



**PRODUCT INFO  
& DATASHEET**

## **SICO PENETRATOR**

### ***Agricultural spraying water conditioner***

*Combats medium and high pH water and neutralises unwanted ions such as calcium, magnesium and bicarbonates.*

#### **PRODUCT DESCRIPTION**

SICO PENETRATOR is a new farm tool for the treatment of water to be used in horticulture and agriculture. SICO PENETRATOR is designed to combat medium and high pH water and for neutralising unwanted ions such as calcium, magnesium and bicarbonates. By lowering the water pH the effectiveness of many fertilisers and pesticides, which in turn can be alkaline, will be very much improved.

#### **APPLICATIONS & DIRECTIONS FOR USE**

##### 1) Typical application rates:

Each 1 ml of SICO PENETRATOR required to obtain a pale green / yellow in the sample water equates to 1 ltr. of SICO PENETRATOR in 1,000 ltrs. of spray water.

	Soft water	Medium / Hard water	Hard water
Test sample:	0.5 ml/ltr.	1 ml/ltr.	2 ml/ltr.
Spray water:	50 ml/100 ltrs.	100 ml/100 ltrs.	200 ml/100 ltrs.
Volumes:	0.5 ltr./1,000 ltrs.	1 ltr./1,000 ltrs.	2 ltrs./1,000 ltrs.

N.B. Check water samples regularly as water pH can sometimes vary.

##### 2) Equipment:

SICO PENETRATOR can be used effectively through all sprayers. Always ensure that the equipment is properly calibrated, has been cleaned and is in good working order. Check that all hoses are fitted correctly and are undamaged. Check nozzles for wear and are correct for type of application.

##### 3) Mixing:

Half fill the spray tank with water and commence agitation. Add the previously calculated quantity of SICO PENETRATOR to water before adding agrochemicals and/or fertilisers. Add the required quantity of pesticide. Top up the sprayer with the correct volume of water.

#### **PRECAUTIONS**

- Irritant.
- Irritating to skin and eyes.
- Wear suitable protective gloves and face protection when handling concentrate.
- Keep locked up and out of reach of children.
- In case of contact with eyes or skin, wash with plenty of water and seek medical advice.
- Keep in original containers, tightly closed and in a safe place.
- Do not contaminate ponds, waterways, and ditches with chemical or used container.

#### **PACKING**

In 1 ltr. bottles, 12 x 1 ltr. per carton.

**More complete technical literature is available upon request.**

Any information in this publication is believed to be accurate and is given in good faith, but is for the customer to satisfy himself of the suitability for his own particular purpose. No representation, warranty or guarantee is made to its accuracy, reliability or completeness.

**SAP INTERNATIONAL CORPORATION bvba Krekelenberg 69, B-2980 Zoersel, Belgium**  
**Tel. +32-3-309.06.51 Fax. +32-3-309.19.31 Email : info@sico.be Website : www.sico.be**

