

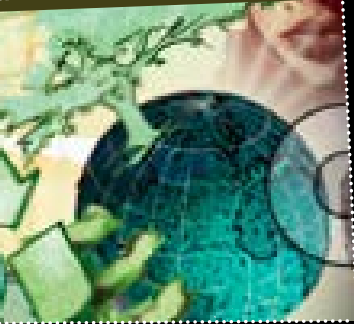
CANNAtalk[®]

MAGAZINE FOR SERIOUS GROWERS

ISSUE 37 2018

THE CHEMICAL DILEMMA

True or not?



TERRIFIC TEQUILLA

Blue spirit



CRUNCHY CELERY

Green glory



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HOTalk:

Tequila. Let that word linger for a moment, and allow all those memories to rise up to the surface... Visions of fear and loathing. Victory and regret. And endless blistering hangovers? But, you know what? You only got those hangovers because, most likely, they have been serving you the bad stuff. Good tequila is awesome and does not give you a hangover. It is full of flavor. It is a joy and yes, it does give you that 'the-world-and-the-universe-are-mine' feeling. We report on the results of all those exhaustive tests in our What's Happening section in this issue, which is an ode to the blue agave, the plant used to create this wonderful drink.

In this issue, Geary Coogler shines his bright light on the philosophical dilemma of using chemicals in growing. What are they and what do they do? Should you use them or leave them? A short guide to help you understand the chemical dilemma, which is also the title of the article.










We also take a look at the carbon cycle to get an idea of how organic matter is formed and how it lays the groundwork for humic and fulvic formation - and why that is important for your crop.

Last but definitely not least, we take a closer look at the king of crunch, celery, in Grow it Yourself. Celery drenched in tomato juice and booze can scare away a grown-up hangover. So to complete the circle, why not take a stick of celery, pour over tomato juice, add... tequila, for a delightful Bloody Juanita and enjoy it while reading this mag. Repeat as required!

