row use only	Yes	<u>All fruit crops considered:</u> ⇨ Identified alternatives considered to be in general use: - Grassing or mechanical weed control ⇨ For these alternatives, effective use without any major practical or economic disadvantages identified.
For under-row use only	No	<u>For bushy crops:</u> ⇨ Identified alternatives not considered to be in general use (small fruit and hazelnuts): - Covering the ground with tarpaulins; mulch or plant-fibre felts; <u>For other fruit crops:</u> ⇨ Identified alternatives considered to be in general use: - Management of grass cover by mowing; - Mechanical weed control of the row (tillage, "sandwich" method); ⇨ For these alternatives, the practical and economic disadvantages are considered to be major, in particular: - Availability and cost of equipment and specialised labour for weed control of the row; - Redesign of orchards (e.g. adapting the irrigation system) - Reduced yield.

General conclusion

For situations identified as involving <u>technical deadlocks</u>:

- in the case of <u>plots where mechanisation is not possible</u>, **substitution is not adopted**. It is therefore not proposed to apply any restrictions on use in terms of areas treated;
- with regard to <u>control of established perennial weeds</u>, they can be managed in both mechanisable and non-mechanisable situations while complying with the maximum authorised rate and using spot applications only.

Non-chemical alternatives exist for inter-row treatment. Insofar as they can be considered practices in general use and do not have any major practical disadvantage in arboriculture, **the substitution of glyphosate by non-chemical alternatives is possible** between rows of fruit trees.

However, for under-row weed control, total substitution is not possible:

- in the absence of any alternative in general use, for bushy crops such as small fruit and hazelnuts;
- in view of the fact that the non-chemical alternatives in general use (management of grass cover by mowing/mechanical weed control) have major practical and economic disadvantages that have been identified for other crops.

Therefore, a **restriction of the conditions of use is recommended**, to take into account substitution on the inter-row spaces and maintaining chemical weed control under the rows over the smallest possible area.

From an agronomic point of view, restricting weed control to treating the area under the row means reducing the area treated to 20 to 40% of the plot area, depending on the crops and management methods. It is therefore proposed to reduce the maximum annual quantity per hectare by 60% to cover all situations, leading to the annual quantity of glyphosate being limited to 900 g of active substance per hectare per year, based on the maximum quantity of glyphosate not to be exceeded, in accordance with the opinion to operators of 8 October 2004.

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

Uses	Maximum rate and conditions of use
Fruit crops* Weed control* Planted crops	**Product rate to be calculated according to the glyphosate content of the product based on a maximum rate of 900 g of glyphosate per hectare**
	Conditions of use: Do not apply between rows. Do not apply to more than 40% of the plot area. Do not exceed the annual rate of 900 g of glyphosate per hectare.
	Product rate to be calculated according to the glyphosate content of the product based on a maximum rate of 2160 g of glyphosate per hectare (see glyphosate opinion of 8 October 2004[7])
	Conditions of use: Only in the following situations: land where mechanisation is not possible (sloping, terraced or hilltop orchards, very stony/rocky soil) or where there is mechanical harvesting of fruit on the ground (nuts, cider apples, prune plums, etc.). Do not exceed the annual rate of 2160 g of glyphosate per hectare.

[7] 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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