# Wooden piles in horticulture and viticulture:

## Why wooden piles were so durable in the past – and why nowadays this is once again the case

A message from Kurt Obermeier GmbH & Co. KG

KORA® WOOD PROTECTION
THE BEST FOR YOUR WOOD.

# Dear reader,

This special edition is aimed at all interested parties, particularly treatment companies, timber traders, winemakers, as well as fruit farmers.
Maybe you too, from your own personal experience, can confirm that the challenges presented by the use of wood in horticulture and viticulture are "rather unusual".

As a producer of wood preservatives, we have in-depth knowledge in precisely this area, largely due to long-established relationships with producers and users of wooden piles from across Europe that trace back years.

Our expertise is supplemented by our transnational activities in the domain of research and development, for example, through operating test sites or financing doctoral theses, as well as the necessary connections to authorities, collaborations with institutions, or cooperation in international specialist associations.

Over the course of the past few years we have observed that in practice the potential use of wooden piles is unfortunately evaluated very differently, an attitude that presumably originates from respective individual positive or negative personal experiences with regard to stability. It would appear relatively difficult to estimate in advance the anticipated durability of a wooden pile. As we consider the maintenance of a functional wooden pile to be an important issue, the time seems ripe for highlighting the complex topic of "treated wooden piles for horticulture and viticulture" and providing a clear overview of the situation in existing contexts.

We hope that you find this publication to be interesting and useful and, in writing it, we aim to offer responses to, amongst others, the following questions:

- ✔ **What criteria should be used when selecting wood?**
- ✔ **How were piles impregnated in the past, and what options are available today?**
- ✔ **How to recognise a properly impregnated wooden pile that will last for many years?**
- ✔ **What options are available to protect both piles and environment equally?**
- ✔ **And what makes wood particularly appealing for use in horticulture and viticulture?**

We hope that you enjoy reading this brochure, and that scientific and relevant practical arguments come to again be given primary position in assessing the performance of wooden piles. After all, what could be more suitable for horticulture and viticulture than a natural material such as wood?

Yours,

Jochen Obermeier

# Topics covered:

# The long tradition of wooden piles in horticulture and viticulture

Cultivation of fruit and vines has a tradition going back millennia, and cultivating grapes shapes the landscape and the economy of entire regions. Europe has half of all vineyards worldwide, particularly in Spain, France, Italy, and Portugal.[1,2] In Germany there are approximately 100,000 ha for wine.[3] Wooden piles have probably been used for wine making since the very beginning. The lack of durability of the timber was generally an issue. Various processes and methods were used, but with little success. Over time, the importance of wood protection grew in order to minimise repair costs, amongst other things.

As a manufacturer of wood preservation products we are, unfortunately, also aware that in terms of durability, wood piles are not always considered in a positive light. *"Wood is no longer of any use. My father still bought piles that would easily last for 20 or 30 years, but nowadays they sometimes start to rot after a couple of years, so I prefer to play safe and go for steel or concrete instead."* We hear this type of statement regularly, and ask how the piles were impregnated. Usually the answer is: *"I don't know, they were a bit green."*

**Much appeared to have changed over the past few years. Let's take a look back.**

1 OIV (Int. Organisation of Vine and Wine) 2013: 36th Weltkongress für Rebe und Wein; Statistischer Bericht 2013 der OIV über den weltweiten Weinbau: Perspektiven und Trends; Pressemitteilung; 3 pp.

2 OIV (Int. Organisation of Vine and Wine) 2013: Statistical report on world vitiviniculture 2013; 28 pp.

3 OIV (Int. Organisation of Vine and Wine) 2009: Weltkonjunkturbericht März 2009; (World economy report, March 2009) 13 pp.

# Wood preservation over history

Copper compounds have been used in chemical wood protection since as far back as the 19th century, however the results were at first not exactly satisfactory. It was only later identified that the addition of fluorides, arsenates, and chromates could achieve a considerable improvement and, consequently, a series of patents were issued, in particular, between 1910 and 1930.[4] Nevertheless, toluene (creosote) covered approx. 90 % of the need for wood preservatives in Germany up until 1940, in particular for railway sleepers, masts, and in mining.[5]

**Both product classes, wood preservatives containing chromates, and creosote, were, and still are, used up to the present day to impregnate piles, even though over time their composition or recipe has become no longer comparable to products now commonly available on the market.**

4 KAISERLICHES PATENTAMT 1913: Prüfungsstoff Cl.12q Gr.15. (GERMAN IMPERIAL PATENT OFFICE: Test material Cl.12q Gr. 15) Verfahren zum Imprägnieren von Holz mit wässrigen Lösungen der Dinitrophenole bzw. ihrer Salze mit oder ohne Zusatz anderer Stoffe, z. B. anorganischer Salze. (Process for treating wood with aqueous solutions based on dinitrophenols or their salts, with or without other ingredients such as inorganic salts.) Patent specification. 2 pp.

5 VAN GROENOU, H.B.; RISCHEN, H.W.L.; VAN DEN BERGE, J. 1951: Wood preservation during the last 50 years; 318 pp.

# The fall in the variety of chromium salts over recent years

In France and Spain, salts containing chromium, solely in the form of CCA (chromium/copper/arsenic), were still considered state-of-the-art up until 2006 for impregnating piles for vineyards, notwithstanding Directive 2003/2/EC,[6] which was already laying out restrictions. Eventually, as of September 2006, these wood preservation salts were no longer available on the common market within the European Union.[7]

The trigger for this was a European Directive known as the Biocidal Products Directive, in short BPD.[8] This directive had the purpose of protecting both people and the environment. Its consequences have been far-reaching with regards to chemical wood preservatives over the past few years. Arsenic compounds have not been the only ones to fall foul of this directive. Most recently, it has affected CCB (chromium/copper/boron) salts, which have not been available on offer since 2014, meaning that they are considered to be discontinued. This leaves only CC (chromium/copper) salts, and of these just a few, which will only be available for a restricted period of time.

