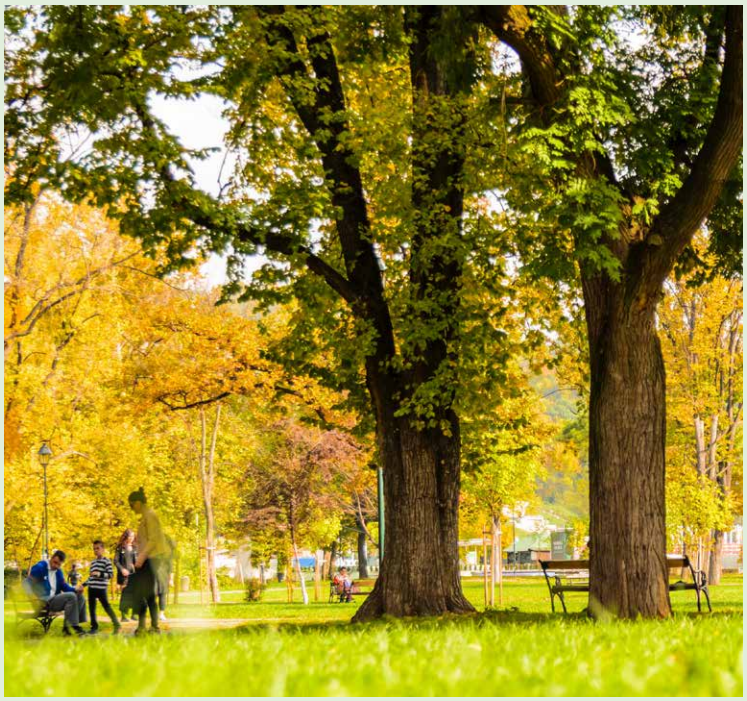
Bitecare®
– endoinfusione –

The revolution of endotherapy

newpharm



The revolution of endotherapy

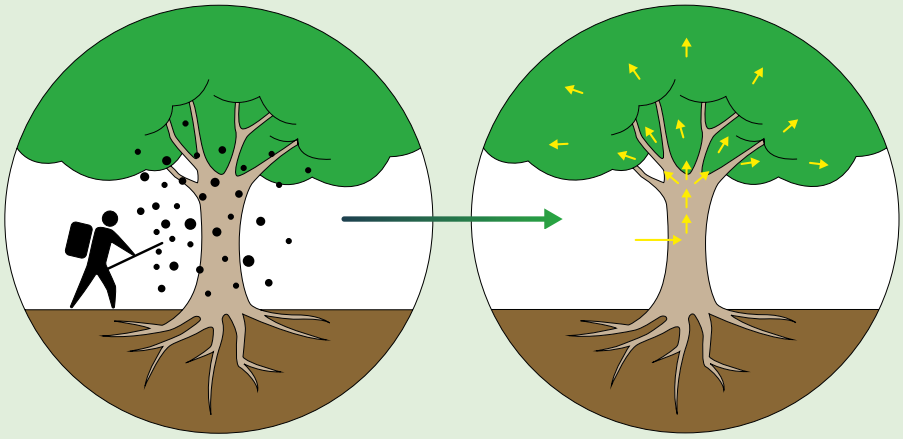
From traditional methods to endotherapy

Traditional plant protection treatments applied to the tree's crown only allow a small percentage of the solution containing the active ingredient to actually reach the "target" to perform its functions.
In addition to drastically reducing the amount of plant protection products used, the use of endotherapy saves the surrounding environment and "non-target" organisms from exposure to chemical molecules. Moreover, soil and groundwater are preserved from pollution caused by drift and run-off, and the benefits of treatment are longer lasting than traditional spraying.

Endotherapy eliminates the ingress of harmful agents which can invade the tissues of woody plants whether they are broadleaves or conifers. This practice also allows nutrients to be rapidly taken in and absorbed by tall trees.

ADVANTAGES OF ENDOTHERAPY

- **No spillage of products in the environment.**
- **Complete treatment of the vegetation regardless of plant size.**
- **Reduced number of treatments needed.**
- **High treatment persistence.**
- **Eco-sustainable method.**



SPRAYING TREES
95% active ingredient loss

ENDOTHERAPY
0% active ingredient loss

HOW IT WORKS

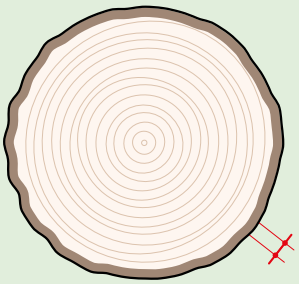
Endotherapy consists of introducing into the outermost conductive tissue of the tree, small quantities of liquids which eliminate harmful agents from the inside. This is made possible by the xylematic sap: by moving from the roots to the crown through channels called xylematic vessels, the xylematic sap carries water and minerals into every part of the crown. With the same principle, beneficial solutions can be introduced into the tree.

PRODUCTS THAT CAN BE USED

The products used in endotherapy are: insecticides, biostimulants 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 trunk and is usually equal to 1 mL of nutrient or therapeutic solution per each centimetre of the circumference.



1 mL × cm
of circumference
(Enerbite® dosage example)

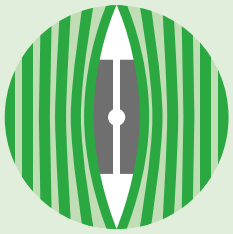
The revolution of endotherapy

The new frontier of endoinfusion begins with the Bitecare® method, a unique system that needs no power source, opens the plant tissues and infuses small quantities of product with beneficial solutions into the xylematic vessels, which are directly under the bark.

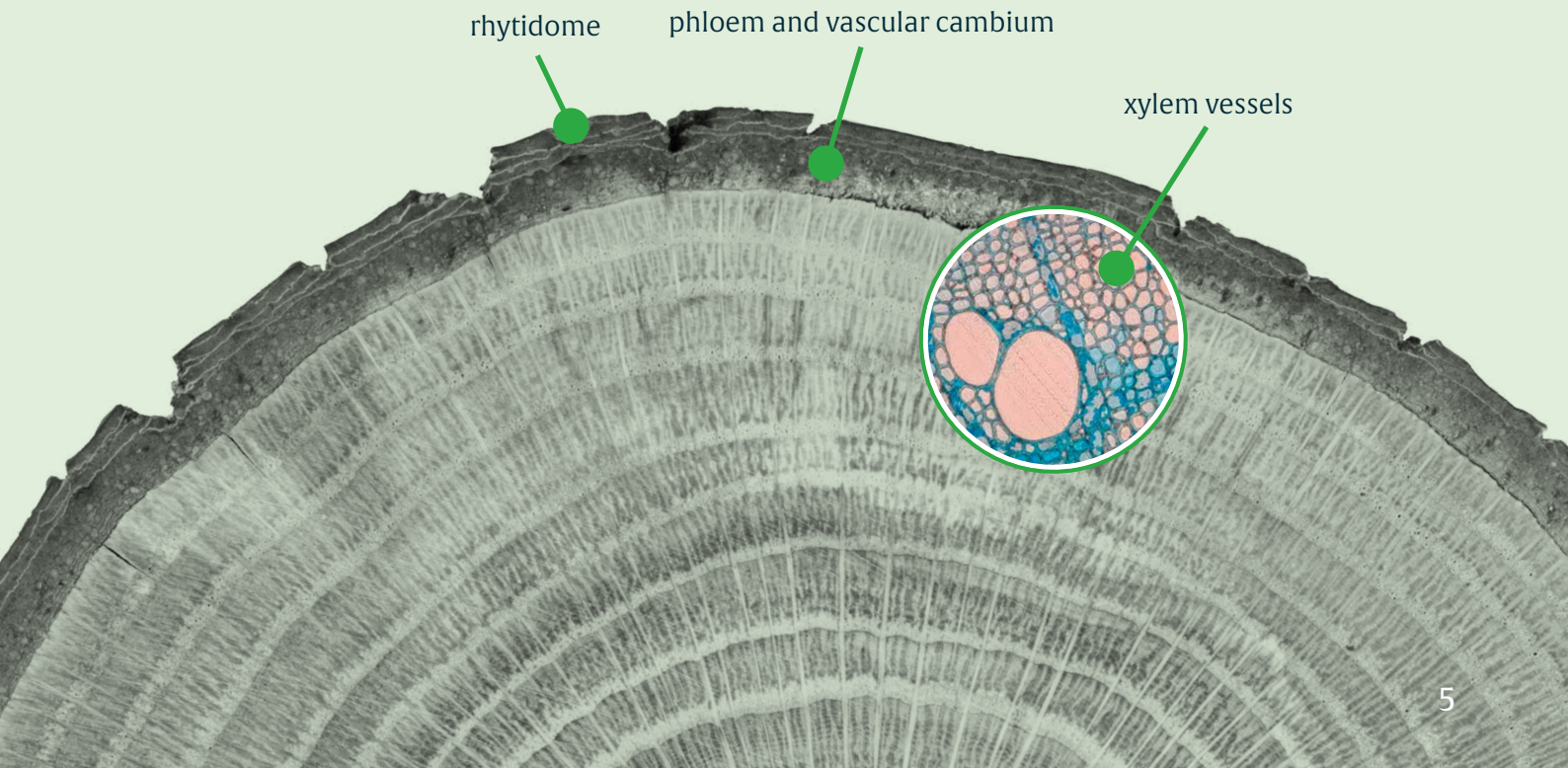
The innovative Bitecare® method **does not cause damage holes** in the trunk to inject the solution, whatever the species. A **needle with a lenticular section** opens the plant fibres while the beneficial solution enters the xylem under atmospheric pressure or low pressure, **avoiding stress or trauma.**
This system leaves no permanent trace on the plant since no holes are drilled. After the extraction of the needle, no specific treatment is required as there is no laceration of the tissues. Targeted application of with natural products (e.g. *Propolis*) will be sufficient.

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

The special lenticular section needle, manually inserted into the trunk, spontaneously opens the fibres exerting a minimal friction which does not cause overheating.