**SICO FERTILISERS**  
 EVERY TIME THE *right* SOLUTION



## **SICO PENETRATOR**

*Stability of agrochemicals with respect to pH of carriers and diluents*

Chemical name	Common name /Rate of hydrolysis time for 50% to decompose Trade name ..... (T 1/2) and comments	
Acetphate	Orthene	pH 3 = 3 days, pH 9 = 2 days.
Alphacypermethrin	Allethrin and others	Hydrolyses in alkaline media.
Bacillus thuringiensis	Various	Stable between pH 4 and pH 7.
BT var Israelensis	Bactimos	Incompatible with alkaline conditions. Stable pH 4 to pH 7.
Bendiocarb	Ficam and others	pH 7 = 4days, pH 9 = 45 minutes.
Benomyl	Benlate	pH 6 = 22 hrs., pH 6.5 = 12 hrs., pH 7 = 2.5 hrs.
Captan	Various	pH 4 = 32 hrs., pH 7 = 8 hrs., pH 10 = 2 minutes.
Carbaryl	Sevin, Sevin XLR	pH 7 = 7 days, pH 9 = 3 hours.
Carbofuran	Furadan and others	Performs best at pH 4 - 6, hydrolyses in alkaline conditions.
Cartap	Padan	Stable < pH 6, hydrolyses slowly at 7 and is instantly hydrolyses in alkaline solution.
Chinomethionat	Morestan	pH 4 = 10 days, pH 7 = 80 hrs., pH 9 = 3 hrs.
Cypermethrin	Cymbush and others	pH 9 = 35 hrs. Optimum = pH 4
Diclofop	Hoegrass	pH 7 = 32 days, pH 9 = 12 hrs.
Difenzoquat	Avenge	Alkaline conditions cause precipitation.
Dimethoate	Various	pH 2 = 21 hrs. pH 6 = 12 hrs., pH 9 = 48 mins. The presence of iron accelerates decomposition.
Disolfoton	Di-Syston	pH 5 = 60 hrs., pH 6 = 32 hrs., pH 9 = 72 hrs.
Ethoprophos	Mocap	Rapid hydrolysis at pH 9.
Fenvalerate	Sumicidin	Optimum stability pH 4.
Glyphosate	Roundup & others	Stable at pH 2.5
Iprodione	Rovral	Rapid chemical breakdown, pH 7 x 1+ days, pH 9 = less than 1 hour.
Malathion	Various	Hydrolyses rapidly above pH 7 and below pH 5, iron will catalyze decomposition, pH 8 = 19 hrs.
Omethoate	Folimat	pH 4 = 100 days, pH 7 = 17 days, pH 9 = 28 hrs.
Oxamyl	Vydate	pH 7 = 8 days, pH 9 = 3 hrs.
Paraquat	Gramoxone & others	Rapidly hydrolysed under alkaline conditions.
Phenmedipham	Betanal	Hydrolyses rapidly; pH 7 = 5 hrs., pH 9 = 10 mins.
Propoxur	Baygon	pH 7 = 90 days, pH 9 = 30 hrs., pH 10 = 40 mins.
Pyrethrins	Various	Rapidly hydrolyses under alkaline conditions.
Terbufos	Counter	Hydrolysed under alkaline conditions.
Thiometon	Ekatin	Hydrolyses easily under aqueous conditions.
Thiodicarb	Larvin	Stable at pH 6, rapidly hydrolysed at pH 9.
Triazophos	Hostathion	Degrades by alkaline hydrolysis.
Trichlorfon	Dipterex	pH 6 = 90 hrs., pH 7 = 6 hrs., pH 8 = 1 hr.



# SICO PENETRATOR

## *Agricultural spraying water conditioner - Technical literature*

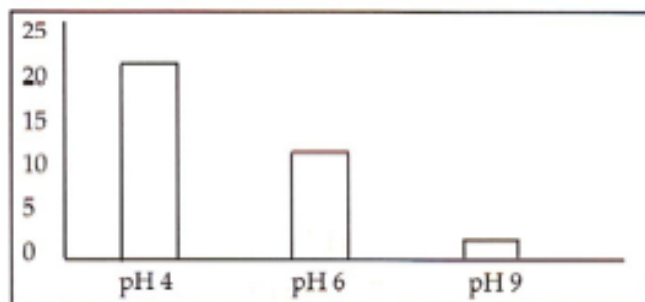
The performance of some agrochemicals, foliar applied fertilisers and micronutrients is impeded when mixed in water that is either alkaline, hard, brackish or water that is contaminated with insoluble deposits.

SICO PENETRATOR is a new farm tool for the treatment of water to be used in horticulture and agriculture. SICO PENETRATOR is designed to combat medium and high pH water and for neutralising unwanted ions such as calcium, magnesium and bicarbonates. By lowering the water pH the effectiveness of many fertilisers and pesticides, which in turn can be alkaline, will be very much improved. A great many agricultural pesticides and fertilisers are alkaline by nature and are prone to precipitate or degrade by rapid hydrolysis in the spray tank if the water is of a medium to high pH. Compatibility complaints and problems of poor performance are also commonly associated with poor water. Alkaline materials have a low rate of foliar penetration. SICO PENETRATOR reduced the risks of poor performances, improves compatibility and enhances foliar penetration.