Both the arsenic and boron compounds in the types of salt mentioned here also act alongside their basic substance, copper, as additional active substances, known as co-biocides, demonstrating their effectiveness in particularly against brown and white rot fungi, which also occur in the soil. While copper compounds are extremely effective in small quantities against fungi causing soft rot, a considerably higher dosage is required against other fungi that cause decay.

There is, therefore, a sound justification for these co-biocides, even if as ever, boron compounds are not fixed in the wood.[9]

For wood protection, it is advantageous to have long-lasting mobility due to later distribution of the active ingredients in the wood. On the other hand, the presence of any moisture can mean that mobile substances can easily filter through to surrounding areas, such as the soil. It can, therefore, be assumed that the active ingredients in wood preservatives initially protect the wood, and then later – as a result of leaching – also have an effect on the soil, sterilising it and generating a "fungus-free" zone in the immediate area surrounding the wooden piles. While this effect is positive in more ways than one, it is not generally regarded positively for wood preservatives to leach into the environment.

6 COMMISSION DIRECTIVE 2003/2/EC of 6 January 2003 relating to restrictions on the marketing and use of arsenic. 3 pp.

7 COMMISSION DIRECTIVE 2006/139/EC of 20 December 2006 amending Council Directive 76/769/EEC as regards restrictions on the marketing and use of arsenic compounds for the purpose of adapting its Annex I to technical progress; 4 pp.

8 Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market 63 pp.

9 PFABIGAN, N.; FÜRHAPPER, CH.; GRÜNDLINGER, R. 2013: Wooden noise barriers treated with chromium free wood preservatives - two years exposure study; WEI spring meeting Brussels, 20.03.2013. 33 pp.

10 KRAWCZYK, N. 2012: Bor plötzlich gefährlich? – Die EU sieht es so (Is boron suddenly dangerous? The EU seems to think so) …; Holz-Zentralblatt No. 48; P. 1248

11 COMMISSION DIRECTIVE 2009/94/EC of 31 July 2009 amending Directive 98/8/EC of the European Parliament and of the Council to include boric acid as an active substance in Annex I thereto. 4 pp.

**Environment awareness, that has been on the increase for decades, and the associated EU Directives, have resulted in a critical evaluation of this situation, ultimately resulting in CCB salts being no longer available in the future due to the environmental impact of components containing boron.**[10, 11]

# Will creosote soon cease to be available?

The effectiveness of creosote has been undisputed for decades. However, even as a traditional active substance, it nevertheless remains subject to current laws, meaning that even creosote has been re-evaluated by the relevant authorities within the European Union. Its widespread biological effectiveness can purely scientifically be boiled down to the fact that it is a cocktail composed of several highly potent substances. This also makes creosote problematic for the authorities, although the current types WEI B and WEI C feature ingredients containing low levels of benzpyrene. After years of discussion between producers, users, and consumers on the one side, and the authorities on the other, creosote was initially approved for continued use in 2011, however subject to restrictions.[12]

Moreover, the discussions are ongoing, as the member states must submit a report by the middle of 2016 and explain why there are no alternatives to creosote.

At a workshop on this topic held in 2013, German authorities involved, such as the Federal Institute for Occupational Safety and Health, the Federal Environment Agency, and the Federal Institute for Risk Assessment, made it absolutely clear that from their perspective, they could see no future for creosote in Germany due to existing toxicological and ecotoxicological concerns. A summarising report published in June 2015, aimed at assisting the authorities involved in the biocide process with making their upcoming decision concerning the admission of creosote-based wood preservatives, made the following statement with regard to the agricultural sector: *"... the researchers support the suggestion made by the Obstbauversuchsanstalt Jork (Jork Fruit Research Institute) that the use of creosote as a tar base for posts and piles for agricultural purposes should be permitted for such applications initially until 2018 ..."* The information available suggests the availability of suitable alternatives to wood impregnated with creosote, and that in the researchers' opinion the continued use of creosote for this purpose would no longer be necessary in the future.[13]

**Tar bases, recommended by the Deutscher Holzschutzverband (German Wood Preserving Association; DHV)[14] approximately 10 years ago, or for use in the Altes Land region of Germany by Meyer 2005[15] and recently by Köpcke[16] in 2012, would also take their place in history. As a result, scepticism regarding the durability of wooden piles has become more apparent.**

*Clear damage to piles on vineyards were apparent even after a few months due to a variety of different reasons.*

# Wood preservatives nowadays: Recent negative experiences from France

After the use of CCA preservatives was forbidden in 2006, French impregnation companies started to use modern wood preservative systems without chromate, which had been available on the market for several years. Practical experience in this specific application for this product was not available at that point in time, and in hindsight it was not surprising that early signs of damage became apparent only a few months to years later. In occasional instances, entire vineyards succumbed within extremely short periods of time. Increasing crop failure was feared and as a result, experts and even the judiciary became involved on a fairly regular basis to identify the causes, and then also the originating and responsible parties. The order of magnitude was alarming and various pile producers/suppliers as well as a wide range of wood preservatives were affected.

Ultimately, a wide variety of reasons were identified. For starters, the quality of the wood used played an important role. Wooden piles already damaged as a result of decay should no longer be used in a vineyard. The quality of the preservative was also important, as a "tight is right" attitude was widespread at that time and price was the only criterion that mattered. The fact that prices were bound to go up after cheap CCA-type preservatives were discontinued was also not too readily understood. However, faults such as a lack of sufficient drying time before impregnation also caused problems, and in many cases there was also insufficient preservative in the wood, or it was not evenly distributed. In some instances, modern wood preservatives were deemed responsible for the damage and considered to be "ineffective".