DELICATE TISSUE SPACING AVOIDING DAMAGE TO THE TREE
Once the xylematic vessels are reached, **beneficial solutions** can be introduced. The surrounding tissues heal naturally in a few weeks, with the help of *Propolis*.



From endotherapy to endoinfusion with Bitecare®

An innovative approach that avoids drilling holes and forcefully introducing a liquid

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

STEP 1
REACHING THE VESSELS

Old endotherapic methods

It is necessary to drill holes all around the entire circumference (drilling one hole every 20 cm).

- The drill causes damage, tearing vital tissue.
- Holes can often lead to infections and disease.
- Overheating caused by drilling causes damage to the tissue.

Bitecare®

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

- No tissue damage.
- Total prevention from infections.
- No overheating and therefore no permanent injury.

STEP 2
INTRODUCING THE LIQUID

Old endotherapic methods

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

- The air which enters the hole is pushed in causing embolisms.
- By applying the pressure, part of the liquid can come out of the hole.
- The tissues are often irreversibly damaged.

Bitecare®

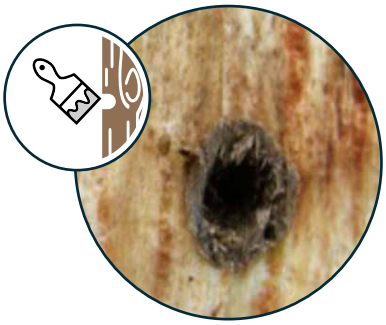
Spontaneous infusion by atmospheric pressure or low pressure.

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

STEP 3
CLOSING OF THE PORT

Old endotherapic methods

The port must be closed with dressing (often phytotoxic) or a plug.



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

Bitecare®

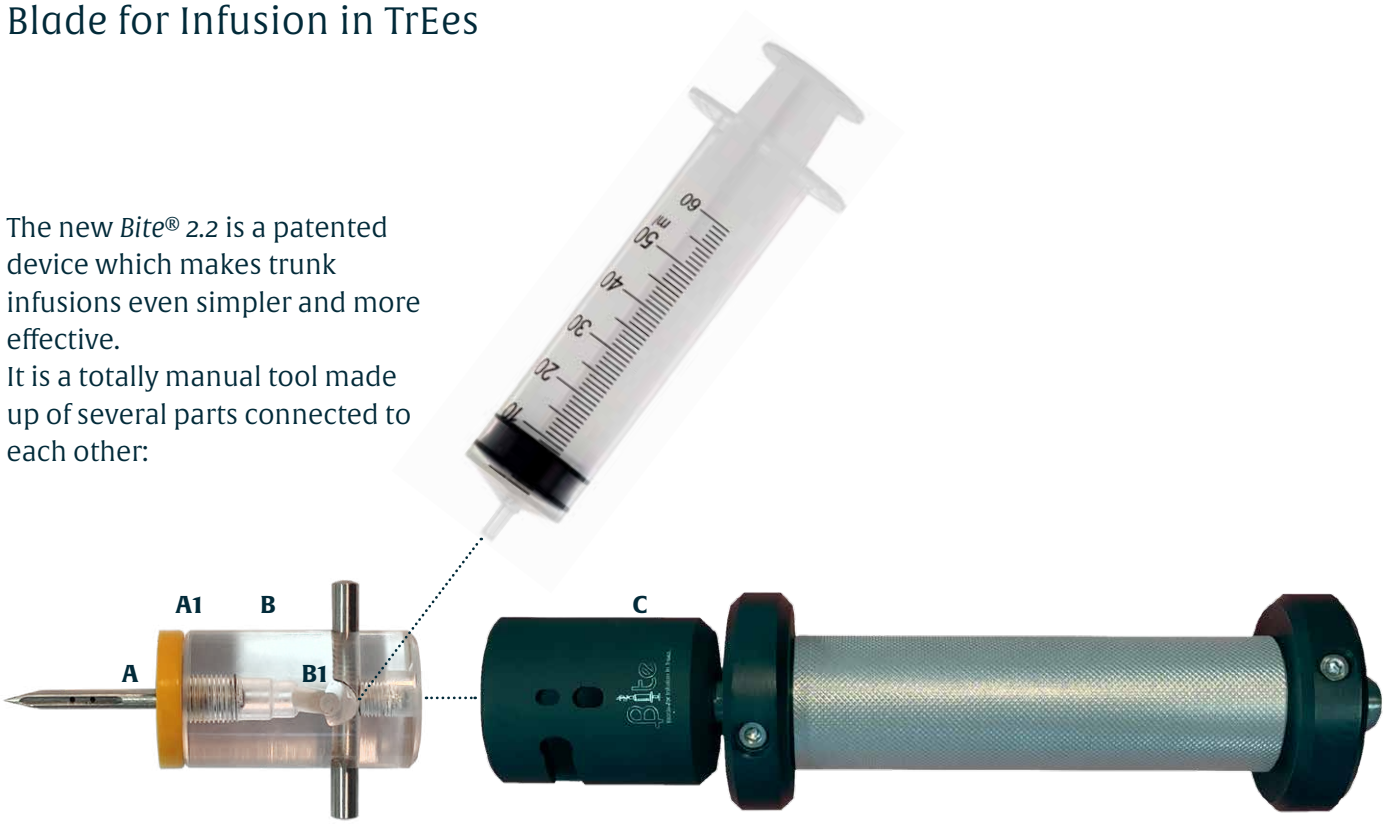
The port can be treated with natural products (e.g. Propolis).

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

The Bite® 2.2 device

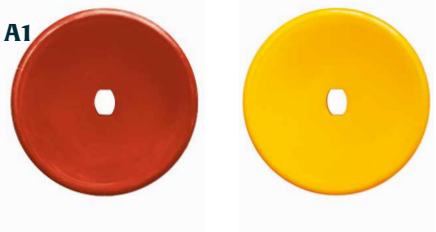
Blade for Infusion in TrEes

The new *Bite® 2.2* is a patented device which makes trunk infusions even simpler and more effective.
It is a totally manual tool made up of several parts connected to each other:



- Special interchangeable needles (**A**), hollow and perforated, for tissue spacing.
- Gaskets (**A1**) that allow the needle-holder to adhere perfectly to the bark and prevent sap or liquid's leakages.
- A polycarbonate needle-holder (**B**) with a seat for housing the pharmaceutical syringe (**B1**) containing the benefical solution.
- A sliding hammer (**C**) allows the axial insertion and extraction of the needle along the circumference of the trunk.

35 mm needle | 53 mm needle | 65 mm needle

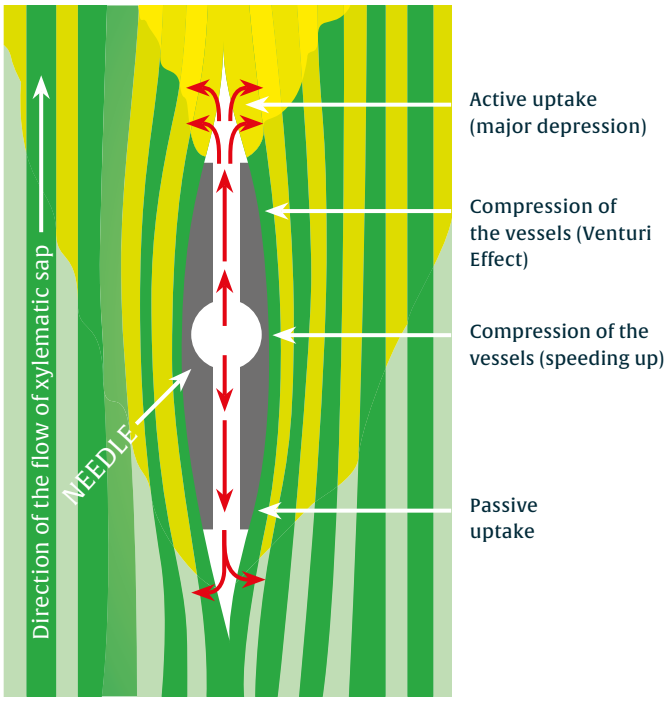


Soft gasket (hardwood) | SuperSoft gasket (softwood)

Watch the video

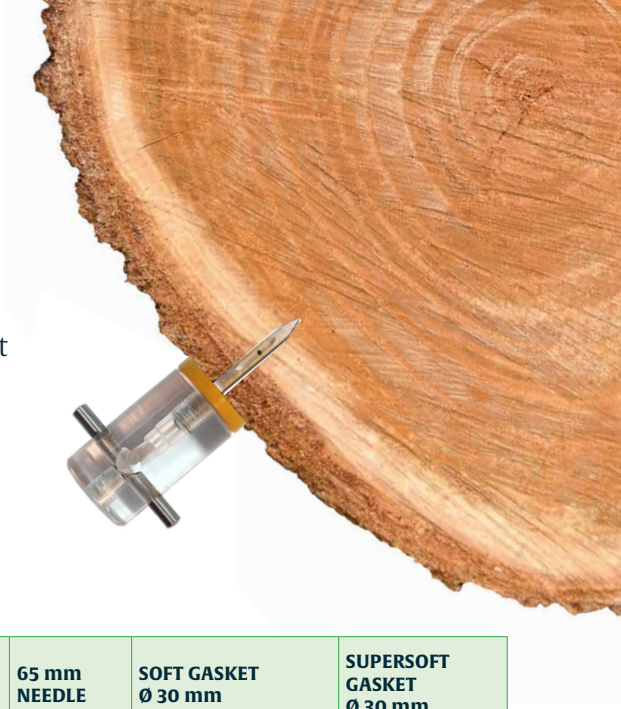
ENDOINFUSION WITH BITE® 2.2

The special needle is inserted between the vessels, increasing the speed of the sap flow towards the crown by "Venturi Effect".
Thanks to this phenomenon an external liquid, with **beneficial** properties, is absorbed in a spontaneous and natural way.
Unlike traditional injection, which requires external force in order to introduce a fluid, **endoinfusion is based on the intensity of the leaf transpiration as driving force for the movement.** The uptake 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 plane tree *(Platanus acerifolia)* can spontaneously absorb 10 ml of external liquids in less than a minute.



