

# Standard PEFC Italia

## **PEFC - ITALY Annex 5 ITA 1004 - 1**

### **Criteria and Indicators for Individual and Group Certification of Sustainable Tree Plantation Management**

Rev	Date	Reasons
6	15.05.2015	Integrations at the instance of PEFC and Proposals from the Bologna Forum WG
7	28.10.2015	Approval by the PEFC Italy Assembly

## **Summary**

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Criteria and Guidelines of SFM and their application  
in certification standards for Sustainable Plantation Management in Italy

The common basis for the verification of sustainability of forest management (**but also of plantations, as PEOLG promoters declared**) is the Pan-European Operative Guidelines adopted at the fifth Expert Level Preparatory Meeting of the Lisbon Conference on the Protection of Forests in Europe, in Geneva, April 27-29.

The Operational Level Guidelines form a common framework of recommendations that can be used on a voluntary basis and as a complement to national and/or regional instruments to further promote sustainable forest management at the field level, on forest areas both natural (woods) and artificial (plantations) in Europe. The indicators of the 6 Criteria are inferred from the "PEFC Technical standards for Sustainable Plantation Management". The standards were developed starting with the draft of the "PEFC Working Group Document", which was based on the results of the Ecopioppo Project of Regional Administration Piemonte. It was then integrated with the debates of three Forums, which took place in Udine (8<sup>th</sup> April 2004), Casale Monferrato (12<sup>nd</sup> May 2004) and Mantova (29<sup>th</sup> June 2004) and with the comments made in the course of the public consultation which was completed by the middle of September 2005. A Pilot study to verify the SPM scheme was carried out in winter 2005-2006 and the Certification body tested the existing documentation.

In this document, the Pan-European Operative Guidelines must be interpreted in a specific way, because the words "forest" and "forestry", in the original English document, also refer to artificial stands, including plantations. That is the reason why **they will be used, in Italy, with this interpretation for the verification of Sustainable Tree Plantation Management.**

### **Brief description of Pan-European Criteria and Guidelines**

At the Second Ministerial Conference, held in Helsinki in 1993, the ministers responsible for forestry in Europe embraced the internationally accepted UNCED Forest Principles, taking a further step in the history of the concept of sustainable forest management by adopting, *inter alia*, Resolution H1 "General Guidelines for Sustainable Management of European Forests" and Resolution H2 "General Guidelines for the Conservation of the Biodiversity of European Forests". These General Guidelines represent the political commitment of the signatory states of the Helsinki Resolutions by providing a general policy direction and a long-term goal to meet the demands on European forests for multiple goods and services in a manner that is consistent with their sustainable management, and conservation and enhancement of their biological diversity.

A new, common definition of "sustainable forest management" was laid down in Resolution H1:

"the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems".

For the follow up and the implementation of the General Guidelines, the pan-European national level criteria and indicators were adopted at the expert level within the Follow-Up Process of the Helsinki Ministerial Conference in 1994. They are a policy instrument for evaluating and reporting progress towards sustainable forest management, as described in Resolution H1, in individual European countries and in Europe as a whole.

The Pan-European Operational Level Guidelines have been elaborated to further promote sustainable forest management in Europe by translating the international commitments down to the level of forest management planning and practices. They represent a common framework of recommendations for reference at the field level that can be used on a voluntary basis. These Guidelines are directly based on Resolutions H1 and H2, and they follow the structure of the six pan-European criteria that were identified as the core elements of sustainable forest management. For clarity they are divided into "Guidelines for Forest Management Planning" and "Guidelines for Forest Management Practices",

focusing on basic ecological, economical and social requirements for sustainable forest management and plantations within each criterion.

If the tree plantation is associated with herbaceous cultivation managed with agronomic techniques, it's allowed to certify only the existing products derived from the trees (eg: timber, veneer, pole, firewood, fascine, truffles, honey, silkworm, ...). Associated herbaceous cultivations are excluded from the requirements of this certification standard.

**Annex (Technical standards)**

PEFC Italy Working Group Document concerning poplar plantations: "Technical standards for Sustainable Poplar Plantation Management"

PEFC Italy Working Group Document concerning medium-long cycle plantations: "Technical standards for Sustainable medium-long cycle plantations Management"

PEFC Italy Working Group Document concerning polycyclic plantations: "Technical standards for Close to nature Sustainable polycyclic plantations Management"

## CRITERION 1

### Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles

#### Management Planning:

Guidelines	Assessment Parameters	
	Assessment Parameters	Threshold
a - Forest management planning should aim to maintain or increase forest and other wooded area, and enhance the quality of the economic, ecological, cultural and social values of forest resources, including soil and water. This should be done by making full use of related services such as land-use planning and nature conservation.	<p>The owner/manager must:</p> <ul style="list-style-type: none"> <li>Demonstrate having taken into consideration the legislative and administrative provisions at Community and National, Regional level regarding sustainability, paying particular attention to soil, water, and environment management.</li> <li>Report applications made to public administration bodies for grants/contributions for establishing/management of the plantation.</li> <li>Establish objectives regarding the above matters.</li> </ul>	to refer to documents and/or to records in the planning document (see ITA 1004 par. 3.2)
b - Inventory and mapping of forest resources should be established and maintained, adequate to the local and national conditions, and in correspondence with the topics described in these Guidelines.	The owner/manager must have an inventory and map of his own plantations.	Presence of an updated and comprehensive inventory system, complete land registry information and records.
c - Management plans or their equivalents, appropriate to the size and use of the forest area, should be elaborated and periodically updated. They should be based on legislation as well as existing land use plans, and adequately cover the forest resources.	<p>The owner/manager must establish, file, keep and update a document as provided in ITA 1004 par. 3.2 concerning the matters indicated in guideline a).</p> <p><i>Note: the inventory must be updated yearly, reporting any changes in cultivation.</i></p>	Presence, completeness and continuous update of planning document (see ITA 1004 par. 3.2)
d - Monitoring of the forest resources and evaluation of their management should be periodically performed, and their results should be fed back into the planning process.	<p>The owner/manager must:</p> <ul style="list-style-type: none"> <li>monitor – at appropriate intervals based on the size of the company – and</li> <li>keep – for planning purposes – records of the results from monitoring activity</li> </ul>	Presence of a register with a chronological record of precise information about all treatments carried out and an evaluation of their effect.

# Management Practices:

Guidelines	Assessment Parameters	Threshold
a - Forest management practices should safeguard the quantity and quality of the forest resources in the medium and long term by balancing harvesting and growth rates, and by preferring techniques that minimise direct or indirect damage to forest, soil or water resources.	<p>The owner/manager must adopt techniques of cultivation consistent with what has been planned (see guideline for planning in Criteria 1).</p> <p><i>Note: while spreading phytosanitary products it is necessary to take precautions to reduce harm to the operators and to environment. This is why the following conduct is necessary: to respect active ingredient dosage rates and the indications concerning water volume; to carry out the treatments when there is no wind and during the coolest hours of the day; to choose the products with the lowest toxicity in relation to their effectiveness; to carry out periodic maintenance of the equipment, to use protective clothing.</i></p>	<p>Presence of a system for recording treatments with phytosanitary products.</p>

<p>b - Appropriate silvicultural measures should be taken to maintain the growing stock of resources at - or bring to - a level that is economically, ecologically and socially desirable.</p>	<p>The owner/manager, in order maintain the plantation at a high level, from an economic and quality standpoint , must adopt:</p> <ul style="list-style-type: none"> <li>adequate pruning schemes, following the indications set out at paragraph 6 of the document s "PEFC technical standards",</li> <li>tillage operations following the indications set out at paragraph 7 of the documents "PEFC technical standards";</li> <li>an action plan for weed control in poplar plantations, following the indications set out at paragraph 8 of the documents "PEFC technical standards".</li> </ul>	<p>Respecting the pruning schemes indicated in "PEFC technical standards" and keeping the relevant records. Keeping records regarding tillage operations (see "PEFC technical standards" document, par. 1.1, par. 2.1, par. 4., par 5, par. 6, par. 7.1. For poplar: establishing an improvement plan for weed control, which includes proposals for testing suitable clones (see "PEFC technical standards" 2.1)</p>
<p>c - Conversion of abandoned agricultural and treeless land into forest land should be taken into consideration, whenever it can add economic, ecological, social and/or cultural value.</p>	<p>In the case of conversion of abandoned agricultural and treeless land into plantations, the owner/manager must provide a plan of related activities and analyses of any potential economic, environmental, social and/or cultural impact.</p>	<p>Presence of a improvement plan or an investment plan supplemented by analyses of any potential economic, environmental, social and/or cultural impact.</p>

## CRITERION 2

### Maintenance of forest ecosystem health and vitality

#### *Management Planning:*

Guidelines		Assessment Parameters		Threshold
a - Forest management planning should aim to maintain and increase the health and vitality of forest ecosystems and to rehabilitate degraded forest ecosystems, whenever this is possible by silvicultural means.		Not pertinent		
b - Health and vitality of forests should be periodically monitored, especially key biotic and abiotic factors that potentially affect health and vitality of forest ecosystems, such as pests, diseases, overgrazing and overstocking, fire, and damage caused by climatic factors, air pollutants or by forest management operations.	The owner/manager must: <ul style="list-style-type: none"><li>• monitor – at appropriate intervals based on the size of the company– the damage caused by biotic and abiotic factors and by management activities;</li><li>• keep records of resulting data.</li></ul>		Presence records of damage caused by biotic (animals and management activities) and abiotic factors.	
c - Forest management plans or their equivalents should specify ways and means to minimise the risk of degradation of and damages to forest ecosystems. Forest management planning should make use of those policy instruments set up to support these activities.	The owner/manager must: <ul style="list-style-type: none"><li>• specify in the document – indicated at par. 3.2 ITA 1004– managerial aims, managerial measures and action to minimize damage with reference to the matters referred to in Guideline b);</li><li>• adopt a suitable planning system consistent with policy and the indications specified in "PEFC technical standards" Documents par. 2.</li></ul>		Presence of planning document (see ITA 1004 par. 3.2). See "PEFC technical standards" Par. 1.1, Par. 2.1, Par. 3.1, Par. 4, Par. 5, Par. 6, Par. 7.1.	