### **Effect of pH**

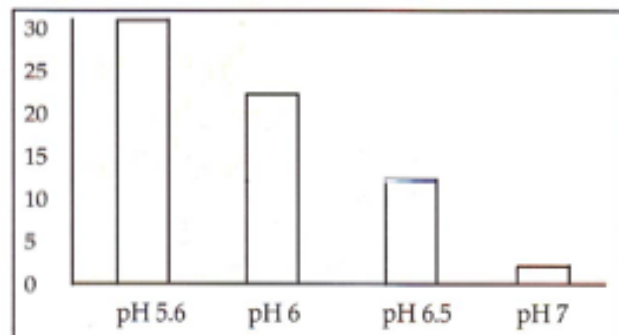
In such conditions, some expensive agrochemicals and fertilisers are prone to rapid hydrolysis and precipitation, resulting in poor performance due to loss of active ingredients particularly when multi product tank mixes are required. Pesticides can quickly degrade and this is measured by the time taken for 50% of the active ingredient to be broken down. This is called the "Half-life". Three examples where pH of the spraying water has a marked effect on activity are shown for dimethoate (table 1), benomyl (table 2) and captan (table 3).

**Table 1: Effect of pH on Half-life in hours of Dimethoate.**



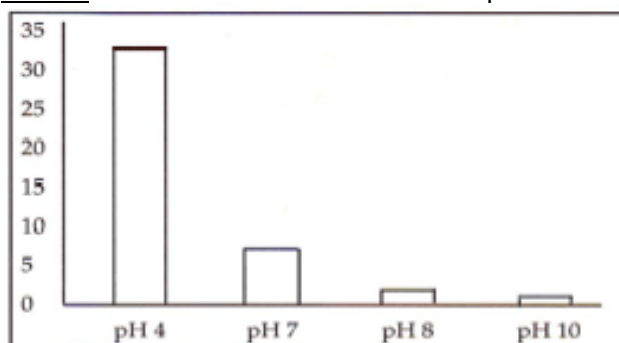
As can be seen from this table (1), while the pH is low, the rate of degradation is relatively slow. However once the pH starts to increase, the timescale becomes more critical so that at pH 7 50% of the active is lost within 1 hour. In practical terms, once the chemical is in the sprayer, a 1 hour delay will lead to half of the activity, whilst a 2 hour delay will result in a further halving to 25% of the initial potential effectiveness.

**Table 2: Effect of Half-life in hours for Benomyl**





**Table 3:** Effect of Half-life in hours for Captan



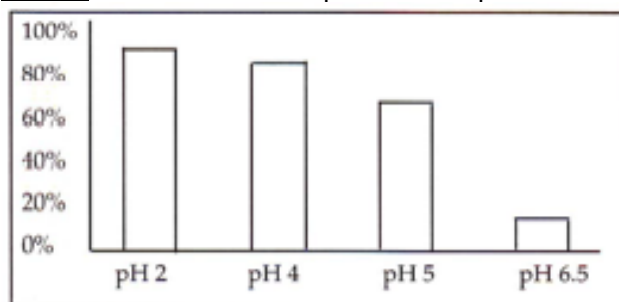
Half-life of Captan at pH 10 is 2 minutes and at pH 8 a matter of 2 1/2 hours.

Not only can pH have an effect on the stability of products, but it can influence their uptake by the plant through the leaf. Most foliar nutrients are taken into the plant more rapidly using a spray water of lower pH.

A number of research workers have looked at the rate of absorption using radioactively labelled nutrients (Swanton & Whitney, American Journal of Botany; Vol. 40).

In this particular case, phosphate fertiliser was used (table 4).