The choice of the needle

Depending on the tree species, a needle of suitable length must be selected. As a general rule, it is sufficient to penetrate the vascular tissues by about 2 cm (Needle 35 mm or 53 mm, depending on the thickness of the bark and the porosity of the wood), while on pines it is advisable to use a longer needle (Needle 65 mm) which allows to overtake the resin canals.



The choice of the kit

The system is proposed in two types of kits consisting of:

TYPE OF KIT	KIT CODE	NEW SLIDING HAMMER	NEW NEEDLE-HOLDER	35 mm NEEDLE	53 mm NEEDLE	65 mm NEEDLE	SOFT GASKET Ø 30 mm	SUPERSOFT GASKET Ø 30 mm
A	10880 00600	1 pc	1 pc	1 pc	1 pc	1 pc	1 pc	1 pc
B	10880 00605	1 pc	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs	5 pcs

Based on specific needs, it is possible to expand the kit with specific spare parts:

SPARE PARTS	CODE	NUMBER OF PIECES
35 mm needle	10880 00090	5 pcs
35 mm needle	10880 00653	1 pc
53 mm needle	10880 00091	5 pcs
53 mm needle	10880 00654	1 pc
65 mm needle	10880 00092	5 pcs
65 mm needle	10880 00655	1 pc
Needle-holder	10880 00651	5 pcs
Needle-holder	10880 00089	1 pc
Soft gasket	10880 00096	5 pcs
Supersoft gasket	10880 00098	5 pcs

Helpful hints

Bite® 2.2 mounts the brand-new polycarbonate needle-holder, which can be quickly inserted into the trunk even through a handy rubber hammer as well as with the striking mass of the sliding hammer. With the new *Bite® 2.2*, the self-tapping needle-holder allows to always keep the needle in an optimal position, even taking advantage of the useful screw holes in the sliding hammer.

Hole for screwing the 35 mm Needle

Hole for screwing the 53 and 65 mm Needles

For starters

To get familiar with the method, it is advisable to run some preliminary tests using only water in an un-pruned tree with smooth bark (e.g. plane tree, birch, etc.) and fully developed canopy. Perform treatments preferably between bud break and late summer, in sunny breezy days, according to general rules in tree endotherapy applied to the trees.

Methods of use

1. MEASURE OF THE CIRCUMFERENCE

4. SCREWING THE NEEDLE

7. INSERTING THE NEEDLE INTO THE WOOD

8. INSERTING THE SYRINGE AND EXTRACTING THE AIR

1. Using a measuring tape, measure the circumference of the trunk 100–150 cm from the base; usually a needle is inserted every 30 cm and 1 mL of beneficial solution per centimetre of circumference is introduced.
2. Carefully observe the plant and follow the root flares to identify ideal ports for the needles. Select the best sites for needle ports, preferring lightly convex, smooth locations. Avoid any part with anomalies able to interfere with sap flow, above or below the insertion site (e.g., knots, wood decay, pruning cuts). If necessary, superficially smooth the bark with a knife to allow the external gasket to make a perfect seal with the bark. In the case of very thick bark, it is possible to use a Forstner drill bit (4 cm ø), proceeding with caution in order not to risk damaging the functional tissues of the wood. If the site is too rough or too curved, move a few cm to one side.
3. It is advisable to previously spray a small amount of disinfectant (e.g., *Propolis*) at the point of injection.
4. Choose a needle with a length compatible with both bark thickness and tree diameter/circumference: in broadleaves, at least 2 cm must enter the functional woody tissues; in conifers and palms, due to the specific anatomy, longer needles are preferable. Screw the needle to the needle-holder using the holes in the sliding hammer.
5. Choose the right gasket: the yellow one is particularly suitable for the use of the 35 mm Needle or in the case of rough bark; the red one, with higher density, is characterized by even greater resistance over time. Place the gasket on the needle-holder by passing the needle through the centre hole, keeping the concave part facing outward.
6. Fill a disposable pharmaceutical syringe of suitable volume with the solution required for drug delivery, keeping the plunger in for at least 2–3 cm deep. As an alternative to the syringe, use any container for tree injections (e.g., drip bags, pre-filled capsules, etc.) fitting with the conical hole in the needle holder.
7. **Keeping the side with the word "IN"** upwards, insert the needle-holder into the sliding hammer. Hold the body firmly with a hand, directing the needle to the tree's centre. Keeping the position firmly, with the other hand strike the sliding hammer on the body until the external gasket is completely squeezed against the bark. The needle's edge must be directed parallel to the fibers. Carefully detach the hammer. **As an alternative to the sliding hammer, it is possible to use a common rubber hammer.**
8. Insert the syringe in the conical opening and gently draw out the plunger. **The resistance of the plunger indicates the perfect insertion of the needle.** Withdrawing the plunger will also remove any air present within the needle.
9. Wait for total uptake by the tree.
10. In the meantime it is possible to place a second needle-holder to perform the endoinfusion in another position on the same or different tree.

11. When the speed of the sap is too low and the endoinfusion is slow (e.g., less than 1 mL/minute, or in cloudy weather, or operating on conifers and palms), to switch from infusion to injection, simply insert the plunger back into the syringe and proceed by applying pressure with the fingertip.
12. Once the syringe is completely empty, remove it, then wait a few more seconds for the needle-holder to drain, then **reinsert the sliding hammer on the needle-holder holding up the side with the word "OUT", press lightly and make a clockwise rotation to lock it**, then extract the needle by striking the sliding hammer in the opposite direction with firm strokes.
13. It is recommended to disinfect the needle-holder, the gasket and the needle before carrying out new endoinfusions, especially if the plant is affected by transmittable diseases.
    To do this, remove any wood residues from the tools, then proceed with disinfection (e.g., with quaternary ammonium salts) and rinse them thoroughly with water.

12. EASY REMOVAL

IMPORTANT NOTICE: use only solutions specifically authorized for tree injection. The formulations, used individually, must be diluted in water or *Sapjet® HD*, according to the information provided by the producer. Always wear gloves and protective glasses, and any other safety device according to regulations in force.

WARNING! Avoid injections on trees with water stress: uptake may be slow and the solution phytotoxic. If not postponable, it is advisable to irrigate the root area a few days before. Avoid carrying out injections when it is too hot: normally non-phytotoxic solutions can become so.

FAQ

IF THE NEEDLE IS NO LONGER ON THE AXIS
After several applications it is possible that the needle housed in the needle-holder is rotated and not in the correct position. In this case, insert the needle into the holes in the sliding hammer and make a small rotation to further screw the self-tapping needle into the needle holder.

IF THE INFUSION IS QUICK (E.G., 10 mL/minute)
It is possible to increase the volume injected for each insertion (e.g., by refilling the syringe) and decrease the total number of insertions. Anyway, to ensure an optimal distribution of the liquid to the canopy, it is recommended to make an insertion at least every 40 cm of the circumference.

IF YOU NOTICE A LIQUID LEAK AT THE GASKET
Make sure that the gasket is tightly compressed on the bark and does not leave any gaps. To further increase the adhesion of the needle-holder, a few strikes with a rubber hammer may be helpful. Check that the surface of the bark at the point of insertion is sufficiently smooth, and, if necessary, smooth the surface of the bark with a cutter so that the outer seal can adhere perfectly to the bark. In some cases, it may be effective to apply a small amount of linseed oil glazing putty to the base of the needle.

IF THERE IS SLOW OR NO UPTAKE
Check that there are no blockages inside the needle-holder and the needle.
You can try to speed up the process by applying thumb pressure to the plunger, switching from infusion to injection. Alternatively, postpone the treatment until suitable physiological and climatic conditions will be more favorable.

IF THE PROTECTION OF THE WOUND IS COMPULSORY
Use inert wax or paraffin for closure. Note: pruning or grafting gums containing pesticides can be phytotoxic for the vascular cambium, slowing down the wound closure.

Recommendations for optimal endoinfusion with Bite® 2.2

The appropriate period for endoinfusions

BROADLEAVES
The ideal period is between the restart of the vegetative phase (March/April) and the beginning of summer.

CONIFERS
We recommend performing the operations with *Bite® 2.2* in autumn; for what concerns pines, it is best to perform the interventions when the resin is less fluid that is in winter or opting for the use of the *Rite 2.2* device.

The best points 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 (Fig. 1).

The best time of the day to perform endoinfusion

Prefer the 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 uptake is slower. Conifers have a limited intrinsic speed of the sap, so infusions will take longer (Fig. 2).
In this case it is advisable to exert a slight pressure on the plunger of the syringe. For the treatment of resinous species, we recommend the use of *Rite 2.2*.

Comparison between the uptake time required by traditional endotherapic pressure methods and 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. 3).