## Management Practices:

Guidelines	Assessment Parameters	Threshold
<p>a - Forest management practices should make best use of natural structures and processes and use preventive biological measures wherever and as far as economically feasible to maintain and enhance the health and vitality of forests. Adequate genetic, species and structural diversity should be encouraged and/or maintained to enhance stability, vitality and resistance capacity of the forests to adverse environmental factors and strengthen natural regulation mechanisms.</p>	<p>The owner/manager must:</p> <ul style="list-style-type: none"> <li>• adopt poplar pest and disease control techniques; "PEFC technical standards" par. 2 (points 5 and 6), 3 (point 3), 8 and 10;</li> <li>• limit mineral fertilizer use in good site conditions "PEFC technical standards" par. 5 (point 1);</li> <li>• limit the setting up of mono-clonal plantations, "PEFC technical standards" par. 2 (points 5 and 6).</li> </ul>	<p>According to "PEFC technical standards" Documents for:</p> <ul style="list-style-type: none"> <li>• Choice of the poplar in poplar plantation: adoption of certificated clones chosen according to criteria in table 1 and 2 in appendix of the PEFC technical standards for the "Sustainable management of poplar plantation"</li> <li>• Limit for monoclonal plantation: Par 2 and 3 of the document "Sustainable management of poplar plantation"</li> <li>• For the Integrated pest control "PEFC technical standards" Document par. 10;</li> <li>• For fertilizers: "PEFC technical standards" Document par. 5</li> </ul>
<p>b - Appropriate forest management practices such as reforestation and afforestation with tree species and provenances that are suited to the site conditions or the use of tending, harvesting and transport techniques that minimise tree and/or soil damages should be applied. The spillage of oil through forest management operations or the indiscriminate disposal of waste on forest land should be strictly avoided.</p>	<p>Consistent with the site conditions, the owner/manager must:</p> <ul style="list-style-type: none"> <li>• adopt measures and techniques of cultivation (for example spacing plantation layout, pruning, tillage), par. 2 (point 6), 4, 1 e 4,2; 7</li> <li>• use motor vehicles for hauling and transportation suitable for the soil conditions;</li> <li>• use biodegradable lubricating</li> </ul>	<p>Availability of related records. See:</p> <ul style="list-style-type: none"> <li>• "PEFC technical standards" Document par. 4, 6 and 7;</li> <li>• use motor vehicles for hauling and transportation suitable for the soil conditions;</li> <li>• presence of records on the</li> </ul>

	<ul style="list-style-type: none"> <li>products; avoid dumping of non-wood waste.</li> </ul> <p>If cultivation operations are contracted out, the contract for services or contract by tender must include the conditions that the contractors use biodegradable lubricating products, motor vehicles for hauling and transportation suitable for the soil conditions and avoid dumping non-wood waste.</p>	<ul style="list-style-type: none"> <li>characteristics of products used; absence of waste materials.</li> </ul>
<p>c - The use of pesticides and herbicides should be minimised, taking into account appropriate silvicultural alternatives and other biological measures.</p> <p>In any case are excluded the WHO Type 1A and 1B pesticides, those pesticides whose derivatives remain biologically active and accumulate in the food chain beyond their intended use and any pesticides banned by international agreement. For biotechnologies and GMO the approach must be precautionary implementing them only after experimentation has shown the absence of their impact on the ecosystem.</p>	<p>The owner/manager must:</p> <ul style="list-style-type: none"> <li>specify the purposes and dates (period) of application of active ingredients and the quantities used; "PEFC technical standards" Documents;</li> <li>register and keep records of purchase of commercial products used.</li> </ul> <p>If cultivation operations are contracted out, the contract for services or contract by tender must include the treatment indications specified in the action plan and in the "PEFC technical standards" Document.</p>	<ul style="list-style-type: none"> <li>See "PEFC technical standards" Documents Par 8 and 10</li> <li>For poplar plantations: see "PEFC technical standards for sustainable poplar plantation management" tab. 5, 7 and 8</li> <li>Presence of records.</li> </ul>
<p>d - In case fertilisers are used they should be applied in a controlled manner and with due consideration to the environment.</p>	<p>The owner/manager must:</p> <ul style="list-style-type: none"> <li>specify the purposes and dates (period) of application of fertilizers and the quantities used; "PEFC technical standards" Documents par. 5 points 2, 3, 4, 5, 6, 7, e 8;</li> <li>register and keep records of purchase of commercial products used.</li> </ul> <p>If fertilizing operations are contracted out, the contract for services or contract by tender must include the treatment indications specified in the action plan and in the "PEFC technical standards" Documents.</p>	<ul style="list-style-type: none"> <li>See "PEFC technical standards" Documents par. 5 points 2, 3, 4, 5, 6, 7, e 8;</li> <li>Presence of records.</li> </ul>

## CRITERION 3

### Maintenance and encouragement of forest products (both wood and non-wood)

#### *Management Planning:*

Guidelines		Assessment Parameters	Threshold
a - Forest management planning should aim to maintain the capability of forests to produce a range of wood and non-wood forest products and services on a sustainable basis.	The owner/manager must indicate the obtainable assortments during the planning phase;	Presence of planning document (see ITA 1004 par. 3.2).	
b - Forest management planning should aim to achieve sound economic performance taking into account possibilities for new markets and economic activities in connection with all relevant goods and services of forests.	At the planning phase, the owner/manager must indicate the potential markets for the obtainable assortments.	Presence of planning document (see ITA 1004 par. 3.2).	
c - Forest management plans or their equivalents should take into account the different uses or functions of the managed forest area. Forest management planning should make use of those policy instruments set up to support the production of merchantable and non-merchantable forest goods and services.	At the planning phase, the owner/manager must indicate the potential funds (Regional, National and Community sources) for the activities and the obtainable assortments from the plantation.	Presence of planning document (see ITA 1004 par. 3.2).	

#### *Management Practices:*

Guidelines		Assessment Parameters	Threshold
a - Forest management practices should be ensured in quality with a view to maintain and improve the forest resources and to encourage a diversified output of goods and services over the long term.	At the moment of utilization, the owner/manager must specify the assortments obtained. In the case of standing sales (the most frequent type of sale) the owner/manager need only specify the quantity obtained, making no distinction as to assortments.	Presence of a record of wood and non-wood assortments obtained (typology and quantity).	
b - Regeneration, tending and harvesting operations should be carried out in time, and in a way that do not reduce the productive capacity of the site, for example by avoiding damage	The owner/manager must adopt a plantation layout consistent with what is established in "PEFC technical standards"	See "PEFC technical standards" Document par 4.3 and Criteria 2,	

to retained stands and trees as well as to the forest soil, and by using appropriate systems.	Documents par 4.3 and in Criteria 2, Management Practice Guideline point b).	Management Practice Guideline point b).
c - Harvesting levels of both wood and non-wood forest products should not exceed a rate that can be sustained in the long term, and optimum use should be made of the harvested forest products, with due regard to nutrient offtake.	Not pertinent	
d - Adequate infrastructure, such as roads, skid tracks or bridges should be planned, established and maintained to ensure efficient delivery of goods and services while at the same time minimising negative impacts on the environment.	Not pertinent	

## CRITERION 4

### Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems

#### *Management Planning:*

Guidelines	Assessment Parameters		Threshold
a - Forest management planning should aim to maintain, conserve and enhance biodiversity on ecosystem, species and genetic level and, where appropriate, diversity at landscape level.	The owner/manager must choose clones suitable for the site conditions of the plantation.	Presence of planning document (see ITA 1004 par. 3.2).	
b - Forest management planning and terrestrial inventory and mapping of forest resources should include ecologically important forest biotopes, taking into account protected, rare, sensitive or representative forest ecosystems such as riparian areas and wetland biotopes, areas containing endemic species and habitats of threatened species, as defined in recognised reference lists, as well as endangered or protected genetic in situ resources.	The owner/manager must supplement what is established in Criteria 1, Management Planning Guideline point b) with information about protected areas bordering on poplar plantation and included in the same municipal/administrative area.	Presence, completeness and continuous update of documentation and/or records.	

#### *Management Practices:*

Guidelines			
	Assessment Parameters	Threshold	
a - Natural regeneration should be preferred, provided that the conditions are adequate to ensure the quantity and quality of the forests resources and that the existing provenance is of sufficient quality for the site.	Not pertinent		
b - For reforestation and afforestation, origins of native species and local provenances that are well adapted to site conditions should be preferred, where appropriate. Only those introduced species, provenances or varieties should be used whose impacts on the eco-system and on the	The owner/manager must prefer local-origin species that are suitable for the condition of the area. The owner/manager must use plants and clones suitable for the site conditions for	Using species with local origin and provenience. Par 2 and 3.1 of "PEFC technical standards" documents;	

genetic integrity of native species and local provenances have been evaluated, and if negative impacts can be avoided or minimised. As to the remaining 10% of the plantation, clones must be chosen according to the indications set out in tables 1 and 2 of the appendix (pag. 42 and 43).	every kind of plantation with poplar trees.	see also Criteria 2, Management Practice Guideline point a) and tab. 1 of" Technical standards for Sustainable Poplar Plantation Management"
c - Forest management practices should, where appropriate, promote a diversity of both horizontal and vertical structures such as uneven-aged stands and the diversity of species such as mixed stands. Where appropriate, the practices should also aim to maintain and restore landscape diversity.	The owner/manager of a plantation (except for poplar plantations) must promote a vertical structure and a mix of species.	PEFC technical standards (except for poplar plantations)
d - Traditional management systems that have created valuable ecosystems, such as coppice, on appropriate sites should be supported, when economically feasible.	Not pertinent	
e - Tending and harvesting operations should be conducted in a way that do not cause lasting damage to ecosystems. Wherever possible, practical measures should be taken to improve or maintain biological diversity.	Fertilizing, pruning, soil managing, disease control, use and choice of plant protection products	PEFC technical standards Par 6, 7, 8, 9 and 10
	Only for poplar plantation The owner/manager of a poplar plantation larger than 20 hectares must practice clonal diversification in a cultivation cycle. See Criteria 2, Management Practice Guideline points b), c) and d). <i>Note: the principal clone may constitute a maximum of 90% of individual or group poplar plantation area.</i>	For poplar Respecting of minimum threshold of 10%.. See also in Criteria 2, Management Practice Guideline points b), c) and d).
f - Infrastructure should be planned and constructed in a way that minimises damage to ecosystems, especially to rare, sensitive or representative ecosystems and genetic reserves, and that takes threatened or other key species - in particular their migration patterns - into consideration.	Not pertinent	
g - With due regard to management objectives, measures should be taken to balance the pressure of animal populations and grazing on forest regeneration and growth as well as on biodiversity.	Not pertinent	
h - Standing and fallen dead wood, hollow trees, old groves and special rare tree species should be left in quantities and distribution necessary to safeguard biological diversity, taking	Not pertinent	

into account the potential effect on health and stability of forests and on surrounding ecosystems.		
i - Special key biotopes in the forest such as water sources, wetlands, rocky outcrops and ravines should be protected or, where appropriate, restored when damaged by forest practices.	See Criteria 2, Management Practice Guideline points b), c) and d).	See also Criteria 2, Management Practice Guideline points b), c) and d).