**Table 4:** Relative leaf absorption of Phosphate for differing pH of spray solution



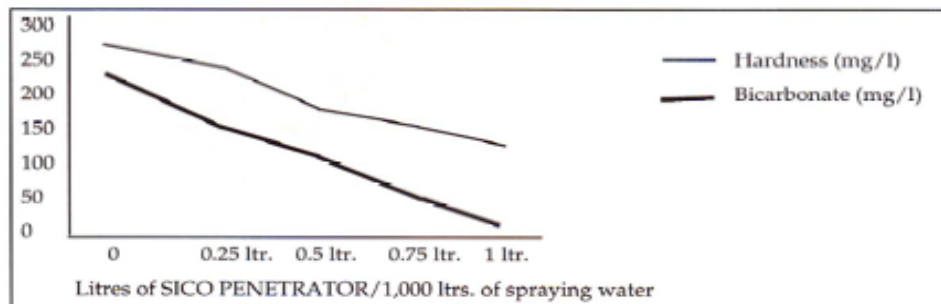
Measurements were taken after a predetermined time to record how much phosphate had been absorbed by the leaves and translocated away from the initial site of application. The effect of lowering the pH can clearly be seen and it can be argued that reducing the pH to below 4 is not of practical significance.

### **The importance of cations and their effective removal**

It is important to appreciate that the activity of some agrochemicals is affected by the presence of Calcium, Magnesium and Bicarbonate ions associated with hard water. Whilst the pH may also be high is not enough to just acidify the solution and many acids such as a propionic acid reduce the pH, but do not isolate these unwanted ions. As a result they are ineffective as water treatment chemicals. SICO PENETRATOR contains specific ingredients which are able to remove these unwanted cations and so often the spraying water prior to the addition of sensitive agrochemicals. Table below shows how the addition of SICO PENETRATOR reduces these 2 important factors - see table 5.

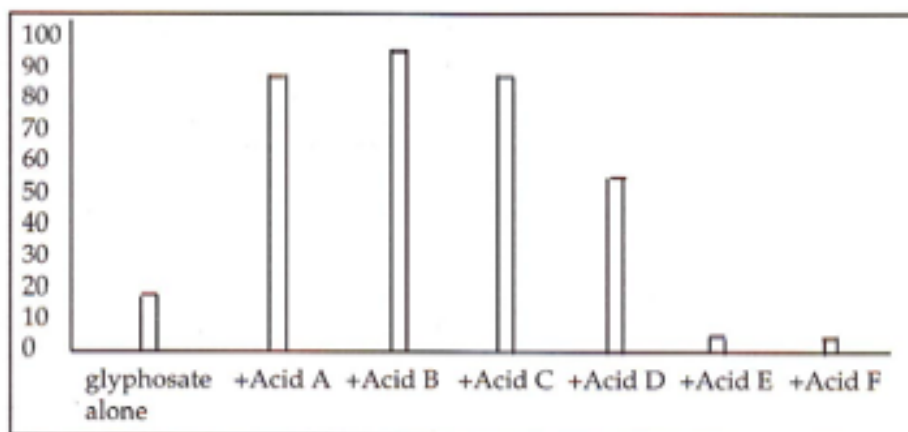


**Table 5:** Changes in water "hardness" and bicarbonate content



### **The herbicide glyphosate is a case in point**

Many workers have established that the potential activity of glyphosate is reduced in the presence of calcium ions. Turner & Loader (1978) showed that where antagonistic calcium ions were present, glyphosate was only 16% efficient from its theoretical 100%. As the calcium ions were immobilised the potential activity returned. Only certain acids were capable of immobilising the unwanted ions.



Acid A forms part of the formulation of SICO PENETRATOR whilst the poorly performing Acid F (propionic acid) is often used. SICO PENETRATOR also contains specific sequestering agents which will further immobilise the unwanted ions and so protect the potential herbicidal activity.