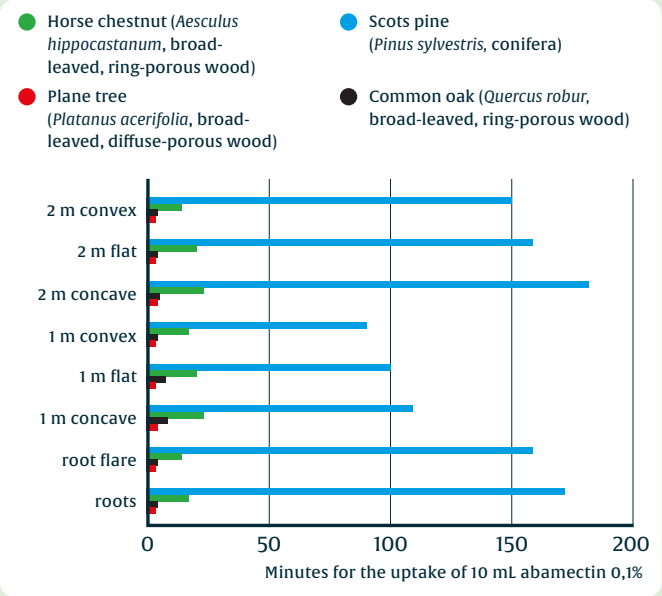


Fig. 1: *Experimental data on uptake times according to port location and wood porosity. Comparative tests conducted by the University of Padova.*

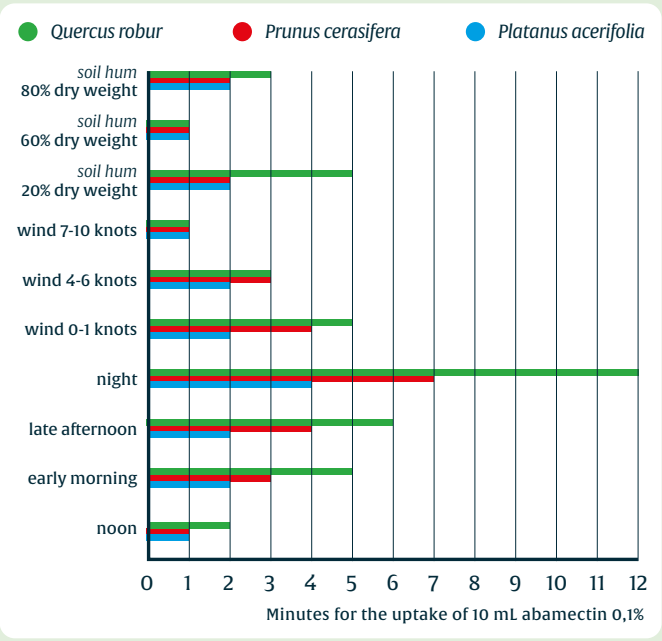


Fig. 2: *Experimental data on the influence of environmental variables on the uptake rate. Comparative test conducted by the University of Padova.*

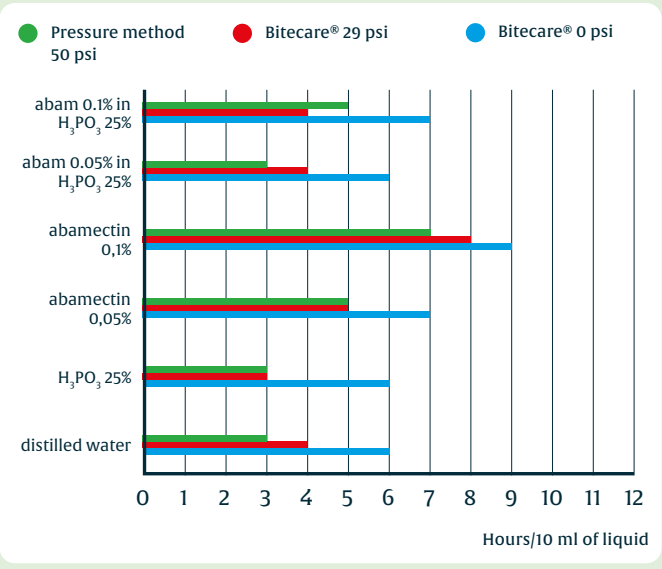
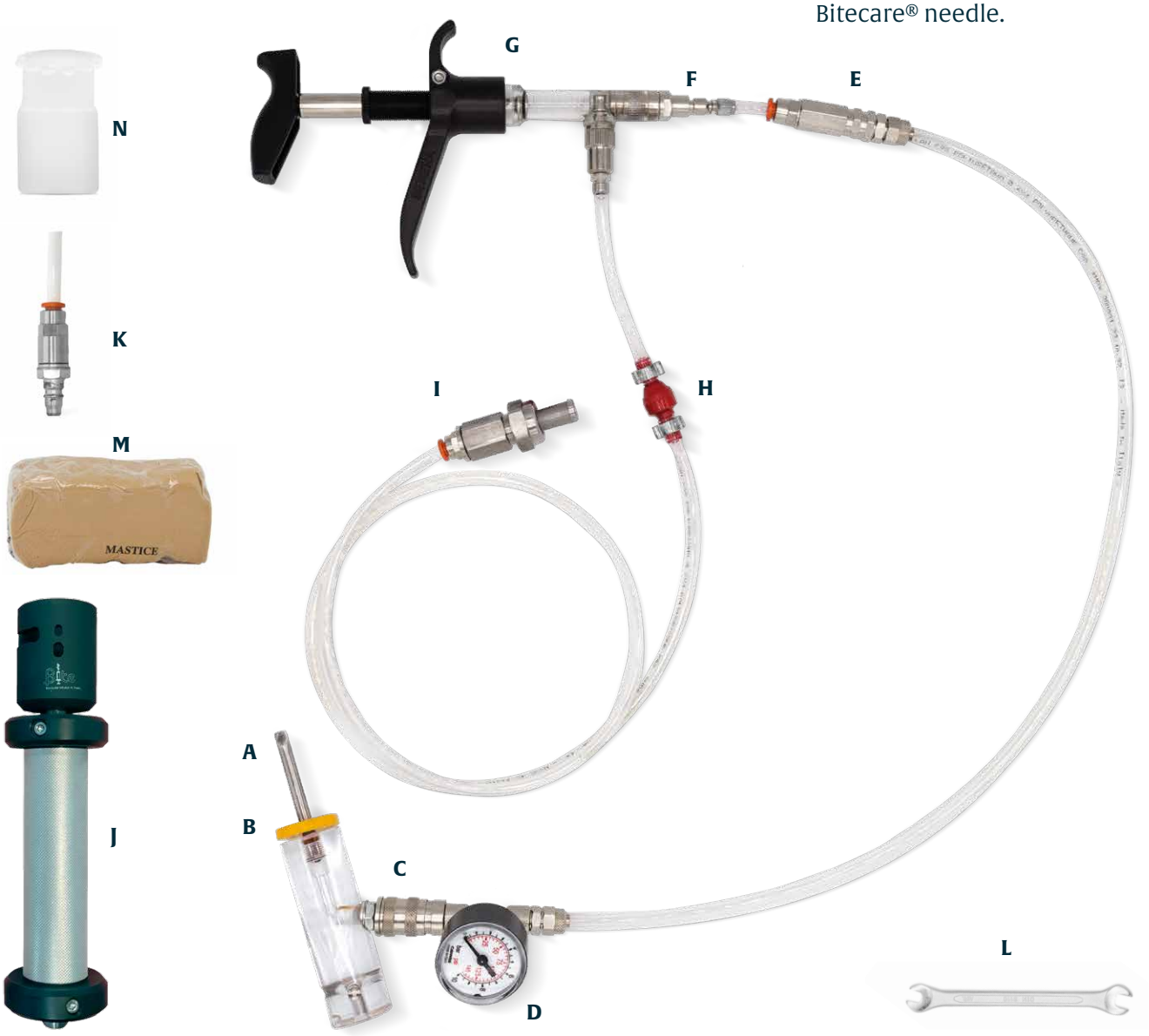


Fig. 3: *Experimental data concerning uptake time to leaves of different formulations. Comparative test conducted by the University of Padova.*

The Rite 2.2 device

Resinous Injection Tool Evolution

Rite 2.2 is the new Bitecare® professional device for carrying out endoinfusion on resinous species. With the new *Rite 2.2* device it is possible to inject a beneficial solution in resinous species by exerting a slight but significant pressure from the outside, without giving up the advantages of the Bitecare® needle.



It is a tool made up of several interconnected parts:

A. Special 65 mm needle
B. Supersoft gasket
C. A polycarbonate needle-holder with an automatic quick coupling equipped with non-return valve
D. Pressure gauge 0–10 bar
E. Non-return valve
F. Luer-Lock adapter
G. Self-refilling 2 mL syringe and two-way valve system
H. Non-return valve
I. Foot valve with filter
J. Sliding hammer
K. Valve release connector
L. 6–7 mm wrench
M. Linseed oil glazing putty
N. Lubricant

Watch the video of the previous version

In trunk injection the resin represents a significant obstacle as it risks dirtying the instrumentation causing a general slowdown in the uptake of the product.
Rite 2.2 represents the solution to the problem of the resin thanks to the combination of the advantages of Bitecare® method with a specific instrumentation that allows, by exerting a slight but significant pressure from the outside, the entry of the solution into the xylem.

The ideal pressure for injection purposes should ensure maximum movement of the liquid inside the tree without physically damaging it. Pressures that are too high (over 5 bar) could actually increase the risk of leaks and, above all, of damage to the vascular cambium as well as of generation of bark lesions (detachment and splitting of the bark).

The wood of resinous species (es. *Pinus pinea, Pinus pinaster, Pinus nigra,* etc.) is characterized by the presence of particular channels within which a viscous liquid with an amber colour flows: the resin.
When a tree is injured, the resin flows out of the resin canals invading the injured area. It is toxic to many parasites and can act as a protection against herbivores.

Despite *Rite 2.2* has been developed for treatments of resinous trees, in particular pines, the device is also well suited for stem injections on palms. Furthermore, by using a needle of the appropriate length and decreasing the operating pressure (max 1,5–2 bar), it will be possible to carry out controlled pressure treatments with *Rite 2.2* on both cedars and broadleaves, shortening the treatment times in comparison with endoinfusions. To facilitate the uptake of the product by the tree, it is recommended to use it combined with *Sapjet® HD* while, at the end of the operations, it is essential to clean the instrument with *CleanTech*.

Rite 2.2 allows to continuously monitor the pressure exerted thanks to the built-in pressure gauge, in order to make the injection ensuring the maximum movement of the liquid inside the tree without affecting the physiology of the plant.

Useful hints

Rite 2.2 allows to widen the time window useful for carrying out endotherapic operations on the pines. In any case, it is suggested to avoid operating when temperatures are high. In fact, in the summer period the resin pressure in the resin channels is very high and it would be necessary to carry out a considerable (and excessive) pressure to carry out the treatment. On the contrary, when operating on the pines in the autumn and winter period, maximum pressures of 3–4 bar are sufficient to obtain the uptake of the product.
The basic kit *Rite 2.2* comes with the 65 mm needle, specific for resinous plants (in particular pines), but also suitable for injections on palm trees. In the case of application on cedars or broadleaves with diffuse porosity, it is recommended to replace it with a more suitable needle of intermediate length (53 mm needle).