## CRITERION 5

Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)

### *Management Planning:*

Guidelines	Assessment Parameters	Threshold
a - Forest management planning should aim to maintain and enhance protective functions of forests for society, such as protection of infrastructure, protection from soil erosion, protection of water resources and from adverse impacts of water such as floods or avalanches.	In areas where overflows caused by floods are frequent and usually involve damage to people and property, the owner/manager must establish measures and take action which favours the limitation of soil erosion and damage caused to other cultivation and infrastructures, through suitable poplar plantation management.	Presence of planning document (see ITA 1004 par. 3.2).
b - Areas that fulfil specific and recognised protective functions for society should be registered and mapped, and forest management plans or their equivalents should take full account of these areas.	Presence of planning document (see ITA 1004 par. 3.2).	Presence, completeness and continuous update of documentation and/or records.

### *Management Practices:*

Guidelines	Assessment Parameters	Threshold
a - Special care should be given to silvicultural operations on sensitive soils and erosion-prone areas as well as on areas where operations might lead to excessive erosion of soil into watercourses. Inappropriate techniques such as deep soil tillage and use of un-suitable machinery should be avoided on such areas. Special measures to minimise the pressure of animal population on forests should be taken.	Depending on the rotation period, the owner/manager must: <ul style="list-style-type: none"> <li>determine the frequency of soil tillage operations, and</li> <li>specify the characteristics of the machines used for such operations.</li> </ul> <i>Note: the cultivation practices must be</i>	See par. 7 and Presence, completeness and continuous update of documentation and/or records of tillage operations.



	<i>consistent with those established in "PEFC technical standards" Documents</i>	
<p>b - Special care should be given to forest management practices on forest areas with water protection function to avoid adverse effects on the quality and quantity of water resources. Inappropriate use of chemicals or other harmful substances or inappropriate silvicultural practices influencing water quality in a harmful way should be avoided.</p>	<p>In relation to cultivation practices, depending on the rotation period, the owner/manager must determine the frequency of :</p> <ul style="list-style-type: none"> <li>• tillage operations;</li> <li>• the use of chemical products, see Criteria 2, Management Practice Guideline points b), c) and d).</li> </ul> <p><i>Note: the provisions established in the "PEFC technical standards for Sustainable Poplar Plantation Management" Document (par 10.1 and tab. 8). must be respected</i></p>	<ul style="list-style-type: none"> <li>• See par. 7 and Presence, completeness and continuous update of documentation and/or records of cultivation operations and chemical products used;</li> <li>• see also Criteria 2, Management Practice Guideline points b), c) and d).</li> </ul>
<p>c - Construction of roads, bridges and other infrastructure should be carried out in a manner that minimises bare soil exposure, avoids the introduction of soil into watercourses and that preserve the natural level and function of water courses and river beds. Proper road drainage facilities should be installed and maintained.</p>	Not pertinent	

## CRITERION 6

### Maintenance of other socio-economic functions and conditions

#### *Management Planning:*

Guidelines	Assessment Parameters	Threshold
a - Forest management planning should aim to respect the multiple functions of forests to society, have due regard to the role of forestry in rural development, and especially consider new opportunities for employment in connection with the socio-economic functions of forests.	Not pertinent	
b - Property rights and land tenure arrangements should be clearly defined, documented and established for the relevant forest area. Likewise, legal, customary and traditional rights related to the forest land should be clarified, recognised and respected.	The owner/manager must demonstrate ownership of the plantation and any third party or other rights in existence over the property.	Presence, completeness and continuous update of documentation and/or records.
c - Adequate public access to forests for the purpose of recreation should be provided taking into account the respect for ownership rights and the rights of others, the effects on forest resources and ecosystems, as well as the compatibility with other functions of the forest.	Not pertinent	
d - Sites with recognised specific historical, cultural or spiritual significance should be protected or managed in a way that takes due regard of the significance of the site.	Not pertinent	
e - Forest managers, contractors, employees and forest owners should be provided with sufficient information and encouraged to keep up to date through continuous training in relation to sustainable forest management.	The owner/manager and operators must demonstrate that they are informed about and have kept up to date with Sustainable Plantation Management developments.	Presence, completeness and continuous update of documentation and/or records.

## Management Practices:

Guidelines			
	Assessment Parameters	Threshold	
a - Forest management practices should make the best use of local forest related experience and knowledge, such as of local communities, forest owners, NGOs and local people.	The owner/manager must demonstrate that the cultivation practices adopted have been validated both by operational experience in the plantation area and by research programmes.	Presence of information sources and/or documental references.	
b - Working conditions should be safe, and guidance and training in safe working practice should be provided.	Consistently with the size of the company, the owner/manager must demonstrate: <ul style="list-style-type: none"><li>the adoption of measures and actions on safety related to management activities in the plantation;</li><li>attendance at refresher courses on safety.</li></ul>	<ul style="list-style-type: none"><li>Presence of equipment, machines and subsidiary materials consistent with safety regulations;</li><li>Presence of information sources and/or documental references.</li></ul>	
c - Forest management operations should take into account all socio-economic functions, especially the recreational function and aesthetic values of forests by maintaining for example varied forest structures, and by encouraging attractive trees, groves and other features such as colours, flowers and fruits. This should be done, however, in a way and to an extent that does not lead to serious negative effects on forest resources, and forest land.	Not pertinent		

## Appendix 1

### PEFC Technical standards for Sustainable Poplar Plantation Management

Document approved by PEFC Italy BoD on 28<sup>th</sup> October 2015

## PEFC Technical standards for Sustainable Poplar Plantation Management

The Technical Standards for Sustainable Poplar plantation Management (SPM) are mainly advanced in order to obtain a high quality product for the wood industry (plywood, OSB, wood for packaging, wood for chips, etc) and carbon credits.

These standards are the result of an analysis of the most significant direct environmental impacts caused by poplar cultivation; specific rules for the management of poplar cultivation following ecological principles have been integrated into the model.

The following indications are consistent with the law in force and are aimed at identifying guidelines for sustainable poplar plantation management in Italy.

### 1. Suitability of conditions for cultivation

#### 1.1 Soil

Flood plains and soils with good fertility and available water are the most favourable sites for poplar cultivation. Poplar growing is not advisable on poor soils with low water capacity, hydromorphic,, with high presence of active limestone or in slopes (marginal land), where cultivation techniques, including phytosanitary treatments, are neither efficient nor cost-effective.

Deep (at least 50 cm), permeable soil is preferable for poplar planting ,with water available (the optimum conditions are when the ground water table is at 100-150 cm), sandy-loamy and sandy-clayey in texture, not too compact or open, of uniform profile and sub-acid or mildly alkaline pH. These conditions reduce the stress caused by primary parasitic insects (*Marssonina*, *Melampsora*), prevent damage by weakening caused by parasitic insects (*Discosporium populeum*, *Melanofila*, *Agriolo*) or the onset of physiological diseases ("brown spots on the stem"). Lime-rich (in excess of 10%) and salt-laden soils must be avoided. A sodium chloride concentration of only one per thousand can be toxic for the majority of the cultivated clones, especially in the first period after planting poplar sets.

#### 1.2 Climate

The cultivated species of poplar are basically heliophilous and hygrophilous. Although capable of adjusting to different cultivation environments, they need a mean annual precipitation of more than 700 mm or supplemental irrigation during the summer. Only black poplars and white poplars can tolerate short periods of drought. The average annual temperature should be 8.5°C-17°C.

### 2. The interrelationship between poplar and the environment

#### 2.1 Environmental compatibility and poplar cultivation

Even though it involves a woody species for industrial use, poplar cultivation can be rightly considered as agricultural cultivation from the viewpoint of cultivation techniques and the relatively short rotation cycles.

The reasoning underlying this is evident from the following two points:

1. poplar can be defined as a renewable raw material given the rapid and complete renewal of the plantations;

2. given the specific characteristics required for poplar wood, the necessary techniques are agricultural in nature (soil preparation for the plantation, use of selected genetic material, pest management, application of fertilizers, pruning, etc...)

The particular cultivation conditions in Italy and the experience acquired give Italian poplar particular characteristics, which make it especially suitable for industrial use in the plywood sector. For this reason, both the market and tradition require the almost exclusive use of selected clones.

The poplar clone to be cultivated should be chosen according to the principle end-use of the wood product (plywood, packaging, panels, etc), the cultivation environment (climatic and soil characteristics of the plantation) and any environmental factors which must be taken into account.

The use of selected clones, characterised by greater environmental flexibility and more resistance to the main pests and diseases, encourages the development of models which, by reducing cultivation requirements and pest control to a minimum, permit poplar growing to be more stable and ecologically regulated.

Moreover, so far as parasitic diseases are concerned real epidemics can be prevented by limiting the creation of monoclonal plantations. Therefore, companies which have more than 20 hectares of poplar under cultivation must establish clonal diversification over the course of one rotation cycle. The main clone used may reach a maximum of 90% of the area covered by the group or company's poplar plantations.

### 3. Nursery material

#### *3.1 Quality requirements for nursery material*

The establishment of new plantations is only permitted using certified nursery material, according to the D.Lgs. 386/2003 (certificated "C" of the annex VIII of the same law).

The poplar sets must be, lignified, have a correct shape, and be free of parasites and lesions.

### 4. Planting models and density

#### *4.1 Spacing and plantation layout*

The choice of the spacing depends on the characteristics of the planting area (climate, soil) and on the clone. The spacing influences the rotation length which increases in relation to the increase in planting distance.

In the poplar plantations for log for the **veneer production**, the number of plants per hectare can be between a minimum of 200 (50 m<sup>2</sup>/plant) and a maximum of 330 (30 m<sup>2</sup>/plant).

A planting density of 250-280 plants per hectare is recommended. A square, rectangular or triangular plantation layout is advisable because this helps to minimise ovalization and trunk curvature, as well as encouraging trunk thickness.

In the poplar plantations for small log for other use (**OSB, pulp**) the density can be between a minimum of 600 and a maximum of 1,700 plants per hectare.

It is advisable a square or rectangular plantation layout with distances between rows that allow the mechanical intervention.

## **4.2 Planting times in relation to clone characteristics**

The new plantation should be established using poplar sets in a dormant state. Planting during the most intense frosty periods should be avoided because the correct digging and filling in of the planting holes can be hindered.

