








The revolution of endotherapy  
by NEWPHARM®

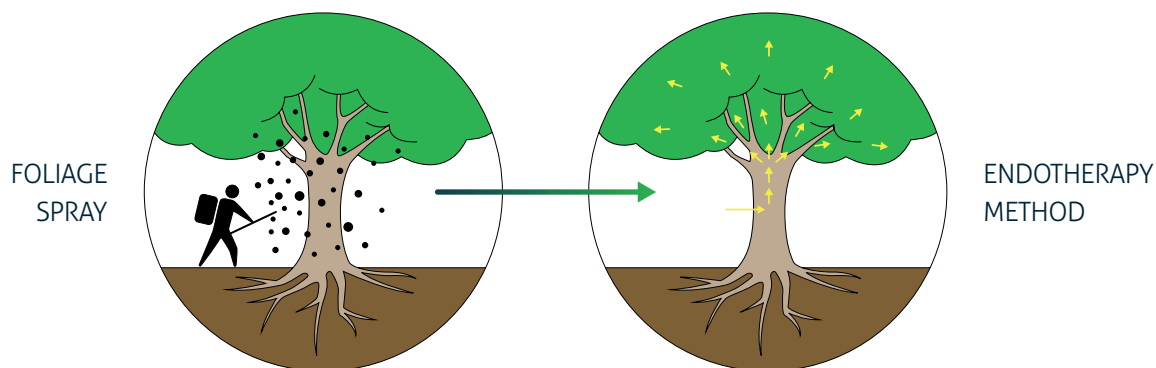
# From traditional methods to endotherapy

Traditional plant protection treatments applied to the tree's foliage only allow a minimum percentage of the solution containing the active substance to actually reach the "target" to perform its functions. In addition to drastically reducing the amount of plant protection products used, the practice of endotherapy saves the surrounding environment and "non-target" organisms from exposure to chemical molecules. In addition, soil and groundwater are preserved from pollution caused by drift and runoff, so that the benefits of treatment are much more durable than traditional spraying.

The endotherapy technique eliminates harmful agents which, due to their characteristics of parasites, invade the tissues of woody plants whether they are Broad Leaf or Conifers.

This practice also allows nutrients to be rapidly assimilated by tall trees.

-  **No dispersion of plant protection products in the environment.**
-  **Complete coverage of the vegetation regardless of size.**
-  **Reduced number of interventions needed.**
-  **High treatment persistence.**
-  **Eco-sustainable method.**



## How it works

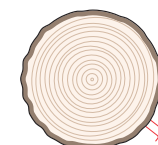
The endotherapeutic intervention consists of introducing into the vital part of the stem, i.e. in the outermost part, small quantities of liquids which attack the parasites, eliminating them from the inside without affecting the aerial vegetation. This is made possible by the xylematic sap: by moving from the roots to the foliage through channels called xylematic vessels, the xylematic sap carries water and minerals into every part of the plant. With the same principle nutrients can be fed to the plant, especially if it is in a state of stress.

## Products that can be used

The products used in endotherapy are: insecticides, phytostimulants and nutrients.

## The quantities in endotherapy

The quantity of liquid to be introduced into the xylematic vessels is directly proportional to the diameter of the stem. The quantity is equivalent to 1ml of nutrient or therapeutic solution per each centimeter of the circumference.



1 ml per cm of circumference



## The revolution of endotherapy

**The new frontier of endoinfusion begins with the Bitecare® method, a unique system that using solely the strenght of the operator allows to mechanically separate the plant tissues and to infuse small quantities of liquid with nourishing action or antiparasitic into the small xylematic vessels, which are placed directly under the bark.**

With this new approach, a special needle is inserted between the vessels, increasing the speed of the lymphatic flow towards the crown by "Venturi Effect". Thanks to this phenomenon an external liquid, with healing or nourishing properties, is absorbed in a completely spontaneous and natural way in a very short time. Following the extraction of the needle, no specific treatment is required as no tissue tearing occurs.

Bitecare® was developed following a research conducted by the Spin-off of the University of Padova PAN/De Rebus Plantarum. The patented solution has received numerous awards and the prestigious United Nations/ UNIDO Award in 2016.

## The injection gives way to the *infusion*

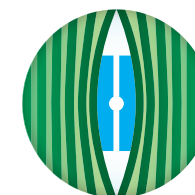
Unlike traditional injection, which requires the exercise of an external force in order to introduce a fluid into the system, **endoinfusion is based on the intensity of the leaf transpiration as driving force for the movement.**

Therefore, the absorption speed of an external liquid is closely correlated with the intensity of the xylematic flow directed towards the canopy, and the xylematic flow is in turn directly proportional to the volume of water dispersed by the leaves.

As an example, under normal conditions a common Platanus (*Platanus acerifolia*) can spontaneously absorb 10 ml of external liquids in less than a minute; in ideal conditions even 1 liter in just 10 minutes.