**Finally, and a factor of some importance in its own right, is the role played by the location – ultimately these are areas used for horticulture or viticulture.**

12 COMMISSION DIRECTIVE 2011/71/EU of 26 July 2011 amending Directive 98/8/EC of the European Parliament and of the Council to include boric acid as an active substance in Annex I thereto. 6 pp.

13 UBA-TEXTE 48/2015: Projektnummer 39316 UBA-FB 002109; Vorbereitung der Entscheidung über eine mögliche Zulassung kreosothaltiger Holzschutzmittel in Deutschland, 85 pp. (UBA TEXT 48/2015: Project number 39316 UBA-FB 002109; preparation of the decision for potential approval of creosote-containing wood preservatives in Germany, 85 pp.)

14 HALUPCZOK, U. 2005: Presseinformation des Deutscher Holzschutzverband für großtechnische Imprägnierung e.V. (DHV), Gütegemeinschaft Imprägnierte Holzbauelemente e.V.; Produkte mit Zukunft, Holzpfähle im Weinbau, Doppelte Imprägnierung sichert lange Standzeiten, 3 pp. (Press release from the Deutscher Holzschutzverband für großtechnische Imprägnierung e.V. (DHV), Gütegemeinschaft Imprägnierte Holzbauelemente e.V., Products with a future, wooden piles in viticulture, double treatment ensures durability, 3 pp.)

15 MEYER, G. 2005: Mitt. OVR 60 · 12/2005; Frühzeitiger Pfahlbruch salzimprägnierter Baumpfähle. (Early failure of salt-impregnated timber piles). P. 496-498.

16 KÖPCKE, D. 2012: Mitt. OVR 67 · 05/2012; Qualität von Obstbaumpfählen (Quality of fruit tree piles); P. 181-186.

# Are horticultural and viticultural areas exceptional for wood?

This question needs to be addressed in more detail, as only due consideration of its complexity can ensure proper understanding and that the correct consequences are drawn.

The appearance of phylloxera and various fungal infections, such as downy mildew and powdery mildew, are known to have already been causing serious economic damage to European winemaking from the very beginning of the Industrial Age. It took until after the end of the Second World War for the world economy, and with it viticulture, to recover.

The introduction and use of mechanisation made it both easier and cheaper to grow grapes, while numerous scientific insights led to the use of various agricultural chemicals. This led not only to enhanced quality, but at the time also secured production. Plant protection products are used in all wine-growing production methods and are imperative for reasons of cost-effectiveness. With regard to wooden piles and their durability, this can in some instances have a direct influence, explained here through an example. Plant protection products, particularly copper compounds such as copper hydroxide, copper octanoate, or alkaline copper sulphate, serve primarily to protect the plant, i.e. vine growth, as a remedy against *plasmopara viticola* or against scab in the case of stone fruits.[17,18]

**In this fashion, it is known that copper will inevitably come into contact with and seep into the soil, and subsequently remain in the system.**

17 BVL 2014a: Bundesamt für Verbraucherschutz und Lebensmittelsicherheit: Pflanzenschutzmittel-Verzeichnis 2014 – Teil 2 – Gemüsebau - Obstbau - Zierpflanzenbau; 400 pp.
(Federal Office of Consumer Protection and Food Safety: 2014 plant protection agent directory – part 2 – vegetable cultivation - fruit cultivation - ornamental plant cultivation; 400 pp.

18 BVL 2014b: Bundesamt für Verbraucherschutz und Lebensmittelsicherheit: Pflanzenschutzmittel-Verzeichnis 2014 – Teil 3 – Gemüsebau - Obstbau – Zierpflanzenbau; 106 pp.
(Federal Office of Consumer Protection and Food Safety: 2014 plant protection agent directory – part 3 – wine making: 106 pp.

19 UBA 2009: Research report 360 03 040. UBA-FB 001261. Einsatz von Kupfer als Pflanzenschutzmittel -Wirkstoff: Ökologische Auswirkungen der Akkumulation von Kupfer im Boden. (Use of copper as plant protection agent: Ecological effects of the accumulation of copper in soil.) 72 pp.

20 RABANUS, A. 1939: Über die Säureproduktion von Pilzen und deren Einfluss auf die Wirkung von Holzschutzmitteln. (About the acid production of fungi and their influence on the effect of wood preservatives.) Mitt. Dt. Forstverein 23. P. 77-89.

21 GÖTTSCHE, R.; BORCK, H.-V.; PEEK, R.-D.; STEPHAN, I. 1992: DGfH München; Vorträge der 19. Holzschutztagung 1992 in Rosenheim; Zur Reaktion von kupferhaltigen Holzschutzmitteln mit oxalsäurebildenden Basidiomyceten. (German Society for Wood Research, Munich; lectures from the 19th Wood Protection Conference in Rosenheim, 1992; On the reaction of wood preservatives containing copper with basidiomycetes creating oxalic acid). P. 33-80.

The quantity of copper used solely as a plant protection agent in vineyards in Germany in 2001 amounted to approx. 30 tonnes, according to calculations by the Federal Environment Agency,19 while that contained in farm manure was several times higher. The effects of copper in the ground/soil have become apparent, with micro-organisms that are highly sensitive to copper being restricted in terms of development/growth. This leaves only those micro-organisms that do not react to copper, or that are resilient enough to neutralise this ingredient, originally aimed at protecting plants. In technical terms, these are known as copper-resistant fungi. Known types include, for example, *Antrodia vaillantii* (DC.), Oligoporus rennyi *Oligoporus rennyi* (Berk. & Broome), *Serpula himantoides* (Fr.), which have been described by various authors decades ago.[20,21] A stretch of soil could, therefore, contain only such fungi, which cause brown rot, and can quickly expand over a wide area due to lack of competition.

