

Choosing the right tree guard

Although it is often necessary to protect trees and shrubs from wildlife damage, unsuitable and consequently ineffective strategies are observed far too often in the field. The wide diversity of tree guards currently on the market requires forestry professionals to find out what is available and identify the products that best meet their needs. Installing tree protection is usually quite expensive and the technical specifications of the different products are quite complex for non-specialists. Foresters or farmers need to be well acquainted with the different types in order to use them properly and make the right choice for protecting trees from the types of damage observed in the local situation.



35



36

How and when to use tree guards?

Mesh tree guards and individual fences are made of fine or wide-meshed plastic or metal and are designed to provide total or partial “mechanical” protection of individual trees.

Unlike “chemical” repellants² (Photo 35), “mechanical” protection is designed to physically prevent animals from causing damage, by keeping them at a distance from the trunk of the tree so that they cannot rub against it or browse the branches and terminal buds.

Whereas “overall” site protection (wire mesh or electric fences) is designed to exclude animals altogether from a newly planted area (Photo 36), “individual” protection restricts access to the trees (Photo 37) but otherwise allows animals to move around the site and forage among the individually protected trees (Table 4). This type of protection must be placed closely around the tree and must have

certain mechanical resistance characteristics. It is suited to both artificial plantings and naturally regenerating stands.

Tree guards come in two categories, according to whether they protect:

- the whole plant: “total” tree protection is when the tree guard protects the whole tree (stem and crown) from every possible type of damage from a given animal species. Examples include wide-meshed (≥ 5 mm) plastic tree guards to keep rabbits from browsing and gnawing on bark but also simple, mixed-mesh or reinforced fine-meshed (≤ 4 mm) tree guards that prevent rubbing and browsing by roe deer (Photo 37);
- part of the plant: when the aim is to prevent only one type of damage (rubbing or bark stripping), the protection is referred to as “partial”. The type of damage to be prevented needs to be known, since a mesh tree guard is placed on the particular part of the plant likely to be damaged. For example, fine-meshed tree guards are

⁽²⁾ Chemical repellants are painted or sprayed onto plants or trees. They repel animals by their taste or smell, which is formulated according to the animal to be discouraged and to the type of damage to be prevented.



37



38

35 - Applying a repellent (animal and tar extracts) to prevent stag rubs on Douglas fir.

36 - A wire mesh fence can be used to protect extensive naturally regenerating and artificial stands from large animals. Shown here is a fence around a plantation of Christmas trees (Nordmann firs) to prevent red deer damage.

37 - Tree guards (ht 120 cm) protecting against roe deer damage to Norway maples. Foreground: heavyweight ($\pm 420\text{g/m}^2$) reinforced fine-meshed tree guard ($\varnothing 15\text{ cm}$); background: climate-regulating tree guard ($\varnothing 15\text{ cm}$).

38 - Heavyweight ($\pm 410\text{ g/m}^2$) mesh tree guard in expandable diamond-shaped mesh (ht 180 cm, extended width 50 cm) on a Douglas fir to prevent rubbing and bark stripping by red deer.

placed around young broadleaved and poplar stems to protect them from buck rubs. Tree guards in expandable diamond-

shaped mesh can be wrapped around the trunks of fragrant conifers to protect them from bark stripping by red deer (Photo 38).

▼ Table 4 - Advantages and disadvantages of individual and overall mechanical protection

PROTECTION	INDIVIDUAL TREES	WHOLE SITE (FENCING)
Advantages	<ul style="list-style-type: none"> Competitively priced for low to medium density naturally regenerating woodlands and artificial plantations (Photo 39). Allows animals (and hunters) to circulate freely without restricting foraging possibilities in the site. Makes young trees easily identifiable during mechanical or manual clearing operations (particularly in low-density plantings). Fast and easy to install, much less expensive than fencing (except for high planting densities or large areas). 	<ul style="list-style-type: none"> Competitively priced for extensive high-density naturally regenerating woodlands and artificial plantations. Provides lasting physical protection against all types of damage without endangering the trees. More effective protection against red deer than individual tree guards. Cost per plant protected diminishes with increasing planting density or area. Effective protection of companion trees in mixed hardwood plantations.
Disadvantages	<ul style="list-style-type: none"> Cost prohibitive for high-density plantings over large areas. Never 100 % effective with high animal densities (Photo 40), except at prohibitive cost. Weather resistance sometimes poor if stakes are of low quality. Some tree guards can cause tree deformation or become embedded in the trunk if not removed in time (Photo 41). Regular checking involves costs that vary depending on planting density. Visual and environmental pollution and risk of impacts on the plants if not removed in time (Photo 42). 	<ul style="list-style-type: none"> Higher cost for low-density plantings over small areas. Installation is time-consuming and difficult for foresters working at hourly rates. Animals lose access to part of their habitat and can cause more damage to unprotected plant populations. Fences prevent circulation between neighbouring properties and are sometimes resented by neighbours. Can be ineffective on uneven land (ditches, natural slopes). Fences require constant checking to prevent animals from being trapped in the enclosure (turning it into a game enclosure).



39

Making the right choice

The choice of a mesh tree guard should not be dictated solely by the price. Ignoring their actual effectiveness against animal damage never makes good economic sense. Tree guards should be chosen according to the tree species to be protected, the initial height and growth rate of the saplings, and also the animals concerned, their density and the potential risks.

Resistances to deterioration over time and to tearing, piercing or gnawing are key criteria for the effectiveness of mesh tree guards. Their resistance depends on weight, composition, the moulding extrusion method and the number of plastic filaments (or strands) (Photo 43).

Height and diameter

The effectiveness of a mesh tree guard depends on its capacity to protect young woody plants, saplings or mature trees during their entire period of vulnerability. The types of potential damage, the animals responsible - which should be identified beforehand - and their density, should all be taken into account when making the choice.

The minimum height of a tree guard must always be greater than the critical height of possible injuries inflicted on trees by an animal (Table 3, p.12). The standard heights of tree guards currently on the market are 50 cm for rabbits, 60 cm for hares, 120 cm for roe deer, and 180 cm for red deer.

Quality criteria



40



41



42



43.1



43.2

39 - Semi-rigid (ht 120 cm, Ø 14 cm), medium weight (330 g/m²) fine-mesh tree guards were chosen to protect this low-density (833 plants/ha; 4 x 3 m) mixed planting of red oak and Norway maple.

40 - The flexible main shoot of this young red oak was rubbed by a roe deer during the rutting season (mid-July to mid-August) after it had pulled off the standard-weight (± 200 g/m²) flexible mesh guard (ht 120 cm, Ø 14 cm).

41 - If not removed in time, metal stakes can quickly become embedded in the lower trunk of fast-growing tree species such as locust trees.

42 - This mesh tree guard has deteriorated and is no longer protecting the tree; it must be disposed of to avoid environmental pollution.

44 - In this experimental plantation, a rigid, medium-weight (330 g/m²), 3-stranded reinforced mesh tree guard (43.1) withstood attacks by roe deer, but the lighter (270 g/m²), 2-stranded guard (43.2) was torn and the young tree was browsed and rubbed.