Cheers,

Jeroen

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THE CHEMICAL DILEMMA



THE USE OF CERTAIN CHEMICALS IN MODERN SOCIETIES

HAS, ARGUABLY, PROPELLED THE HUMAN RACE TO

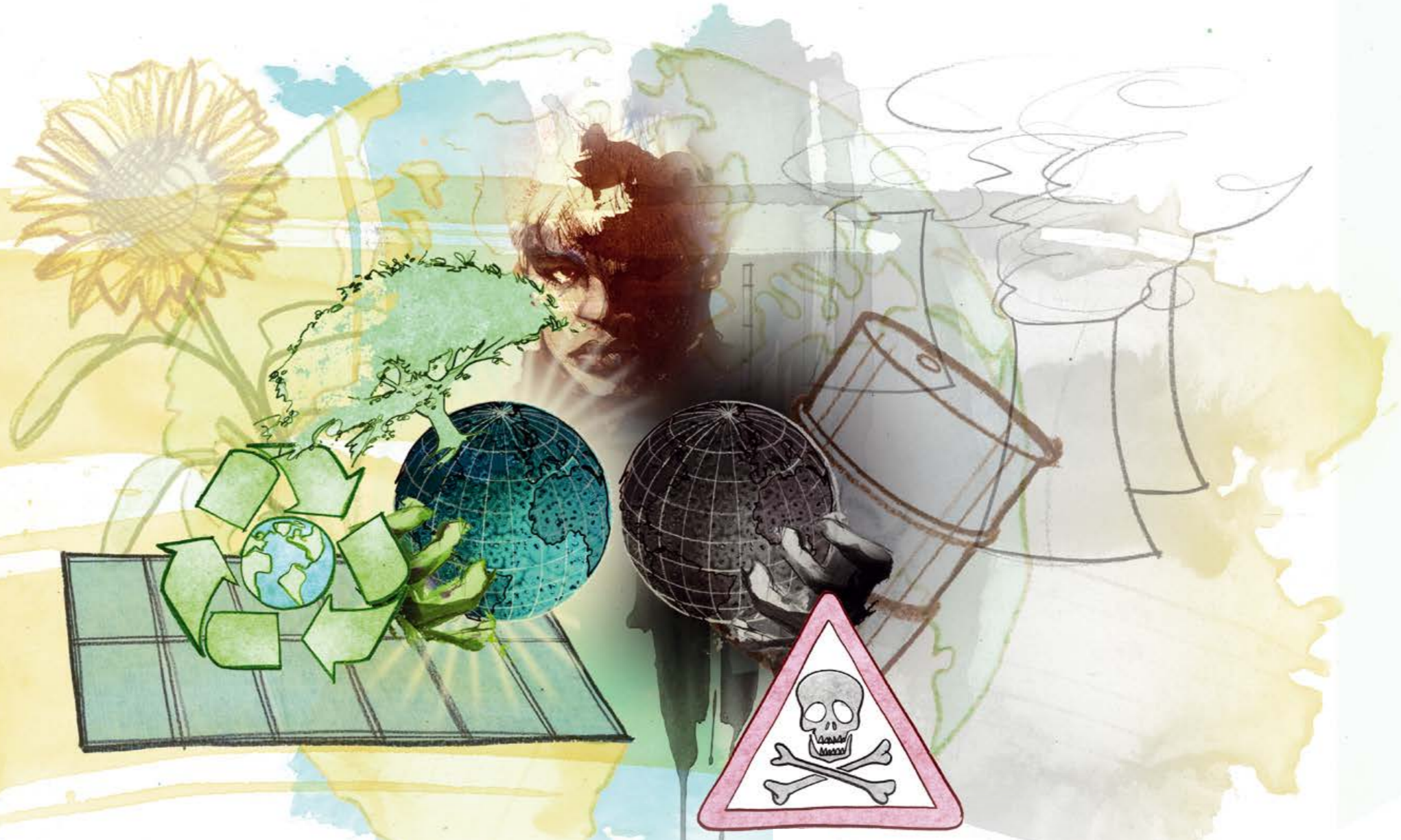
HEIGHTS THAT WOULD NOT HAVE BEEN POSSIBLE

WITHOUT THEM. IT SEEMS THAT THE CATCH PHRASE OF

VARIOUS CHEMICAL ASSOCIATIONS - LIVING BETTER

THROUGH CHEMISTRY - IS TRUE. OR IS IT?

By Geary Coogler BSc Ornamental Horticulture/Floriculture



Well, not always. The uncovering of links to chemicals that, while initially serving as a chemical path to a valuable product or end result, now show activity that harms life to many degrees. The current government of the USA takes the position that there is some line drawn someplace that serves to distinguish an acceptable amount of risk for the value obtained. More important, they take the position that this is true, not just for those chemicals that are incidental in the environment as a result of manufacturing processes in the same area, but

also to the direct materials applied to the food society eats and the direct environment in which it conducts its activities. The problem is, there is no way that the food supply could support the current populations without the advent of these synthetic materials, from the fertilizer used to grow that food through the products that protect those food stocks. Thus the dilemma: can't live with them, can't live without them. There is no way around this fact, so being smart is the first step to mitigate this issue. Educate before demonstrate, a grower must educate

themselves on all the facts of any material applied to a crop, organic or synthetic, before they demonstrate their own ignorance by incorrectly using that material in a fashion that endangers.

Crop production

When it comes to crop production, personal or commercial, organic or not organic, there are several factors that affect the ultimate need to react to an issue, but it all begins and ends with plant health. The first step in successful crop

production is the understanding of everything the plant needs at optimal levels. This includes simple things, beginning in the medium, from how well drained the medium should be, its pH and how it changes, the fertility level and ratio of the nutrients required by the plant, and how wet that medium will be held. The root system, in the vast majority of plants, is the heart of the system. It must be designed to handle correctly those characteristic for a successful medium for that particular crop. The physical design is less of an issue since most materials are known



and their properties that affect things such as drainage and water holding capacity. The chemical equation is more of an issue and sometimes a mystery. This design has to extend upward through the plant allowing for everything including temperature, humidity, light levels, activity around the crop, even onto the cleanliness of the air the plant functions in. These things, when correct, greatly decrease the need for most chemicals.