Methods of use

1. When using the product, wear any protective device provided.
2. Use the supplied valve release connector to unlock the valve in the quick coupling, then let the liquid flow inside the whole device to expel the air from the *Rite 2.2* Disconnect the connector.
3. If necessary, superficially smooth the bark with a knife to allow the external gasket to make a perfect seal with the bark. In the case of very thick bark, it is possible to use a Forstner drill bit (4 cm ø), proceeding with caution in order not to risk damaging the functional tissues of the wood.
4. Disinfect the injection site with *Propolis* to prevent the possible entry of potential pathogens.
5. Fit the needle-holder in the sliding hammer, **keeping the side with the word "IN" upwards**, then insert the needle perpendicularly into the trunk. Detach the needle-holder from the sliding hammer. **As an alternative to the sliding hammer, it is possible to use a common rubber hammer. ATTENTION: make sure that the gasket is compressed as much as possible in order to avoid leakage or loss of product.**
6. It is advisable to remove the air present in the needle-holder by inserting a syringe preloaded with the solution into the cannula in the male connector of the quick coupling and partially extracting the plunger.
7. Remove the syringe and connect the quick coupling to the needle-holder.
   ATTENTION: make the connection as soon as possible in order to avoid the leakage of resin that would dirty the instrumentation.
8. Start the injection of the beneficial solution*. The amount of liquid to be injected varies according to the circumference of the tree and the concentration of the solution.
9. At the end of the treatment, when the pressure has dropped to about 0,5 bar, disconnect the quick coupling from the needle-holder then reinsert the sliding hammer on the needle-holder **holding up the side with the word "OUT"**, press lightly and make a clockwise rotation to lock it, then extract the needle by striking the sliding hammer in the opposite direction with firm strokes.
10. Apply further *Propolis* on the injection site.
11. It is recommended to disinfect the needle before carrying out new endoinfusions, especially if the plant is affected by transmittable diseases, then rinse it thoroughly with water.
12. At the end of the intervention, immediately use *CleanTech* to clean the *Rite 2.2* device, taking care to let it flow into the system to avoid any annoying resin residues remaining inside. After at least 30 minutes, rinse with water.

2. AIR EXPULSION

5. INSERTING THE NEEDLE INTO THE WOOD

6. AIR REMOVAL

8. CONTROLLED PRESSURE INJECTION

The kit is proposed ready for use in a handy tool case:

KIT CODE
10880 00770

Spare parts for components are available as well the needles of shorter length (53 mm needle) for the application on cedars and broadleaves.

SPARE PARTS	CODE	NUMBER OF PIECES
53 mm needle	10880 00654	1 pc
65 mm needle	10880 00655	1 pc
Soft Gasket	10880 00096	5 pcs
Supersoft Gasket	10880 00098	5 pcs

It is also possible to use the *Rite 2.2* sliding hammer for endoinfusions in natural absorption thanks to *Bite 2.2* spare parts:

SPARE PARTS	CODE	NUMBER OF PIECES
35 mm needle	10880 00090	5 pcs
35 mm needle	10880 00653	1 pc
53 mm needle	10880 00091	5 pcs
53 mm needle	10880 00654	1 pc
65 mm needle	10880 00092	5 pcs
65 mm needle	10880 00655	1 pc
Needle-holder	10880 00651	5 pcs
Needle-holder	10880 00089	1 pc
Soft gasket	10880 00096	5 pcs
Supersoft gasket	10880 00098	5 pcs

FAQ

ARE THERE ANY SPARE PARTS FOR RITE 2.2?
Needles and needle-holders are available as spare parts. As for the syringe, it is possible to replace the valve group, by requesting the dedicated replacement kits.

I HAVE NOTICED A LEAK OF LIQUID AT THE GASKET LEVEL ON THE BARK, WHAT CAN I DO?
Make sure that the gasket is well compressed on the bark and does not leave breaches.
To further increase the contact of the needle-holder with the bark, a few blows with a strictly rubber hammer may be useful.
In some cases, it may be effective to apply a small amount of linseed oil glazing putty to the base of the needle.

ARE THERE ANY MAINTENANCE TO BE CARRIED OUT?
The use of *CleanTech* allows you to keep the device clean and functioning. It is advisable to periodically check the correct flow of the liquid in the instrument.
For a deep cleaning, you can unscrew the needle using the holes in the sliding hammer, replace the PTFE tape (supplied) and screw the needle back into the needle holder.
If some friction of the syringe plunger is felt, proceed as follows: unscrew and remove the knurled washer on the side of the syringe, unscrew the black handle from the transparent barrel, dip the plunger slightly into the supplied bottle with the lubricant and reassemble the syringe.

IS IT POSSIBLE TO CHANGE THE DOSE AUTOMATICALLY REFILLED BY THE SYRINGE?
By acting on the piston bar, it is possible to adjust the volume of liquid processed by the syringe.

HOW CAN I STORE THE DEVICE?
In case of prolonged inactivity, it is recommended to carry out the usual cleaning operations with CleanTech, then use water to remove the last residues and allow to dry as much as possible.

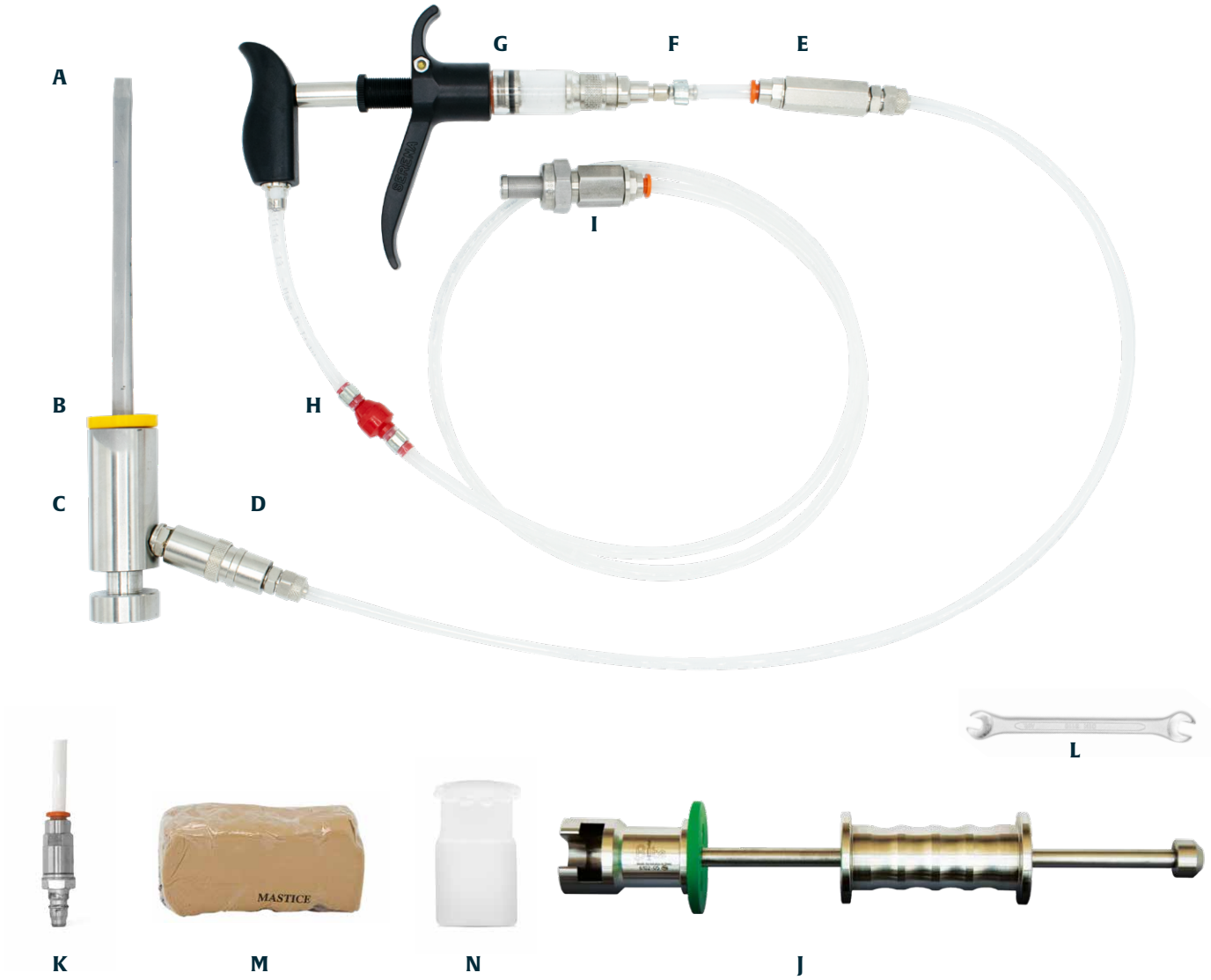
WHAT CAN I DO IF THE NEEDLE IS NO LONGER IN AXIS?
After several applications it is possible that the needle housed in the needle-holder is rotated and not in the correct position. In this case, insert the needle into the holes in the sliding hammer and make a small rotation to further screw the self-tapping needle into the needle holder.

**On pines it is advisable not to exceed the maximum pressure of 4 bar; on cedars and broadleaves the threshold is 1,5–2 bar.*

The Pite device

Protection of palms from the inside

Pite is the innovative Bitecare® device developed specifically for endoinfusions on palms, thanks to the special 18 cm long needle (including thread).



It is a manual tool composed of multiple interconnected parts:

A. Special 180 mm needle
B. PITE-Supersoft gasket
C. Stainless steel needle-holder with quick male coupling
D. Female quick coupling joint with non-return valve
E. Non-return valve
F. Luer-Lock adapter
G. Self-refilling 5 mL syringe with unidirectional flow
H. Non-return valve
I. Foot valve with filter
J. Sliding hammer
K. Valve release connector
L. 6–7 mm wrench
M. Linseed oil glazing putty
N. Lubricant

Palms are an icon for many cities in the Mediterranean and beyond. However, their presence has long been threatened by the spread of the red palm weevil (*Rhynchophorus ferrugineus*) and of the palm borer moth (*Paysandisia archon*).