**However, copper is one of the most important elements in wood protection, and is indispensable due to the protection it provides against fungus.**

As the effectiveness of a wood preservative can become very limited in the case of a spread of copper-resistant fungi, containing an appropriate co-biocide is of paramount importance, as described previously. This means taking into account its range of activity and, as would be expected, an adequate dosage. Many of the incidences of early failure in France described above raised the suspicion that these aspects had most certainly not been adequately considered in advance.

In general, fault analysis led to clear consequences regarding the production of wooden piles in France – and an associated improvement in quality. The idea that mono piles, i.e. without a tar base, which have been treated with products not containing chromate, are equally durable, was demonstrated in vineyards where piles that had quickly become damaged in 2006/2007 were replaced by new ones.

These piles still perform the function they were designed for without issues. After replacing the preservative with the highly potent wood preservative Korasit® KS2, more attention was paid in particular to identifying the required quantity of wood preservative, and optimising the impregnation process.

**Ultimately, such complex consideration of current questions has led to improved quality and very good results in practice, i.e. durable wooden piles.**

# Wooden piles in horticulture and viticulture – types of wood

The following is an attempt to cover several aspects regarding types of wood, impregnation, and wood preservatives. While it is self-explanatory that it is impossible to discuss these topics in their entirety here, the aim is to cover the most important aspects.

Piles made of robinia (*Robinia pseudoacacia* L.) also known as false acacia, can handle the stringent requirements of horticulture and viticulture due to their natural durability, and can be used in their natural states.[22] However, robinia piles are rarely available in sufficient quantities and of suitable quality, as has been the case for over 20 years.[23]

Not much has changed in the meantime, apart from the odd quota – whether round or split – coming from Hungary or Romania. However, price is often another issue with regard to this type of wood.

Oak piles are also just as difficult to *(Quercus ssp.)* piles are equally difficult to obtain, which is actually rather surprising. Presumably both availability and price play a major part in this instance.

Piles made of chestnut are even rarer, i.e. sweet chestnut *(Castanea sativa* Mill.), however many Italian winemakers swear by them, as they appear to have proven their worth there. As would be expected, the sapwood is not naturally durable, and as the piles still contain a small proportion of it, they are generally impregnated with a wood preservative, thus achieving relatively easily protection of this outermost centimetre.

**In Germany, and indeed Europe in general, native softwoods are generally available for producing piles. The majority are made of various types of pine, whether Scots pine (*Pinus sylvestris* L.), maritime pine (*Pinus pinaster* Ait., *Pinus maritima* Lam. non Mill.), or black pine (*Pinus nigra* Arnold). However, piles made of spruce (*Picea abies* L.) are also frequently used in Germany. These softwoods are known to be naturally not very durable, and are extremely susceptible to wood-destroying organisms. Impregnation is therefore indispensable if the piles are to last over many years.**

22 EN 350-2 (1994): Dauerhaftigkeit von Holz und Holzprodukten. (Durability of wood and wood products). Natürliche Dauerhaftigkeit von Vollholz. (Natural durability of solid wood). Part 2: Guidelines for natural durability and permeability of selected wood types of particular importance in Europe. 26 pp.

23 VDH 1992: Verein Deutscher Holzeinfuhrhäuser e.V., Arbeitsgemeinschaft Holz e.V.: Informationsdienst Holz, Merkblattreihe Holzarten, Blatt 101 Robinie, 2 pp. (Bulletin series of wood types, bulletin 101 robinia, 2 pp.).

*Robinia (Robinia pseudoacacia* L.*)*

*Oak (Quercus ssp.)*

*Sweet chestnut (Castanea sativa* Mill.*)*

*Scots pine (Pinus sylvestris* L.*)*

*Spruce (Picea abies* L.*)*

*Black pine (Pinus nigra)*

# Wooden piles – impregnation methods

In the case of piles made of (*Pinus ssp.*), full impregnation of the sapwood is relatively easy to achieve through vacuum pressure impregnation, due to its permeability.

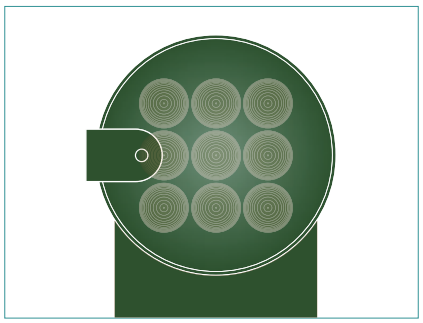
Naturally, it is important here that all process parameters are correct, and that the sapwood has not been cut away beforehand. Preference would thus be given to peeled piles. It is considerably more difficult to impregnate piles made of spruce due to this wood being not particularly permeable. For this reason, it is recommended to use double impregnation after further cracks appear, or deliberate perforation to improve permeability. In addition, the alternating pressure method can be used as a specific form of pressure impregnation. Impregnation using this process can also achieve extremely good results.

Generally, pile producers tend to use the traditional vacuum pressure process, which involves pressing the wood preservative deeply into the wood at high pressures.

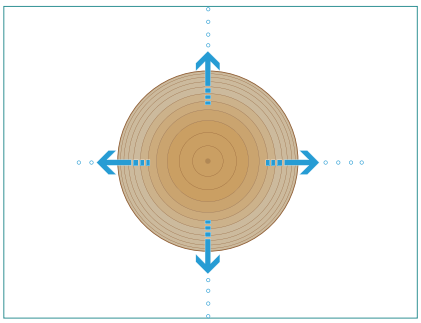
To ensure that there is room in the wood for the preservative to soak in, it is essential to remove any water present in the wood after felling. Prior drying out of wood in this fashion, i.e. generating what is known as permeability, is a prerequisite for vacuum pressure to work effectively.