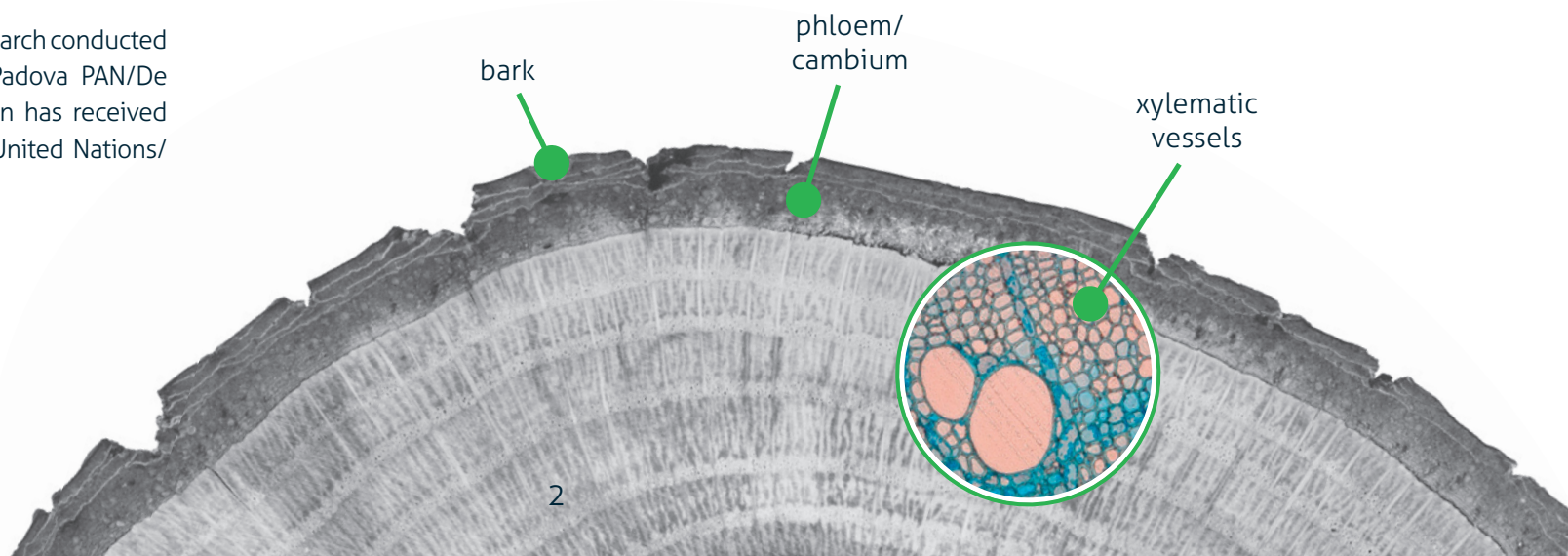


The special lenticular section needle allows to spontaneously spread of a bundle of fibers exerting a minimal friction.



**Delicate tissue spacing avoiding damage to the plant**

Once the xylematic vessels are reached, nutrients or treatments can be introduced spontaneously into the plant. Spaced tissues heal naturally in a few weeks.



# From endotherapy to endoinfusion with Bitecare®:

an innovative approach to avoid holes and distressing pressure

## A comparison between traditional endotherapeutic pressure systems and the new Bitecare® endoinfusion method

### STEP 1: REACHING THE VESSELS

#### PRESSURE SYSTEM

It is necessary to pierce the trunk with the point of a drill along the entire circumference (drilling one hole every 20 cm).



- The drill causes tearing and removes vital tissue.
- Holes can lead to infections and diseases.
- The overheating caused by the drill causes the devitalization of large portions of tissue.

#### Bitecare®

Through the Bite® endoinfusion tool, a special needle gets inserted between the fibers.



- No tissue tearing.
- Total prevention from infections.
- No tissue heating and therefore no permanent injury.

### STEP 2: INTRODUCING THE LIQUID

#### PRESSURE SYSTEM

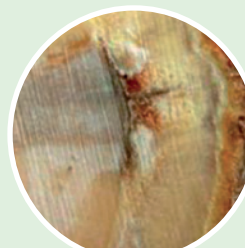
The injection of the product inside the hole is carried out by applying pressure.



- Pressure injections often cause embolisms following vessels cavitation.
- By applying the pressure, part of the liquid can come out of the hole.
- The tissues are irreversibly damaged (e.g. discolored wood).

#### Bitecare®

Spontaneous infusion by atmospheric pressure.



- No modification of the plant's physiology.
- No alteration of the characteristics of the product used and no waste of the product.
- No damage to the tissues.

### STEP 3: CLOSING THE PORT

#### PRESSURE SYSTEM

The port must be closed with mastic (often phytotoxic).



- Complete healing is impossible due to the depth of the lesions.
- Permanent loss of strength and vitality.
- Completely necrotized portions of the stem.

#### Bitecare®

The port can be treated with natural products (e.g. propolis).



- Complete cicatrization in a few weeks.
- No loss of strength and vitality.
- No aesthetic damage.

