

# CANTINAtalk

MAGAZINE FOR SERIOUS GROWERS

ISSUE 9 2010

## MILDEW

The continuing story



## Plant HORMONES

Function and effect



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Mini Grow



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# HOTalk:

Finally we can say goodbye to winter. No more snow, no more ice, and no more salt shortage.... ah WELCOME to spring! Flowers start flowering again, trees start forming their leaves and the CANNAtalk comes with a whole new edition!

Yes you read it correctly, we have totally changed the CANNAtalk. Most of the designs have completely changed! You might have seen it on the cover already, if not, you will definitely see the changes further on in the magazine. Hopefully you will enjoy the new issue. We are always interested in your opinion! So please send us an email through the website [www.cannatalk.com](http://www.cannatalk.com) or fill out the answering card and give your opinion!

In this issue we have two CANNA Research articles for you. The first research article can be found on the next page and informs you about plant hormones. You might have the impression that only women deal with hormones, but less is true. The second research article you can find is about mildew. Yes again this fungus, there is so much we can tell you about and many growers have problems with this fungus that is why we want you to know everything about mildew.

In this issue we will also tell you everything about growing cucumber(s) in the mini grow section. In the section 'what's happening' you can find the extreme sport snow kiting and in "what's new" we tell you everything about the improved CANNAZYM. What didn't change is the puzzle, the growers tip, panic Pete and last but not least the grower's talk; from a woman this time! We hardly hear from the female growers and that is why we want you to hear from them as well.

Rest me only to say, please sign up as a CANNA family member! As a member you will receive bi-weekly a CANNA newsletter with all the latest developments around CANNA and you will find a research article with every newsletter. But the newsletter is not the only advantage of being a member! You are also able to download the CANNA leaflets, infopapers and you can even download the CANNA Calendar 2010! For more information please visit our website [www.cannatalk.com](http://www.cannatalk.com).

The more you read the more you know!

Karin

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# PLANT HORMONES

## FUNCTION AND EFFECT

HORMONES ARE ORGANIC MOLECULES THAT CAN INFLUENCE THE PHYSIOLOGY

OF PLANTS AND ANIMALS, EVEN AT LOW CONCENTRATIONS. HORMONES PLAY

AN IMPORTANT ROLE IN THE GROWTH AND FLOWERING OF THE PLANT, AMONG

OTHER THINGS. THIS ARTICLE EXPLAINS BRIEFLY HOW PLANT HORMONES WORK

AND HOW THEY ENSURE THAT PLANTS GROW AND FLOWER.

Hormones are produced by and transported around the entire plant. Put simply, hormones are like signals that can be sent and received throughout the entire plant. So a leaf can transmit a signal to the end of the stem telling it to form flowers for example. The most well-known plant hormones are auxin, gibberellin, cytokinin, ethylene and abscisic acid (see figure 1). It has also been demonstrated that brassino-steroids, salicylates and jasmonates function in a similar way to hormones. Hormones can also be found bonded to sugars or amino acids. In this form they are inactive and serve as storage. These hormones can be released again and become active under the influence of gravity or light for example.

## Auxin

In the 1880s, Charles Darwin and his son Francis conducted experiments that finally confirmed the existence of plant hormones. They experimented with oats and the influence of light on the direction of growth. These experiments demonstrated the role of auxin. Auxin is a hormone that is produced in the plant's growing tips both above ground and in the roots. It influences water absorption, cell division and cell stretching (it softens cell walls), among other things. Because auxin promotes the formation of roots on stems it is used in a variety of forms in rooting hormones.

Experiments carried out by CANNA have shown that the effect of administering auxin depends very much on the concentration and method of application used for each plant type. With weak concentrations, flower formation is promoted slightly and ripening takes longer. With high concentrations there is an inhibiting effect on growth accompanied by deformities and tumour-like symptoms. Auxin produced in the growing tips of plants is capable of inhibiting the development of side shoots. This symptom is known as apical dominance. Removing the main growing tips stops this inhibiting effect and allows side shoots to develop, eventually resulting in a broader, bushier plant. If you only plant a few plants per square