In areas where food is scarce and deer populations very dense, the attractiveness of newly planted trees often compels foresters to use higher, heavier, more rigid and necessarily more expensive tree guards.

These should be 150 cm high for roe deer and 200 cm high for red deer, and supported by reinforced wooden stakes, since deer can bend young trees or rear up on their hind legs to reach appetising shoots.

The diameter of tree guards varies from 10 cm to 33 cm and will depend on the type of tree to be protected:

- 10 cm to 15 cm for poplar;
- 14 cm to 15 cm for hardwoods with strong apical dominance (e.g., cherry, ash, maple, red oak);
- 20 cm to 25 cm for hardwoods with strong lateral development and weak apical dominance (oak, beech, walnut, service tree), and also for very fast-growing softwoods with flexible branches (Douglas fir, larch);
- a diameter of 30 cm to 33 cm is acceptable for conifers.

Durability of synthetic plastics

Durability is a key parameter. During their useful life, tree guards are exposed to bad weather and to sunlight. Foresters must be aware of the type and quality of the constituent materials, which determine how quickly the tree guard will deteriorate and

how long it will provide effective protection against animals.

Six years are considered as a minimum in forests (at least 10 years in agroforestry), but

Polyolefins

Mesh tree guards are made of one or more synthetic organic polymers combined with stabilisers, plasticisers and dyes that together make up the plastic material. These polymers are produced by chemical reactions, like the naphtha and diesel produced from petroleum distillation.

They belong to the family of polyolefin chemicals and are mostly derived from the polymerization of ethylene (polyethylene PE) or propylene (polypropylene PP) monomers. Identifying them is easy because they give off a thin white smoke and a smell of candlewax when they burn, and will float on water.

Their main technological characteristics explain their success: they are lightweight and resistant to corrosion, chemicals (pesticides, fertilizers) and biological agents (bacteria, fungi).

They are described as “thermoplastic”, meaning that they are softened by heat and become malleable, so that they can be shaped and processed into a wide variety of mesh tree guards.

this will vary with tree species, their growth rates and the presence, or not, of companion plants, which can be important as a means of indirect protection.

Three different polymers (polyolefins) may be used for forestry supplies: polyvinyl chloride (PVC), polypropylene (PP) and polyethylene (PE). They differ in their chemical structure, degradability and resistance to climatic conditions:

- although cheap, PVC should be avoided. It has a rather short useful life because it gradually hardens as it loses plasticity. It contains chlorine and is therefore an environmental hazard;
- although PP is sturdier and more rigid than PE, it is more sensitive to oxidation, becoming fragile and brittle with age;
- PE is the polymer with the best performance because its particular molecular structure guarantees the elasticity and tensile strength of the final product (**Tip 1**).

Durability of biodegradable plastics

New "biodegradable" tree guards against damage by hares, rabbits and roe deer have recently become available on the European market. The material is based on corn starch, potato starch and carbon, but its chemical formulation and bio-assimilation by soil microorganisms are unknown.

These products do not have conformity labels providing information for buyers.

50-cm biodegradable tree guards will rapidly decompose to a height of 10 cm to 15 cm from the ground when they are in contact with the surrounding vegetation. This allows rabbits

Tip 1 - Choose between PP and PE

Do not simply settle for a "polyolefin" tree guard, but have the primary material specified in the contract: the sale price of PP is lower than that of PE. Given the absence of quality standards for forestry materials and the rising price of petroleum from which these hydrocarbon polymers are produced, there is a risk of PP being added to PE, to the detriment of product durability and performance.

For total tree protection, preference should be given to mesh guards made of high-density polyethylene (HDPE). HDPE products are more rigid and less elastic; they eventually tear but can leave marks on thin bark (**Photo 44**). For partial protection, expandable mesh guards made of low-density polyethylene (LDPE) are an option: the mesh stretches without injuring the tree and eventually breaks as the tree grows in girth.

PE should contain added stabilisers to protect against decomposition by heat, oxidation and sunlight. Plastics for forestry in particular must contain ultraviolet (UV) radiation absorbers, which considerably improve the resistance of the finished product to photodecomposition and therefore their durability.

Tip 2 - What is a "biodegradable" material?

A material is biodegradable if it is broken down by microorganisms (microflora and microfauna) that use the material as a nutrient. This is called bio-assimilation, and results in the production of water, carbon dioxide and/or methane, and sometimes other by-products that are non-toxic for the environment.

Interest in the use of biodegradable materials has prompted some industrial manufacturers to offer pseudo-biodegradable products. It is important to be careful, because these materials, made from blends of polyethylene and starch or oxidant, are in fact "photofragmentable" rather than biodegradable; in other words, they are broken down over time (by exposure to light, heat or extreme cold) into pieces that are smaller and smaller but are not bio-assimilable.

This practice is misleading for users, because although - in the best of cases - these fragments are invisible, the polymer will remain in the soil.

Moreover, there is no knowledge at present about how these pieces of plastic and their additives will evolve, or about their impact on the environment through long-term accumulation.

easy access to the stem of the "protected" plant (**Photo 45**). 120-cm tree guards quickly lose their rigidity and mechanical resistance. They tear at the folds and gradually sag down to the base of the young tree during the 2nd growing season (**Photo 46**).

Because their useful life is currently less than 2 years (with a guarantee of 18 months max.), biodegradable tree guards are not well suited to forestry. Furthermore, as long-term storage is impossible, they are only available on order.

Weight

When choosing a plastic mesh tree guard, the factors to consider are the mesh size, the number and thickness of strands and the possible presence of reinforcing material, all of which determine the weight and especially the resistance of the product to animal damage.

Forestry supply catalogues currently give weights in grams per linear meter (lm). However, this is not a reliable indication when choosing between two products of equal height but different brands and/or diameters. Weight in grams per m² is the only realistic criterion for reliable comparisons between different types of protection (**Tip 3**).

Mesh tree guards come in five weight categories.

Lightweight ($\leq 150 \text{ g/m}^2$)

These are mainly wide-meshed ($\geq 8 \text{ mm}$) lightweight ($\pm 90 - 100 \text{ g/m}^2$) tree guards used to deter rabbits, hares, and small



44.1



44.2

44 - High-density PE-based medium-weight ($\pm 250 - 350 \text{ g/m}^2$) tree guards with mixed mesh sizes will tear as the tree grows in girth (44.1) but can leave marks on the bark (44.2).

45 - Bark gnawing damage by rabbits on a tree protected by a 50 cm biodegradable tree guard (ht 60 cm, $\text{\O} 17 \text{ cm}$), which has partly decomposed (due to contact with weeds) after 2 years on the site.

46 - Browsing damage to a red oak inside a biodegradable tree guard (ht 120 cm, $\text{\O} 14 \text{ cm}$) that was torn apart by roe deer.

rodents from damaging small trees, shrubs or vines (**Photo 47**) in forests, parklands, orchards and vineyards.

These tree guards are above all lightweight and economical. The 40-cm models are not recommended because they are not high enough to protect against rabbits.

Heavier (150 g/m^2) deterrent tree guards with a finer mesh (4 mm) to contain the terminal bud and lateral branches are also available at competitive prices.