# βitecare®

- endoinfusion -

*The revolution of endotherapy*



**1** Bite®

**Patented infusion device**



**2** Sapjet®

**A patented carrier for nutrients or therapeutic solutions**



**3** Enerbite®

**Nutrient solution with fast assimilation**



**4** Propolis

**Natural protectant**

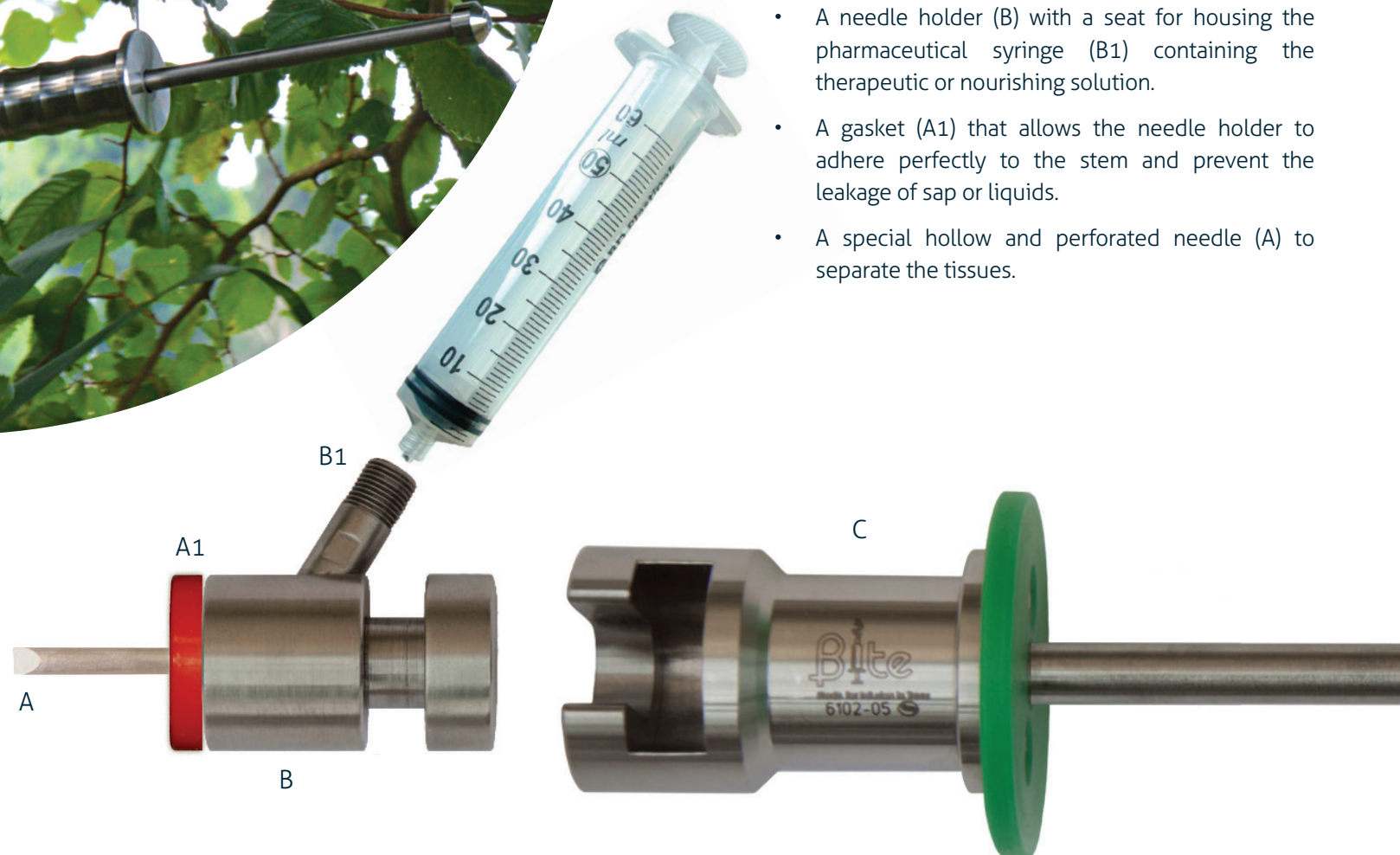




## 1 The Bite® device

Bite® is a patented device composed of several connected parts.

- A striker (C) screwed to a handpiece (D) to insert the needle along the circumference of the trunk.
- A needle holder (B) with a seat for housing the pharmaceutical syringe (B1) containing the therapeutic or nourishing solution.
- A gasket (A1) that allows the needle holder to adhere perfectly to the stem and prevent the leakage of sap or liquids.
- A special hollow and perforated needle (A) to separate the tissues.



## Choosing the needle

Depending on the tree species, a needle of appropriate length must be selected. In case of interventions on broadleaf it is sufficient to pierce the tissues 2 cm (53 mm Needle). On conifers it is advisable to use a longer needle (63 mm Needle), which allows to overcome the resiniferous channels.