Progression of the attack by the red weevil on *Phoenix canariensis*.

Palms have a characteristic vascular system: unlike broad-leaved and coniferous trees, where conducting elements are arranged under the bark in the periphery of the trunk, in palms, vascular bundles are dispersed throughout the section of the stem. Palms do not have a secondary growth, which is why they do not have the ability to close wounds. *Pite* minimizes the impact of treatment on palms, as the **special needle** is inserted into the stem **without tissue removal**. Thanks to the small gap created above and below the needle with the insertion among the fibers, it is possible to bring the nutrient or therapeutic liquid to the heart of the palm. Once the endoinfusion is complete, the needle is removed from the stem and the tissues tend to close spontaneously thanks to their elasticity.

In the conducting elements of palms, the sap flow very slowly. However, thanks to the *Pite* device, it is possible to overcome this problem by applying **slight manual pressure** using the syringe. Field tests have shown that the resistance in the uptake is extremely low, with pressure exerted never exceeding 2 bar.

Useful hints

Pite has been developed for use on palms with a diameter greater than 25–30 cm. For smaller palms and for application on Chinese Windmill palm (*Trachycarpus fortunei*) or Mexican Fan palm (*Washingtonia robusta*), it is recommended to use *Rite 2.2* or *Bite® 2.2* with 65 mm needle.

Methods of use

1. During the use of the product, wear any protective device provided.
2. Connect the syringe to the Luer-Lock adapter and, using the 6–7 mm wrench, tighten without forcing.
3. Use the supplied connector to unlock the valve in the quick coupling joint, then expel the air from the *Pite* by flowing the liquid into the device.
4. If necessary, in case of prominent dead leaf residues, perform a local cleaning (using a cutter, chisel, or sickle) to obtain a smooth surface sufficient to accommodate the gasket.
5. Disinfect the injection site using *Propolis* to prevent possible infections by pathogens.
6. It is advisable to place a small amount of linseed oil putty at the base of the needle.
7. Place the needle holder in the sliding hammer, then insert the needle perpendicularly into the stem: hold the equipment body with one hand, the sliding hammer with the other hand, and use the sliding hammer to axially insert the needle into the stem. Remove the needle holder from the sliding hammer.
   CAUTION: after insertion, the gasket must be squeezed to avoid dripping or product leakage.
8. It is advisable to remove the air present in the needle holder by inserting a hypodermic syringe preloaded with the solution into the male connector of the quick coupling joint and partially extracting the plunger.
9. Remove the hypodermic syringe and connect the quick coupling joint.
10. Start injecting the nutrient or therapeutic solution.
11. At the end of the treatment, disconnect the quick coupling joint. Then reinsert the sliding hammer and extract the needle from the wood with firm strokes.
12. Apply additional natural *Propolis* to the injection site.
13. It is recommended to disinfect the needle before performing new endoinfusions, especially if the palm is affected by transmissible diseases; rinse with water after disinfection.
14. At the end of the procedure, use *CleanTech* to clean the device, ensuring it flows into the system to prevent any residual plant protection product from remaining inside. After at least 30 minutes, rinse with water.

4. STEM PREPARATION

6. PLACEMENT OF THE LINSEED OIL GLAZING PUTTY AT THE BASE OF THE NEEDLE

7. INSERTION OF THE NEEDLE INTO THE PALM

8. INJECTION OF THE NUTRIENT OR THERAPEUTIC SOLUTION

The kit is provided in a tool case:

KIT CODE
10880 00888

Gasket replacement is available:

SPARE PARTS	CODE	NUMBER OF PIECES
PITE-Supersoft gaskets	10880 00889	5 pcs

FAQ

IF LIQUID LEAKAGE IS OBSERVED AT THE SEAL LEVEL
Ensure that the gasket is well compressed, parallel to the stem, and leaves no gaps. To further increase the contact of the needle-holder with the bark, a few blows with the sliding hammer may be useful. Preparation (cleaning) of the stem is a fundamental phase, especially in the case of palms with prominent residues of leaf sheaths.

I FEEL A FRICTION OF THE PLUNGER, WHAT SHOULD I DO?
After a certain number of uses, friction of the syringe piston may be perceived. Proceed as described below: unscrew and remove the knurled washer on the side of the syringe, unscrew the black handle from the transparent barrel, place the supplied lubricating grease between the black and red grommets of the piston, and finally reassemble the syringe.

CAN I MODIFY THE VOLUME AUTOMATICALLY RECHARGED BY THE SYRINGE?
It is possible to adjust the volume of liquid dispensed by the syringe by adjusting the piston bar.

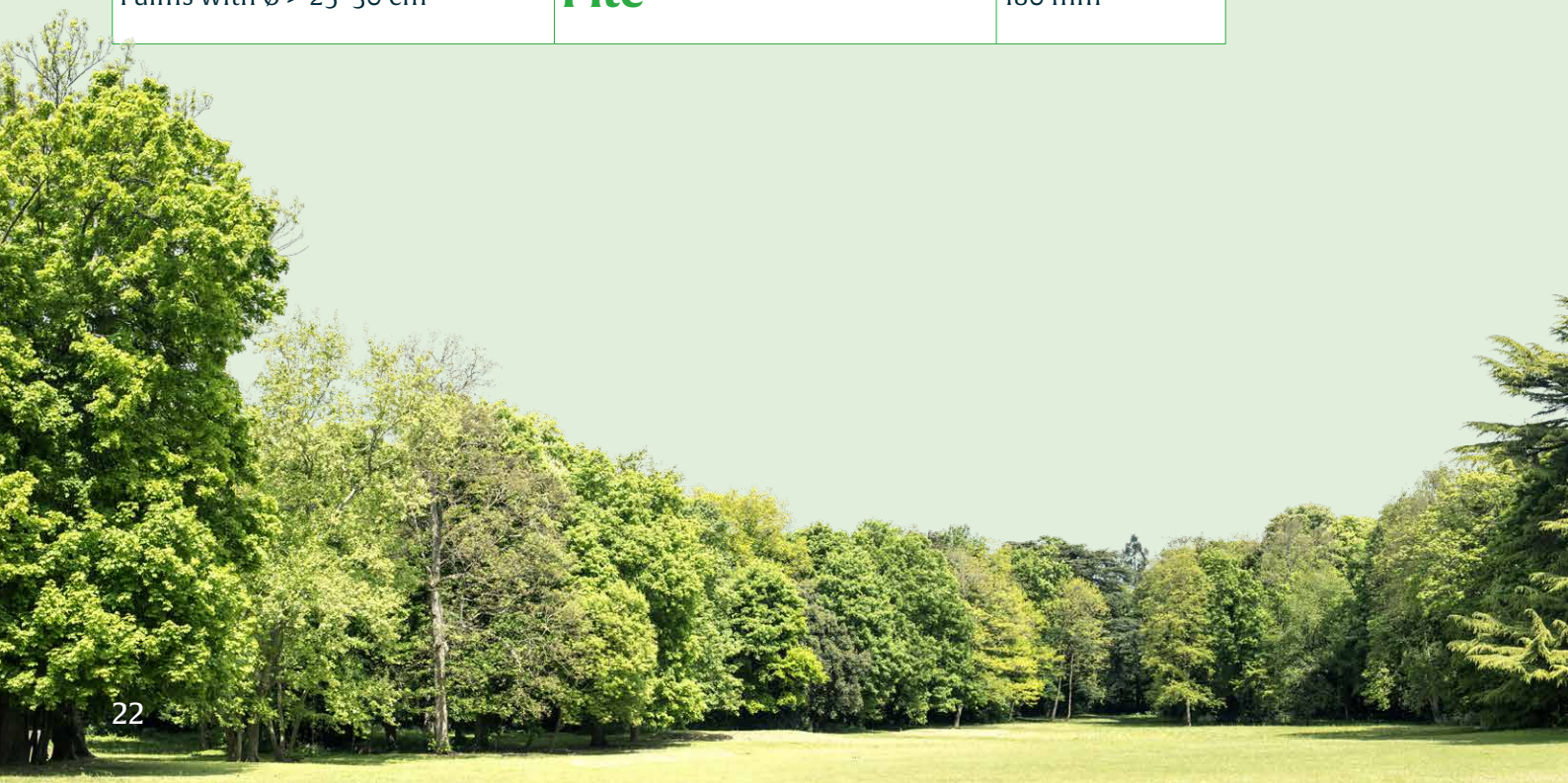
HOW CAN I STORE THE DEVICE?
In case of prolonged inactivity, it is recommended to use *CleanTech* for internal cleaning of the device and then flushing with water. Finally, disconnect the quick coupling joints and allow to dry as much as possible.

WHAT CAN I DO IF THE INSERTION/ EXTRACTION OF THE NEEDLE HOLDER FROM THE PERCUSSION IS TOO SOFT OR TOO HARD?
On the sliding hammer, proceed by unscrewing the threaded bar from the needle holder housing. Use an Allen key (5 mm) to unscrew and extract the threaded insert in the threaded bar housing. Using a flat-head screwdriver, rotate the second threaded insert remaining in the housing so as to adapt the insertion and extraction of the needle holder to your needs.

Choosing the Bitecare® device

Different plant species have different operational needs in endoinfusion, deriving from their specific morphology and physiology. It is indeed necessary to reach the xylem vessels where the sap flows, which in broad-leaved and confers are located 1–5 cm beneath the bark, while in palms they are distributed throughout the section.
Depending on the application, it is possible to choose the most suitable Bitecare® device (see table below): with *Bite*® 2.2, it is possible to exploit the spontaneous uptake of the product, while with *Rite 2.2* and *Pite*, slight external pressure is exerted.