Standard ($\pm 200 - 250 \text{ g/m}^2$)

This range comprises fine-meshed (2-4 mm) tree guards (**Photo 48**) that protect small woody plants against damage by rabbits, hares and roe deer. The fine mesh stops the main shoots from pushing out sideways and becoming deformed, and especially from being browsed by animals.

Tip 3 - Work out the weight in grams per m^2

Use the following formula to calculate the weight of a mesh tree guard in grams per square meter (W in g/m^2):

$$W = g / (\pi \cdot \text{\O} / 100),$$

where :

- g : grams per linear meter (g/lm) ;
- π : mathematical constant equal to 3.1416 ;
- \O : diameter (cm) of the mesh tree guard.



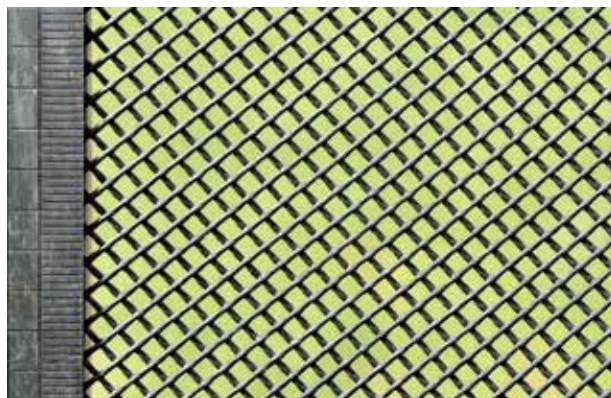
45



46



47



48

For protection against roe deer, preference should be given to heavier weights that provide more rigidity, better protection from hare and rabbit damage and better resistance to wind (they will not twist around the trunk) and snow (less risk of collapse).

In areas where hare damage is a potential problem (hares will stand on their hind legs to try to pull the tree guards down, thus crushing them), we recommend a heavier (medium-weight) mesh with good vertical rigidity (thanks to longitudinal reinforcement canes in the 4 folds) and better tear resistance (horizontal reinforcement rings every 10 cm).

If herbicides are used, tree guards with a solid bottom portion (where the top mesh portion represents 25 % to 50 % of the total height) can be useful because they will protect the tree from herbicide drift. This type of product (40 cm to 60 cm in height) with four pre-formed folds (easy to shape into a square) and longitudinal reinforcements (good rigidity) is mainly used in vineyards.

Medium weight ($\pm 250 - 350 \text{ g/m}^2$)

Mixed-mesh tree guards are designed to protect trees from roe deer damage but are too small to deter red deer.

These are made of double-stranded mesh (Photo 49). The wider mesh sizes (thickest strands) provide good vertical

rigidity (27 x 27 cm). The finer mesh sizes (fine strands) ensure better protection from browsing by keeping the buds of the leader and lateral branches inside the tree guard (3 x 3 mm).

The medium-weight range also includes rigid, wide-diameter (30 cm to 33 cm) tree guards with a wide (20 x 20 mm) diamond-shaped mesh (Photo 54). These have very strong, thick (2 mm) strands and are recommended mainly for protecting conifers from deer.

For red deer, the mesh must be fastened to two strong, large-diameter ($\varnothing 6-8 \text{ cm}$) chestnut, locustwood or oak stakes.

Heavyweight ($\pm 400 - 450 \text{ g/m}^2$)

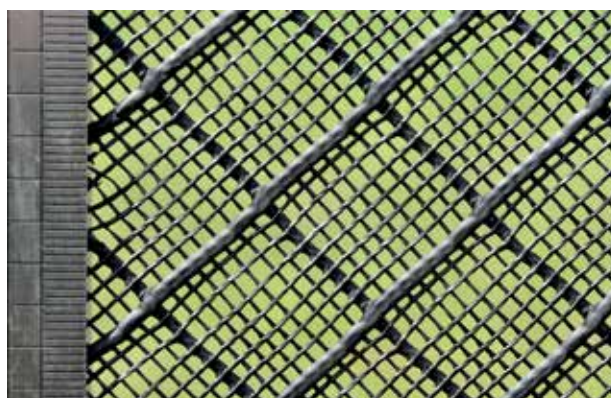
Reinforced double-mesh tree guards are recommended for high deer densities and are increasingly used (Photo 50).

They have a mixed mesh characterised by thicker horizontal and vertical strands providing greater tear resistance. Because they are both rigid and durable, routine inspections are only necessary once the mesh comes into close contact with the lower part of the trunk.

Four pre-formed folds make the mesh guard easy to open for placing on the tree without injuring the tip, and help to maintain an oval cross-section to ensure the tree can grow out of the top.



49



50

Ultra-heavyweight (> 500 g/m²)

To meet the specific requirements for protecting hardwoods in agroforestry plantations from roe deer damage, a new type of tree guard with innovative features is now being marketed (Photo 51).

These have large diameter (2 mm) strands for better tear resistance and a small mesh size (5 x 5 mm) to stop terminal buds from pushing out sideways.

Their weight (± 700 g/m²) makes them very rigid, extremely durable and highly resistant to tearing.

The 150-cm height prevents roe deer from reaching the main stem and the 20 cm diameter reduces the risks of the mesh rubbing against thin bark. Ideally, this type of guard is fastened to one or two sturdy pointed chestnut stakes (ht 180 cm; \varnothing 4-6 cm).

47 - Close-up of a lightweight, wide-meshed (8 x 8 mm) tree guard used to deter animals from browsing.

48 - Close-up of a standard fine-meshed (3 x 3 mm) tree guard.

49 - Close-up of a medium-weight double-meshed tree guard (27 x 27 mm/3 x 3 mm).

50 - Close-up of a heavyweight, reinforced double-mesh tree guard (25 x 25 mm/2.5 x 2.5 mm).

51 - An agroforestry tree guard (ht 150 cm, \varnothing 20 cm) is an ultra-heavyweight (> 700 g/m²), wide-meshed (5 x 5 mm) protective guard designed to protect trees planted at very low densities.



51.1



51.2



51.3

Types of mesh tree guards

Total tree protection

Lightweight wide-meshed (≥ 5 mm) tree guard

Lightweight mesh tree guards (± 90 to 100 g/m²) can be used to deter browsing animals. They are made from black, blue, green or dark brown plastic mesh (5 to 10 mm, in a square or diamond shape). The mesh is cut to the desired length to form individual tree guards (\varnothing 14 to 30 cm). They can be purchased in 100-m rolls, which are 2 to 2.5 % cheaper than individual tree guards.

These are recommended for reducing rabbit, hare and small rodent damage to young trees in forests, orchards, parklands or vineyards. With high rabbit or hare densities, a heavier weight (≥ 200 g/m²) and a finer mesh are preferable.

The mesh guards are shipped flat in packages of 100 and therefore easy to transport. They are quickly installed by slipping them down the plant from the top and inserting two bamboo stakes (\varnothing large end 6-8 mm).

In windy regions, it is advisable to attach the mesh tree guard to thicker bamboo stakes (\varnothing large end 8-10 mm, using with metal "pig-nose" clips), to two metal stakes (Photo 52) or to a single wooden stake.