35 mm needle



53 mm needle



63 mm needle

### Gaskets



SuperSoft

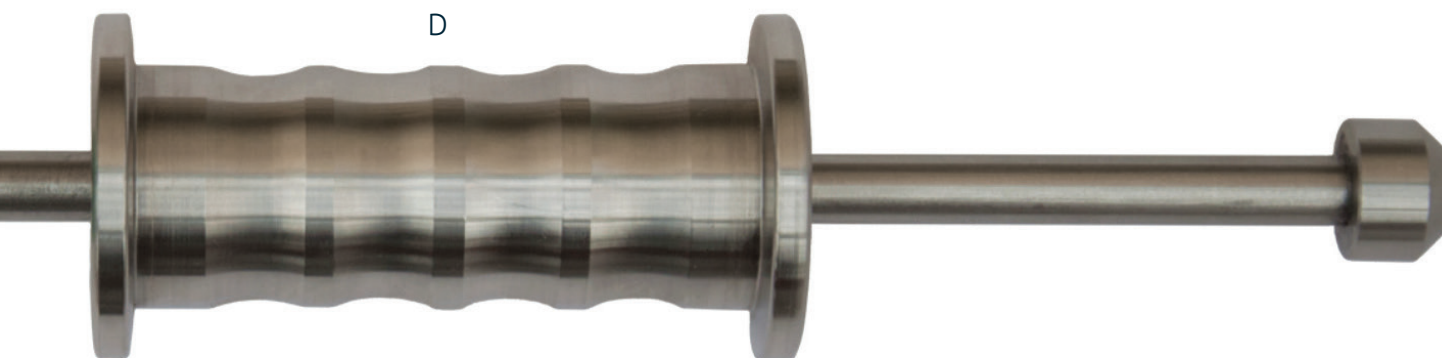


Soft

## Choosing the kit

TYPE OF KIT	KIT CODE	THREADED ROD AND STRIKER	NEEDLE-HOLDER (MAIN BODY)	35 mm NEEDLE	53 mm NEEDLE	65 mm NEEDLE	30 mm Soft GASKET	30 mm SuperSoft GASKET
<b>L KIT</b>	1077710	1 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs	10 pcs
<b>M KIT</b>	1077690	1 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs
<b>S KIT</b>	1077700	1 pcs	3 pcs	3 pcs	3 pcs	3 pcs	3 pcs	3 pcs

SPARE PARTS	CODE	NUMBER OF PIECES
35 mm NEEDLE	1077770	1 pcs
	1077740	5 pcs
53 mm NEEDLE	1077780	1 pcs
	1077750	5 pcs
65 mm NEEDLE	1077790	1 pcs
	1077760	5 pcs
NEEDLE HOLDER	1077730	1 pcs
SOFT GASKET	1077800	5 pcs
SUPER SOFT GASKET	1077810	5 pcs



### LEGEND

- A. Special needle
- A1. Gaskets
- B. Needle holder
- B1. Syringe housing
- C. Striker
- D. Handpiece



## 2 Sapjet®

**A patented carrier that speaks the same language of the sap**

The sap of plants is an aqueous solution that carries minerals within the plant. Common water, although compatible with the practice of endotherapy, does not possess the same characteristics and peculiarities of the sap.

The perfect balance with the plant's physiology is achieved with Sapjet®, the special carrier for the preparation of therapeutic or nourishing solutions.

Sapjet® is a carrier which is fully compatible with the sap. It facilitates the absorption of external fluids, greatly increasing the infusion rate.



It improves and accelerates the plant's absorption rate of the products.



Sapjet® replaces the dilution water used for the preparation of the products to be infused into the stem of the plant.



CODE	FORMAT	Qty per carton
10722830	500 ml	14 pcs per crt

## Sapjet® fast and spontaneous infusion of active substances

The graphs clearly demonstrate how Sapjet® increases the absorption rate of external liquids.