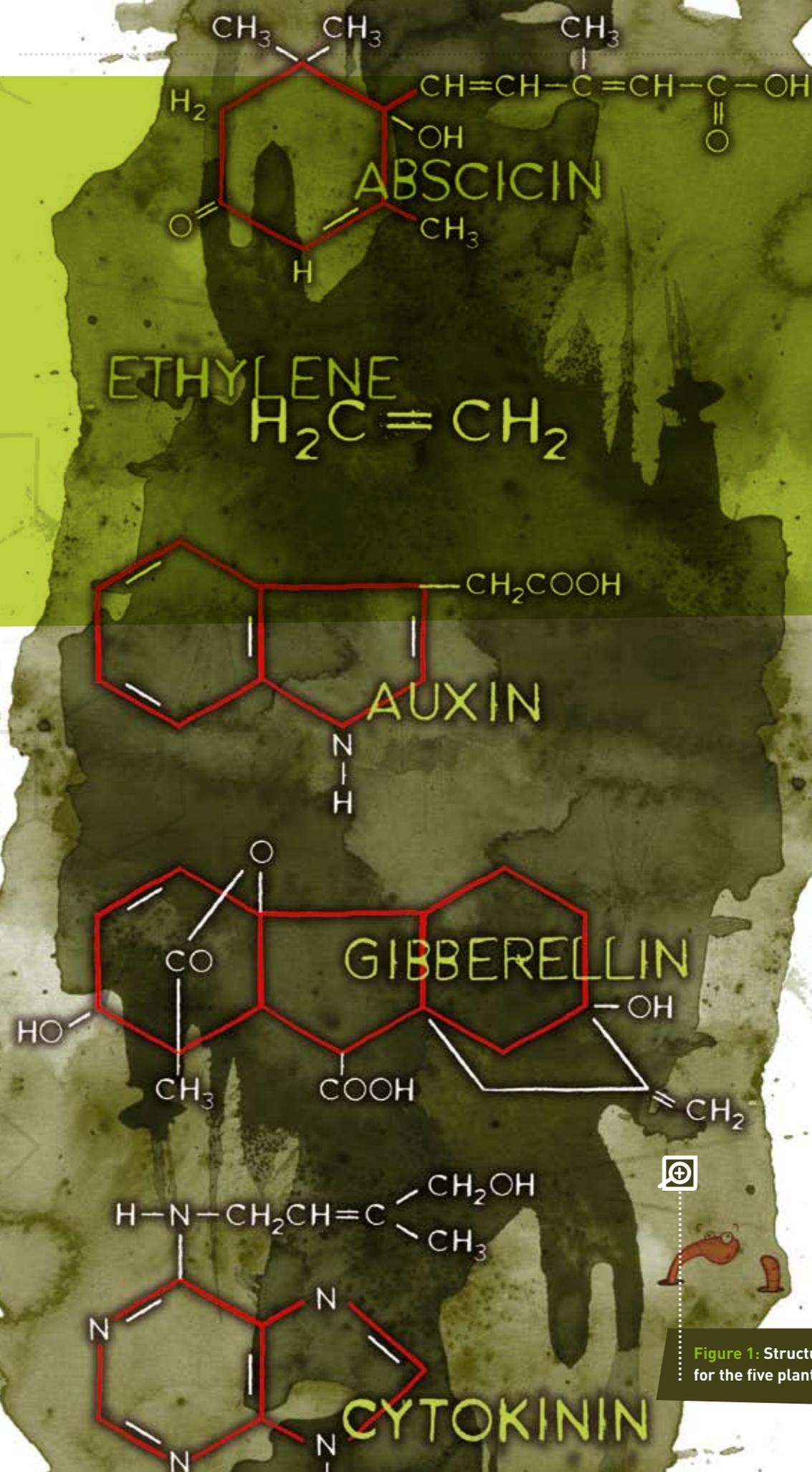


Figure 1: Structural formulae for the five plant hormones.



Photo: CANNA Research: Stem that has torn open because of growing too fast after gibberellin was administered.

metre, it's worthwhile removing the tops since this makes it possible to use the light better. You also need to remove the tips regularly to achieve a good mother plant with a lot of side shoots.

## Gibberellin

Gibberellin was first isolated in 1935 in Japan by Yabuta. The gibberellin was acquired from a fungus that had been causing reduced productivity for Japanese rice farmers for centuries. The gibberellin initially caused better growth but later in the season it caused sterile fruits.

Generally speaking, gibberellins work as growth accelerators, causing cell stretching and cell division. They ensure that seeds germinate and that flowers form in plants that need long days. Gibberellin is often used in the cultivation of fruit to help unfertilised pears and apples to mature fully.

Administering gibberellin to short-day plants, or autumn flowerers as they are also known, very quickly produces clear results even at low concentrations. The plants become light green in colour and stems split open because of the fast growth (photo 1). The plant's speed of growth can reach 10 cm per day!

Administering gibberellin during the vegetative phase will delay and slow down flowering. For short-day plants, gibberellin has a similar effect to testosterone in humans. It stimulates the formation of typically male organs and taller plants, longer internodes and male flowers in dioecious plants. When pollen from these flowers is used to fertilise female flowers, the seeds created always produce female plants. Certain environmental influences can also cause the production of extra gibberellin. Plants will produce more gibberellin under poorly lit conditions, which causes them to become tall, sparse and lanky.

## Cytokinin

The action of cytokinin was first demonstrated in 1913. 30 years later, it was discovered that a natural substance present in coconut milk was capable of helping plant cells to multiply. Cytokinin is the hormone responsible for this.

Cytokinin is known as the hormone responsible for cell division. It stimulates the metabolism and the formation of flowers on side shoots, and as such it is a counterpart to auxin. Cytokinin is most concentrated in the youngest parts of the plant, such as the seeds, fruits, young leaves and root tips. A high concentration of cytokinin in organs or tissues stimulate the transport of sugars to those organs or tissues. Administering cytokinin leads to a greater leaf surface area and faster flower formation. However, the time at which flowering finishes remains comparable to that in untreated plants.

Cytokinin can be seen as a counterpart to gibberellin in this respect because it stimulates the formation of female flowers on male plants.

## Ethylene

The practical application of ethylene dates back to the time of Ancient Egypt, when figs were scored to make them ripen faster. In 1934, it was discovered that plants produce ethylene themselves, which enables them to regulate fruit ripening.

Ethylene is the least complex plant hormone from the molecular point of view and is produced by all organs. It is a gaseous hormone which is transported via the spaces between plant cells. It is responsible for fruits ripening, inhibiting lengthways growth and causing leaves to be shed.

Ethylene promotes flower formation in certain types of plants such as pineapples, mangoes and lychees. Administering ethylene results in smaller plants and flowering finishes a lot quicker. The flowers 'ripen' too quickly and consequently remain small.

Because plants can be very sensitive to ethylene, the concentration is expressed in parts per billion parts of air (ppb). Concentrations of just 10 ppb can cause abnormalities in tomatoes. In situations where ripening flowers come into contact with young plants there is a risk of accelerated ripening in the young plants. The ethylene that is produced can reach the young plants via the air. Ventilating occasionally (once daily) will remove any ethylene that has accumulated. Higher concentrations of ethylene cause leaves to turn yellow immediately.

Ethylene can also accumulate around roots if they are wet for too long. This can lead to leaf chlorosis, stem thickening, leaves bending towards the stem and increased susceptibility to diseases.

In situations of stress, such as disease or damage to the plant, the plant produces more ethylene, which causes it to remain smaller and finish flowering faster.

Mechanical stress such as air movement can also cause the plants to produce extra ethylene, which will result in smaller plants with thicker, sturdier stems. If fans are placed too close to plants, they will cause stress and this will adversely affect the yield.