### **What is SICO PENETRATOR?**

Unlike adjuvants, SICO PENETRATOR DOES NOT increase the activity of the various agrochemicals with which it is mixed. By treating the water, it ensures that any antagonistic constituents that may be present are removed or neutralised before the agrochemical is added to the spray tank. In this way it enables the agrochemical to reach its full potential activity.

SICO PENETRATOR is a low cost spray treatment water additive that contains:

- Complexed acidifiers to reduce pH and hydrolysis.
- A long chained polymer based water softener.
- A sequestering agent to isolate cationic contaminants.
- Buffering agents to improve tank mixing compatibility.
- A pH colour reagent to indicate the actual pH of the spraying water, which enables the appropriate addition to be added.

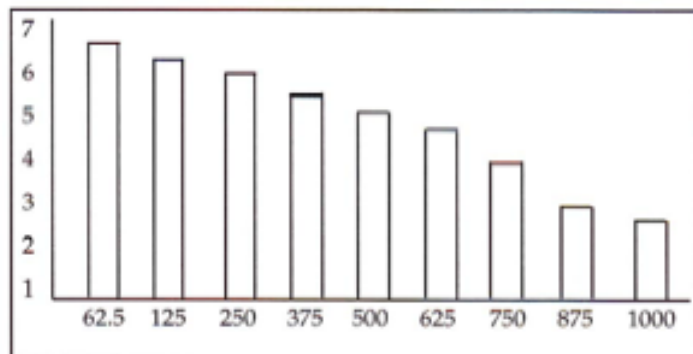
The amount of SICO PENETRATOR required will depend upon a number of factors including the starting pH, the hardness of the water and the desired finishing pH.

The table (6) below shows the typical amounts required for a medium hardness water with a starting pH of 7.5.





**Table 6: Effect of SICO PENETRATOR on spraying water pH**



It is not always possible for a farmer to access such complete data so SICO PENETRATOR has been formulated with its own built in pH indicator which will give colour changes at a number of defined pH values. These colour changes can either be observed in the spray tank itself, as the SICO PENETRATOR is gradually added to the water, or test kits can be supplied so that small samples can be checked prior to spraying. All assessments should be made before any agrochemicals are added as they may mask colour changes.

**SICO PENETRATOR: Test kit instructions:**

- Take a 1 ltr. sample from the water supply.
- Add 1 or 2 drops of SICO PENETRATOR to the water to obtain an initial colour change and pH indication.  
Using the pipette supplied add 0.5 ml of the red coloured SICO PENETRATOR to the water.
- Continue to add measured quantities of SICO PENETRATOR to the water sample until the required final colour change is reached.
  - At pH 7 and above, the water colour will change to BLUE.
  - At pH 5.2 and below, the water colour will change to GREEN.
  - At pH 3.6 and below, the water colour will change to YELLOW.

The optimum pH of the final mix (including agrochemicals) should be 4.5 - 5.5 for improved tank mixing and foliar penetration. Whilst the colour change indicator will give a guide to pH it is not possible to supply a simple farm test kit to measure cations and hardness. Where it is envisaged that these factors are a problem, then we are able to offer a comprehensive independent laboratory test which includes:

- Initial analysis of the water as received from the farm and final analysis of water after the addition of SICO PENETRATOR has reduced the pH to approximately pH 5.
- The following factors are taken into consideration: pH, Carbonate levels (mg/l) (it is expected that carbonate levels will only be detected in very hard water areas where the pH is over 8), Bicarbonate levels (mg/l), Hardness (mg/l, by EDTA titration), Amount of SICO PENETRATOR added.

**Typical application rates**

Each 1 ml of SICO PENETRATOR required to obtain a pale green/yellow in the sample water equates to 1 ltr. of SICO PENETRATOR in 1,000 ltrs. of spray water.

	Soft water	Medium / Hard water	Hard water
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N.B. Check water samples regularly as water pH can sometimes vary. Always add SICO PENETRATOR to spraying water before addition of agrochemicals and fertilisers.