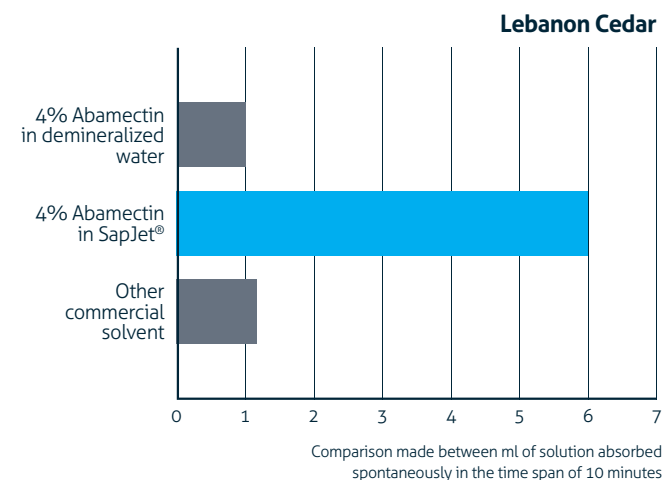
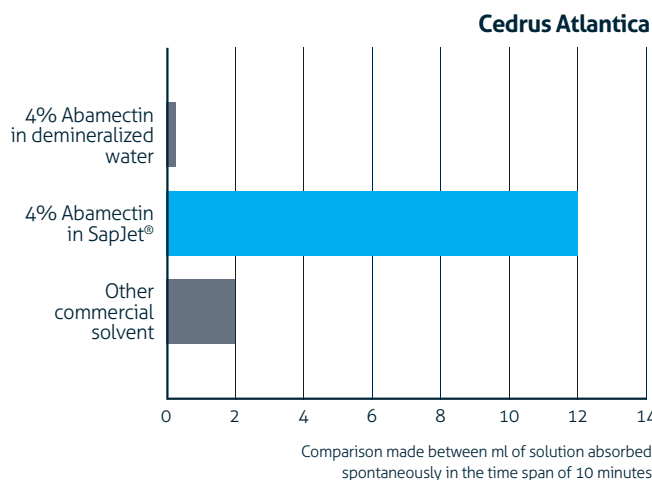
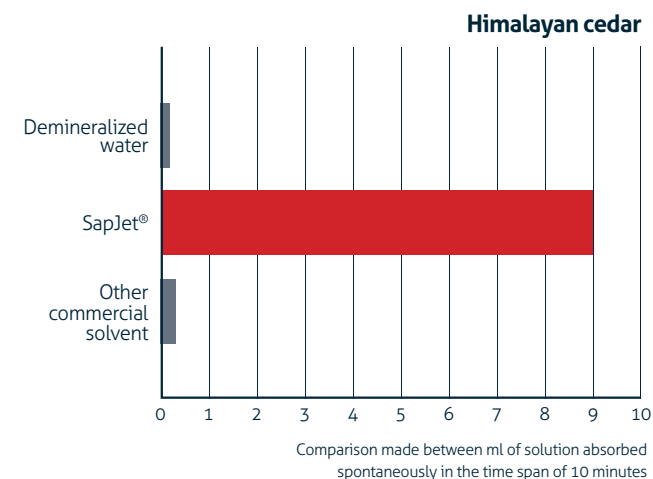
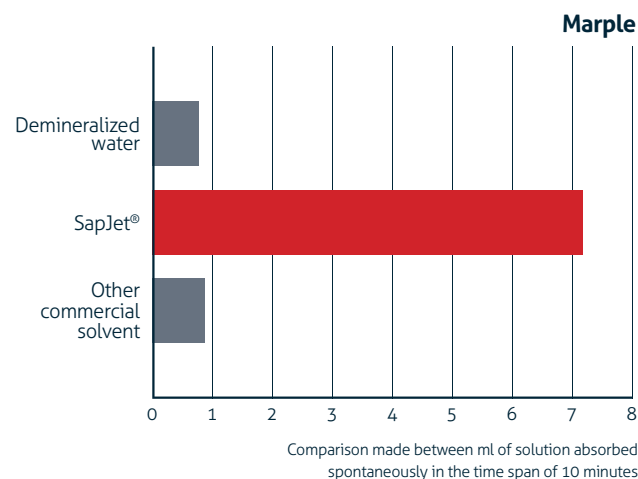


Fig. 1





### 3 Enerbite®

## Immediate energy for the plants!

Enerbite® directly supplies the phosphorus and potassium that the plant needs.

Phosphorus is essential in tree reproduction, flowering and fruiting.

Potassium plays an important role in the resistance to drought and the health of trees.

## New life to plants

How can we feed tall trees?

Bitecare® endoinfusion introduces nutrients into the xylem, that are assimilated fast and efficiently without waste of nutrients at ground level. Enerbite® is a binary liquid fertilizer containing potassium phosphorus in a special formulation designed specifically for the Bitecare® method.

#### COMPOSITION

Phosphorus pentoxide ( $P_2O_5$ ), water-soluble

Potassium oxide ( $K_2O$ ), water-soluble

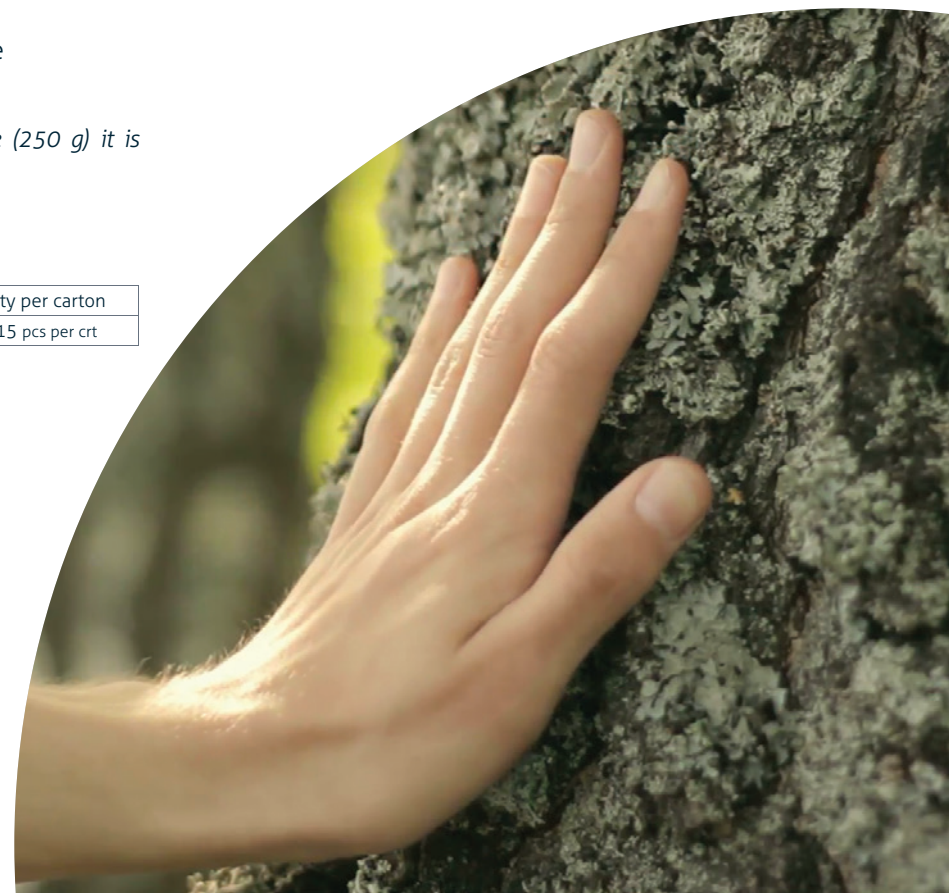
*With the content of each ready-to-use package (250 g) it is possible to treat 4 trees (63 cm crf, 20 cm diam.)*