PLANT SPECIES	DEVICE	NEEDLE
Trees with ø < 10–15 cm	**Bite® 2.2**	35 mm
Broad-leaved trees with thin bark and sapwood (e.g. turkey oak, eucalyptus, holm oak, olive tree, black locust)	**Bite® 2.2**	35 mm
Other broad-leaved trees	**Bite® 2.2** **Rite 2.2**	53 mm
Pines and cedar of Lebanon	**Rite 2.2**	65 mm
Other cedar species	**Rite 2.2** **Bite® 2.2**	53–65 mm
Chinese windmill palm or, in general, palms with ø < 25–30 cm	**Rite 2.2** **Bite® 2.2**	65 mm
Palms with ø > 25–30 cm	**Pite**	180 mm

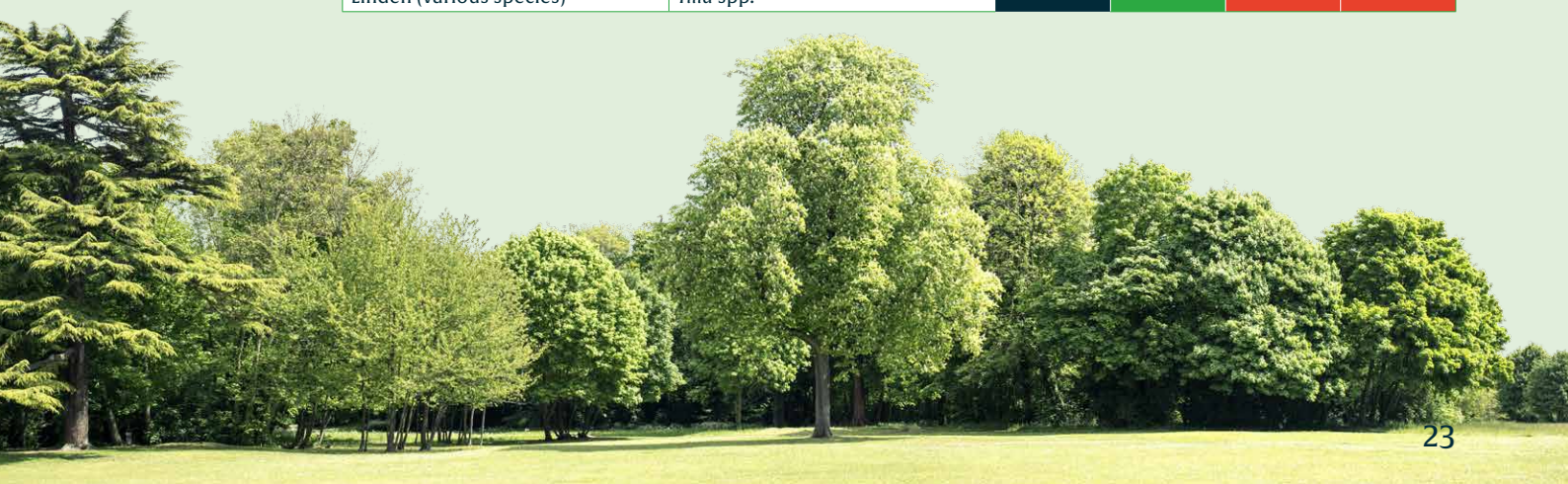


The following table allows you to go into even more detail on the choice of the Bitecare® needle of the appropriate length (35, 53, 65 or 180 mm) depending on the plant species:

LEGEND

- Correct use
- Extreme use
- Improper use

PLANT SPECIES (COMMON NAME)	BINOMIAL NOMENCLATURE	35 mm NEEDLE	53 mm NEEDLE	65 mm NEEDLE	180 mm NEEDLE
Trees with a diameter less than 10–15 cm (all species)					
European silver fir	*Abies alba* Mill.				
Norway spruce	*Picea abies* Karst.				
Maple (various species)	*Acer* spp.				
Bay tree	*Laurus nobilis L.*				
European nettle tree	*Celtis australis L.*				
Birch (various species)	*Betula* spp.				
Common hornbeam	*Carpinus betulus* L.				
Sweet chestnut	*Castanea sativa* Miller				
Atlas cedar	*Cedrus atlantica* (Endl.) Manetti ex Carrière				
Himalayan cedar	*Cedrus deodara* (Roxb. ex Don) Don				
Cedar of Lebanon	*Cedrus libani* Rich.				
Turkey oak	*Quercus cerris* L.				
Mediterranean cypress	*Cupressus sempervirens* L.				
Eucalyptus (various species)	*Eucalyptus* spp.				
Beech (various species)	*Fagus* spp.				
Manna ash	*Fraxinus ornus* L.				
European ash	*Fraxinus excelsior* L.				
Mulberry (various species)	*Morus* spp.				
Green olive tree	*Phillyrea latifolia* L.				
Horse chestnut	*Aesculus hippocastanum* L.				
Evergreen oak	*Quercus ilex* L.				
Tulip tree (various species)	*Liriodendron* spp.				
American sweetgum	*Liquidambar styraciflua* L.				
Southern magnolia	*Magnolia grandiflora* L.				
Walnut (various species)	*Juglans* spp.				
Olive (ornamental)	*Olea europaea* L.				
Elms (various species)	*Ulmus* spp.				
Canary Island date palm, with ø > 30 cm	*Phoenix canariensis* Chabaud				
Date palm, with ø > 30 cm	*Phoenix dactylifera* L.				
Palma di Fortune	*Trachycarpus fortunei* H.Wendl.				
Palma messicana	*Washingtonia robusta* H.Wendl.				
European fan palm	*Chamaerops humilis* L.				
Aleppo pine	*Pinus halepensis* Miller				
Stone pine	*Pinus pinea* L.				
Maritime pine	*Pinus pinaster* Aiton				
Austrian pine	*Pinus nigra* Arnold				
Scots pine	*Pinus sylvestris* L.				
Poplar (various species)	*Populus* spp.				
Plane tree (various species)	*Platanus* spp.				
Oaks (various species, excluding those already on the list)	*Quercus* spp.				
Black locust	*Robinia pseudoacacia* L.				
Sessile oak	*Quercus petraea (Matt.)* Liebl.				
Downy oak	*Quercus pubescens* Willd.				
Willows (various species)	*Salix* spp.				
Elder (various species)	*Sambucus* spp.				
Linden (various species)	*Tilia* spp.				



Everything you need to take care of the trees

Sapjet® HD

Patented carrier for therapeutic solutions

Propolis

Fortifying Biological enhancer of the natural defences of plants

Processorex New

Trap for catching larvae pine processionary moth

Enerbite®

Quick assimilation nutrient solution

Micromegas®

Concentrated insecticide acaricide

Zamir® 18

Concentrated insecticide acaricide

Vargas®

Concentrated insecticide acaricide

CleanTech

Degreasing and disaggregating solvent

Sapjet® HD

THE PATENTED CARRIER THAT SPEAKS THE SAME LANGUAGE OF THE SAP

- **Improve and speed up the uptake of products by plants.**
- **Sapjet® HD transforms water into a solution very similar to sap.**

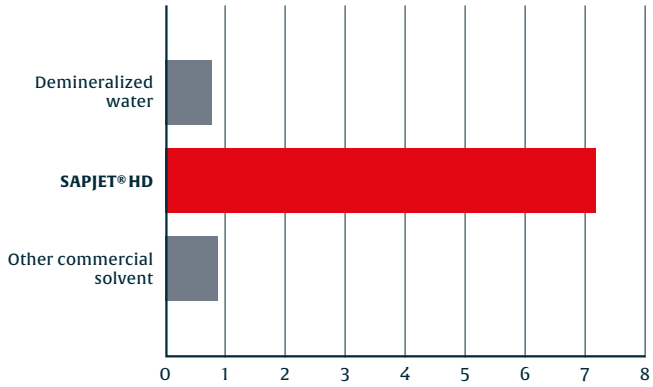
The sap of the plants is an aqueous solution that carries minerals within the plant. Common water, although compatible with the practice of endotherapy, does not possess the same characteristics and peculiarities of the sap. The perfect balance with the plant's physiology is achieved with *Sapjet® HD*, the special patented carrier for the preparation of beneficial solutions.
Sapjet® HD is a carrier which is fully compatible with the sap, which facilitates the uptake of external fluids greatly increasing the uptake rate. It comes in a new formulation. It has been freeze-dried to be more practical in the phase of preparation of the solution.

DOSAGE
One sachet of *Sapjet® HD* per litre of solution to be infused into the tree.

Quick and spontaneous infusion of active ingredients

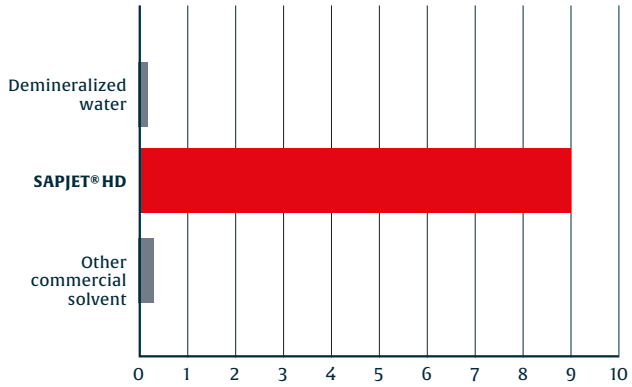
The graphs clearly demonstrate that *Sapjet® HD* increases the uptake rate of external liquids.