## Abscisin

Abscisin was first isolated in 1963 and its name is derived from the Latin word *abscissio*, meaning 'breaking off'. This is because people thought that abscisin was responsible for the breaking-off (shedding) of leaves and fruits, however, it was later shown that ethylene in fact plays a much more direct role in this process. Abscisin is produced in the chloroplasts of older leaves and in fact has both inhibiting (growth) and stimulating (protein storage) characteristics. When there is a large





supply of abscisin to the growing points of the stem and roots, cell division stops and the plant enters a rest period. Abscisin is an important hormone as far as situations of stress are concerned. It is responsible for closing the stomata when there is water stress due to prolonged high temperatures, low atmospheric humidity and an EC in the feeding medium that is too high for example.

## Flower formation in short-day plants

Although a lot of research has been done into the transition from growth to flowering in plants, it is still not clear exactly how this mechanism works. In the case of short-day plants, the formation and development of flowers depends on the length of the night in particular. Short-day plants will flower when the night-time period is longer than 12 hours. However, it is important that it is really dark during this period because the plant is only sensitive to the period of darkness and not the period of light. This is measured in the leaves, which then send a signal to the ends of the branches instructing them to form flowers. The hormone that sends this signal is called florigen. So it is theoretically possible, for example, to use material from flowering plants to stimulate other plants to flower under 18 hours of light. Different hormones play an important role in the phase following the first growth of flower buds. Cytokinin and auxin play an important role in the further formation and growth of the flowers, for example, while abscisin and ethylene are important during ripening.

## Using hormone preparations

If you want to experiment with plant hormone preparations, pay close attention to how, when and how much you use. The final effect will depend on factors such as the time of administering (which phase, which time of the day), the route chosen for administering (leaves or roots) and the concentration. For example, administering auxin depends very much on the concentration used: weak concentrations stimulate root growth while strong concentrations cause extra ethylene production, which causes the plant to finish flowering faster.



a word from  
a GROWER

# GROWERS

# TALK

Hi there CANNA,

I've been reading CANNAtalk from the beginning and I must say: I'm loving it! It's informative and fun to read. The only thing I'm missing out on, is a word from a female grower. They are also out there you know!! That's why I decided to write you. To hearten all those female growers out there.

My experience in growing started out about 5 years ago. Fed up with all the high fruit and veggie prices at Asda's I decided to grow my own. I started out with tomatoes as I figured that little could go wrong cultivating tomatoes. Boy, what a false assumption.... Out of my 5 plants, I could only harvest like 10 really small tomatoes. This did not discourage me, in fact it made me even more determined to do it better next time.

Instead of asking my family and friends for some advice, I surfed the net to collect all information I thought I needed to make my next grow a huge success. This is also when I discovered CANNA's website. The thing I found very useful, is that they had the possibility to create my own grow schedule. So that's what I did.

I decided to give my tomatoes another try, using CANNA's Terra potting mix and nutrients. I only bought the nutes, as I thought the additives were only a slick marketing trick and not really needed to let my tomatoes grow. Boy, was I wrong again! Although I could harvest a lot more tomatoes this time, it still wasn't all satisfying to me.

So the next grow of tomatoes I made sure I had all the products CANNA prescribed on my shopping list. And I must say, it really paid off! At harvest time I could collect more tomatoes than I could possibly eat myself. I finally did it!!

After growing tomatoes, I also grew my own peppers,



both sweet and chilli, cucumbers, basil but still using CANNA. I did also switch growing methods in the mean time. I'm now growing on coco, and still achieving great results!

So thank you CANNA!

You can even make an experienced grower out of a woman!

Cheerio, Anne





# What's NEW

## NEWS from CANNA Research: IMPROVED CANNAZYM!

Of course, our CANNAZYM didn't really need any improvement, because it was already top of the bill. But the CANNA Research department can't resist a challenge, and they have now come up with a version that is even better.

CANNAZYM still takes care of dead roots and prevents diseases from taking hold – none of that has changed. What has changed is that the new version has an even higher concentration of enzymes, producing increased enzyme activity in cellulose, while the response interval for function has been reduced. In plain English, this means that it works better and faster! But you still need to give the bottle a good shake before use.

It is not only the composition that has changed, CANNAZYM also looks slightly darker. With the old formulation, the colour told you how old it was – the lighter the colour, the older the product. The colour is more stable now, so you can't tell its age any more. But don't worry, the shelf life has been improved too. It can now be kept for up to 24 months!

### Storage conditions

As you know, the storage conditions do affect the product. The best way to store CANNAZYM is in a closed bottle and a dark environment, at a temperature between 9°C and 21°C. However, if the new product experiences warmer conditions (up to +40°C) or cooler (down to -30°C), it will not be affected immediately! The improved CANNAZYM can withstand a broader range of temperatures. CANNA Research have really done their homework!!

The new CANNAZYM formulation is available from your local hydroponic store right now. So give your plants the treatment they deserve – improved CANNAZYM! However, if you still have some of the old formulation of CANNAZYM left over in your cupboard, it's still good and you can still use it up. Stores will not take your old CANNAZYM back.



Quality proves itself!

CANNA  
The solution for growth and bloom

Extreme temperature protection

More concentrated



Better shelf life

NEW FORMULA

Dark colour





# MILDEW

## THE CONTINUING STORY

OIDIUM (PART II) BY IÑAKI GARCIA

In the last issue, I talked about some of the oidia that can attack your plants. This time, I would like to discuss one oidium in particular, the fungus *leveillula taurica*. This oidium differs from the others in two main respects: while *s. macularis* and *t. roseum* only penetrate the surface layers of the plants, *l. taurica* penetrates further and colonizes deeper areas. The result is that when you run your finger over the characteristic surface 'powder', the residue does not come off altogether (as it does with other types of oidia) or leaves a mark on the leaf. The second difference is that, whereas the conidiophores (the parts of the mycelium in which the reproductive spores, or conidia, are located) of the fungi *s. macularis* and *t. roseum* grow on the surface of the mycelium produced, the conidiophores of *l. taurica* emerge through the stomata of the plant, which are located mainly on the back of the leaves. The symptoms of *l. taurica* vary greatly, depending on the species on which it is growing. Under the microscope, *l. taurica* can be distinguished from *s. macularis* by the morphology of the conidia and conidiophores, and by the emergence of the conidiophores through the stomata. Remember that the stomata are mostly located on the back of the leaves, so you might notice a whitish felt running round the leaf. Very little information is available on the factors that affect this species in hop plants. Although this phytopathogenic affects around 700 different species, the principal studies carried out have been on hop plants.