A Process management during impregnation is, of course, an important factor, along with wood humidity. Here it can be of considerable significance to use an extended, high-quality vacuum, ideally < 100 mbar, as the air contained in the wood is counterproductive to high quality impregnation and therefore has to be removed. The quality of the vacuum tended to be a factor that was frequently overlooked, as we often discovered.

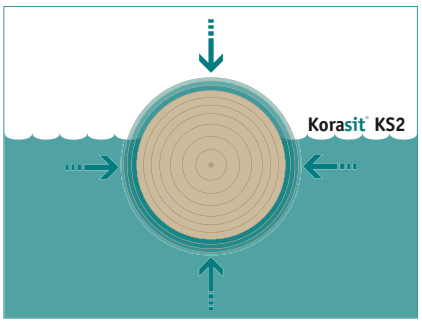
*"This presence of permeability, is compulsory for vacuum pressure to work effectively."*



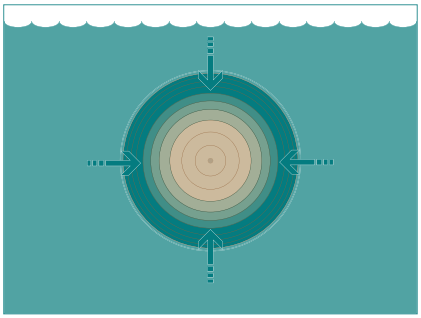
*The vacuum pressure plant is filled with piles.*



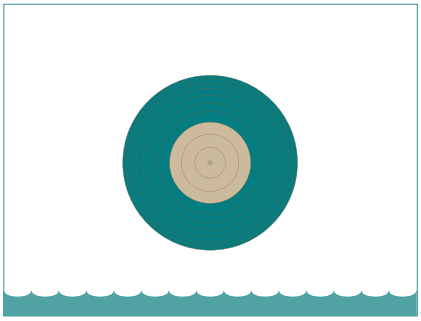
*A vacuum is generated in the chamber for pprox. 30 minutes, resulting in the air in the wood being drawn out.*



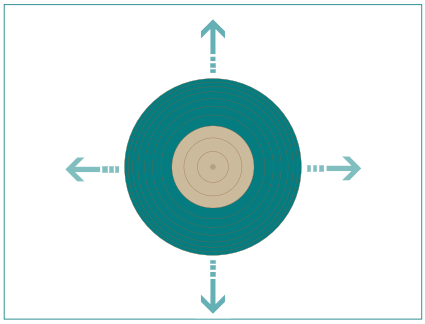

*While in a vacuum, the boiler is filled with Korasit® KS2 wood preservative.*



*The preservative is pressed into the wood under pressure (> 8 bar).*

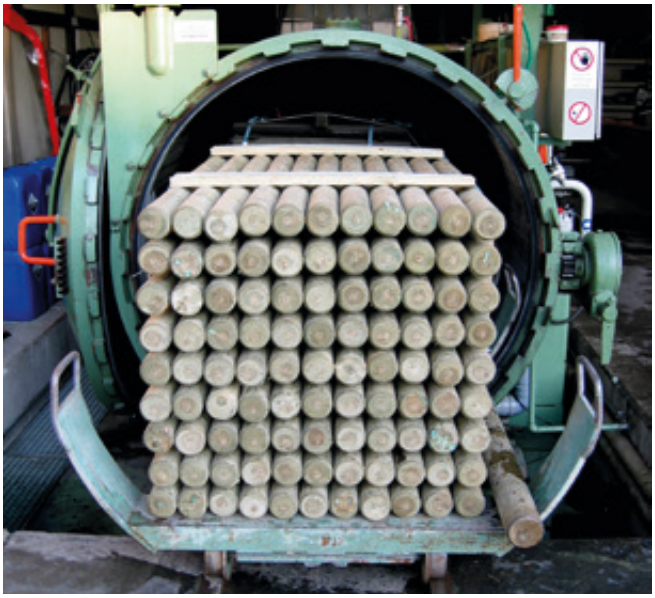


*The boiler is allowed to drop to normal pressure and the impregnation solution is drained off.*



*Finally, a post-vacuum is generated, and excess solution is drawn out of the wood.*

This satisfies a second important point. It should be borne in mind that the liquid preservative requires time during impregnation, depending on the width of the sapwood, to permeate right through to the core. This can involve permeating through many centimetres in normal cases, particularly with pine piles from Southern or South-Western Europe. For this reason, the pressure should be maintained at a correspondingly high level, and for an appropriate duration. If the process is terminated prematurely, then the resulting image of the distribution of thewood preservative would be similar, in the most unfavourable case, to that seen when using damp wood.



*A typical vacuum pressure plant for treating piles, e. g. Horner GmbH, Lauterach.*

**If these few important factors, namely wood humidity, vacuum quality and duration, and pressure level and duration are taken into account during treatment, then it is relatively simple from a technological perspective to produce a high-quality pile that will last for years. This is provided that the solution concentration recommended by the manufacturer is observed, and the preservative is suitable for the task. This brings us to the next topic, that of the wood preservative.**

Our experience has unfortunately confirmed that in the past many wooden piles were not prepared in accordance with the vacuum pressure treatment process described above, but instead in a more slapdash fashion. Unfortunately, this “process” is at times used when extremely high levels of orders impose severe time pressures on the impregnation process, with the result of being terminated far too early for reasons of cost. The resulting piles will not last!