Ultra-wide meshed (≥ 15 mm) tree guard

Ultra-wide black plastic mesh (Photo 53) of medium weight (± 300 g/m²) with a simple diamond shape (20 x 20 mm) is used to make tree guards 30-33 cm in diameter.

These are highly resistant to stretching and tearing. They will last for considerably more than 10 years with an anti-UV treatment.

They are not recommended for total protection of small broadleaved trees, even those with strong apical dominance (e.g., cherry, maple or ash). Since their shoots frequently grow laterally through the mesh, the risk of malformation of the main stem and browsing of the terminal bud is quite high (Photo 54, Photo 55).

Because of the mesh size, bucks and stags can also lift or even tear off this type of tree guard with their antlers.

These tree guards are primarily designed to protect conifers from deer damage. They can also be used to prevent risks of browsing, rubbing and bark stripping by red deer (Photo 58)

in low-density plantations of the most sensitive species, tall hardwood saplings (stem height > 1.50 m) or fruit trees with the lower branches removed.

These mesh tree guards are bulky and come in packs of 25. They are placed by slipping them down the tree and stapling them to two pointed chestnut (C 11/13 mm) or locustwood (S 22 x 22 mm) stakes (L 150 cm) for protection from roe deer. For red deer, we recommend using two round posts of natural chestnut (\varnothing 6-8 cm) or machine-rounded treated pine (\varnothing 5-6 cm).

Ultra-wide metal mesh tree guard

Metal mesh tree guards are made from steel wire, galvanised or not. Two types of mesh are used: chicken wire for rabbits, hares, and roe deer, and expensive heavyweight mesh for "individual fences" to protect trees from red deer.

"Chicken wire", so called because it is commonly used to make chicken coops, aviaries and rabbit hutches, is a type of netting made of 1 mm steel wire woven into a wide 13 to 50 mm hexagonal mesh (Photo 56). It is sold in rolls and easily cut by hand through the twists of the strands into rectangu-

52 - Wide-meshed (8 x 8 mm) lightweight (187 g/m²) tree guards protecting shrubs from hares (ht 60 cm, \varnothing 17 cm).

53 - Ultra-wide mesh (20 x 20 mm) medium-weight (290 g/m²) tree guard protecting a red oak from roe deer damage (ht 120 cm, \varnothing 33 cm).



52



53



54.1



54.2

lar sheets (60 cm or 120 cm x 80 cm). When the user can choose the final diameter of the tree guard, it is usually installed by fastening it to form a 25-cm diameter tube around 2 bamboo stakes (ht 90 cm and Ø 6-8 mm) with 3 wire ties, or to one or two wooden stakes (ht 150 cm and C 9-11 cm) by nailing the edges together with 4 fence staples.

Although widely used in the past, this type of netting is strongly discouraged nowadays for several reasons:

- malformation of the tree when the leader grows laterally through the mesh (so that animals can reach it with their teeth) and high risk of bucks tearing it off with their antlers during the rutting season (classic disadvantage of wide-mesh tree guards);
- it tends to be crushed without regaining its original shape when pawed by a roe deer (as they try to pull it off), which makes it useless;
- it has to be removed eventually (which means dismantling the worn netting and taking it to a recycling centre): removal is often a difficult, time-consuming (Photo 56),



54.3



55

- and therefore expensive operation;
- possible rubbing injuries to the main stem of trees with thin bark; if not removed, the netting lasts for a very long time and the metal will become embedded in the lower trunk, thus compromising the quality of the butt log;
- the market price is much higher than for a plastic ultra-wide mesh (≥ 15 mm) tree guard.

54 - The terminal buds of the young red oak (54.1) and Norway maple (54.2) grew through the mesh of their tree guards and were browsed by roe deer; another bud (54.3) will soon meet the same fate.

55 - Browsing of a lateral branch will not compromise the future silvicultural value of a tree as long as the main stem is unharmed.



56.1



56.2

56 - The branch whorls of an Atlas cedar have gradually grown through the mesh of its chicken-wire tree guard. The metal wire will have to be removed so that it does not become embedded in the lower trunk of the tree, a time-consuming and tedious operation.



57.1



57.2



57.3

57 - Different types of individual wire mesh protection (ht 200 cm) against red deer damage: an individual fence (Ursus® type) with a finely-meshed upper section is fastened to one oak fence-post around a larch (57.1), to two industrial treated pine posts (L 250 cm, Ø 6/8 cm) around a broadleaved tree (57.2) or to four oak posts (L 250 cm, C 30-40 cm) around a horse chestnut (57.3).

"Individual metal wire mesh fences" can be used to protect young woody plants individually from red deer in forests, but also in orchards, woodlots, forestry and agroforestry plantations of commercial hardwoods, ornamental trees, (future) tree-lined avenues, etc.

We recommend heavily galvanised (class C, 270 g zinc/m²) wire mesh (horizontal wires Ø: 2.5 to 3 mm; selvedge wires Ø: 2.5 to 3.4 mm) fencing made of widening, woven mesh sections (Cyclone®: mesh size 89 to 178 mm from the bottom to the top; Ursus® heavy AS: mesh size 75 to 200 mm; Rempart®: 76 to 203 mm).

Tip 4 - Choosing the right tree guard against red deer damage

There is no 100 % effective method for total tree protection at a reasonable price when red deer pressure is very severe. Commercial hardwoods are routinely damaged by animals browsing or snapping branches that grow out of mesh tree guards up to 180 cm above the ground.

Individual metal wire mesh fences (Photo 57) ensure effective total protection, but the cost is prohibitive : €5.5 to €5.8 (excluding VAT) for Cyclone fencing (ht 205 cm, Ø 100 cm) plus € 3.1 to €3.4 excluding VAT per fence-post (L 250 cm, Ø 8-10 cm). Not including cutting and installation time, an individual wire mesh fence with two posts (Photo 58) will cost €11.7 to €12.6 on average, excluding VAT; €17.9 to € 19.4 with four wooden posts.

Plastic tree guards (ht 180 cm, Ø 30-33 cm), with an ultra-wide 20 x 20 mm diamond-shaped mesh (320 to 340 g m²) and two posts are a less expensive alternative at €2.5 to €2.9 (excluding VAT) for each mesh tree guard, plus €2.4 to €2.6 (excluding VAT) per industrial treated pine post (L 250 cm, Ø 5-6 cm), i.e. a total cost of €7.3 to €8.1, excluding VAT. Sometimes this solution turns out to be less effective and constant monitoring is required to prevent the terminal buds from growing laterally through the wide mesh.

The cheapest option is a **plastic mixed-mesh tree guard** (250 g/m²) fixed to two stakes: 2.1 to 2.5 € (excl. VAT) for the mesh (ht 180 cm, Ø 30-33 cm) and 1.10 to 1.19 € (excl. VAT) per locustwood stake (L 210 cm, S 28 x 28 mm), making a total of 4.3 to 4.9 € (excl. VAT). If red deer density is high, a better solution would be a reinforced double mesh fixed to two more robust stakes (L 200 to 250 cm, Ø 4-6 or, better, 6-8 cm) in natural wood, or possibly treated pine (Photo 59).