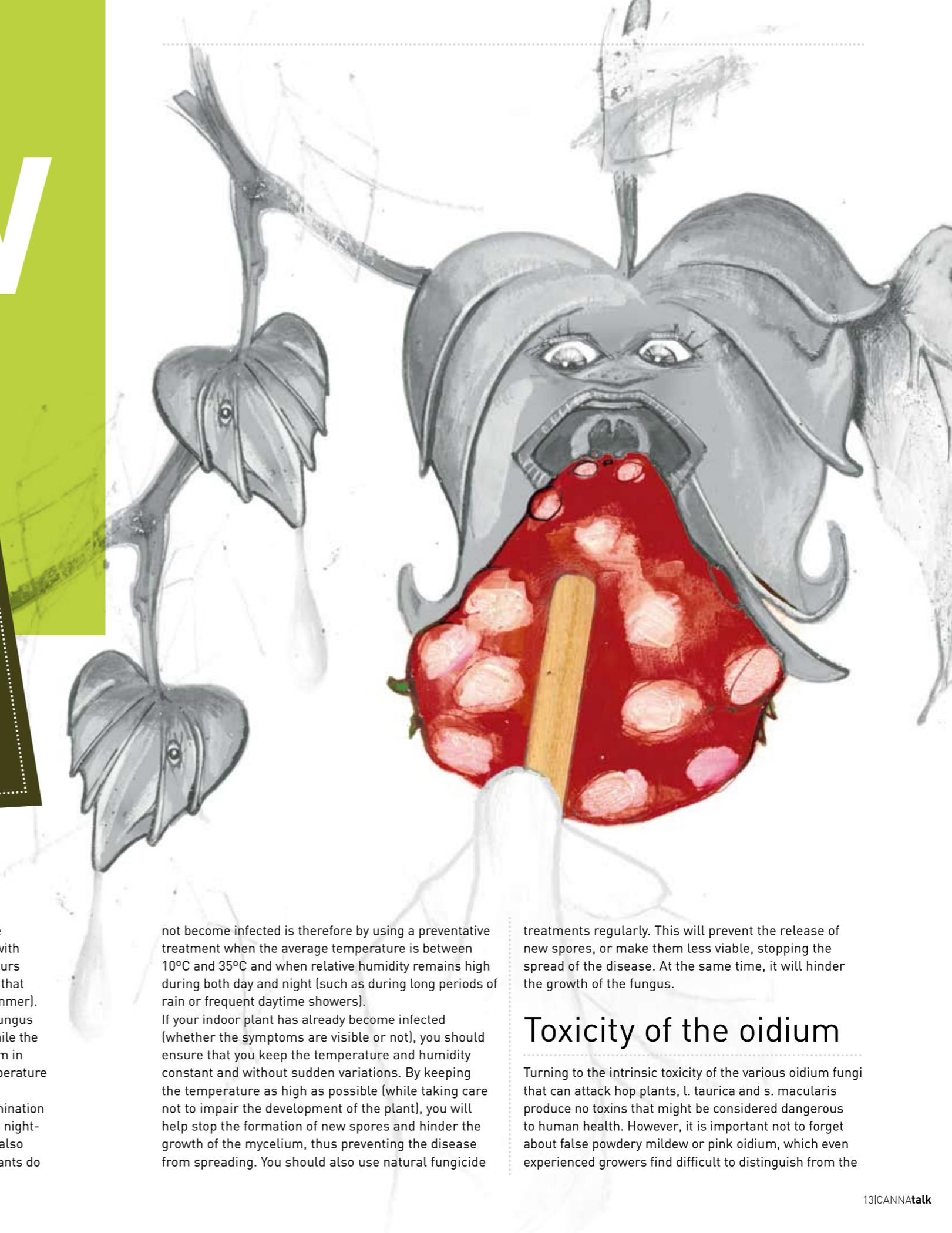
These studies of *l. taurica* in hop plants have observed that the conidia germinate at temperatures between 10°C and 35°C, with an optimum temperature of 20°C. More extreme conditions (6 hours at 40°C) significantly reduce the viability of the spores (meaning that there is a reduced chance of infection in very warm areas in summer). It has previously been noted that the development cycle of the fungus depends on climatic variations and this is also the case here. While the optimum temperature for germination is 20°C, no new spores form in infected plants at higher temperatures; however the optimum temperature for the growth of the mycelium is between 15° and 25°C. As for relative humidity levels, the most favourable conditions for germination are a day-time figure of between 85% and 95%, combined with very high night-time humidity. But although high humidity levels favour germination, they also hinder the development of the mycelium. The obvious way of ensuring that plants do

not become infected is therefore by using a preventative treatment when the average temperature is between 10°C and 35°C and when relative humidity remains high during both day and night (such as during long periods of rain or frequent daytime showers). If your indoor plant has already become infected (whether the symptoms are visible or not), you should ensure that you keep the temperature and humidity constant and without sudden variations. By keeping the temperature as high as possible (while taking care not to impair the development of the plant), you will help stop the formation of new spores and hinder the growth of the mycelium, thus preventing the disease from spreading. You should also use natural fungicide

treatments regularly. This will prevent the release of new spores, or make them less viable, stopping the spread of the disease. At the same time, it will hinder the growth of the fungus.

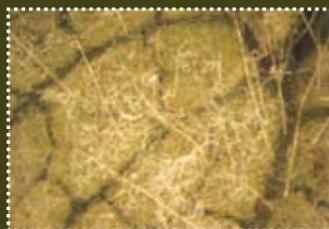
### Toxicity of the oidium

Turning to the intrinsic toxicity of the various oidium fungi that can attack hop plants, *l. taurica* and *s. macularis* produce no toxins that might be considered dangerous to human health. However, it is important not to forget about false powdery mildew or pink oidium, which even experienced growers find difficult to distinguish from the





Sphaerotheca macularis infection in strawberries.