CODE	FORMAT	Qty per carton
1077720	250 g	15 pcs per crt



Enerbite®  
nourishes the plant.





## 4 Propolis

### Strenght from nature

It is an extract of propolis in aqueous solution containing multiple beneficial substances processed by bees. It disinfects the surface when applied to the area where the needle will be inserted. After the endinfusion treatment, Propolis must be applied again to the area to prevent the spread and infiltration of microorganisms.

One of the causes of the spread of diseases among tree species is linked to the use of tools for endotherapy or pruning. The colonization of plant tissues by microorganisms (in particular fungi) then, is favored by the lesions present on the surface of the tree.

Although the Bitecare® method preserves the integrity of plant tissues, it is common practice to apply preventive molecules to the areas where the needles are inserted. Many preventive molecules are natural, like those contained in the propolis extract.

In line with the Bitecare® philosophy, the application of propolis extract on the bark before inserting the needle prevents any possible infection.

Once the endoinfusion process is completed, a further application of propolis extract forms a waxy defensive film on the surface that prevents the development of some fungi thanks to its high content of Flavonoids and vegetable pigments.

The propolis extract also favors the cicatrization of the port, ensuring a long-lasting protection from fungi and bacteria, which are actively repelled by the Flavonoids.





# ***In perfect harmony with the plant***

*Four solutions for a cutting-edge  
concept fully compatible with the  
physiology of the plant.*

## **Designed for the professionals of garden maintenance and pest control**

Gardening services experts, agronomists, arborists,  
garden designers, landscapers, architects, land surveyors,  
agrotechnics, forest studies, etc.

Pest Control and  
IPM (Integrated Pest Management) professionals.



**broad-leaved  
trees**



**conifers**



# Recommendations for optimal endoinfusion

## The appropriate period for endoinfusions

### BROAD-LEAVED TREES

The ideal period to perform endoinfusions is between the vegetative growth (March/April) and the beginning of summer.

### CONIFERS

We recommend performing the operations in autumn; for what concerns pines, it is best to perform the interventions when the resin is less fluid or in winter.

## The best ports where to insert the needles

The preferred port locations are on flat or convex surfaces near the roots and along the first meter of height.

## The best time of the day to perform the infusion

The best performing environmental conditions are during peak sunlight hours on sunny days, possibly with damp soil and in the presence of a slight breeze. During the night the xylem flow slows down considerably due to the reduced leaf transpiration, consequently absorption may not occur.

Conifers have a limited intrinsic speed of the sap, so infusions will take longer (Fig. 3).

In this case it is advisable to exert a slight pressure on the plunger of the syringe.

## Comparison between the absorption time required by traditional endotherapeutic pressure methods and the Bitecare® method

When a therapeutic solution containing Abamectin 0.1% (abam) is used, the difference between the traditional pressure method and the spontaneous absorption Bitecare® method is minimal.