The Basic Ideas

First, there needs to be an understanding of some terms and some ideas that will be involved in this discussion. There are 3 ways to grow in the overall: Typical, Natural, and Organic. The idea behind these systems will determine the basic groups of materials used. **Typical** is the way the vast majority of growers grow. It involves using ready to go mediums, mineral fertilizers, and approved synthetic pesticides/ chemicals. In a **Natural** system, the attempt is made to use as much natural materials as possible such as natural mixes and fertilizers and pest controls that are or are derived from natural ingredients, but nothing certified organic but is mostly done organic

even though an occasional synthetic product might be used on a limited basis. **Organic** growing, in the modern era, is a certified process. Even though the end product might not go through an organic certification, all inputs are certified organic to the national definitions as issued by USDA in the USA or CFIA in Canada. These systems are in natural mediums using native methods that do not include hydroponic or hybrid systems by definition.

Mineralization

Additionally, it must be understood that with synthetic, organic, or synthetic/organic nutrient, plants only take up nutrients in a mineral or ion form. Organic molecules decompose to ions that are identical to the mineral derived versions in a process known as mineralization. These minerals form available pools that the plant can dip into when required, a reserve of ions, and pH affects which ion form these ions take. The ratio of one element to another is a ratio, and there are ratios each plant requires to be as productive as possible. Finally, most of these chemical input materials have some regulation attached, usually through the state, in some cases through the federal

THE CHEMICAL DILEMMA

government. Not all states are created equal, however, so it is important for the grower to do their homework before committing to a course of action.

So, the problem with chemicals is they are chemicals. It does not matter if they originate in an organic or a synthetic source. It is certainly true that the synthetic ones are much more numerous, come in many forms, breakdown into worse forms, and persist for much longer, but who cares if the toxin that gets them is lead exposure from high lead containing organic material, or a growth regulator that persists for years and gives you cancer. The funny thing about some issues, such as heavy metal contamination, many heavy metals are required for a plant to exist. When these are just right, no issues, and they are part of a normal degradation process and not just supplied as a mineral fertilizer. Too much and the excess is still taken up by the plant (along with non-required heavy metals) and deposited into the vacuoles of the plant cells where it accumulates, can change or combine to form toxins, and the concentration goes up over time. Then, it is available in concentrated form for consumption by the consumer or as a breakdown component of the organic process. It does not matter if this is a plant essential metal like Copper or Molybdenum, or a contaminant heavy metal like Lead, Arsenic, or Uranium.

Lurk in the mud

Chemicals are persistent in the environment. Some breakdown rather quickly into simple components that are inert and of no consequence, but some exist for years and are only diluted down. Some adhere to a soil particle or side of a container for years until a small pH change releases them. Some, like PCB's (Polychlorinated biphenyls) can lay in the mud of a creek until something disturbs the bottom and then it releases back into the environment in large amounts. Some can persist for hundreds of years, such as Chlordane (pest control from 1940 that was used to control many insects especially termites) that is now migrating from under the foundations of homes into the rivers and estuaries around the world even though it was outlawed in the late 1980's. It does not go away. The Law of the Conservation of Mass: Matter is neither created nor destroyed. All it can do is change form.