Leveillula taurica



Pseudoperonospora cannabina



Photographs: Karna Maj

real thing. Indeed, scientific studies have been carried out to try to establish the difference between the two fungi on hops, so that they can be safely identified. This pink oidium, trichothecium roseum, produces a number of micotoxins which are highly toxic in mammals. Studies carried out in 1969 showed that extracts of this fungus at various levels of concentration were fatal to mice, rabbits and even 19-day-old pigs, as well as causing other adverse effects. Given how dangerous this fungus is, it is obviously critical to prevent the development of oidium on your plants and minimize the risk of consumption of contaminated plants.

### MILDEW

Mildew is the common term used for two fungi that cause this disease in hop plants: pseudoperonospora humuli and pseudoperonospora cannabina. The former is a major problem on hop plants and plenty of information is available on it, although there is hardly any literature on its development in hop plants, specifically.

In any case, we have a good picture of the effects of these mildews in hop plants. As the disease spreads, the leaves curl up, necrotise and eventually fall off. The parts of the mycelium containing the spores of this fungus emerge through the stomata of the plant. In good light it can readily be identified as a grey to purple felt on the back of the leaves.

Cold nights (around 10°C) with very high humidity (over 85% relative humidity) provide ideal conditions for the formation of the sporangia (the structures containing the spores). Once the spores of these fungi reach the leaves, they require very high levels of humidity or even free water (rain, dew, etc.) to germinate and penetrate through the natural gaps in the leaf (the lenticels and stomata). One feature of the spores of these fungi is that they have little hairs (flagella) which make them mobile; for this reason they are known as zoospores. The sporangia require free water to release the spores, which then move through water using their flagella. As a result, this fungus occurs only at certain times of the year and in areas with prolonged rainfall. The spores are also scattered on the wind. Spores form by night and day, but are only released during daytime.

The optimum temperature range for infection is 16°C – 22°C. Once the plant has been infected, the development of the fungus is promoted by fluctuations between daytime and night-time temperatures, the optimum daytime and night-time temperatures for the development of the fungus being 25°C and 15°C respectively.

Mildew-type fungi can be controlled using copper-based preparations, rather than the sulphur-based ones used to control oidia. Because mildew spreads to the internal layers of the plant, you should attempt to control it using fungicides with a systemic effect, such as potassium phosphite.

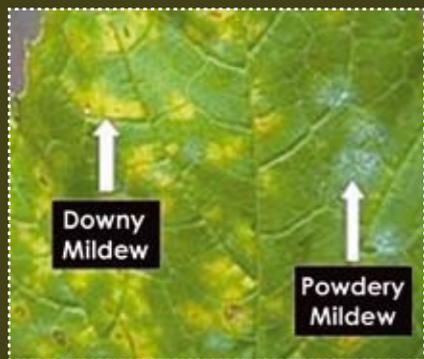
## Preparing a customised prevention strategy

When deciding on the best prevention strategy to combat the fungi that might attack your particular plants, you should consider the weak points of the attacking fungus during each phase of the infection process. As a grower, you want to keep your plants clean and free from any parasitic fungus at all times. It is therefore

essential to prevent the inoculum from reaching your plant (the inoculum is any part of the fungus that can cause an infection). We will therefore analyse the factors that cause the fungus (and its spores in particular) to visit our crops.

We have already seen that the more spores there are in the air, the greater the chance that your plant will become infected. For indoor plants, therefore, it is a very good idea to feed filtered air to the plants, rather than extracting it. Meanwhile for outdoor plants, you

LOCATION OF THE MYCELIUM	MICROSCOPIC DIAGNOSIS	SPORULATION	OTHER CHARACTERISTICS	FUNGUS
On the upper and underside of leaves. Yellow spots can appear on the upper leaf surface	The conidiophores arise from the stomata (underside of the leaf), they are wire-shaped with a conidium at the end		When you brush your finger lightly over the mycelium, it leaves a stain behind	<i>Leveillula taurica</i> Common name: powdery mildew
On the upper side of the leaf	The conidiophores arise from the mycelium (on the upper side of the leaf), they are wire-shaped with the conidia forming a chain, like prayer beads		When you brush your finger lightly over the mycelium, it disappears	<i>Sphaerotheca macularis</i> Common name: powdery mildew
On the upper side of the leaf and on stems	The conidiophores cannot be distinguished		In later stages of development, presents a pink colour. Associated with secretions from other pests (aphids, whiteflies, etc.)	<i>Trichothecium roseum</i> Common name: pink rot
Grey mycelium underside of leaves	Sticking out of the stomata (underside of leaves), branching threads with some dark areas (sporangia) on the ends		Yellow spots occur between the veins that can turn brown in colour. Causes curling of the leaves	<i>Pseudoperonospora cannabina</i> Common name: downy mildew



will need to establish the temperature and humidity ranges which lead to the highest numbers of spores in the air. These spores may originate from various sources in the vicinity, such as horticultural and ornamental plants, weeds, waste material or your other plants. They will usually be carried on the wind, though you may be responsible for transporting some of the spores yourself, on your clothes or hair, for example. Rainfall is another factor to take into account. As these two articles have shown, the spores of some fungi can be spread by water running off the leaves, whereas the same wet conditions can actively inhibit the spores of some other types of fungi from spreading. In other cases, rainfall promotes the growth of the fungi; and not just rain either, but water that is splashed or sprayed onto the leaves during irrigation, for example.

You should also bear in mind that certain environmental factors can damage the inoculum or reduce its chances of survival (for example, a temperature of over 40°C for a period of 6 hours reduces the viability of the *L. taurica* conidia). You also need to know exactly where the inoculum will germinate and develop the best. For example, we have seen that *t. roseum* begins its development on waste matter such as the sticky excretions from pests such as whitefly, plant lice, or on accumulations of pollen or dust. Other fungi, on the other hand, germinate directly on the plant. So keeping your plant free of pests that secrete sticky substances and other waste will help prevent *t. roseum* but will not help against other fungi. You should also remove any plants that are not part of your crop and could host parasitic fungi.