The mesh is fastened to one or two fence-posts to form an oval section around the plant, or to three or four posts to form a triangle or a square. These should be sturdy pointed posts (ht 250 cm, Ø 6-8 or 8-10 cm) in natural or treated wood, and placed at least a 1.5 m apart (Photo 57). The fencing is nailed to the outside of the posts and closed with barbed, U-shaped fence staples. The barbs keep the staples from being pushed out once they have been nailed in.

To prevent red deer damage, a 200-cm high individual fence is recommended. To lower the overall cost of this rather expensive type of protection (Tip 4), the mesh can be cut to a height of 180 cm and placed 20 cm above the ground to make it easier to remove weeds around the base of the tree.

On mountains and in areas with heavy snowfall, it is better to use highly resistant fencing 200 cm in height made with heavily galvanised 3 mm wire.

On tall trunks, we recommend coating the first primary lateral branches with lime to make them less palatable, because red deer can rear up on their hind legs to reach and browse on them, and can even snap off the top by pulling on it. In terms of maintenance, the base of the tree should be kept weed free and pruning has to be done by inserting the secateurs through the mesh.

Fine-mesh (≤ 4 mm) wind-resistant tree guard

Plastic tree guards in fine, wind-resistant mesh are used for total protection of all broadleaved (Photo 60) or fast-growing softwood species with flexible branches (Douglas fir, larch) from all kinds of rabbit, hare and roe deer damage (this type of mesh may not be sturdy enough to resist high roebuck



58



59.1



59.2

pressure). They can provide partial protection from rubbing on large broadleaved trees, conifers and poplar saplings (Photo 61). They are not recommended for red deer.

These tree guards are characterised by their fine mesh (< 5 mm). The manufacturing process, developed in the 1980s, resolves the two disadvantages of wide-mesh tree guards (shoots cannot grow out sideways, main stems are not browsed or malformed). For beeches, which have pointed buds, the mesh must be smaller than 3 mm to prevent the main stem from growing through the sides, with the risk of malformation (Photo 62) and browsing.

These tree guards are sold as preformed sleeves tubes (Ø 12.5 to 30 cm) and should be made of polyethylene treated with an anti-UV agent (avoid polypropylene). They are delivered flat to reduce bulk and weight, facilitating transport and storage.

They are quickly installed by sliding them down the tree around two bamboo stakes (ht 60 or 90 cm), to protect it from rabbits (large end Ø 6-8 mm) and hares (Ø 8-10 mm), or by stapling them to a pointed wooden stake (ht 150 cm, S 22 x 22 mm or C 9-11 cm) to protect it from roe deer.

58 - Ultra-wide diamond-shaped mesh tree guard (ht 180 cm, Ø 30 cm) attached to 2 industrial treated pine posts (L 250 cm, Ø 6-8 cm) to prevent red deer damage to a pedunculate oak.

59 - Mixed-mesh (59.1) or reinforced double-mesh (59.2) tree guards (ht 180 cm, Ø 30 cm) attached to 2 industrial treated pine posts (L 250 cm, Ø 6-8 cm) to prevent red deer damage to a pedunculate oak.

60 - A Norway maple protected from roe deer damage by a standard (200 g/m²) fine-mesh plastic tree guard (ht 120 cm, Ø 14 cm) on chestnut stake (L 150 cm, C 9-11 cm).

61 - A standard (200 g/m²) fine-mesh plastic tree guard (ht 110 cm, Ø 10 cm) for partial protection of a poplar from buck rubs.

62 - The stem of a young beech has a natural tendency to curve and bend towards the ground and will twist as it grows inside a small-diameter fine-mesh plastic tree guard. If a fine mesh is used, the tree guard should therefore be at least 20 cm in diameter and attached to 2 stakes to maintain its oval shape.



60



61



62



63



64



65

In very windy regions, it is advisable to strengthen these tree guards with a bamboo stake (L 120 cm, large end \varnothing 8/10 or 10/12 mm).

These tree guards will gradually stretch and tear without injuring the tree as it grows in girth (on thin-barked trees, they may leave marks with no ill effects).



66.1



66.2

63 - A Norway maple protected from roe deer damage by a heavyweight (400 g/m^2) reinforced mixed-mesh plastic tree guard (ht 120 cm, \varnothing 15 cm).

64 - A larch protected from roe deer damage by a heavyweight (420 g/m^2) reinforced mixed-mesh plastic tree guard (ht 120 cm, \varnothing 30 cm).

65 - Mixed-mesh plastic tree guards are not recommended around poplars (fine bark and rapid growth). The mesh weight (\varnothing 14-15 cm) must be less than 260 g/m^2 to ensure that it gradually tears.

66 - This mixed-mesh tree guard (ht 120 cm, \varnothing 20 cm) will stretch (66.1) and gradually tear (66.2) as the trunk grows in girth.

Mixed and/or reinforced mesh tree guard

To help protect hardwoods (Photo 63), softwoods (Photo 64) or poplar saplings (Photo 65, Photo 66) from deer damage, several models of double-mesh or reinforced mixed-mesh tree guards are now marketed.

These combine the advantages of wide and fine mesh: the thick plastic strands, generally forming a 1 cm to 3 cm mesh, provide rigidity, while the fine mesh (2 to 3 mm) prevents shoots from growing through the sides, thus considerably reducing the risks of malformation and browsing of the main stems.

Thanks to their excellent rigidity and high resistance to wind and snow, tree guards in heavyweight, reinforced double mesh are very durable. They can be used to control the less severe types of red deer damage to hardwoods.

They need to be inspected for stretching (Photo 44) and tearing as the mesh comes into contact with the tree (Photo 66). A lighter (medium weight) mixed mesh is preferable for poplars.

Partial protection

Spiral tree guard

Spiral tree guards differ from mesh guards. They are made from single-walled, semi-rigid to rigid sheets of beige, white, or brown plastic perforated with staggered rows of ventilation holes to reduce risks of insect or fungus infestations. They are designed to be wound directly around a tree that has already been planted.

They are made of polypropylene (avoid products made with chlorine derivatives because of pollution) and are sold pre-cut into spiral strips (Ø 4 cm) that are compact and easy to transport.

They can be installed quickly and easily by winding them (from bottom to top) around the stem. They are rigid enough to stay in place and therefore do not need to be staked. As the tree grows in girth, the spiral should gradually loosen without strangling the tree.

Used in the past by foresters to protect newly planted poplar seedlings, spiral tree guards are now sometimes used in parklands or orchards for large hardwoods with no low-growing lateral

branches, for protection against bark gnawing by hares and rabbits and rubbing by roebucks.

However, they are not recommended because of their numerous drawbacks (Photo 67):

- because the polypropylene deteriorates rapidly, the spiral often loses its rigidity, and therefore its effectiveness, and drops like a sock to the base of the tree;
- the spiral is only effective for a very short time (± 2 years) because its diameter is too small: as the trunks of fast-growing tree species grow in girth, they push out the spiral, causing it to fall away too soon;
- sometimes the spiral is too rigid to expand as the tree grows in girth. The consequences are marks on the bark and in certain extreme cases, embedding in the wood (Photo 68), which causes irreversible damage (weakened trunks, secondary pest⁽³⁾ infestations);
- if the mesh comes into close contact with the tree, the lack of ventilation of the stem and overheating of the plastic during heatwaves can cause burns on fine bark.