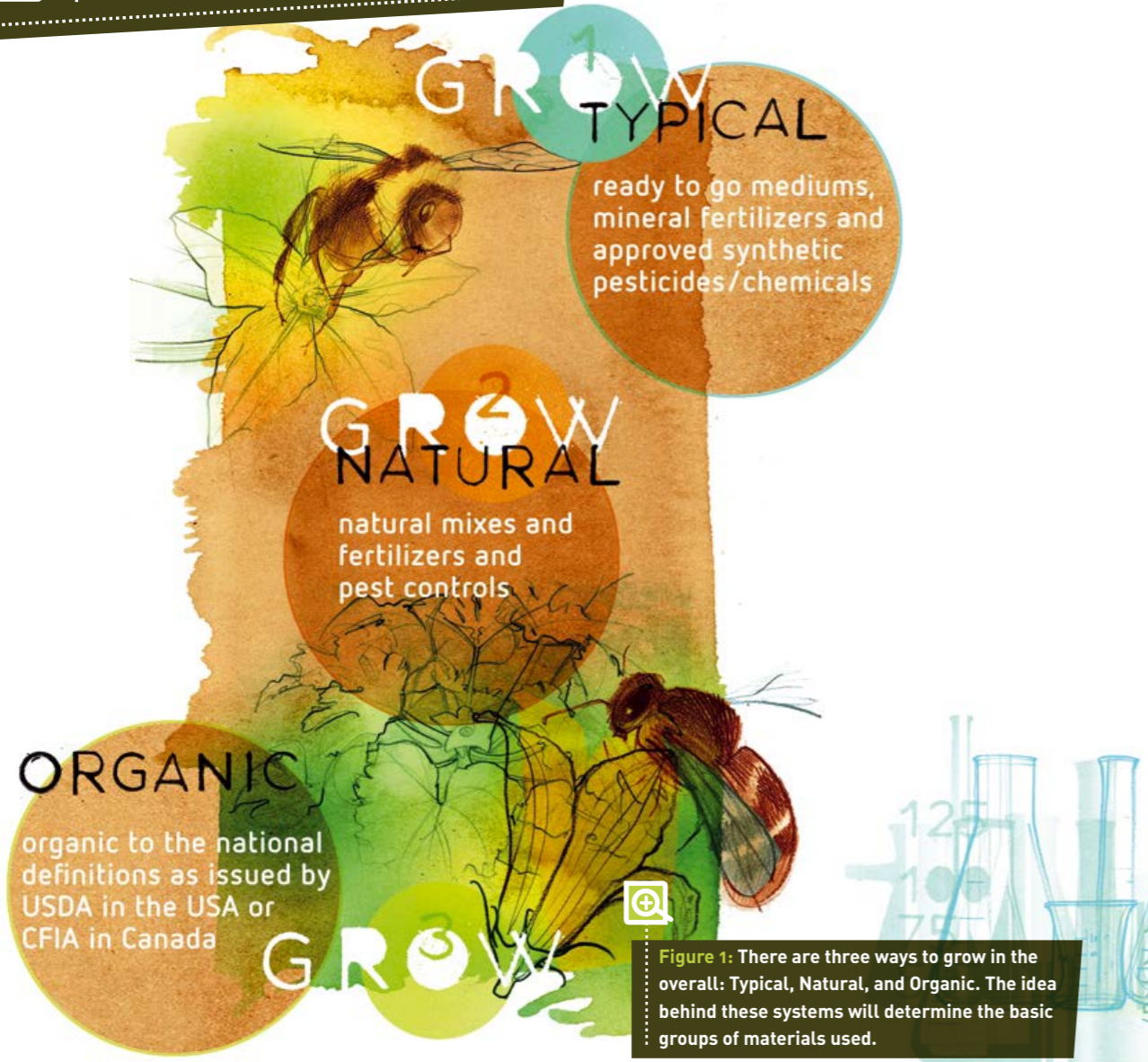
Chemicals are everywhere and in every form. Life is not possible without a very large group of many, many chemical processes occurring. Everything that exists in the world, and the world are all the results of chemical processes, past, present, and future. Chemicals are everywhere, in the building materials we use, the containers in which we grow, the medium that supports the plant, the materials we apply, and even the air in which we produce. It arises at a point of pollution, drifts in the air currents and falls to earth as a solid down wind or dissolves in the water that rains down on the gardens or moves through the soil. The chemical dilemma is what it is. The answer lies in how we deal with them.