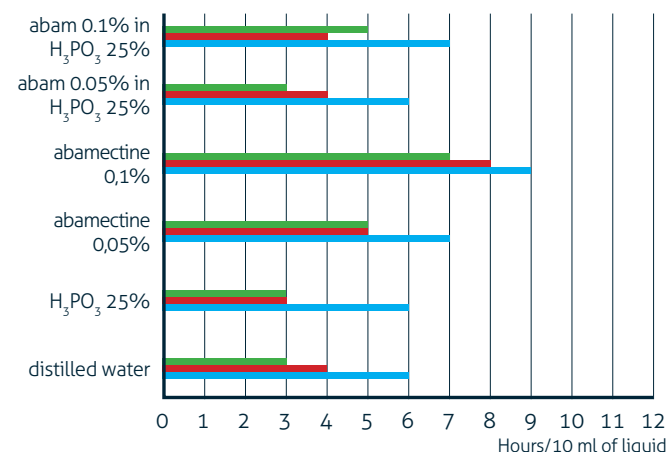
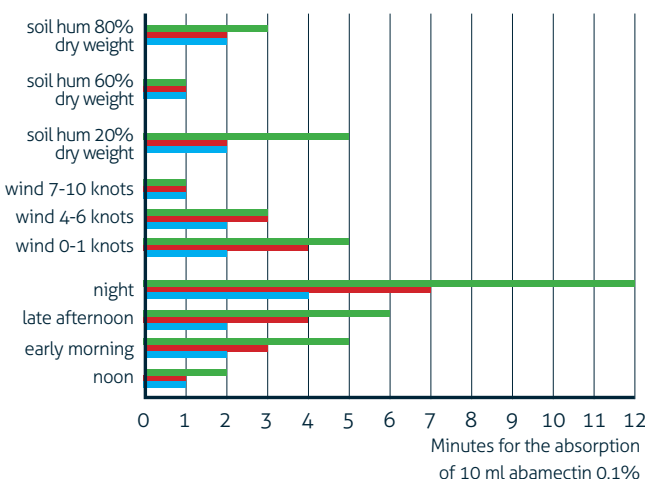
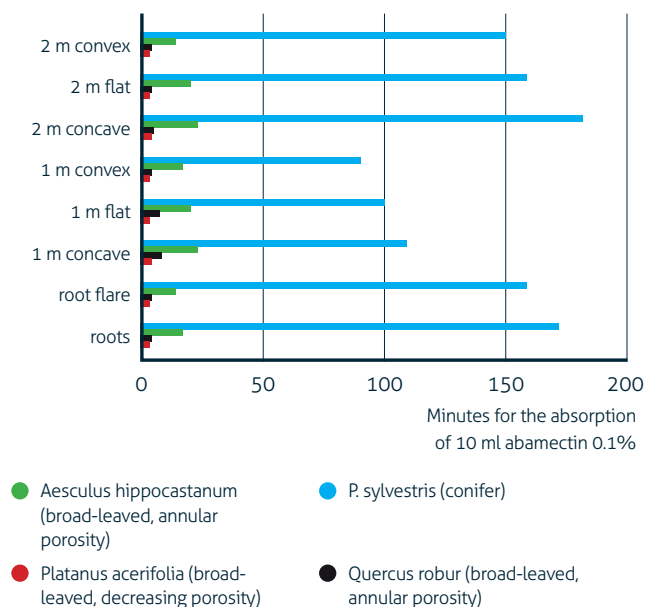


Fig. 2: Experimental data on absorption times according to port location and wood porosity. Comparative tests conducted by the University of Padova.

Fig. 3: Experimental data on the influence of environmental variables on the absorption rate. Comparative tests conducted by the University of Padova.

Fig. 4: Experimental data concerning up-take time to leaves of different formulations. Comparative tests conducted by the University of Padova.

# Addressing the most common **problems**

One of the main purposes of the Bitecare® method is the direct elimination and optimal control of parasites (insects and mites) and micro-organisms (bacteria and fungi).

The approach is mainly designed for tall tree species - broad-leaved and coniferous - and it is not affected by: plant size, plant species and age of the plant.

## Duration of treatment with Bitecare®

Only one annual intervention is sufficient to address the main problems that can afflict broad-leaved trees. On conifers, the benefits from Bitecare® endoinfusion can even last for several years.

- **Pine processionary**  
*Thaumetopoea pityocampa*
- **Processionary of the oak**  
*Thaumetopoea processionea*
- **American antrina**  
*Hyphantria cunea*
- **Leaf Chest of the Horse Chestnut**  
*Cameraria ohridella*
- **Limantria**  
*Lymantria dispar*
- **Tans of the Plane tree**  
*Corytuca ciliata*
- **Aphids:**
  - Aphid lanigero of the poplar**  
*Phloeomyzus passerinii*
  - Afine lanigero of the oak**  
*Diphyllaphis mordvilkoii*
  - Waxy pheasant beech**  
*Phyllaphis fagi*
  - Aphid of the lime tree**  
*Eucallipterus tiliace*