Where the intention is to use Euro-American clones, which generally have a high rooting and taking capacity, the plantations should be established in winter (November-February).

Using *P. deltoides* or clones that are phenotypically similar to this species (such as 'Carolinian' clones) necessitates establishment of the plantation at a later period (February-March) because these clones compared to the former have more difficulty in rooting and taking and dehydrate more easily.

In the latter case, in order to assist the plants' taking and to obtain a more regular crown shape, it is preferable to use year-old nursery –grown poplar sets obtained directly from cuttings or from coppice nurseries, (rather than resorting to topping two year nursery-grown poplar plants).

In any case, it is a good rule to keep the period between uprooting the plants and replanting them to a minimum. Before planting the saplings, it is advisable to immerse the poplar sets in water (either entirely or just the lower part which is to be planted) for at least ten days.

## **4.3 Cultivation models in relation to stand characteristics**

Careful soil preparation is necessary in order to establish the poplar plantation. Tilling to a depth of 30-50 cm is recommended, and to 70-120 cm, if it is combined with subsoil tillage in deep soil and where it is necessary to avoid bringing soil layers with unfavourable chemical and physical characteristics to the surface.

Where there are loamy-clay soils, the ground should be prepared under conditions of optimal humidity, preferably by the end of the October preceding the planting of the poplar plantation.

Poplar seedlings (1 year) should be planted at a depth of one fifth of their height (at least 70 cm for year-old poplars and 120 cm for two-year old plants). The planting hole should normally be about 30 cm across. In coarse-textured soils and those with limited water-holding capacity drills with a smaller diameter (up to 10 cm) can be used, and the planting depth can be extended to reach the permanent water-table (maximum 300 cm). In fine or moderately fine-textured soils, it helps to dig holes with a diameter greater than 30 cm to encourage rooting and the development of the root system. Such holes must be dug from November to December in order to allow the sides of the planting holes compacted by the drilling action to weather.

The plantation of the vegetative material, in case of poplar bareroot saplings (2 years) could be carried out with a mechanical transplanter up to the depth of about 50 cm.

# **5. Fertilization**

## **5.1 Guidance for the use of fertilizers in poplar stands**

In ecologically sensitive areas with good water availability and often characterised by open, deep, fresh soil a good rate of wood production can be obtained even where the input of mineral fertilizers is limited. In any case the use of organic fertilizers, either animal manure or compost made from leguminous plant material is indicated.

A chemical analysis of the soil should be undertaken for plantations exceeding 1 hectare and only when basic dressing with fertilizer is contemplated.

Where basic fertilizer dressing is contemplated, the use of nitrogen should be excluded except for the input provided by organic fertilizers (manure or compost is recommended). Only the use of phosphorus ( $P_2O_5$ ) and potassium ( $K_2O_5$ ) is indicated not exceeding respectively 125 kg/ha and

175 kg/ha (higher rates are allowed only if specifically required, as confirmed by the results of chemical tests conducted by accredited laboratories). During the 2°, 3° and 4° year, surface nitrogen distribution can be carried out under the canopy projection, not exceeding respectively 50, 75 e 100 unit of nitrogen per hectare. It will be possible having the nitrogen fertilization also during the subsequent years only in case of special needs highlighted by soil analysis from accredited laboratory and in case of presence of superficial soils (<70 cm).

The application of phosphorous and potassium fertilizer is permitted on the surface soil during the first four years, at a maximum rate of respectively 125 kg/ha and 175 kg/ha of each element over the three-year period: this maximum rate includes the fertilizer doses spread during the soil preparation phase for planting (basic dressing).

For the first four years fertilizers can only be spread during the period from the second half of April to the first half of June.

Organic animal manure and digestate can be spread and subsequently worked into the soil throughout the entire rotation period, excepting during the August - September period and the winter months.

## 6. Pruning

### 6.1 Stem Pruning

The purpose of pruning is to obtain trunks without knots. The pruning height is proportional to the planting density and to the estimated length of the rotation; for average spacing and average rotation it is sufficient to prune up to a maximum height of 7 meters in order to obtain satisfactory results. The branches to be removed are generally those which grow on the part of the trunk of the poplar sets following planting, , and only to a lesser extent, those which can be differentiated as forming on the part of the trunk which has developed during the first and second year after planting.

To produce the best quality timber from a technical viewpoint, the apical branches, which are the ones most likely to compromise wood quality, must be eliminated. Within the first two years of cultivation, the double and multiple leaders must be eliminated in good time (stem pruning). During the following years the lateral branches must be gradually eliminated up to a height of 5-7 m from the ground (stem pruning).

Pruning operations are normally carried out during the dormant period. Only in the case of *P. deltoides* clones, which are prone to producing a more chaotic crown, and where the soil is very fertile, it may be expedient to bring forward the first form-pruning operation to the July of the first growing season.

#### 6.1.1 Dormant period pruning scheme for application in plantations established using one-year-old poplars destined for rotary-cut veneer production

- Year 1: eliminate double and multiple leaders and all branches up to 1,5 m from the ground (this kind of branch can be cut even during the growing season).
- Year 2: cut the most vigorous branches of the second verticil and thin out those of the first verticil cutting the biggest ones; moreover eliminate all branches up to 2 m from the ground.
- Year 3: thin out the branches of the second verticil eliminating the biggest ones and all branches under the first verticil up to 3 m from the ground.
- Year 4: thin out the branches of the second verticil eliminating the biggest ones and any suckers.
- Year 5: Eliminate all the remaining branches of the second verticil and every branch up to 6-7 m height.



### **6.1.2 Dormant period pruning scheme for application in plantations established using two-year old poplars destined for rotary-cut veneer production**

Year 1: eliminate double and multiple leaders and all branches up to 2 m from the ground (this kind of branch can be cut even during the growing season).

Years 2 and 3: thin out the branches of the first verticil eliminating the biggest ones and all branches up to 3,5 m from the ground. If the second verticil starts at a height of over 7 m, it is not necessary to intervene; if this is not the case, eliminate double and multiple leaders

Years 4 and 5: eliminate all the branches up to a height of 4 m or, in any case, as far as the portion of the trunk with a diameter of 12-13 cm

### **6.1.3 Dormant period pruning scheme for application in poplar plantations for the production of little logs for the production of OSB panels, wood pulp production**

Year 1: For Seedling: eventually eliminate the buds along the trunk, adopting manual techniques up to 1,5 m from the ground

For Bareroot sapling: no intervention

Following years: pruning is not necessary because of reasons related to the higher density of the plants and to the characteristic of the final material obtainable. It is ammited a mechanical pruning up to 2-2.5 m from the ground for removing branches that may hinder the transit of machines.

## **7. Soil Management**

### ***7.1 Tillage operations for plantations***

In the first half of the rotation, tillage operations with a disk harrow are of primary importance, to improve texture and permeability of the active layer and for weed control. On heavy soils, a maximum of two ripping operations using a ripper can be carried out. Ploughing which throws clods along the tree-rows, where necessary to avoid water stagnation, should be carried out during the autumn months.

No positive effects on growth following tillage during the second half of the rotation have been noted ; therefore the number of such operations can be reduced or substituted with mowing or cutting self-sown vegetation once or twice, avoiding such action during May (wildlife breeding). The formation of turf, kept under control by mowing or shredding, is advisable, particularly with heavy and moist soils, in comparison to traditional harrowing to avoid the formation of a compaction layer.

For high density plantations, the tillage is advisable and feasible only during the first two years, with mechanical interventions (by harrowing or mowing).

## **8. Weed control**

Control of self-sown vegetation must be carried out with agronomic interventions (by mowing, shredding and/or conducting the tillage during the first half of the turn). For high density plantations the containment of spontaneous vegetation must be carried out adopting mechanical methods (by mowing, harrowing or shredding); this intervention is advisable

and feasible only during the first two years, subsequently the complete coverage of the foliage inhibits naturally the spontaneous vegetation.

The use of chemical herbicides is not permitted, with the exception of chemical application limited to the rows of trees themselves, following the active ingredients and dosage rates indicated in table 1. In sensitive areas, a maximum rate of two interventions during the first three years is allowed.

Table 1 Permitted chemical interventions for the spontaneous vegetation management

Intervention criteria	Active ingredient	% a.i.	Usage limit and notes
Localized treatment along the row, to be executed on weeds in the early stages of development (after germination)	glyphosate	30-45	10 l/ hectare of commercial compound for the treated surface
Localized treatment along the row, to be executed during the weeds pre-germination phase	pendimetalin	31-40	4 l/ hectare of commercial compound for the treated surface
	oxyfluorfen	2,5	

## 9. Irrigation

### *9.1 Poplar water requirements in the various production cycle phases*

It is very important to ensure water supply to the plant, particularly during summer, in order to avoid stops or checks on growth during the most intense vegetative period. It is necessary to provide supplemental irrigation, by flood irrigation if possible, in case the roots are unable to reach the water table.

In evaluating the suitability of the soil for irrigation, high or poor permeability should be considered as unfavourable factors.

## 10. Use and choice of phytosanitary products

### *10.1 Indications for phytosanitary procedures consistent with poplar pest and disease control*

The chemical defence is justified only if associated to cultural practices, in young plantations or if the plant productive potentialities are high.

Only the active ingredients set out in table 2 may be used and only the active ingredients included in commercial products having written in the label the "popular" category (just for the indicated adversities) may be used, unless specifically excepted by competent territorial offices (eg: by the regional phytosanitary departments or by the Italian Osservatorio per le Malattie delle Piante - Plant Disease Observatory), which can if necessary also authorize treatment for parasites not specifically listed.

The active ingredients set out in table 2 are not included in the WHO "Type 1A and 1B" and in the lists of pesticides banned by international agreements of the Stockholm Convention of 2009.

All provisions and possible restrictions on use must be respected.

During application of the phytosanitary products all possible precautions to limit damage to the operator and the environment must be adopted: respecting the application rates of the active

ingredients and the indications regarding volume of water, spraying in the absence of wind and during the cooler hours of the day, choosing products with the least toxicity and non dangerous for the environment in relation to their effectiveness, carrying out periodic maintenance of the equipment, using protective clothing.