Thoughts and Tips

No matter what the system, first thing is to have confidence in your inputs, no matter what they are input into. Materials for compost, teas, peat, processed fertilizers, pest controls, pH adjusters, and all other are always suspect, but not just these. Construction material can off-gas harmful chemicals, air pollution is real and can cause major harm to crops, plastic can be composed of problem materials or breakdown into harmful chemicals or can hold chemicals applied several years before, and the list goes on. What you put into the system will add to the chemical dilemma, make sure of what you are adding and how much. Nutrients and fertilizers are registered and verified by the state, organic or otherwise, for a reason, to protect the consumer. Heavy metal data is available, the grower must know these values. Any pesticide or plant protectant must pass reviews and tests to pass federal certification, make sure they are registered!

Second, fully understand that, while it may seem there is, outside of the wonder of nature and life, no real magic in growing. Plants are most likely to grow, flower and die without a grower's help, but helping achieve all the needs of a plant makes it all better. Still the grower is working inside the requirements of the crop and controlling its chemical contacts. In this instance, KIS is the way to go, Keep It Simple. Throwing more and more chemicals at it will not help. A healthy plant, which is a result of all aspects of growing such as culture, light, air, and correct watering techniques, is the best start. Take care of all the things that do not involve chemicals correctly, and the need for any chemistry is decreased. However, when a grower starts down a road of increased chemical usage, any chemical regardless of how it is derived, the grower will have to add even more at some point, if for no other





reason, then to offset or correct the changes any chemical brings to the equation. Keep it simple, plant 10% more and accept a few losses.

Use the Management approach to all aspects of growing, such as Integrated Pest Management. Know exactly why and to what the chemicals are being applied to and why. Understand that there are times when the issues that a crop is going through are not worth the economic, social, and health benefits that would be seen if addressed with more chemicals.

Finally, use all chemicals that are knowingly applied to a crop, according to directions, at the correct levels, with the correct timing, on the approved plants, against the correct targets, in the correct manner. If a product is not approved to use on consumed crops...DON'T. If the plant is not listed on the label don't use it. Remember that a grower can be held accountable for any and all damages that occur to all parties impacted by a poor choice on the part of the grower. This includes environmental clean-

THE CHEMICAL DILEMMA

up. Only use products intended for the system being grown (Organic, Natural, or Typical), in accordance with all directions, this includes Organic. The wrong material composted in the wrong manner can lead to issues, even seemingly easy ones like the over-production of Ammonium instead of the cycle finishing for Nitrates, which will cause issues with all parties most especially the plant.

Final Thoughts

In the end, the grower can only take precautions against the unwanted introduction of chemicals into the system they use, but these are usually incidental amounts. The grower can become the major source of chemical introduction through poor cultural practice. Only the grower is responsible for any failures in the system, not the components. It is a poor grower that blames his or her tools, as they choose the tools they use. Get it right the first time, Keep It Simple, and avoid the Chemical Dilemma! •