*Easy to spot: the wood preservative (olive green) has penetrated through the entire cross-section and can provide effective protection (above) or is only present on the edge due to improper impregnation (below).*

# Wooden piles – our recommended wood preservatives

As previously mentioned, products that proved effective in the past, such as those based on chromium/copper/arsenic (CCA, as in France), or chromium/copper/boron (CCB) can no longer be used due to occupational, environmental and user safety legislation. Various standardised directives and regulations issued by the European Commission have therefore resulted in comparable regulations for plant protection regarding the use of chemical wood preservatives.[24] These stringent legal requirements must be satisfied with a product that also meets the demanding requirements regarding the durability of piles – especially in horticulture and viticulture.

**For the production of wooden piles there is a clear product recommendation from our range: our wood preservative Korasit® KS2. This product was the result of intensive research, while also taking into consideration decades of experience in the piles segment.**

24 Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market supply and use of biocidal products. 123 pp.

# Korasit® KS2 – facts and reasons for using it

The formula of Korasit® KS2 does not contain mobile components such as boron compounds that could leach out of the wood over time, end up in the surrounding environment, and therefore be considered ecotoxicologically critical. The active ingredients of Korasit® KS2 remain in the wood, thus ensuring that they can be effective where needed. This is evidenced clearly by the results of an investigation conducted by Holzforschung Austria (Austrian Forest Products Research Society) regarding "Emissions of active ingredients from wood impregnated with wood preservatives based on copper and amine: A study of two-year outdoor exposure in a semi field test".[25]

**This is also evidence that chemical wood protection is compatible with ecological fruit growing and winemaking.**

Besides ecological considerations, there are further reasons for this product recommendation, as the secret of Korasit® KS2 lies in its unique formula. On the one hand, Korasit® KS2 contains an exceptionally high proportion of active ingredients, securing it a special position among what are known as vacuum pressure products. On the other hand, it also combines copper as a primary biocide with a quaternary ammonium compound, which is a powerful ingredient in its own right. This ensures that wood is also protected against copper-resistant fungi, as the quaternary ammonium compound used in the product is particularly effective against pore fungi (*Poria spp.*).

The basis for 20 years of positive experience in practical usage is provided in various product tests[26, 27], conducted both in laboratories and open field by accredited European institutes. The treated wood is protected not only against known wood-destroying organisms (dry rot, fungus, etc.) but also against "specialists" such as copper-resistant *poria* types, as well as xylophages, death watch beetles, or termites.

This combination of copper and a quaternary ammonium compound in a 1:1 ratio has been successfully used by Kurt Obermeier GmbH & Co. KG since 1996 and can only be found in our Korasit® KS range. This makes the water-soluble, liquid, easily fixed wood preservative a highly effective product for the professional user, i.e. producers of wooden piles, hail protection systems, hop poles, or masts.

Korasit® KS2 is also authorised for use in countries with the largest orchards and vineyards, meaning that piles impregnated with KS2 are to be found in France, Spain, Germany, and Portugal.

25 PFABIGAN, N.; FÜRHAPPER, CH.; GRÜNDLINGER, R. 2014: Holztechnologie (55) (Wood technology), P. 41-46.

26 DIN EN 599-1 (1996): Durability of wood and wood-based products – Requirements of preventive wood preservatives as determined by biological tests – Part 1: Specification according to use class. 24 pp.

27 DIN EN 599-1 (2009): Durability of wood and wood-based products – Efficacy of preventive wood preservatives as determined by biological tests – Part 1: Specification according to use class. 20 pp.

- ✔ Protects wood from wood-destroying fungi and insects
- ✔ Effective against copper-resistant fungi and termites
- ✔ For vacuum-pressure impregnation
- ✔ Compatible with ecological wine and fruit growing
- ✔ High level of durability of piles impregnated with KS2
- ✔ For professional users
- ✔ Successfully used in horticulture and viticulture for 20 years

# Experience from diverse regions and climate conditions

Kurt Obermeier GmbH & Co. KG has been very closely analysing the stability of impregnated piles, and have recently initiated research with a focus on the durability of wooden piles. However, understanding the mechanisms behind wood decay caused by micro-organisms, whether bacteria or fungi, particularly in horticulture or viticulture, is part of the puzzle. Initial results from this investigation requested by the German Federal Environmental Federation were presented at the 2014 Deutsche Holzschutztagung conference and focused on the question of the extent to which impregnated wooden piles have an effect on the microbial composition of the soil.[28]

Concerning another project that has been running for a considerably longer period of time, located in the Altes Land region, the following is stated in the UBA report[29]: *"Currently at the Obstbauversuchsanstalt Jork (Jork Fruit Research Institute) there are test rows for the suitability of newer wood preservatives containing quaternary ammonium compounds on areas with copper-resistant fungi. A product from Obermeier (Korasit KS2) has now demonstrated itself to be effective for almost 10 years..."* This test is conducted under "normal practical conditions", i.e. fruit tree piles treated with KS2 are positioned in rows, fulfilling their purpose. In addition, and interesting from a scientific perspective, a test area was contaminated equally with copper-resistant fungi. To date, these tests have also been successful.

As a result, we have gained profound insights, which have also been applied, in close collaboration with treatment companies, to the treatment process. Korasit® KS2 is ideally suited for the reliable, long-term protection of wood in outdoor use for all applications and has proved to be particularly effective for use on wooden piles, telegraph poles, as well as playground equipment.

**Due to widespread use in many countries, we have gained comprehensive practical experience in widely differing regions and climatic conditions.**

28 LASOTA, S,; NOLL, M.; JÜNGEL, P. 2014: Deutsche Holzschutztagung 2014: Mikrobiologische Untersuchungen an Holz im Erdkontakt. (2014 Deutsche Holzschutztagung conference; microbiological investigations on wood in contact with soil. P. 143-149.