## Aphid of the elms

*Tinocallis platani*

## Cypress aphid

*Cinara cupressi*

## Green aphid of white fir

*Cinara pectinatae*

## • Eriophides:

### Eryopid of maples

*Artacris macrorhynchus*

### Linden Erinosi

*Phytoptus leiosoma*

### Eryofose of the ash tree

*Eriophyes fraxini*

### Eryofida maple

*Eriophyes macrorrhynchus*

### Eryopid of the plane tree

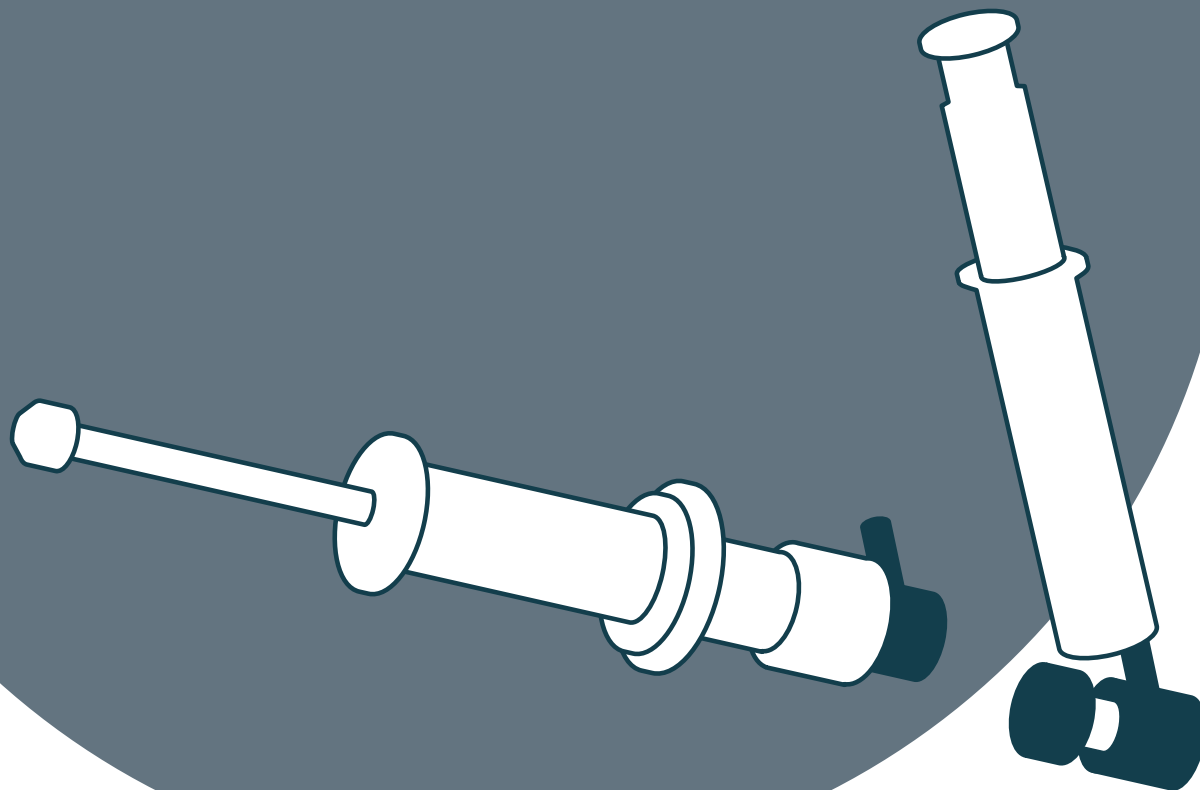
*Eriophyes pseudoplatani*

## • Spittlebug

*Philaenus spumarius* (carrier of the *Xylella fastidiosa* affecting olive trees)

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***As easy***  
*as hammering a small nail!*

## How to perform the endoinfusion with the **Bitecare®** method?

Instructions for setting up the Bite® infusion system correctly:

- 1.** Carefully observe the plant and become familiar with its structure as a whole. Follow the root flares to identify ideal ports for the needles.
- 2.** Using a measuring tape, carefully measure the circumference of the stem 100-150 cm from the collar; usually a needle is inserted every 25/30 cm, and 1 ml of therapeutic or nutrient solution per centimeter of circumference is introduced.
- 3.** Once identified the best ports, smooth the surface of the plant and disinfect it preemptively (for example with Propolis).



2



4. After selecting the appropriate sized needle, insert it into the Bite® needle holder.
5. At the base of the needle, insert the appropriate seal according to the stiffness of the tissues.
6. Place the needle holder in the striker, then fully insert the needle perpendicular to the tissue with firm and unidirectional strokes until the seal adheres perfectly to the surface of the plant. The needle position must be parallel to the plant tissues, i.e. with the holes of the needle facing the crown of the tree.
7. Remove the needle holder from the striker and proceed with other insertions.
8. Insert a traditional pharmaceutical syringe containing the therapeutic or nourishing solution into the appropriate housing.

9. Try to withdraw the syringe plunger: the resistance of the plunger indicates that the needle has been inserted correctly. Withdrawing the plunger will also remove any air that entered the instrument when the needle was inserted.
10. Completely remove the plunger and let the normal physiological processes of the plant draw the solution inside.
11. Once the syringe is completely empty, wait a few more seconds for the needle holder to drain, then reinsert the striker and pull the needle out again with firm strokes.

**IMPORTANT NOTICE:** Use only solutions specifically designed for endotherapy (such as insecticides and desiccants) and authorized for tree injection according to local or national rules. Formulated chemical mixtures must be diluted with water or Sapjet® according to the information provided by the producer. Lymphatic tissues must absorb only the quantities indicated on the label (obviously taking into account the size of the stem).



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7



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NEWPHARM® organises training workshops for the sector's professionals to learn how to master the application technique and provide the best therapeutic strategies for every need.

**βitecare®**  
- endoinfusion -

[www.bitecare.it](http://www.bitecare.it)