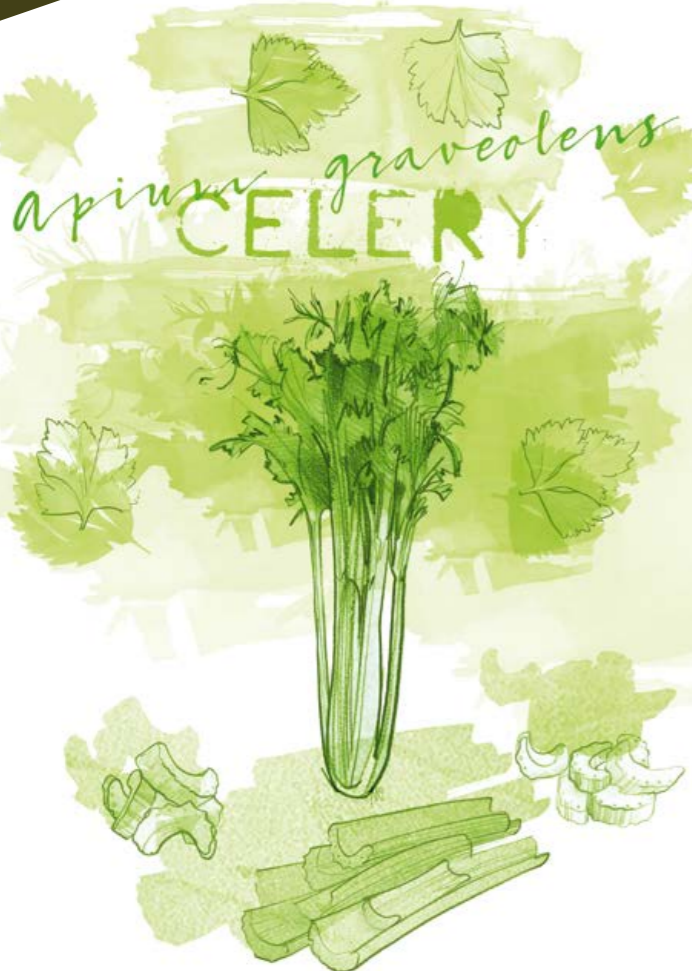
LOOK AT IT. STANDING TALL IN ALL ITS PALE GREEN GLORY. WITH ITS FEET DRENCHED IN TOMATO JUICE AND BOOZE,

AND A CRUNCH THAT COULD SCARE AWAY A GROWN-UP HANGOVER. BUT THAT'S NOT ALL THIS HEALTHY AND

VERSATILE VEGGIE CAN DO. SAY HI TO TERRIFIC, NOT SO CALORIFIC CELERY. By Marco Barneveld, www.braindrain.

As the legend goes, it happened on a rather dreary day in 1927, at the height of the roaring twenties. Actor and comedian George Jessel orders the first Bloody

Mary, a half-vodka, half-tomato juice recipe supposedly concocted to help with a tough hangover from the night before. It wasn't long before some smart bartender



Crunch to your health

With like six calories per stem, celery is not very calorific. Therefore it's a great choice if you are watching your weight. So, munch on children. But that's not all. Celery reduces inflammation. If you are suffering from joint pains, lung infections, asthma, or acne, eating more celery will bring much-needed relief. And if you are stressed about those inflammations, celery may calm you down: Celery for stressrelief? Oh yes! The minerals in celery, especially magnesium, and the essential oil in it, soothes the nervous system. If you enjoy a celery based snack in the evening, you may sleep better. It also regulates the body's alkaline balance, thus protecting you from problems caused by an overly acidic diet. So, celery aids digestion: some say celery tastes like crunchy water and this may be part of the reason it is so good for your digestive system. The high water content of celery, combined with the insoluble fiber in it, makes it a great tool for easy passage of stool. Celery also contains good salts. Yes, celery does contain sodium, but it is not the same thing as table salt. The salt in celery is natural and essential for your health.

Like carrots celery cares for your eyes. One large stalk of celery delivers five percent of your daily need for Vitamin A which protects the eyes and prevents age-related degeneration of vision.

Celery lowers blood pressure: An active compound in celery called phthalide has been proven to boost circulatory health. Raw, whole celery reduces high blood pressure. Celery can combat cancer: Two studies at the University of Illinois show that a powerful flavonoid in celery, called luteolin, inhibits the growth of cancer cells, especially in the pancreas. Another study suggests that the regular intake of celery could significantly delay the formation of breast cancer cells.

Considering all, we have no clue why you are not eating celery everyday and live until you are bored of life. Anyway, you might want to start growing celery in that little patch of garden of yours. Go ahead. This is how you do it.

Grow it yourself

Growing crunchy celery is quite simple. The main features this crop requires are rich soil, plenty of water and protection from hot sun and high temperatures. Sow seeds indoors ten to twelve weeks before the last average spring frost. Fill a container with a mix of 50% compost and 50% sand and plant in rows three centimetres apart. Cover the seeds with a sand layer 1-inch-deep, then cover the flats with damp cloth until seeds sprout.