29 UBA-TEXTE 48/2015: Projektnummer 39316 UBA-FB 002109; Vorbereitung der Entscheidung über eine mögliche Zulassung kreosothaltiger Holzschutzmittel in Deutschland, 85 pp. (UBA TEXT 48/2015: Project number 39316 UBA-FB 002109; preparation of the decision for potential approval of creosote-containing wood preservatives in Germany, 85 pp.)

# Piles made of wood – quality with insurance

In order to ensure the consistent quality associated with the tag “Made in Germany”, the entire production chain for Korasit® KS2 satisfies the requirements of DIN ISO 9001:2000 from receipt of raw materials to laboratory testing, and to documentation. Production is regularly monitored by accredited, independent institutes, such as MPA-Eberswalde (Germany) and the FCBA (France).
Korasit® KS2 performs to safeguard wooden pile, when impregnated in line with its state-of-the-art process, for at least 15 years against wood-destroying organisms. This quality guarantee is also re-insured by an insurance company, giving those involved in horticulture and viticulture the assurance necessary for the continued use of wooden piles in future. As a producer of wood preservatives, we ensure the quality of the pile, while the manufacturer of the pile simply passes this on to the purchaser.
This transparent and simple process of ensuring quality is unique in Europe.

# How to recognise a quality wooden pile

In his 2012 article in the bulletin for the *Obstbauversuchsring des Alten Landes e.V. (OVR)*, Dr. Köpcke recommended the following: *"During delivery, the fruit grower should thoroughly inspect the quality of the wood. By sawing or splitting the pile in a longitudinal direction, it is also possible to test the required full treatment of the sapwood has taken place."* This is certainly a very good method for initially monitoring impregnation.

**With quality pile, this is not required, as the fruit grower or winemaker receives a 15-year guarantee via the producer of the piles.**

Generally, the vendor is actively involved in advertising quality pile, particularly abroad, for example, in France, Italy, or Portugal. Due to the wide-ranging trade in piles, it is important that the pile's path be traceable with as little effort required as possible. This is generally covered in the delivery notes or invoices.

*"During delivery, the fruit grower should thoroughly inspect the quality of the wood."*

*Dr. Köpcke 2012*

# An attempt at a comparison of different materials

Wooden piles have played an important role in the history of mankind for millennia: in construction, as well as in horticulture and viticulture. While in earlier times excellent availability and advantageous transport and processing were of primary importance, nowadays the ecological benefits of wood are also of great importance. As a renewable raw material with an exceptional ecological balance, wood fulfils the requirements of sustainable management superbly and also has a series of benefits in comparison with piles made from steel, concrete, or other materials. However, other materials also have their strengths. The weighting given to individual aspects is very much in the eye of the beholder and grants considerable leeway for interpretation and discussion.

Upon compiling our experiences, including those from discussions with fruit growers or winemakers, and consulting various literature on the topic, we come to the conclusions shown in the following table.[28,29,30]

28 KÜNNIGER, T.; RICHTER K. 2003: Ökobilanz von Konstruktionen im Garten- und Landschaftsbau. (Ecological balance of structures in garden and landscape construction.) Forschungs- und Arbeitsberichte – Abteilung 115, Holz, Eidgenössische Materialprüfungs- und Forschungsanstalt; 115/43. (Research and working reports – Department 115, wood, Swiss Federal Laboratories for Materials Testing and Research; 115/43. 169 pp.

29 UBA 2013: Umweltbundesamt (UBA) im Auftrag des Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit (BMU). Federal Environment Agency on behalf of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety). Statuspapier zum Workshop „Ausstieg aus Kreosot: Aus Umweltsicht nötig! Aus Wirtschaftssicht möglich? - eine Annäherung an eine Alternativenprüfung". (Status paper from the workshop titled "Moving away from creosote: necessary for the environment! Is it possible from an economic standpoint? – an approach at testing alternatives." 23 October 2013 in Bonn

30 DHV 2014: Sozioökonomischer Vergleich zwischen mit Kreosot imprägnierten Holzprodukten (Pfähle für Wein- und Obstbau, Hagelstangen) und den "Alternativen". (Socio-economic comparison between wood products impregnated with creosote (piles for horticulture and viticulture, hail piles) and the "alternatives". 6 pp.

**Our perspective of the relative benefits and weaknesses of various materials**

✓ = better ✗ = worse – = no judgement possible

| Aspect | | Korasit KS2 quality pile | Untreated wooden pile | Pile made of steel (galvanised) | Pile made of concrete | Pile made of plastic/WPC |
|---|---|---|---|---|---|---|
| Health/environment | Ecology | ✓ | ✓ | ✗ | – | – |
| | Sustainability | ✓ | ✓ | – | – | – |
| | Disposal/ recycling | ✗ | ✓ | – | ✗ | ✗ |
| Function | Availability | ✓ | ✗ | ✓ | ✓ | – |
| | Durability | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Handling – instal-lation/removal | ✓ | ✓ | ✗ | ✗ | – |
| | Attachment of hooks | – | ✗ | ✓ | ✓ | – |
| | Stability/ solidity | ✓ | ✓ | – | ✗ | – |
| | Transport | ✓ | ✓ | ✓ | ✗ | ✓ |
| Costs | Material | ✓ | ✗ | ✓ | ✗ | ✓ |
| | Transport | ✓ | – | ✗ | ✗ | – |
| | Disposal | ✗ | ✓ | ✓ | ✗ | ✗ |

# Quality pile – impregnated with Korasit® KS2

The use of vacuum pressure impregnated piles has many benefits, particularly with regard to functionality, sustainability, and ecological aspects. Only disposal can bring about challenges, however everything is covered via regulations and guidelines.[31,32,33]

31 ALTHOLZV 2002: Verordnung über Anforderungen an die Verwertung und Beseitigung von Altholz (Altholzverordnung – AltholzV) vom 15. August 2002 (BGBl. I S. 3302) zuletzt geändert durch Artikel 2a der Verordnung vom 20. Oktober 2006 (BGBl. I, Nr. 48, S. 2298) in Kraft getreten am 1. Februar 2007.
(Regulation on requirement on use and disposal of waste wood from 15 August 2002 (BGBI. I P. 3302), last amended by Article 2b of the regulation as of 20 October 2006 (BGBI. I, no. 48, P. 2298) that came into force on 1 February 2007. 19 pp.