If, despite your best efforts, the inoculum does come into contact with your plants, all is not lost. It may still be possible to prevent the germination of the spores by altering the environmental conditions. The most important factor is humidity. For any fungi, it is vital to know what level of humidity will promote germination. Some fungi prefer pools of water while others are harmed by them. The second important factor is the temperature at which the spores will germinate. As we have seen, in extreme temperatures (at certain times

of the day in the summer or winter months), many of these fungi cannot germinate. However, in the case of indoor plants which you are trying to maintain at a mild temperature, limited action can be taken to adjust this temperature. Finally, there are many substances of natural origin that will hinder the germination of fungi, so a basic part of your strategy should include the preventative application of organic fungicides. There are also other products that rather than preventing germination, stop the fungus's germ tube from penetrating the plant. For example, some fungi take advantage of natural irregularities in the cuticle to penetrate the internal tissues. Others, meanwhile, force their way into the cuticle. In both cases, the use of oils can be helpful since they provide an extra barrier against which the fungi have to fight. There are also products that reinforce the plant's cell walls, increasing the cell's mechanical resistance. Extract of Common Horsetail (*equisetum arvense*), for example, contains silicates that perform this strengthening function.

Of course, you won't know that you have not done enough to prevent the fungus from invading and colonising your plants until the first symptoms appear. After the inoculum has penetrated the plant, it can be a long time before the appearance of the first symptoms (this is called the incubation period). During this time, the plants may appear to be perfectly healthy but the fungus is silently securing its position inside it. It is therefore important to keep using the fungicide treatments even if you can see no trace of fungus; the fact that you cannot see it doesn't mean it is not there.

Once your plant is infected, you will have to radically change your strategy, and concentrate on deciding on the best products for eradicating the pathogen or at least slowing down its development. One thing you should bear in mind is that in general, these types of phytopathogenic fungi prefer different temperature and humidity levels for germination, dispersion and growth. This explains why most fungal attacks take place during months when the weather is mild but there are major variations in temperature and humidity, such as in the spring and autumn. If your plants are already infected, therefore, you need to determine the best environmental conditions for the growth of the pathogen, and in case of indoor plants, always try to keep the temperature and humidity of the plants' environment constant, avoid sudden changes and if possible create conditions that will hinder the growth of the pathogen.

Of course, none of this will be of any use at all if you do not know which fungus you are dealing with. It is essential to identify its biological cycle and the optimal conditions for its development so that you can make life as difficult as possible for it. You can use other tactics to do this apart from fungicides (filtering the interior air, for example). If you do have to use fungicides, though (and these should preferably be natural ones), you can limit their use and save money by knowing your enemy's Achilles' heel. •

members only

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And enjoy the benefits! Get full access to all featured downloads like our leaflets and get your online questions answered faster than non-members. Need help growing your crops? As a member we give you more detailed information about grow-related subjects and you can read about the results of our CANNA Research Laboratory. Own a shop? Being a member gives you the advantage of promoting your shop on our website! Sign up today at [www.canna-uk.com](http://www.canna-uk.com) and experience our new member area.

Please visit us at [www.canna-uk.com](http://www.canna-uk.com) and check it out!



# Questions

## & ANSWERS

Letters page – our mail box has been flooded with questions, we've made a selection for you here of things we think might be of general interest. Go to [www.canna-uk.com](http://www.canna-uk.com) or to [www.cannatalk.com](http://www.cannatalk.com) and ASK!!! You know the only dumb question is the one you don't ask!

### Question

I went to your website to get myself a grow schedule for CANNA TERRA. In the final flowering phase, I should add water with an EC of 1.5. Now my question is: Do I need to water daily with an EC of 1.5 or only when I change the water? Thanks for the answer, Marco.

### Answer

Hello Marco! After week 6 the EC must be lowered again because the plant takes up less. 1.5 should do the trick, but when the leaves show burning marks then we advise to flush with only water.

### Question

Hi, I bought your CANNA PK 13/14. Do I still need to use CANNA Terra Flores or is PK 13/14 enough?

### Answer

Hello, you will still need to use CANNA Terra Flores. PK 13/14 is an additive and not a nutrient, although there is some PK 13/14 in CANNA Terra Flores as well. You need some extra during generative periods (see grow guide). PK 13/14 is basically a nutrient (so it has an EC) but you only need it for a short period of time, which is why we call it an additive.



### Question

Question for you regarding quality of water: Will using a water filter that rates 99% chlorine and 95% of sediments be good enough? Or is it much better to use an actual reverse osmosis machine? I am asking because the RO machine costs 5x as much. But if the difference is significant, I will do it. I'm growing in soil with organics. Many thanks!

### Answer

Hello, thanks for the question. These are 2 different functions. The filter can remove the chlorine in the water, while RO removes salts from the water. If toxic levels of chlorine are an issue, but the starting EC is low then the filter will do fine (sometimes just letting the tank sit full for 24 hours will also do the job as long as the chlorine has been added using the older method of chlorinating water with the gas chlorine dioxide. It is not effective if the chlorine is supplied by chloramine). If the EC of the tap water is above 0.4 or 400 ppm, then it might be a good idea to use an RO set-up and mix the RO water back with the tap water to get a starting EC of about 0.2 or 200 ppm. This will mean bigger savings over time than using straight RO water. CANNA recommends starting with no less than 0.2 or 200 ppm in source water. If the EC is much below this, use Ca15% Mg7% to bring up the start EC. Filtering out sediment is important for equipment such as drippers, lines, pumps, tanks, etc. It is also a requirement for RO since you do not want sediments blocking the RO filters or clogging up the lines and high-pressure pumps in the system.