When our little baby celeries are at six inches tall, transplant them into the garden in a bed with added compost. Give them about six to eight inches' personal space in rows which are about two feet apart. Set them no deeper than they grew in pots. Quench them first by watering them liberally. Take out any weeds that might compete over nutrients. Feed every two weeks with fertilizer. When temperatures appear to drop below

figured out that adding a stick of celery made the highly popular morning drink even better than it already was, as celery helps cleaning the taste in your mouth. But our pale green, crunchy veggie had been around for a while before that legendary moment.

The leaves of the celery were favored by both the Greeks and the Romans to weave victory crowns for athletes, as did the Egyptians. In fact, archaeologists discovered a celery wreath in Tutankhamun's tomb. Perhaps they added it to his pyramid just in case dear Tut would suffer from a bad case of hangover after drinking copious amounts of booze in the heavens he was going to. You never know.

All of the ancient civilizations used the wild plant also medicinally for a slew of ailments besides hangovers. As aphrodisiac for example. For thousands of years there was no real proof that celery could actually boost your sexlife. The hard stem might have tickled the fantasy of our ancestors, who knows.

But according to Dr. Alan R. Hirsch, Director of the Smell and Taste Treatment and Research Foundation their gutfeeling was right: two pheromones in celery (androstenone and androstenol) do boost your arousal levels. They are released when you chew on a celery stalk. So put in in your mouth and chew it.

fiftyfive degrees Fahrenheit, cover the plants with dry cloth. Frost will make them less crunchy.

Blanching

Blanching celery destroys some nutrients but prevents stalks from becoming bitter. It also protects fall crops against heavy frosts. This is how you blanch them. Gradually pull the soil up around the plants as they grow, keeping the leaves exposed. Two weeks before harvest, tie the tops together and mound soil up to the base of the leaves. Cover the stalks with large cans with both ends removed or make sleeves made out of paper. Line up boards, secured with stakes, along each side of a celery row to shut out the sun. Water carefully after setting up your blanching system, avoiding wetting the leaves and stalks, or they may rot

Diseases

Common diseases that affect celery crops, include early and late blight, which both begin as small dots on the leaves, and pink rot, which shows up as watersoaked stem spots and white or pink coloration at stalk bases. Crop rotation is the best control.

Distorted leaves and cracked stems can indicate a

borondeficient soil; correct by spraying plants with liquid seaweed extract every two weeks until symptoms disappear.

Harvesting

Cut the plant off just below the soil line, or cut single stalks of unblanched celery as needed. To preserve a crop, pull up the plants and place them in deep boxes with moist sand or soil around the roots. Store in a cool place; they will keep for several months. •

BLOODY MARY

INGREDIENTS



Ingredients:

- 2 oz. tomato juice
- 2 oz. gin (any will do, but the good ones are always better)
- ½ tsp Worcestershire Sauce
- 1 pinch salt
- 1 pinch cayenne pepper
- 1 dash lemon juice
- 1 drip of Tabasco

Shake well with ice and serve in a tall glass.
Add: 1 celery stem with leaves

And do remember: hangovers are the universe's way of telling you that you rocked last night. Enjoy responsibly or repeat session tomorrow morning. Another tip: use tequila instead of gin to create a **Bloody Juanita**.

Cheers.

Eat and drink it yourself

In the case of our crunchy Celery we will provide you with a recipe for the best cure against hard drinking nights the day before: **Bloody Mary**. But, instead of using vodka, we advice you to use gin instead. It gives this renowned pick-me-up-boozier just that tad little extra of taste. Trust us, you'll love it. And so will your hangover. A **Bloody Mary** with gin is called a **Red Snapper**.

Questions

& Answers

e with the CANNA
I am wondering

We receive a lot of questions about growing. Of course, our researchers are more than happy to answer them! Just go to the contact page on our website, www.cannagardening.com, to submit your question.