Table 2: Integrated poplar defence

Pest/Disease	Control measures	Active ingredients	Directions for use and notes
fungi & viruses			
Marssonina leaf spot disease (1) (Marssonina brunnea)	<p>Agronomic control</p> <p>Use of resistant clones</p> <p>Chemical treatment</p> <p>Carry out the first application when the leaves have fully developed. Use a volume of water proportionate to the plants' size.</p>	Mancozeb (°) dodine	<p>Only 2 treatments a year, except where specific exceptions on the grounds of prevailing local conditions, are permitted by the Phytosanitary Department.</p> <p>The first application must be carried out with a protectant product. The first intervention protects effectively the vegetation for at least one month. If there are unfavourable climate conditions for the development of new infections, this first intervention can prevent the parasite attacks for most of the growing season. The use of stickers is advisable, to favour persistence of the product's effect The use of dithiocarbamate is not permitted in ecologically sensitive areas (°).</p> <p>The 2<sup>nd</sup> intervention must be done before the beginning of the summer and, in case of use of Mancozeb during the first treatment, Dodine must be used.</p>

Pest/Disease	Control measures	Active ingredients	Directions for use and notes
Spring defoliation ( <i>Venturia populina</i> )	<u>Agronomic control</u> Use of resistant clones.  In case of infection, elimination of the pruning debris by shredding.  <u>Chemical treatment</u> Chemical control is not practicable for technical-agronomic reasons.	–	No treatments are permitted.
Rusts ( <i>Melampsora</i> species)	<u>Agronomic practices</u> Use of resistant clones.  <u>Chemical treatments</u> Treat only when there are infections. The curative treatment must be carried out at the appearance of the first uredinia on the underside of the leaf surface (in summer).	tetraconazole	No preventive treatments are permitted.  Chemical applications can be carried out only in 3-6-year old plantations, except where specific exceptions on the grounds of prevailing local conditions, are permitted by the local Phytosanitary Department. Only 1 treatment per year is permitted which must be carried

			out at the end of August.
Bark necrosis ( <i>Disco sporium populeum</i> )	<u>Agronomic control</u> Keep the plants in good condition by following rational cultural practices. Hydrate the poplar sets before transplanting. <u>Chemical treatment</u>	-	No treatments are permitted.
Virus diseases (Poplar Mosaic Virus)	<u>Agronomic control</u> Use of asymptomatic material. Use of resistant clones.	-	

Root rot ( <i>Rosellinia necatrix</i> e <i>Armillaria mellea</i> )	<u>Agronomic control</u> Remove soil from around base of the tree-trunk of plants that show leaf yellowing in order to expose the infected part of the roots. Eliminate the remnants of stumps. Avoid replanting for at least two years, setting aside the land for grass crops preferably for ploughing in as green manure.		No treatments are permitted.
Pest/Disease	Control measures	Active ingredients	Directions for use and notes
<b>Main pest</b>			
Poplar and willow borer ( <i>Cryptorhynchus lapathi</i> )	<u>Chemical treatment</u> Carry out the treatment on plants while budding. Treat when plants are dry, wetting the trunks of the poplar sets until dripping.	chlorpyrifos, chlorpyrifos-methyl ethofenprox (1) Alpha- cypermethrin (*) cypermethrin (*)	Poplar sets which have been pre-treated in the nursery or in stacks must be used when establishing the plantation. Allow at least 10 days from treatment before any immersion of the poplar sets in natural water-courses.

		<p>Otherwise, the treatment can be carried out during the plants' dormant period.</p> <p>This alternative permits high selectivity in favour of beneficial insects.</p>	<p>deltamethrin (*)</p> <p>dimethoate</p> <p>esfenvalerate</p>	<p>The treatment <i>in situ</i> is only permitted in the 2° and 3° years of rotation, except for specific exceptions in the case of plantations using San Martino clones</p> <p>(1) the product can not be adopted in floodplain areas</p> <p>Only 1 treatment per year is permitted</p> <p>Weeds in flower must be removed before the treatment.</p> <p>If the treatment is carried out at the end of winter, the rates of pyrethroides (*) must be increased by 20%.</p>
<b>Occasional pests</b>				
Red Poplar leaf beetle ( <i>Melasoma populi</i> )	<u>Chemical treatment</u>	chlorpyrifos, deltamethrin dimetoate,	Only one insecticidal treatment is permitted in case of infestation, in order to protect sprouting of the newly transplanted poplar sets	
Poplar leaf rolling weevil	<u>Chemical treatment</u>	chlorpyrifos, dimetoate,	Only one insecticidal treatment is permitted in case of infestation, in	



( <i>Byctiscus populi</i> )			order to protect sprouting of the newly transplanted poplar sets
Dusky clearwing moth ( <i>Paranthrene tabaniformis</i> )	<u>Chemical treatment</u>		No treatments are permitted.
Poplar shoot borer ( <i>Gypsonoma aceriana</i> )	<u>Chemical treatment</u>		No treatments are permitted.
Large Poplar borer ( <i>Saperda carcharias</i> )	<u>Chemical treatment</u>  Treat between the end of May and the first half of June. Treat when plants are dry, wetting the trunks of the poplar sets until dripping.	Alpha- cypermethrin (*) chlorpyrifos chlorpyrifos-methyl cypermethrin deltamethrin dimetoate	Only 1 treatment per year is permitted.  The condition of the plantation must be monitored.  A general treatment is permitted in young 2-5 year old plantations (only the basal part of the trunk must be treated), when the percentage of affected plants is equal to or greater than 15%.
	Alternatively ,a localized treatment can be carried out, treating each exit-hole in turn, between mid-June and mid-July.  The correct period for the treatment starts when the exit-holes in the trunks can be seen.		Painting the entrance holes and the first part of the tunnels using the same products used for the general treatment, but at higher rates.

	<p><u>Agonomic control</u></p> <p>Choice of cultivation practices that aids vigorous plant growth.</p> <p>Eliminating the weeds at the base of trunks (see chapter 8), which create a favourable environment for deposition of the insect eggs, permits adequate wetting of the bark in case of subsequent chemical treatment.</p> <p>Retaining dead or split trees within the poplar plantation in order to encourage nesting of spotted woodpeckers, active predators of the larva of timber-boring insects.</p>		<p>Use of spray with nozzle.</p> <p>Localized treatment is preferable in plantations in ecologically sensitive areas.</p>
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<b>Pest/Disease</b>	<b>Control measures</b>	<b>Active ingredients</b>	<b>Directions for use and notes</b>
<p>Woolly poplar aphid (<i>Phloeomyzus passerinii</i>)</p>	<p><u>Chemical treatment</u></p> <p>Treatment of the infested plants at the appearance of the early colonies (approximately the second half of May).</p>	<p>refined oil</p>	<p>It is important to treat when aphid development is still limited and the colonies are not completely covered by a waxy secretion, in order to obtain satisfactory results.</p>

	<u>Agronomic control</u> Use of resistant clones.		The treatment is only permitted once the infestation is in progress.  Weeds in flower must be removed before the treatment, for the protection of beneficial insects and natural aphid predators.
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## 11 Harvesting operation

Harvesting has to be conducted on all the plantation by specialized enterprises working according to the laws in force.

If the plantation is for the production of logs suitable for veneer production, the cut is carried out with traditional methods (low mechanization – eg: chainsaw and non-specialized traditional tractors), advanced methods (high mechanization, with suitable equipment to perform complex operations – eg . with special harvester heads) and/or innovative methods (with use of combined machines – harvester).

Subsequently, the soil must be restored for the agricultural use, even by grinding or removing roots.

If the plantation is for the production of small logs suitable for other uses (OSB, wood pulp), the cut is carried out with different types of harvesting methods, sometimes even at high mechanization. After harvesting, the stumps can be raised for further production cycles .

When the vitality of the stumps ends, the root systems must be removed and the land must be restored for agricultural uses.

### Glossary

**Sensitive areas:** river parks and other protected areas, Natura 2000 network.

**Veneer:** thin sheet of wood obtained by the industrial process of "veneering", which allows to obtain a continuous tape of thin wood (the thickness is generally between 1 and 5 mm) by rotating the trunk system against a cutting blade; after drying, the tape is then cut into sheets which are glued overlapping them with the direction of the grain of adjacent layers generally at a right angle.

**OSB Panel:** (Oriented Strand Board), structural wooden panel that is produced by reconstituting particles (strands or flakes) with predetermined form and thickness, bonded together at high temperature and pressure by the addition of an adhesive. During the deposition (formation of the mattress) between adjacent layers the particles are generally laminated with perpendicular orientation of their grain, so as to give directional properties and better performance characteristics to the finished panel.

**Small log:** short and little-diameter hardwood logs; often in the name it is combined with the destination: small log for veneer, small log for OSB panel, small log for pulp.

**Seedling:** one-year poplar plant without branches (height 3-5 m) or two-year poplar plants (height 5-8 m)

**Bareroot sapling:** set of 1 to 2 meters high.

## Appendix 2

### PEFC Technical standards for Sustainable medium and long rotation Plantations Management

Document approved by PEFC Italy BoD on 28<sup>th</sup> October 2015

The Technical Standards for medium-long rotation plantations are mainly advanced in order to obtain a high quality product for the wood industry (plywood, OSB, wood for packaging, wood for chips, etc) and carbon credits.

The following indications are consistent with the law in force and are aimed at identifying guidelines for sustainable medium-long rotation plantations (more than 5 years – it does not include Short Rotation Forestry).

## **1. Suitability of conditions for cultivation**

### ***1.1 Soil***

Medium-long rotation plantations need adequate soils in relation to the necessity of the planted tree species.

In order to select the best species for each environment and consequently to obtain high production, it is mandatory the use a map of soil suitability realized by official Entities and recognized local organization (if existing).

Areas with already known and/or verified tree growing limits should be excluded from the planning of medium and long rotation plantations. If a map of soil suitability for a specific area is not available, it is mandatory the adoption of the following Table 1.

## **2. The relationship between tree species and environment**

### ***2.1 Environmental compatibility and cultivation***

The cultivated species have to be apt to the area's characteristics (see Table 1).