67 - When a plastic spiral tree guard is too rigid, it can mark the bark, and especially favour the development of cankers that can impair the technological quality of the wood.



67.1

⁽³⁾ Undesired insect species that kill trees and attack mainly weak or dying trees. They often accelerate the process of degradation and weakening of the tree.



67.2



67.3



68



69

68 - Strangling damage to a poplar caused by a spiral which is too rigid.

69 - A mesh (90 g/m²) tree guard (ht 110 cm, Ø 11 cm) wrapped around a sapling with no low-growing lateral branches to protect it from roe deer damage.

Fine-mesh (3 mm) tree wrap

This kind of tree guard is a sheet (ht 55-110 cm) of fine mesh (3 mm) that wraps around the stem (Ø 6, 11, or 15 cm). It is designed to protect poplars and large hardwoods with no low-growing lateral branches from bark gnawing by hares and rabbits and rubbing by roebucks (provided the game density is low). The mesh is made of shape-memory heat-workable plastic that will close itself around the trunk (**Photo 69**), protecting it from animal damage.

Packaged in bags of 75 to 150, these polypropylene mesh tree guards are compact and easy to transport. They can be installed quickly and simply by wrapping them around the stem of young trees, without the need for staples or stakes as they are self-closing (**Photo 69**).

Mesh tree wraps are preferable to spiral guards for several reasons:

- the mesh ensures that the enclosed tree inside is always properly ventilated, thus preventing infestations of insect pests and parasitic fungi;
- as the wrap is split lengthways, it will not sag to the base of the plant and therefore provides lasting protection;
- it opens up gradually and according to the irregularities of the trunk as the tree grows in girth, so that there is no risk of strangulation;
- it is easy and quick to remove and can be re-used.

The diameter must be chosen on the basis of the juvenile growth rate of the tree to be protected. If the cross-section is too small (Ø 6 cm), the tree wrap will open and fall to the ground too soon for rapidly-growing species (cherry, poplar).

Expandable ultra-wide mesh tree guard

Expandable mesh tree wraps are supplied as wraparound sleeves (ht 180 cm, perimeter 45 or 78 cm) of wide, diamond-shaped mesh (15 mm) and will expand to three times their original width. This type of tree guard is designed to protect young saplings and pruned mature hardwoods and softwoods from bark stripping by red deer (**Photo 38**).

The pre-cut, low-density black polyethylene sleeves come in packages of 50 and are wrapped around the pruned trunk (**Photo 70**).

Thanks to the highly expandable mesh, these tree guards can be used to protect trees of varying girths. The mesh expands with the growth of the tree and tears at the right point (Ø of the trunk ca. 40 cm) without damaging the wood.

They are closed by stapling together the vertical strands along the selvages with Omega® galvanised staples (which resist opening even under heavy pressure) every 15 cm. A special hand-held stapler is used (**Photo 71**).

A specially adapted version for protecting newly planted poplars from rubbing by roebucks is made of expandable diamond-shaped mesh (ht 120 cm and Ø 7 cm) capable of expanding to three times its original diameter.

These low-density black polyethylene tree guards come in packages of 25 sheets or in 50 m rolls to be cut to size. They are wrapped around the saplings before planting (**Photo 72**). They can be installed very quickly, as there is no need for staples or stakes.



70.1



70.2



71

Colour

Tree guards come in a wide range of colours. The most common are black, blue and green, but some are supplied in dark brown, beige, grey and other colours.

The colour has no effect on the growth of the trees, so the choice will mainly depend on its impact on the landscape, which must be minimal. In general, the best choice is black or green, since these colours blend in best with the vegetation.

In the same product line, however, the colour affects the final cost: blue and green tree guards are 2.5 % to 3 % and 7 % to 8 % more expensive, respectively, than black ones.

Some people claim that bright colours are better deterrents to animals. However, there is no known study confirming this hypothesis, and mammals cannot distinguish the different colour shades of objects very well. The main reason for bright colours is to make the tree rows easier to see, thus facilitating mechanised maintenance work or hand weeding.

Actual costs

In forests, no protection is 100 % effective, except at prohibitive cost. A damage tolerance threshold has to be accepted, based on planting density and on the cost of protection. In agroforestry, investing in tree guards is essential.

A given product may seem expensive to buy, but may make more economic sense than a cheap system that has to be replaced after two years or takes longer to install. All costs therefore need to be considered when making the choice: purchase price, installation time, performance, durability, side effects and eventual removal.

The actual cost of a tree guard (Table 5), including delivery and installation, depends on several factors: the type of tree guard (Table 6), and especially the weight of the mesh (Tip 5), and also on the sales policies of manufacturers and dealers.

70 - The expandable mesh is closed around the tree by stapling the vertical strands (70.1) of the edges together with metal staples about every 15 cm (70.2).

71 - OMEGA® stapler and galvanised staples.

72 - This expandable tree guard (72.1) of wide, diamond-shaped mesh (72.2) will expand to three times its original diameter (72.3).



72.1



72.2



72.3

Tip 5 - Choose the heavier weights

Within each weight range, foresters and farmers have a choice between different products with fairly similar technical specifications (height, diameter, mesh size).

We strongly recommend choosing the heavier weights over lighter and less expensive products.

Type of tree guard

This is defined by:

- the mesh type: metal, wide-meshed or fine-meshed plastic (wind-resistant mesh ≤ 4 mm);
- height: standard heights are 50 cm (for rabbits), 60 cm (for hares), 120 cm (for roe deer), and 180 cm (for red deer). Depending on the brand, other heights are also available: 55, 80, 90, 100, 110, 150, 200, 210 cm;
- diameter: 14-15 cm on average for hardwoods; tree guards for softwoods have the widest diameters (20 cm to 33 cm). Split tree guards (tree wraps) for large broadleaved species or poplars are at least 11 cm in diameter.

Sales policy

This determines:

- quantities: prices are lower when products are ordered in large quantities. Moreover, the price breakdown by quantity varies with each manufacturer according to their sales policies. Some manufacturers sell their product lines through a national network of dealers (nursery growers, cooperatives, contractors, etc.);
- direct sales: supplies can sometimes be purchased directly from the manufacturer (Tip 6). It is a good idea to ask their sales department for bulk prices ($> 10,000$ units), which are frequently ad hoc. Sometimes this is also worth doing for small orders ($< 2,000$ units);
- shipping costs: these vary according to distance from 4 % to 16 % of the unit sale price of tree shelters. Some orders may be delivered free, depending on the quantity or the amount invoiced.

Choosing a dealer

For any given product, the differences in prices between two dealers are likely to vary one way or the other according to quantities ordered and business relationships. It is worth contacting different dealers for quotations before placing an order.

Other factors to consider are proximity (as the dealer is liable for problems in managing, shipping and handling orders) and whether after-sales services and technical advice are provided, especially for new products on the market.