### Question

Hi, when using the BIOCANNA nutes, I'm wondering if it's a problem when you tip the bottle upside down, that you see a thick liquid stuck to the bottom of the bottle. Is that a problem? I don't know, but I put the bottle in hot water to soften the residue, so then I can shake it up, just wondering if it makes a difference or not? Thanks

### Answer

Hello, The thick brown stuff in the bottle is known as vinasse. This holds about 50% of the nutrient load for the nutrient. It is important to shake the bottle well before each and every use of the product. DO NOT apply the vinasse to the plant as you will burn it if you are near the end of the bottle. In this case I advise you to dispose of the remainder, get a new bottle and start again. This time follow the label directions and shake well. Turn the bottle upside down, with the cap on, and shake it, which will get it into suspension faster.

### Question

Can you tell me what the pH level is for the CANNA Coco 50L bags? Does adding the nutrients (A+B) raise or lower the pH? Thanks, Jim

### Answer

Hello Jim, CANNA's Buffered Coco has an initial pH around 6.1. The tendency is for the medium to drift lower. The Coco A/B nutrients will increase the pH, but only a little. The combined effect on pH is a buffering activity that gently maintain a steady pH while allowing the plant to move soil solution pH to where it wants it at any given time in the plant's daily routine.



### Question

I am a retailer of CANNA products and would like to know the difference between CANNA Terra Professional and CANNA Terra Professional Plus. It is not immediately obvious. Thank you for your help in this matter. Kind Regards, Mark

### Answer

Hi Mark, Thank you for your question. There is a clear difference between CANNA Terra Professional and CANNA Terra Professional Plus. CANNA Terra Professional contains perlite and black peat. CANNA Terra Professional Plus does not contain perlite but bark, white peat and a small amount of COCO. Hopefully this answers your question.

### Question

Hi. This is my first time using any CANNA products. Just started 12-hour using Classic Flores with CANNAZYM & CANNA RHIZOTONIC 3 weeks ago and at week 5 will try PK13-14. I have a 4x28L pot, 50 litre Res, recirculating system with 1/3 clay and 2/3 perlite using RO water. The last flush was done at the start of the 12-hour light cycle, 3 weeks ago. What is your recommended flushing cycle for vegetative & flowering period? Is it OK to flush straight from the hose or will the chlorine be toxic to the good bugs as well? Cheers, David

### Answer

Hi David, Thank you very much for your question about CANNA Flush. Flushing is only needed when there is a visible deficiency or during the last 3 weeks of the culture. Flushing in combination with plain RO water is possible. If you Flush, throw away the drain water from that day and the day before.



# Grower's TIP #25

## Optimum pH ranges for COCO and TERRA



The 'pH' of a solution is a way of measuring its acidity on a logarithmic scale. In the abbreviation pH, the 'p' stands for Potenz (German, meaning strength), and the 'H' stands for hydrogen ion (H+). The pH value therefore shows the concentration of hydrogen ions in a solution. Both very high and very low pH values should be avoided as these are harmful to your plants. The ideal pH for plants is between 5.2 and 6.2.

Through continuous testing, CANNA Research has found that the ideal pH when growing in either CANNA Coco or CANNA Terra is slightly different.

The new advice is as follows:

For CANNA Terra  
a pH between 5.8 to 6.2

For CANNA Coco  
a pH between 5.5 to 6.2

For CANNA Hydro  
and CANNA Aqua  
the advised pH ranges  
have not been adjusted and  
remain between 5.2 and 6.2.



# Grower's

## Panic Pete



# What's NEW

# ONLINE

CANNA

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FAQ

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General

1. What is the best and easiest growing method for starters?
2. What is a substrate?
3. Why do I have to use a different nutrient for both the growing period and for the flowering period?
4. How do I know when to start giving my plant the flowering nutrient?
5. What means A & B?
6. Why are A&B not available in 1 bottle?

## FAQ SECTION

One of the newest features of the website is also the frequently asked questions (FAQ) section. As our research department often receives the same questions from over Britain, we thought to help you out and we put the most frequent ones on the website. Here you cannot only find the most frequently asked questions about growing, you can also find questions more geared towards retailers. Should your question not appear in this section and is something really bothering you, please fill out the contact form and our colleagues at the research department will try to answer it as correctly as possible and as quickly as possible. In order to do so, please provide as much information on your problem situation as possible.

Please visit our website:

[www.canna-uk.com](http://www.canna-uk.com).

## WEBSHOP

As announced earlier via our C-letter and previous issues of CANNAtalk, the web shop

will arrive soon to [www.canna-uk.com](http://www.canna-uk.com) as a long awaited extension! As a member of the CANNA family you can order the famous CANNA calendar, your own gorilla T-shirt, a DVD explaining how to grow your crops on coco and much more. A lot more reasons to join the family!! Keep a close look at the website as a launch date is uncertain.



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Calendar





# What's HAPPENING



You've probably already heard of kite surfing. But kite surfing during the winter is not much much fun, unless you can take a trip to the Caribbean. So that's why they invented snow kiting. You can snow kite on skis or on a snowboard, whichever you find more comfortable. Plus, you need a kite of course. But what is snow kiting exactly? And how does it work?

# Snowkiting

## In the beginning

It all started in the 1960s with a German guy called Dieter Strasilla. He started out gliding, which soon turned into parapenting, which then became parachute-skiing in the early 1970s. Dieter was inspired by Otto Lilienthal, another German who was the founding father of gliding. Lilienthal was also an inspiration for the Wright Brothers when they were designing the first aeroplane.

In the 1980s, snow kites thought that by crossing lake Erie in USA they had taken the sport as far as it could go. But in the 1990s freestyle snow kiting pushed back the boundaries even further. A competition circuit was set up. Since the turn of the century, snow kiting has been taking giant strides forward thanks to improved snow kite technology. Now, kilters are no longer limited to going downhill, they can go uphill, too, and they can even take off and leave the ground completely. Yes, snow kilters can fly! But not every snow kiter is a freestyler. There are still many for whom crossing a mountain plateau or deep frozen lake is still the ultimate thrill. And there are a lot of snow kiting hotspots in Europe: Norway, France and Switzerland, to name just a few. But you can snow kite anywhere with large open fields, frozen lakes, rolling hills, plateaus or glaciers – so that include many parts of the world!