Maple tree



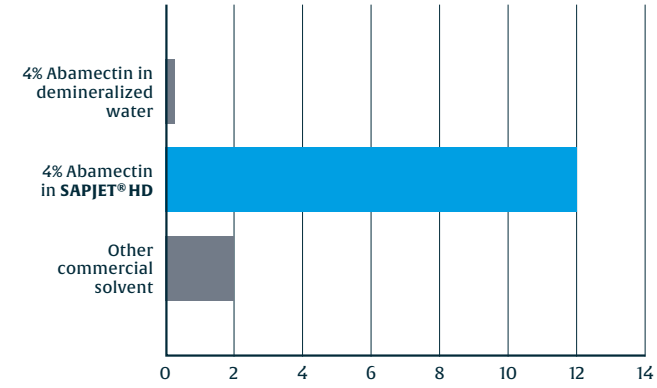
mL of solution absorbed spontaneously in the time span of 10 minutes

Himalayan cedar



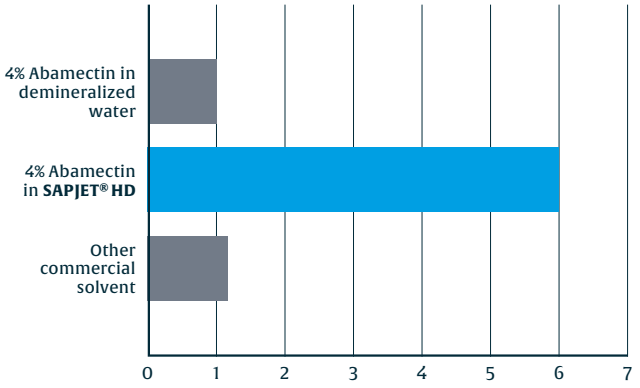
mL of solution absorbed spontaneously in the time span of 10 minutes

Atlas cedar



mL of solution absorbed spontaneously in the time span of 10 minutes

Cedar of Lebanon



mL of solution absorbed spontaneously in the time span of 10 minutes

	CODE	Quantity
	10700 00016	10 sachets × 5,83 g

Propolis

FORTIFYING BIOLOGICAL ENHANCER OF THE NATURAL DEFENCES OF PLANTS

An extract of propolis in aqueous solution containing multiple beneficial substances processed by bees. Applied to the area where the needle will be inserted, it disinfects the surface.
After the endoinfusion treatment, treat the area again to prevent the development and entry of microorganisms.

One of the causes of the spread of diseases among tree species is linked to the use of tools for pruning or for endotherapy. The colonization of plant tissues by microorganisms (in particular fungi) can be favoured 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 molecules with preventive action to the areas where the needles are inserted. Many of these preventive molecules can be natural and the propolis extract contains many of them. 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 contributes to form 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 favours the closure of the port, ensuring a long-lasting protection from fungi and bacteria, which are actively contrasted by the flavonoids.

Finally, among the countless beneficial properties, propolis extract stimulates rooting, flowering, promotes fruit set, improves production during growth and gives colour, flavour, and shelf life to fruits.

	CODE	FORMAT	Qty per carton
	10400 00002	150 mL	12 pcs

	CODE	FORMAT	Qty per carton
	10400 00003	800 mL	6 pcs

	CODE	FORMAT	Qty per carton
	10400 00001	500 mL	12 pcs

Processorex New

TRAP FOR THE CAPTURE OF THE CATERPILLAR OF THE PINE PROCESSIONARY MOTH

Trap for the capture of pine processionary moth caterpillars (*Thaumetopoea pityocampa*) to be placed on the trunk of *Pinus nigra*, *P. sylvestris*, *P. halepensis*, *P. pinea*, *P. pinaster*, *P. insignis*, *P. strobus*, *Larix decidua* e *Cedrus* spp.
During the descent from the top of the tree, the larvae are intercepted and collected inside a container and can be easily eliminated.

1 Foam band
1 Wedge
1 Translucent sheet
1 Belt
1 Deposit (container)
2 Small wedges
1 Funnel
2 Double-sided adhesive

Place the trap on the trunk at breast height already from February. Leave the trap positioned at least 3 weeks after the last descents so that the pupae are formed and that there is no more danger of infestation. Inside the plastic collector, insert some soil to simulate the ground.

Processorex New
for trunks up to 130 cm in circumference

	CODE	Qty per carton
	10860 00040	1 pc

Processorex New XL
for trunks from 130 cm to 280 cm in circumference.

	CODE	Qty per carton
	10860 00044	1 pc

Extension for the collar

CODE	Qty per carton
10860 00042	1 pc

Watch the video

Enerbite® nourishes and stimulates the plant's defences.

Enerbite®

CE FERTILIZER
FERTILIZER SOLUTION PK 11–7,3

Enerbite® stimulates the formation of organic complexes useful for defence of the plant from external agents.
The management of the Chestnut Ink Disease is an example. The disease is caused by the *Oomycetes Phytophthora* cambivora and *Phytophthora cinnamomi* and, if not addressed, it causes total decay of the affected species. *Potassium phosphite* contained in *Enerbite®* contributes to improving the health of the plant which, much stronger, counteracts more effectively the attacks by *Phytophthora* spp.

COMPOSITION
Phosphorous pentoxide (P_2O_5), water-soluble 11%
Potassium oxide (K_2O), water-soluble 7,3%
With the content of each package (250 g), ready-to-use, it is possible to treat 4 trees (65 cm crf, 20 cm diam.).

	CODE	FORMAT	Qty per carton
	10410 00057	250 g	15 pcs

How can we feed tall trees?

Bitecare® endoinfusion allows to introduce 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 phosphite in a special formulation designed specifically for the Bitecare® method.

New **life**
to the plants

Micromegas®

EMULSIFIABLE CONCENTRATE

Micromegas® is an abamectin-based insecticide-acaricide specific for endotherapic treatments with the Bitecare®.
The formulation also allows treatments of numerous pests of citrus fruits, vines, vegetables, and other plant species.
Micromegas® is suitable for infusions both on broadleaves and on conifers, in nurseries, road trees and parks.

COMPOSITION
Pure abamectin 1,9% (18,37 g/L)
Dilute the product at a rate of 10–40 mL of Micromegas® *per litre of water, then add* Sapjet® HD *and infuse the solution into the trunk through the Bitecare® system at the restart of the vegetative phase or in the appropriate phenological phase.*

	CODE	FORMAT	Qty per carton
	1030000065	1 L	10 pcs

Plant Protection Product Reg. n° 15281 of 27/04/2012

Designed for the professionals of garden maintenance and pest control

Gardening services experts, agronomists, arborists, garden designers, landscapers, architects, land surveyors, agrotechnicians, forest studies, etc.
Pest Control and IPM (Integrated Pest Management) professionals.

Zamir® 18

EMULSIFIABLE CONCENTRATE

Abamectin-based insecticide-acaricide, active against all the mobile stages of insects and mites. It is recommended in the fight against the red palm weevil, in combination with the *Pite* or *Rite 2.2* devices. It can also be used for the defense of street trees and parks, as well as citrus, horticultural crops, ornamental and flower crops, shrub and tree nurseries.

COMPOSIZIONE
Pure abamectin 1,84 % (18 g/L)
Against red palm weevil, dilute the product at a rate of 50–100 mL of Zamir® 18 *per liter of water, add* Sapjet® HD *then inject the solution into the stem through the* Pite *or* Rite 2.2 *devices.*
For other endoinfusion uses, dilute the product at a rate of 10–40 mL of Zamir® 18 *per liter of water, then add* Sapjet® HD *and inject the solution into the trunk through a suitable Bitecare® device.*

	CODE	FORMAT	Qty per carton
	10300 00086	3 L	6 pcs

Plant Protection Product Reg. n° 13927 of 13/09/2007

The plant protection product specific for endoinfusion on palms

Vargas®

EMULSIFIABLE CONCENTRATE

Abamectin-based insecticide-acaricide, *Vargas®* is used in endotherapic treatments with the Bitecare® system on broadleaves and conifers for road trees and parks. It is active against all the mobile stages of insects and mites, and it can also be distributed for the defence of orange, mandarin, clementine, lemon, pear, apple, vine, strawberry, horticultural, ornamental and flower crops, shrub and tree nurseries.

The plant protection product for the management of the pine tortoise scale (*Toumeyella parvicornis*)

COMPOSITION

Pure abamectin 1,9% (18,37 g/L)

Dilute the product at a rate of 10–40 mL of Vargas® *per litre of water, then add Sapjet® HD and infuse the solution into the trunk through the Bitecare® system at the restart of the vegetative phase or in the appropriate phenological phase.*

	CODE	FORMAT	Qty per carton
	10300 00063	1 L	10 pcs

Plant Protection Product Reg. n° 16867 of 13/07/2017

CleanTech

DEGREASING AND DISAGGREGATING SOLVENT

Additive designed for the ordinary cleaning of *Bite® 2.2* and *Rite 2.2*
It exerts a powerful solvent, degreasing and disaggregating activity to remove any impurities from the application systems.

Free sale

COMPOSITION

100% diethylene glycol monobutyl ether.

Use pure or diluted 10% in water. With Rite 2.2 *the use of the pure product is recommended. Leave on for at least 10 minutes (ideally a whole night) before rinsing thoroughly.*

	CODE	FORMAT	Qty per carton
	10500 00025	10 L	1 pc

Three devices, one purpose: the direct fight against the main problems of plants

Among the main purposes of the Bitecare® method, the direct elimination and optimal control of parasites (insects and mites) and microorganisms (bacteria and fungi) stands out. The approach is mainly intended for tall tree species — broadleaves and conifers — and is not affected by: plant size, plant species and age of the plant.

DURATION OF TREATMENT WITH BITECARE®

Against the main problems of broadleaves, only one annual intervention is sufficient. On conifers, the benefits of endoinfusion with Bitecare® can even last for several years.

- **Pine processionary**
  Thaumetopoea pityocampa
- **Horse-chestnut leaf miner**
  Cameraria ohridella
- **Sycamore lace bug**
  Corythucha ciliata
- **Pine tortoise scale**
  Toumeyella parvicornis
- **Kuwana pine mealybug**
  Crisicoccus pini
- **Afidi:**
  Poplar woolly aphid
  Phloeomyzus passerinii
  Oak woolly aphid
  Diphyllaphis mordvilkoi
  Woolly beech aphid
  Phyllaphis fagi
  Linden aphid
  Eucallipterus tiliae
  Elm aphid
  Tinocallis platani
  Cypress aphid
  Cinara cupressi
  Green-striped fir aphid
  Cinara pectinatae
- **Eriophyid mites:**
  Maples mite
  Artacris macrorhynchus
  Eriophyes macrorrhynchus
  Linden mite
  Phytoptus leiosoma
  Ash tree mite
  Eriophyes fraxini
  Plane tree mite
  Eriophyes pseudoplatani
- **Palm weevil**
  Rhynchophorus ferrugineus

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Ed.03.2024