Table 5 - Average price in € excluding VAT (2014-15 season)

TYPE OF PROTECTION	WEIGHT RANGE	MESH	
Total protection (and partial for certain models)	Light (≤ 150 g/m ²)	Wide mesh (≥ 5 mm)	
		Fine mesh (≤ 4 mm)	
	Standard (± 200 to 250 g/m ²)	Fine mesh (≤ 4 mm)	
	Medium (± 250 to 350 g/m ²)	Fine mesh (≤ 4 mm)	
		Double mesh	
	Heavy (± 400 to 450 g/m ²)	Ultra-wide mesh (≥ 15 mm)	
		Reinforced double mesh	
Ultra-heavy (≥ 500 g/m ²)	Wide mesh (≥ 5 mm)		
Partial protection	Standard (± 200 à 250 g/m ²)	Fine mesh (≤ 4 mm)	
		Wide mesh	
	Heavy (± 400 to 450 g/m ²)	Wide mesh (≥ 5 mm)	

of mesh tree guards for protecting trees from animal damage

HEIGHT (CM)	DIAMETER (CM)	WEIGHT (G/M ²)			UNIT PRICE IN € (CATALOGUE PRICE)	PRODUCT RANGE
		Griplast	Nortène Internas	Samex		
50	14 - 15	91	91, 107	95	0.08 - 0.10	Stoplièvre, Dissuasion 40 g (47 g), Protectnet (+), Standard
	24 - 25	93	90	89	0.14 - 0.16	Stoplièvre, Dissuasion Ø 24, Paysanet Ø 24, Espaces verts
	30	74	-	117	0.20 - 0.30	Stoplièvre, Espaces verts
60	14 - 15	91	91, 107	95	0.09 - 0.13	Stoplièvre, Dissuasion 40 g et 47 g, Protectnet (+), Standard
	17	-	187	-	0.53 - 0.62	Dissuasion Bio, Paysanet Bio
	24 - 25	93	90	89	0.17 - 0.20	Stoplièvre, Dissuasion Ø 24, Paysanet Ø 24, Espaces verts
	30	74	72	117	0.19 - 0.23	Stoplièvre, Dissuasion Ø 30, Paysanet Ø 30, Espaces verts
50	14	-	148	-	0.12 - 0.14	Dissuasion 65 g, Protectnet 65 g
60	10	-	-	143	0.30 - 0.45	Brise-vent
	14 - 15	193	193	159	0.26 - 0.30	Brocarstop, Climatic simple, Micronet
	14	-	227	-	0.53 - 0.63	Climatic Bio, Micronet Bio
	20	207	207	159	0.40 - 0.47	Brocarstop, Climatic simple, Micronet, Brise-vent
	30	-	255	212	0.46 - 0.55	Climatic simple, Micronet, Brise-vent
100 - 110	10 - 12.5	216, 239	207	-	0.36 - 0.42	Brocarstop, Climatic simple, Micronet
120	10 - 12.5	216, 239	-	143	0.43 - 0.50	Brocarstop, Brise-vent
	14 - 15	193	193	159	0.48 - 0.57	Brocarstop, Climatic simple, Micronet
	14	-	227	-	1.06 - 1.26	Climatic Bio, Micronet Bio
	20	207	207	159	0.73 - 0.86	Brocarstop, Climatic simple, Micronet
	30	233, 255	255	212	1.19 - 1.40	Brocarstop, Climatic simple, Micronet, Brise-vent
150	10	-	-	143	0.43 - 0.50	Brise-vent
	14 - 15	-	193	159	0.60 - 0.71	Climatic simple, Micronet, Brise-vent
	20	-	207	159	0.91 - 1.08	Climatic simple, Micronet, Brise-vent
	30	-	255	212	1.49 - 1.75	Climatic simple, Micronet, Brise-vent
180	30	-	255	-	1.79 - 2.10	Climatic simple, Micronet
60	12	-	371	-	0.43 - 0.50	Climatex, Climatplant
110	10	-	255	-	0.40 - 0.47	Climatic mixte
120	12.5	229	-	-	0.50 - 0.55	Brocarstop+
	14	250	250	-	0.56 - 0.66	Brocarstop+, Climatic mixte, Climanet
	20	302	302	-	0.96 - 1.13	Brocarstop+, Climatic mixte, Climanet
	30	276, 318	297	-	1.43 - 1.68	Brocarstop+, Climatic mixte, Climanet
150	14	-	250	-	0.70 - 0.82	Climatic mixte, Climanet
180	20	-	302	-	1.45 - 1.70	Climatic mixte, Climanet
210	30	-	255	-	2.50 - 2.94	Climatic mixte, Climanet
120	30 - 33	318	289	-	1.50 - 1.76	Conifprotect, Grandes mailles
180	30 - 33	318	338	-	2.49 - 2.93	Conifprotect, Grandes mailles
120	15	403	403	382	1.11 - 1.30	Brocarstop+, Climatic ***, Climanet+, Brise-vent renforcée
	20	-	414	382	1.47 - 1.73	Climatic ***, Climanet +, Brise-vent renforcée
	30	-	424	-	2.15 - 2.53	Climatic ***, Climanet +
150	15	-	403	382	1.38 - 1.63	Climatic ***, Climanet +, Brise-vent renforcée
	20	-	414	382	1.84 - 2.16	Climatic ***, Climanet +, Brise-vent renforcée
180	15	-	403	382	1.66 - 1.95	Climatic ***, Climanet +, Brise-vent renforcée
	20	-	414	382	2.20 - 2.59	Climatic ***, Climanet +, Brise-vent renforcée
	30	-	424	-	3.35 - 3.95	Climatic ***, Climanet +
150	20	-	716	-	2.47 - 2.90	Climatic Agro
180	30	-	716	-	2.96 - 3.48	Climatic Agro
55	11	-	231	-	0.31 - 0.37	Surtronc, Treex
	15	-	263	-	0.37 - 0.43	Surtronc, Treex
80	11	-	231	-	0.45 - 0.54	Surtronc, Treex
	15	-	263	-	0.52 - 0.61	Surtronc, Treex
110	11	-	231	-	0.62 - 0.74	Surtronc, Treex
	15	-	263	-	0.71 - 0.84	Surtronc, Treex
120	7 (- 25)	-	(156 g/u)	-	0.75 - 0.88	Gain extensible, Cerviflex
180	25 (- 75)	-	(410 g/u)	-	2.21 - 2.72	Balivocerf, Cervipro

See **Table 8** (p. 51) to choose the right supports for each type of tree guard.