	FATTORI STAZIONALI							PRODUZIONE											
	Distretti Fitogeografici		Reazione del terreno			Tessitura del terreno			Prodotti legnosi				Prodotti non legnosi						
	Planiziale	Avanaipico	Acida pH < 6	Neutra pH 6/8	Basica pH > 8	Argillosa	Medio impasto	Sabbiosa	Tranciati e sfogliati	Segati	Biomasse industriali	Biomasse energetiche	Fauna selvatica	Classe nettarifera	Polline	Melata	Frutti	Erboristeria	Azobificazione
acero campestre ( <i>A. campestris</i> )										1	1	2		2	•	•			
acero di monte ( <i>A. pseudoplatanus</i> )									3	3	1	2		2	•	•			
biancospino ( <i>Crataegus spp.</i> )													•	2	•			•	
carpino bianco ( <i>C. betulus</i> )										1	2	2	•		•				
carpino nero ( <i>O. carpinifolia</i> )											2	2	•		•				
castagno ( <i>C. sativa</i> )									3	3	2	2	•	6	•	•	•	•	
cedro ( <i>Cedrus spp.</i> )										2	2	1							
cerro ( <i>Q. cerris</i> )											2	3	•		•			•	
ciavardello ( <i>S. torminalis</i> )									3	3	1	1	•	2	•			•	
ciliegio ( <i>P. avium</i> )									3	3	1	1	•	2	•		•		
cipresso ( <i>C. sempervirens</i> )									3	3	1	1				•		•	
douglasia ( <i>P. menziesii</i> )										2	2	1				•		•	•
eleagno spp.												1	•	2			•	•	•
evodia ( <i>E. daniellii</i> )													•	6					
farnia ( <i>Q. robur</i> )									2	3	2	2	•		•	•		•	
frangola ( <i>F. alnus</i> )													•					•	
frassino maggiore ( <i>F. excelsior</i> )									2	3	2	1			•			•	
frassino ossifillo ( <i>F. angustifolia</i> )										2	2	1			•			•	
gelso ( <i>Morus spp.</i> )												2	•				•		
leccio ( <i>Q. ilex</i> )											2	3	•		•	•			
ligustro ( <i>Ligustrum spp.</i> )														3	•			•	
melo ( <i>Malus sylvestris</i> )									3	3		1	•	1	•		•		
mirabolano ( <i>P. cerasifera</i> )												1	•				•		
nocciolo ( <i>C. avellana</i> )												2	•		•		•	•	
noce comune ( <i>J. regia</i> )									3	3	1	1	•		•		•	•	
noce nero ( <i>J. nigra</i> )									3	3	1	1	•		•	•		•	
olmo ( <i>Ulmus. Spp.</i> )									2	3	1	2			•				
ontano napoletano ( <i>A. cordata</i> )										2	2	2			•				•
onatanero nero ( <i>A. glutinosa</i> )									2	2	2	2			•				•
paulonia ( <i>P. tomentosa</i> )									2	3	3	1		3	•			•	
pero ( <i>P. pyrastrer</i> )									3	3	1	1	•	1	•		•		
pino domestico ( <i>P. pinea</i> )										1	2	1					•		
pioppo bianco ( <i>P. alba</i> )									1	2	2	1			•				
pioppo "cloni"									3	2	2	1				•		•	
platano ( <i>Platanus spp.</i> )									1	2	2	3						•	
prugnolo ( <i>P. spinosa</i> )													•	1	•			•	
robinia ( <i>R. pseudoacacia</i> )										1	3	3		6				•	•
rovere ( <i>Q. petraea</i> )									2	3	2	2	•		•			•	
roverella ( <i>Q. pubescens</i> )											2	3	•		•	•			
salice ( <i>S. viminalis/alba</i> )										1	3	2	•	4	•	•		•	
sambuco ( <i>S. nigra</i> )													•	2	•	•	•	•	
sorbo domestico ( <i>S. domestica</i> )									2	3	1	1	•	2	•	•	•	•	
tiglio ( <i>Tilia spp.</i> )									2	2	2	1		4/6	•			•	

Legenda

Fattori stazionali

favorevole

parzialmente limitante

fortemente limitante

Prodotti legnosi

1

2

3

mediocre

buono

ottimo

non ottenibile o non richiesto

Prodotti non legnosi

•

possibile produzione

Classe nettarifera

1

2

3

4

5

6

fino a 25 kg/ha

fino a 50 kg/ha

fino a 100 kg/ha

fino a 200 kg/ha

fino a 500 kg/ha

oltre 500 kg/ha

### 3. Nursery material

#### *3.1 Quality requirements for nursery material*

The nursery material has to be produced and traded in conformity and compliance with the national and, if present, regional laws.

### 4. Planting models and density

#### *4.1 Spacing and plantation layout*

Both linear and open field plantations are admitted. The linear plantations can be composed by one row of trees or trees and shrub. To be considered linear, the plantation shall have a width equal or lower than 10% of its length. Width in young plantations has to be considered as a 6-meter diameter to the canopy projection to the ground, as they would be adult tree. This implicates that 1,667 linear meters are equal to 1 hectare in open field.

In linear plantation, the plantation layout should consider the planting of at least 160 trees per hectare considered “main species” (namely that will be harvested at the end of the rotation cycle).

In open field plantations, the plantation layout should consider between a minimum of 70 and a maximum of 123 trees for hectare belonging to the “main species”.

#### *4.2 Planting times in relation to nursery material*

New plantations shall use plantings in dormancy condition (November-March), avoiding the freezing periods, that could create troubles in opening and closing the planting holes.

#### *4.3 Cultivation models in relation to stand characteristics*

Careful soil preparation is necessary in order to establish the plantation. Tilling to a depth of 30-50 cm is recommended, and to 70-120 cm, if it is combined with subsoil tillage in deep soil and where it is necessary to avoid bringing soil layers with unfavourable chemical and physical characteristics to the surface.

The use of a subsoiler is desirable in deep soils and when it is necessary to avoid the transport deep layers with bad chemical and physical characteristics to the soil surface.

For silty - clay soils it is mandatory the soil to be prepared in a state of tempering, preferably by the end of October, before the planting operations. The planting will be done with suitable techniques to the characteristics of the planting material. In case of risk of damage caused by wildlife, appropriate protections shall be used.

### 5. Fertilization

In ecologically sensitive areas with good water availability and often characterised by open, deep, fresh soil, a good rate of wood production can be obtained even where the input of mineral



fertilizers is limited. If any, the initial fertilisation does not include the nitrogenous compounds, excluding the nitrogenous input deriving from natural and organic fertilizers (it is suggested the use of animal manure, or compost, or leguminous green manure).

Only the use of phosphorus ( $P_2O_5$ ) and potassium ( $K_2O$ ) compounds is admitted, not exceeding respectively 125 kg/ha and 175 kg/ha (higher rates are allowed only if specifically required, confirmed by the results of chemical tests conducted by accredited laboratories). The nitrogenous fertilization is admitted during the productive cycle.

## 6. Pruning

Pruning has to be adequate, both in technique and intensity, to the vigour and to the species of the individual tree and has to be carried out during the pruning periods.

The “qualitative” pruning phase ends when for every “main” tree there is a sufficient length of the trunk without branches (called “log”).

### 6.1 Stem Pruning

#### 6.1 Cutting mode

When an entire branch is removed, the cut must be practiced very near to the trunk, but respecting the branch collar.

Stumps of removed branches shall not be left because these will become knots that will provoke a decrease on the timber’s value (because their lack of firmness and bad structure).

#### 6.2 Size of the branches to be pruned

The pruning should be carried out before that the unwanted branches exceed a diameter greater than 3 - 4 cm.

In certain cases, especially in case of fertile soils and in case of optimal conditions for medium growth species (e.g. walnut or cherry) or rapid - growth species (e.g. poplar) it may be necessary to prune the most vigorous branches. in order to contain the diameter of the branches at their base (“control pruning” operation).

#### 6.3 Production pruning

Production pruning has the purpose of containing knots (coming from the elimination of the branches) in a as small as possible central cylinder.

After every pruning operation, the crown height has to be from 2/3 to 1/2 of the total height of the tree. At the end of the period of production pruning, it is suggested not to push the length of the trunk without branches (the log) beyond 25-33% of the final height of the tree.

## 7. Soil Management

### 7.1 Tillage operations for plantations

The first 6-7 growing seasons, tillage operations with a disk harrow are of primary importance, to improve texture and permeability of the active layer and for weed control. Ploughing which throws clods along the tree-rows, where necessary to avoid water stagnation, should be carried out during the autumn months.

After the first 4-5 growing season, the number of such annual soil operations can be progressively reduced until the 10th growing season, when there will not be any soil operation.

If tillage operations will be necessary in the following years, it is mandatory to justify them in the register of the tillage operations.

Any weeds can be controlled by mowing or shredding operations, avoiding the month of May (that is the wildlife reproduction period).

## **8. Weed control**

Control of natural vegetation must be carried out with agronomic interventions (by mowing, shredding and/or conducting the tillage) or using mulching sheet.

The use of chemical herbicides is not permitted, with the exception of derogations authorized by the Regional Plant Health Departments.

## **9. Irrigation**

Irrigations may be carried out during the first years of the plantation, in case of particularly adverse. All irrigation activities will be entered in a special register.

## **10. Use and choice of phytosanitary products**

Planned phytosanitary treatments are not allowed. In case of pests or diseases that attack some trees, only on them it is allowed the use of active substances indicated for the specific pests or disease, using products allowed by Italian law, and only on specific derogations granted by the Regional Plant Health Departments. All provisions and possible restrictions on use must be respected.

During application of the phytosanitary products, all possible precautions to limit damage to the operator and the environment must be adopted: for example, respecting the application rates of the active ingredients and the indications regarding volume of water, spraying in the absence of wind and during the cooler hours of the day, choosing products with the least toxicity and non dangerous for the environment in relation to their effectiveness, carrying out periodic maintenance of the equipment, using protective clothing.

## **11 Harvesting operation**

Harvesting has to be conducted on all the plantation by specialized enterprises working according to the laws in force.

After tree harvesting, the soil must be restored for the agricultural use, even by grinding or removing roots, except for stumps that, after harvesting, can be raised for further production cycles.

When the vitality of the stumps ends, the root systems must be removed and the land must be restored for agricultural uses.

## Appendix 3

### PEFC Technical standards for Sustainable “close to nature” plantation Management

Document approved by PEFC Italy BoD on 28<sup>th</sup> October 2015

## PEFC Technical standards for Sustainable "close to nature" Plantation Management

The Technical Standards for "close to nature" plantations (or polycyclic plantations) are mainly advanced in order to obtain both a high quality product for the wood industry, the veneer and panel industry or other wooden stocks (e.g.: wood for packaging, plywood, for chips and energy, etc) both other goods and services (e.g.: honey, truffles, carbon credits).

This kind of plantation is characterised by the adoption of planning and managing strategies aiming at creating environmental condition for the reduction of:

1. weed development;
2. plant pests and diseases, in particular of the "main trees";
3. water evapotranspiration;
4. nitrogenous fertilization during the productive cycle.

This characteristic gives the adjective "naturalistic" or "close to nature" to this kind of plantation. Following, even if not systematically specified, the document refers to Close to Nature Polycyclic plantations.

It is possible to distinguish "close to nature" plantations in

\* not permanent polycyclic plantations (**PT Plantations**) when the harvesting time of the main trees coincide with the harvesting time of all plantations (and tree planting starts again with new trees), and

\* potentially permanent polycyclic plantations (**3P Plantations**) when the plantations are never completely harvested (with the permanence of some trees).