32 RICHTLINIE 2001/118/EC: Commission Decision of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes. 31 pp.

33 RICHTLINIE Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. 28 pp.

# Summary

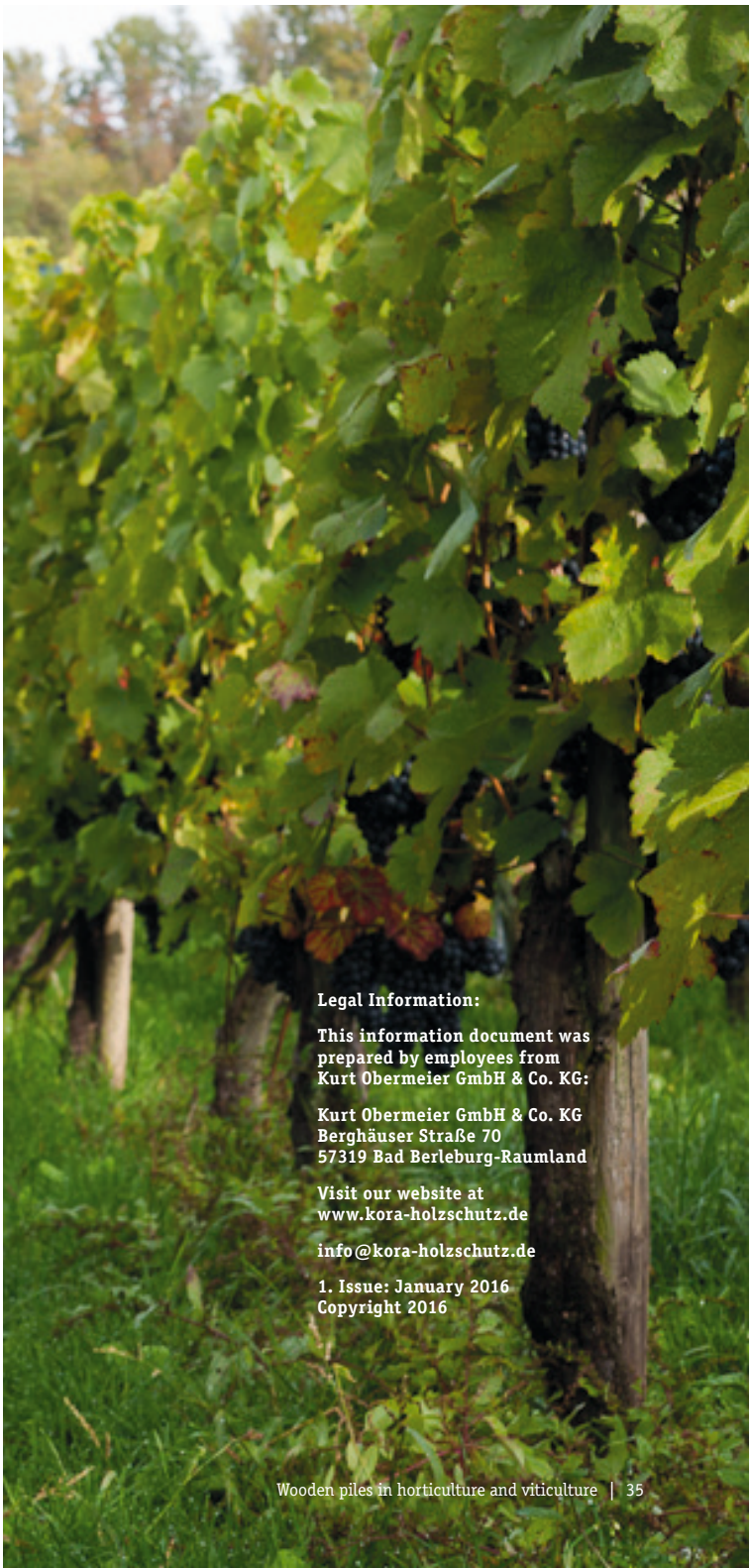
The use of wood has a long tradition in horticulture and viticulture, and has always required impregnation in order to protect against decay when using native types of wood from sustainable forestry. However, changes to alternative materials often occur as consumers frequently tend to believe that wooden piles are not guaranteed to be durable enough for the task at hand.

This is not entirely incorrect, as while salts containing chromium in the form of CCA or CCB as well as creosote were available across Europe in the past and were considered the state-of-the-art regarding treatment of wood, these wood preservatives are no longer available, or were only available for a limited period of time due to new, standardised legislation within the European Union. The causes for failure of an impregnated wooden pile can be extremely varied, as is demonstrated with the example from France.

**When using native softwoods, it is therefore imperative to observe and implement the important aspects. Professional and effective treatment is not rocket science, and if vacuum pressure treatment is carried out with Korasit® KS2 in line with the state-of-the-art, then full impregnation is achieved right down to the boundary between sapwood and heartwood.**

In this case, the balanced combination of copper compounds along with a highly effective quaternary ammonium compound, deep penetration, equal distribution, and fixing the active ingredients into the wood are the basis for successful and long-term protection of the wood.

If the stated parameters are followed and Korasit® KS2 is used correctly, then the treated wooden pile will easily achieve the assured service life. Fruit growers and winemakers can rely on this now and in the future. Speak to your treatment company and pile supplier.



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