▼ Table 6 (continued) - Technical specifications and uses of mesh tree guards

Protection		Weight range	Mesh type	Company	Designation	Black	Blue	Green	Dark brown	Beige	Height (cm)	Diameter (cm)	Mesh size (mm)	Weight (g/m)	Weight (g/m ²)	Weight (g/unit)	Hardwoods	Schrubs	Poplars	Softwoods	Rabbits	Hares	Roe deer	Red deer		
Total	Partial																									
■		Medium (± 250 to 350 g/m ²)	Fine mesh	Intermas	CLIMATEX	x					60	12	2 x 2 + reinforcements	140	371	84	■				■	■				
	■		Double mesh	Intermas	CLIMATIC MIXTE							110	10	27 x 27 / 3 x 3	80	255	88			■		■	■	■		
	■			Griplast	BROCARSTOP +	x							120	12,5	3 x 3	90	229	108			■		■	■	■	
■	■			Intermas	CLIMATIC MIXTE	x							120	14	27 x 27 / 3 x 3	110	250	132	■		■		■	■	■	
■	■			Griplast	BROCARSTOP +	x							120	14	3 x 3	110	250	132	■		■		■	■	■	
■				Intermas	CLIMATIC MIXTE								120	20	27 x 27 / 3 x 3	190	302	228	■	□		○	■	■	■	■
■				Griplast	BROCARSTOP +								120	20	3 x 3	190	302	228	■	□		○	■	■	■	■
■				Griplast	BROCARSTOP +	x							120	30	3 x 3	260	276	312	■	□		○	■	■	■	■
■				Intermas	CLIMATIC MIXTE								120	30	27 x 27 / 3 x 3	280	297	336	■	□		○	■	■	■	■
■				Griplast	BROCARSTOP +	x							120	30	3 x 3	300	318	360	■	□		○	■	■	■	■
■				Intermas	CLIMATIC MIXTE	x							150	14	27 x 27 / 3 x 3	110	250	165	■				■	■	■	■
■				Intermas	CLIMATIC MIXTE								180	20	27 x 27 / 3 x 3	190	302	342	■			○	■	■	■	■
■				Intermas	CLIMATIC MIXTE	x							210	30	27 x 27 / 3 x 3	240	255	504	■			○	■	■	■	■
■			Ultra-wide mesh (≥ 15 mm)	Griplast	CONIFPROTECT	x						120	30	20 x 20	300	318	360	■	□		○	■	■	■	■	
■				Intermas	GRANDES MAILLES	x							120	33	20 x 20	300	289	360	■	□		○	■	■	■	■
■				Griplast	CONIFPROTECT	x							180	30	20 x 20	300	318	540	■			○	■	■	■	■
■				Intermas	GRANDES MAILLES							180	33	20 x 20	350	338	630	■			○	■	■	■	■	
■			Heavy (± 400 to 450 g/m ²)	Reinforced double mesh	Samex	BRISE-VENT RENFORCEE	x			x		120	15	3 x 3	180	382	216	■				■	■	■	■	
■		Griplast			BROCARSTOP +	x							120	15	3 x 3	190	403	228	■				■	■	■	■
■		Intermas			CLIMATIC ***	x							120	15	25 x 25 / 2.5 x 2.5	190	403	228	■				■	■	■	■
■		Samex			BRISE-VENT RENFORCEE	x				x			120	20	3 x 3	240	382	288	■	□		○	■	■	■	■
■		Intermas			CLIMATIC ***	x							120	20	25 x 25 / 2.5 x 2.5	260	414	312	■	□		○	■	■	■	■
■		Intermas			CLIMATIC ***	x							120	30	25 x 25 / 2.5 x 2.5	400	424	480	■	□		○	■	■	■	■
■		Samex			BRISE-VENT RENFORCEE	x				x			150	15	3 x 3	180	382	270	■				■	■	■	■
■		Intermas			CLIMATIC ***	x							150	15	25 x 25 / 2.5 x 2.5	190	403	285	■				■	■	■	■
■		Samex			BRISE-VENT RENFORCEE	x				x			150	20	3 x 3	240	382	360	■			○	■	■	■	■
■		Intermas			CLIMATIC ***	x							150	20	25 x 25 / 2.5 x 2.5	260	414	390	■			○	■	■	■	■
■		Samex			BRISE-VENT RENFORCEE	x				x			180	15	3 x 3	180	382	324	■			○	■	■	■	■
■		Intermas			CLIMATIC ***	x							180	15	25 x 25 / 2.5 x 2.5	190	403	342	■				■	■	■	■
■		Samex			BRISE-VENT RENFORCEE	x				x			180	20	3 x 3	240	382	432	■				■	■	■	■
■		Intermas			CLIMATIC ***	x							180	20	25 x 25 / 2.5 x 2.5	260	414	468	■				■	■	■	■
■		Intermas			CLIMATIC ***	x							180	30	25 x 25 / 2.5 x 2.5	400	424	720	■				■	■	■	■
■		Ultra-heavy (> 500 g/m ²)	Wide mesh	Intermas	CLIMATIC AGRO	x					150	20	5 x 5	450	716	675	■				■	■	■	■		
■				Intermas	CLIMATIC AGRO	x							180	20	5 x 5	450	716	810	■				■	■	■	■
	■	Standard (± 200 to 250 g/m ²)	Fine mesh (≤ 4 mm)	Intermas	SURTRONC	x					55	11	3 x 3	80	231	44	■		■		■					
	■			Intermas	SURTRONC	x							55	15	3 x 3	124	263	68	■		■		■			
	■			Intermas	SURTRONC	x							80	11	3 x 3	80	231	64	■		■		■	■		
	■			Intermas	SURTRONC	x							80	15	3 x 3	124	263	99	■		■		■	■		
	■			Intermas	SURTRONC	x							110	11	3 x 3	80	231	88	■		■		■	■	■	
	■			Intermas	SURTRONC	x							110	15	3 x 3	124	263	136	■		■		■	■	■	
	■		Wide mesh	Intermas	GAINE EXTENSIBLE	x						120	7 (-25)	15 x 15	-	-	156			■		■	■	■		
	■	Heavy (± 400 to 450 g/m ²)	Wide mesh (≥ 15 mm)	Intermas	BALIVOCERF						180	25 (-75)	20 x 20	-	-	410	■			■	■	■	■			

■ RECOMMENDED □ POSSIBLE ○ ONLY FOR VERY FAST GROWING SOFTWOODS WITH FLEXIBLE BRANCHES (DOUGLAS FIR, LARCH)



73.1



73.2



73.3



73.4

Tip 6 - Useful addresses

Manufacturers of mesh tree guards for protecting trees from animal damage sell their products through distribution networks (nursery growers, cooperatives, contractors) in several European Union countries.

For the sake of simplicity and clarity, only French addresses are given in this guide. Please contact the manufacturers at the following addresses to find a dealer or dealers in a particular country or region in Europe.

GRIPLAST INT.

Tel: +33 (0)2 41 75 06 06

Email: info@griplast.com

Web site: www.griplast.com

INTERMAS AGRICULTURE CELLOPLAST S.A.S.

Tel: +33 (0)2 43 64 14 14

Email: info@celloplast.fr

Web site: www.intermas.com

SAMEX

Tel: +33 (0)2 43 97 48 53

Email: samex@samex.fr

Web site: www.samex.fr

NORTÈNE TECHNOLOGIES, S.A.S.

Tel: +33 (0)3 20 08 05 89

Email: contact@netten.fr

Web site: www.netten.fr

73 - Split pointed chestnut (73.1) stakes (L 150 cm, C 18/22 cm) supporting a heavy (400 g/m²) reinforced double mesh (73.2) tree guard (ht 120 cm, Ø 15 cm). If stakes of this type are to be driven into the ground in the conventional way, the operation should be mechanized as far as possible, i.e., using a front-end bucket on a farm tractor (73.3, 73.4 and 73.5).



73.5