This document is written in compliance with the Italian legislation and identifies the indicators for the sustainable management of polycyclic plantation.

## 1. Suitability of conditions for cultivation

### 1.1 Soil

Polycyclic plantations need adequate soils in relation to the necessity of the planted tree species.

In order to select the best species for each environment and consequently to obtain high production, it is mandatory the use a map of soil suitability realized by official Entities and recognized local organization (if existing).

Areas with already known and/or verified tree growing limits should be excluded from the planning of polycyclic rotation plantations. If a map of soil suitability for a specific area is not available, it is mandatory the adoption of the following Table 1.

## 2. The relationship between tree species and environment

### 2.1 Environmental compatibility and cultivation

The cultivated species have to be apt to the area's characteristics (see Table 1).

	FATTORI STAZIONALI								PRODUZIONE										
	Distretti Fitogeografici		Reazione del terreno			Tessitura del terreno			Prodotti legnosi				Prodotti non legnosi						
	Planiziale	Avanapico	Acida pH < 6	Neutra pH 6/8	Basica pH > 8	Argillosa	Medio impasto	Sabbiosa	Troncati e sfogliati	Segati	Biomasse industriali	Biomasse energetiche	Fauna selvatica	Classe nettaria	Polline	Melata	Frutti	Erboristeria	Azobifissazione
acero campestre ( <i>A. campestre</i> )										1	1	2		2	•	•			
acero di monte ( <i>A. pseudoplatanus</i> )									3	3	1	2		2	•	•			
biancospino ( <i>Crataegus spp.</i> )													•	2	•			•	
carpino bianco ( <i>C. betulus</i> )										1	2	2	•		•				
carpino nero ( <i>O. carpinifolia</i> )											2	2	•		•				
castagno ( <i>C. sativa</i> )									3	3	2	2	•	6	•	•	•	•	
cedro ( <i>Cedrus spp.</i> )										2	2	1							
cerro ( <i>Q. cerris</i> )											2	3	•		•			•	
ciavardello ( <i>S. torminalis</i> )									3	3	1	1	•	2	•			•	
ciliegio ( <i>P. avium</i> )									3	3	1	1	•	2	•		•		
cipresso ( <i>C. sempervirens</i> )									3	3	1	1				•		•	
douglasia ( <i>P. menziesii</i> )										2	2	1				•		•	•
eleagno spp.												1	•	2			•	•	•
evodia ( <i>E. daniellii</i> )													•	6					
farnia ( <i>Q. robur</i> )									2	3	2	2	•		•	•		•	
frangola ( <i>F. alnus</i> )													•					•	
frassino maggiore ( <i>F. excelsior</i> )									2	3	2	1			•			•	
frassino ossifillo ( <i>F. angustifolia</i> )										2	2	1			•			•	
gelso ( <i>Morus spp.</i> )												2	•				•		
leccio ( <i>Q. ilex</i> )											2	3	•		•	•			
ligustro ( <i>Ligustrum spp.</i> )														3	•			•	
mele ( <i>Malus sylvestris</i> )									3	3		1	•	1	•		•		
mirabolano ( <i>P. cerasifera</i> )												1	•				•		
nocciolo ( <i>C. avellana</i> )												2	•		•		•	•	
noce comune ( <i>J. regia</i> )									3	3	1	1	•		•		•	•	
noce nero ( <i>J. nigra</i> )									3	3	1	1	•		•	•		•	
olmo ( <i>Ulmus. Spp.</i> )									2	3	1	2			•				
ontano napoletano ( <i>A. cordata</i> )										2	2	2			•				•
onatanero ( <i>A. glutinosa</i> )									2	2	2	2			•				•
paulonia ( <i>P. tomentosa</i> )									2	3	3	1		3	•			•	
pero ( <i>P. pyrastrer</i> )									3	3	1	1	•	1	•		•		
pino domestico ( <i>P. pinea</i> )										1	2	1					•		
pioppo bianco ( <i>P. alba</i> )									1	2	2	1			•				
pioppo "cioni"									3	2	2	1				•		•	
platano ( <i>Platanus spp.</i> )									1	2	2	3						•	
prugnolo ( <i>P. spinosa</i> )													•	1	•			•	
robinia ( <i>R. pseudoacacia</i> )										1	3	3		6				•	•
rovere ( <i>Q. petraea</i> )									2	3	2	2	•		•			•	
roverella ( <i>Q. pubescens</i> )											2	3	•		•	•			
salice ( <i>S. viminalis/alba</i> )										1	3	2	•	4	•	•		•	
sambuco ( <i>S. nigra</i> )													•	2		•	•	•	
sorbo domestico ( <i>S. domestica</i> )									2	3	1	1	•	2	•	•	•	•	
tiglio ( <i>Tilia spp.</i> )									2	2	2	1		4/6	•			•	

**Legenda**

Fattori stazionali

favorevole

parzialmente limitante

fortemente limitante

Prodotti legnosi

1

 mediocre

2

 buono

3

 ottimo

non ottenibile o non richiesto

Prodotti non legnosi

•

 possibile produzione

Classe nettaria

1

 fino a 25 kg/ha

2

 fino a 50 kg/ha

3

 fino a 100 kg/ha

4

 fino a 200 kg/ha

5

 fino a 500 kg/ha

6

 oltre 500 kg/ha

### 3. Nursery material

#### 3.1 *Quality requirements for nursery material*

The nursery material has to be produced and traded in conformity and compliance with the national and, if present, regional laws.

It is necessary that nitrogen-fixing plants represent in number at least the 10% of planted trees and shrubs; exception is done for plantations realized in areas classified by “nitrates Directive” and in areas close to permanent waterways.

### 4. Planting models and density

Both linear and open field polycyclical plantations are admitted.

#### 4.1 *Spacing and plantation layout*

##### 4.1.1 Linear plantation

The linear plantations can be composed by one to three rows of trees or trees and shrubs. To be considered linear, the plantation shall have a width equal or lower than 10% of its length. Width in young plantations has to be considered as a 6-meter diameter to the canopy projection to the ground, as they would be adult tree. This implicates that 1,667 linear meters are equal to 1 hectare in open field.

This value decreases respectively to 833 and 556 linear meters for plantations with double and triple rows.

The spacing have to take into account:

- the canopy surface needed of the main tree with longest production cycle to achieve the expected diameter of the stem;
- the different canopy growing rate of the chosen plants;
- the natural dynamics favourable to the desired production;

At planting time, at least 600 plants/stumps (trees or shrubs) per hectare should be present. In linear PT plantations, it is possible to decrease this value until 100 trees/stumps per hectare (maximum distance between plants: 16 meters) before the final harvesting. For the linear 3P plantations, at least 300 trees or shrubs per hectare should be present after each harvesting.

##### 4.1.2 Open field plantation

For the open field polycyclic plantations at least 800 trees or shrubs per hectare should be present. For open field PT plantation with periodic thinning and harvesting operations, it is possible to decrease this value until 70 main trees per hectare before final harvesting.

For open field 3P plantation after each harvesting of a productive cycle, at least 20% of the blocks with main trees should remain (see Figure 1 and paragraph 4.1.3.1) and generally at least 400

trees/stumps per hectare should remain. Within 1 or 2 years there will be again at least 800 trees/stumps per hectare

In open field plantation the spacing has to consider:

- the canopy surface needed of the main tree with longest production cycle to achieve the expected diameter of the stem;
- the different canopy growing rate of the chosen plants;
- the natural dynamics favourable to the desired production.

### 4.1.3 Hierarchy of plants

In polycyclic plantation a hierarchy is set up, on the basis of the following order:

- Main tree
- Double-role tree
- Accessory tree

The way of conferring a role to the plants and the required area to achieve the productive goals for each plant is described on the following paragraphs.

#### 4.1.3.1 *Main tree (Figure 1)*

A main tree provides at least one of the main products for which the plantation was designed. In case of high quality wood production (e.g. timber for veneer, or sawn wood) a tree species should:

- have a productive surface allowing the final cut only when the commercial diameter is reached;
- have the maximum level of hierarchy compared to any other tree or shrub in the area called "Block" (unit of surface that is given to one or more main trees);
- be subject of individual management practices aiming at obtaining a commercial log with the expected characteristics in due time, in relation to the species and the environment.

#### 4.1.3.2 *Double-role tree*

The "double-role tree" are those trees that are able to influence the architectonic structure of the "main trees", to support other trees as an accessory tree and to produce high quality assortments and/or biomass, at the same time.

A plant of a specific species, to be considered as "double-role tree", should have:

- a productive cycle definitely shorter than the cycle of the main tree, included in the same block (if aimed to produce high quality wood) or be able to bear shading (if aimed to produce biomass);
- a productive surface allowing the final cut only when the expected diameter is reached without being thinned; such situation should not be considered for species aimed to produce biomass (they can be cut more than once);
- a classification as second level of hierarchy, subordinated only to the "main tree" in the "block";

- individual management practices aimed at obtaining a commercial log with the expected characteristics in due time, in relation to the species and the environment.

E.g.: poplar main trees (planted at the right distance) could both give logs for veneer and promote (as accessory trees) an ascendant structure of walnut canopy, in order to facilitate the pruning operations and to overshadow the soil (consequently reducing the working soil operations).

#### **4.1.3.3 Accessory plant (Figure 1)**

An “accessory tree” is included in a plantation for helping the management of the plantation and/or for conditioning main trees development in a positive way.

The adjective “accessory” is due to the non-essential presence of this plants for obtaining the desired timber production from the main trees.

The accessory plant could be helpful for obtaining single or combined “services”, such as:

- reducing the soil working operations
- giving a suitable shape to the main trees (facilitating pruning operations)
- increasing soil fertility
- conferring micro-environmental conditions favourable to the development of main trees and, if present, of double-role trees.

Accessory trees give an advantage to the farmer, but are also a cost in including them in the plantation. For this reason, when their presence is considered, it is important to:

- select suitable species for obtaining at least one of the expected “services”;
- give to this plants the last level of the hierarchy (below main trees and double-role trees);
- choose adequate planting spaces for obtaining the expected effect and for enough time, before they could negatively compete with main trees or double role trees.

Accessory plants should NOT be pruned because this is a managing operation (a cost) not useful for the expected production and because pruning of accessory trees could reduce or cancel the advantages justifying the planting of the accessory trees itself.

If the competition for the light between accessory plants and main trees or double-role trees is too high, the accessory plants (the last step of the hierarchy) should be thinned or completely removed.