## Kites

There are many different types of kites. There are foil kites or inflatable kites, and there are different sizes and shapes. There are kites for beginners and kites for advanced kilters, so there's nothing to stop you giving it a try!

The most common kites are made of foil. These are double-layered, and the side facing the wind – which is known as the 'leading edge' – is open. This way, air can fill the kite to give it its wing or foil shape. Some people also use inflatable kites. These were originally for use on water, but they do the job on the snow just as well. The size of the kite depends on both the weight of the snow kiter and the strength of the wind. It also depends if you are using skis or a snowboard. Skis are recommended for beginners as they give you more stability.

Snow kiting is not hard to learn and better still, it is even easier than kite boarding because snow is easier to stand and balance on! You also need less wind to get going, so you can use a smaller kite than for kite surfing. Jumps and turns are easier and, depending on how you land, softer. Once your kite is in the air and you start your descent, it is far easier to keep yourself on the snowboard. Many advanced kilters prefer to use a snowboard because it gives them more flexibility and ease. Probably the ultimate destination for freestyle snow kilters is Norway. The Hardangervidda glacier plateau is like heaven on earth

with so much room to manoeuvre and practice all the jumps you can imagine!

## Guillaume Chastagnol

Probably the most famous snow kiter is a French guy called Guillaume Chastagnol, who goes by the nickname of Chasta. He has not only been French national champion many times, but he was also the very first world champion snow kiter (he won this title no less than three times). He even participated in the 1998 Winter Olympics in Nagano, Japan, where he finished fifth in the snowboard halfpipe competition. As a real snow lover, he lives in the northern hemisphere for six months a year and in the southern hemisphere for the other six, so that he doesn't miss a single day of snow!! He even has his own snow kiting event called The Chastadays.

Since environmental issues are becoming more and more important lately (and why shouldn't they?), snow kiting can be promoted as an environmentally friendly sport. The only thing you need, except for your equipment and snow, is wind! You can find that everywhere and it's completely sustainable! You don't have to take the chair lift up to the top (or wait in line for a ticket) because the kite will take you up there too! On your descent, you can reach speeds as high as 100 km per hour, and there's no cop to give you a speeding ticket! You can even take off and fly! Flying as free as a bird – isn't that everyone's ultimate dream? Well, start snow kiting and it can become reality! •







# Mini GROW

In the last issue of CANNAtalk, we brought you the first article in this series, which talked about growing mini sweet peppers. We promised you more mini-crops, and this time we focus on mini-cucumbers ...because the more you know the more you can grow!!

## Cucumber

Cucumbers grow on cucumber vines, annuals with stems. The vines can either be grown on the ground or tied upright, but upright vines grow better and produce a greater yield. Cucumber vines grow in a rampant fashion, with their roots spreading very wide but very superficially. Cultivated cucumbers vines have only female flowers which turn into fruits, meaning that fructification happens parthenocarpic – without the production of seed. A lot of these mini-cucumbers carry several fruits per leaf axil. Breeders talk about single-fruited, semi-multi fruited or multi-fruited cucumbers. The fruits may be mini, but the leaves certainly aren't! Mini-cucumber plants have large leaves, which cover over the fruits. The cucumbers are just like the ones we are all familiar with, with their smooth skin. There were once also cucumbers with a bumpy surface.

## Origin

The cucumber family or Cucurbitaceae, to which gherkins, melons and pumpkins also belong, are mainly seen in the tropics. Cucumbers originate from India, from where they found their way to the Mediterranean region. Cucurbitaceae is one of the most important food-producing plant families, and was already being cultivated by the Egyptians 3000 years ago. The Romans brought the cucumber to France and for a long time cucumbers were grown in Europe as an ornamental veggie because of their bizarre shapes. The cucumber is another 'vegetable' which strictly speaking is a fruit, like tomatoes, sweet peppers and chilli peppers. Since 1960, this warmth-loving plant has been grown under glass in the Netherlands. This means that cucumbers are available all year round. The fruits can be harvested when they are dark green. But they can be yellow or white as well!

## Qualities

Cucumbers are low in calories and high in vitamin C and water, which makes them the perfect food for anyone watching their weight! Their high fibre content helps your digestion. Raw cucumber is delicious as sandwich filling, in salads or as a snack. The cucumber is the perfect vegetable for a healthy diet. Cucumbers are also very good for the skin! That's why many cosmetic products include cucumbers in one way or another.

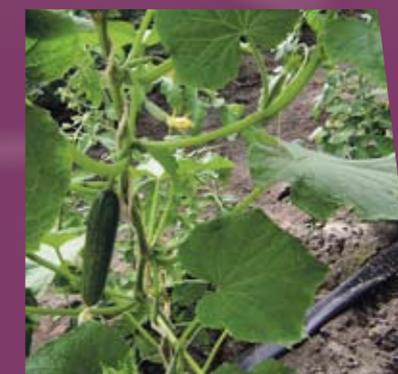
## Cultivation and cooking

To grow the best cucumbers, you'll need to consider the following:

- For lighted indoor cultivation, the temperature should be a constant 20°C.
- Do not use moist potting mix.
- Cucumbers love warmth, so be careful not to let them get cold. But also make sure you do not overdo the heating, because they can easily dehydrate.
- Cucumbers need a lot of water. But do not water the leaves, because this can cause nasty mildew. Do not let your cucumber plants stand in water – they do not like wet feet! Make sure any excess water is drained off immediately.
- Since cucumbers love warmth, it is best to grow them indoors.

It doesn't take long to talk about how to cook cucumbers: here in Europe they are eaten raw and usually sliced in salads. Cucumbers are often combined with tomatoes or lettuce, and sometimes onions or cheese. In the tropics, cucumbers are often eaten cooked and added to warm soups or stews.

## Mini CUCUMBERS!



Photographs: Anton van Dongen



## CANNAtalk

is published by CANNA International BV,  
a company dedicated to finding the best solutions  
for growth and bloom.

## CANNAtalk

is distributed through local  
UK retailers and wholesalers.  
Editor: Karin Brinkman  
E-mail: info@CANNAtalk.com  
Phone UK office: 0870 240 2991



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