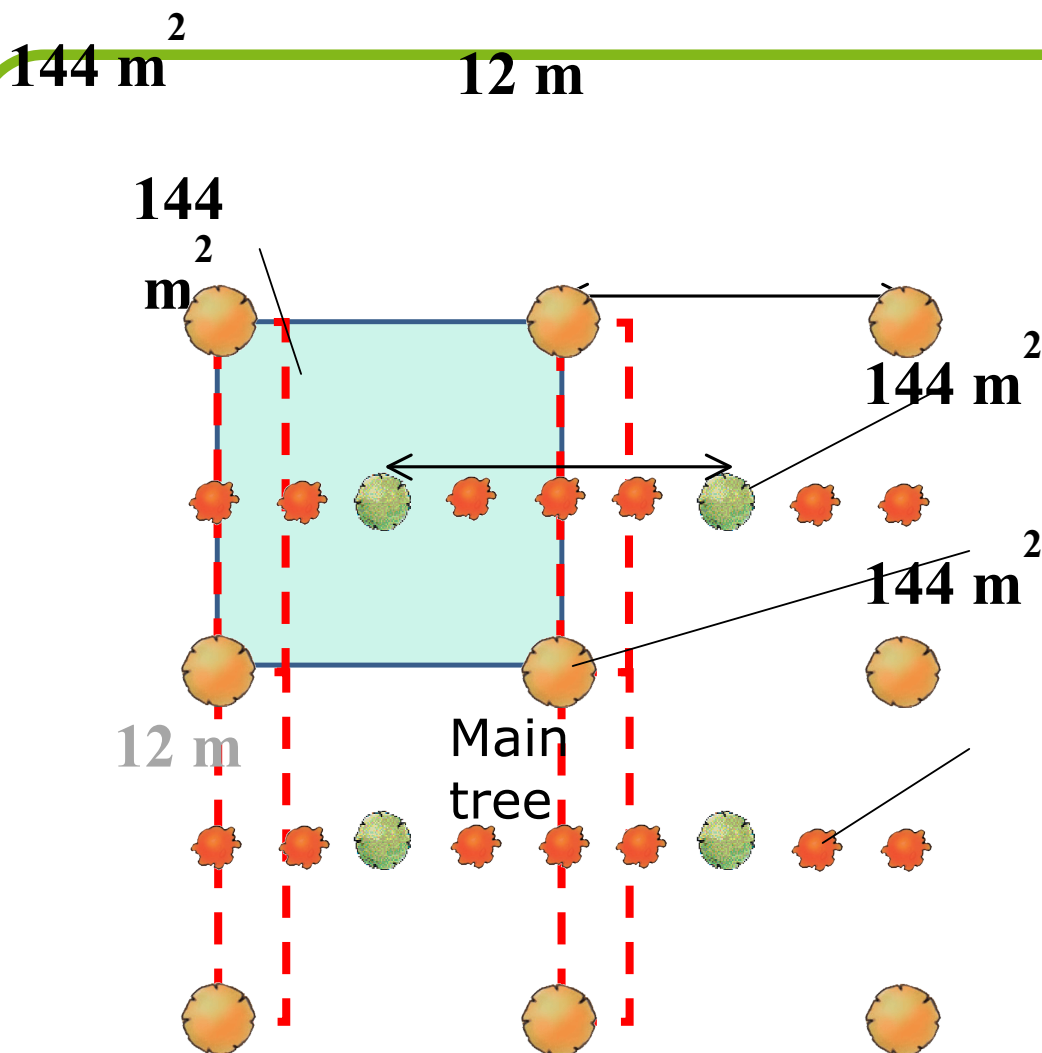


Figure 1 – Example of PT Plantation with medium-long rotation “main trees”, short rotation “double-role” plants e shrub-like “accessory” plants.

#### 4.2 Planting times in relation to nursery material

New plantations shall use plantings in dormancy condition (November-March), avoiding the freezing periods, that could create troubles in opening and closing the planting holes. The nursery material shall be 1 to 3 year old.

#### 4.3 Cultivation models in relation to stand characteristics

Careful soil preparation is necessary in order to establish the plantation. Tilling to a depth of 30-50 cm is recommended, and to 70-120 cm, if it is combined with subsoil tillage in deep soil and where it is necessary to avoid bringing soil layers with unfavourable chemical and physical characteristics to the surface.

The use of a subsoiler is desirable in deep soils and when it is necessary to avoid the transport deep layers with bad chemical and physical characteristics to the soil surface.

For silty - clay soils it is mandatory the soil to be prepared in a state of tempering, preferably by the end of October, before the planting operations. The planting will be done with suitable techniques to the characteristics of the planting material. In case of risk of damage caused by wildlife, appropriate protections shall be used.

## 5. Fertilization

In ecologically sensitive areas with good water availability and often characterised by open, deep, fresh soil, a good rate of wood production can be obtained even where the input of mineral fertilizers is limited. If any, the initial fertilisation does not include the nitrogenous compounds, excluding the nitrogenous input deriving from natural and organic fertilizers (it is suggested the use of animal manure, or compost, or leguminous green manure).

Only the use of phosphorus ( $P_2O_5$ ) and potassium ( $K_2O$ ) compounds is admitted, not exceeding respectively 125 kg/ha and 175 kg/ha (higher rates are allowed only if specifically required, confirmed by the results of chemical tests conducted by accredited laboratories). The nitrogenous fertilization is not admitted during the productive cycle because it will be naturally integrated by nitrogen-fixing plants that shall represent in number at least the 10% of planted trees and shrubs.

## 6. Pruning

Pruning has to be adequate, both in technique and intensity, to the vigour and to the species of the individual tree and has to be carried out during the pruning periods.

The “qualitative” pruning phase ends when for every “main” tree there is a sufficient length of the trunk without branches (called “log”).

### 6.1 Stem Pruning

#### 6.1 Cutting mode

When an entire branch is removed, the cut must be practiced very near to the trunk, but respecting the branch collar.

Stumps of removed branches shall not be left because these will become knots that will provoke a decrease on the timber's value (because their lack of firmness and bad structure).

#### 6.2 Size of the branches to be pruned

The pruning should be carried out before that the unwanted branches exceed a diameter greater than 3 - 4 cm.

In certain cases, especially in case of fertile soils and in case of optimal conditions for medium growth species (e.g. walnut or cherry) or rapid - growth species (e.g. poplar) it may be necessary to prune the most vigorous branches, in order to contain the diameter of the branches at their base (“control pruning” operation).

#### 6.3 Production pruning

Production pruning has the purpose of containing knots (coming from the elimination of the branches) in a as small as possible central cylinder.

After every pruning operation, the crown height has to be from 2/3 to 1/2 of the total height of the tree. At the end of the period of production pruning, it is suggested not to push the length of the trunk without branches (the log) beyond 25-33% of the final height of the tree.

## 7. Soil Management

### *7.1 Tillage operations for plantations*

The first 4-5 growing seasons, tillage operations with a disk harrow are of primary importance, to improve texture and permeability of the active layer and for weed control. Ploughing is admitted only during the soil preparation before planting.

After the first 2-3 growing season, the number of such annual soil operations can be progressively reduced until the 5<sup>th</sup> growing season.

If tillage operations will be necessary in the following years, it is mandatory to justify them in the register of the tillage operations.

## 8. Weed control

Control of natural vegetation must be carried out with agronomic interventions (by mowing, shredding and/or conducting the tillage within the first 5 years of plantation) or using mulching sheet.

The use of chemical herbicides is not permitted, with the exception of derogations authorized by the Regional Plant Health Departments.

## 9. Irrigation

Irrigations may be carried out during the first two years of the plantation, in case of particularly adverse condition. All irrigation activities shall be entered in a special register.

## 10. Use and choice of phytosanitary products

Planned phytosanitary treatments are not allowed. In case of pests or diseases that attack some trees, only on them it is allowed the use of active substances indicated for the specific pests or disease, using products allowed by Italian law, and only on specific derogations granted by the Regional Plant Health Departments. All provisions and possible restrictions on use must be respected.

During application of the phytosanitary products, all possible precautions to limit damage to the operator and the environment must be adopted: for example, respecting the application rates of the active ingredients and the indications regarding volume of water, spraying in the absence of wind and during the cooler hours of the day, choosing products with the least toxicity and non dangerous for the environment in relation to their effectiveness, carrying out periodic maintenance of the equipment, using protective clothing.

In case of phytosanitary treatments to the poplar trees, it is valid what is prescribed in Chapter 10.1 of Annex 1 of the present Document (Indications for phytosanitary procedures consistent with poplar pest and disease control).

## 11 Harvesting operation

Harvesting has to be conducted on all plantations by specialized enterprises working according to the laws in force.

On the basis of the type of the polycyclic plantation there are different way to manage the post harvesting.

**For PT plantation:**

1. After the harvesting of “double-role” trees, the soil should be left without pruned material and branches and it should be levelled in case of damages on soil caused by the machinery.

If “double-role” trees for energy purpose are felled, their stumps should not be damaged.

If “double-role” trees are NOT for energy purpose, their stumps should be grinded or removed.

2. After the final harvesting of the main trees (both for medium-long rotation and short rotation trees) for the high quality wood production, the soil should be restored for the agricultural use, even by grinding or removing the existing roots.

**For 3P plantation:**

1. After the harvesting of “double-role” trees: see PT Plantation description
2. After the final harvesting of the “main trees” (both for medium-long rotation and short rotation trees) for the high quality wood production, the soil should be restored even by grinding or removing the existing roots, with the goal to plant new “main trees” for a new productive cycle.
3. After the final harvesting of the “main trees” with a short rotation cycle for energy purpose that can be used for further productive cycles, the soil should be not restored.  
When the vitality of the stumps ends, the root systems must be removed and the land must be restored for a new tree plantation or for agricultural uses.

The harvesting of the double-role trees (for PT plantations) or each partial harvesting of the plantation (for 3P plantation) shall be conducted with traditional harvesting methods (low mechanization – eg: chainsaw and non-specialized traditional tractors), in order to not damage the remaining plants of the plantation or the soil (that should be not compacted for allowing the presence of roots of following-cycles plants).

The final harvesting in PT plantations could be carried out also with advanced harvesting methods (high mechanization, with suitable equipment to perform complex operations – e.g. with special harvester heads) and/or innovative methods (with use of combined machines – harvester).

For the lubrication of the chainsaws, the use of biodegradable oil is required. The purchase of biodegradable oil should be recorded in a specific register. If the harvesting and/or the piling operations are carried out by contractors, it is mandatory a formal request of use of biodegradable oil for the lubrication of the chainsaws.