A couple weeks ago I started to notice some brown spots on my leaves

in the drain water than in the root ball, which

Also, I need to know if I should be using tap water or r/o water

Hello, Thanks for the questions. Near as I can read this



Question

Hello CANNA, I was just wondering if I should feed with every watering? Or do I feed intermittently, feed, water, water? I currently use BIOCANNA BioVega and Flores, and the BioRhizotonic, and add mycorrhizae, and a line of soil micro-organisms with each watering. Thanks for the Help, Chris P

Answer

Hello, Thanks for the question. The answer is variable. Feed the BIOCANNA line based on the crop, the growth rate, the container size, and the micro-life. This could be from feeding at each watering to every 3rd watering. It is organic which requires a certain time, couple days, to begin its final breakdown. It is generally best to feed the soil, which is the whole reality behind organic, and then it is fed at least 1 time per week. If the crop is a heavy feeder, it will consume more so it might be necessary to feed more often. If the conditions are dry, then less breaks down so it would be fed closer to 1 time per week. If the air is dry then water is used way faster than the feed so you may be feeding every 3rd watering. If it is damp then more often. You see where this is going right? Big thing to know is that if you are adding microbes more than 1 time at the beginning, then you will have to feed way more often. These microbes are usually general feeders so they will out compete the plant for available ions such as Nitrogen. Add these 1 time, at the beginning and no more. In fact you can do without them as these develop naturally. In any event, be careful because if the microbe population gets too high then you will never be able to adequately feed the plant as the microbes will take most of the nutrient package (they feed faster so they deplete the nutrient elements as they come available through the organic breakdown as they use the same things.) I would suggest that you feed every week or every 3rd watering at first, then jump up to every other watering when the plant sizes up and gets a decent root system. Then go up if needed to every watering or back down as you get a few weeks from harvest. In the end it will become dependent on your conditions, the variety grown, and the techniques employed.



Question

Hello, I have just switched from Coco to an HP bulk mix. I found that the Coco had a high Sodium level and a runoff EC of 1.2. I have a full cycle of CANNA Coco A&B in 20 liter bottles with CANNAZYM and CANNA RHIZOTONIC to match. How can I use these nutrients in the new HP mix? Thanks, Josh T.

Answer

Thanks for the question. Well, if it were our coco and you were using our nutrients then you will see a larger EC in the drain water than in the root ball, which is EXACTLY why we say that you cannot look at drain water and know what is going on in the root ball. It is all detailed out in our Coco Infopaper. And, unless you do an analysis, you cannot possibly know it is all sodium. Some will be, but with our coco, it will be predominately Potassium and is the result of the natural degradation of the coco, and is expected. In any event, you can use Coco A/B on anything, it is a fertilizer, but it will not work the same on any peat mix and this includes your HP mix. The CANNA nutrient to use would be SUBSTRA, for soft water, since the HP mix is a bulk grade mix with little amending that will allow it to work correctly. There is a ratio issue and, more importantly, a mid-term pH issue which will play on a 2 month or longer crop. Hope this helps. Cheers, Ralph B

	Cultivation period (weeks)	Light / Day (h)	COCO (ml/Gallon)	RHIZOTONIC (ml/Gallon)	CANNAZYM (ml/Gallon)	CANNABOOST (ml/Gallon)	PK 13/14 (ml/Gallon)	EC+ (µS/cm)	PPM+
VEGETATIVE PHASE									
Start / rooting (3 - 5 days)	<1	18	6-10	15	-	-	-	0.7-1.1	320-810
GENERATIVE PHASE									
Vegetative phase I	0-3 ¹	18	8-12	8	10	-	-	0.9-1.3	470-940
Vegetative phase II	2-4 ²	12	10-13	8	10	8 ⁴	-	1.1-1.5	810-1110
Generative Period I	2-3	12	12-15	2	10	8-15	-	1.4-1.8	1040-1330
Generative period II	1	12	12-15	2	10	8-15	6	1.4-2.0	1180-1480
Generative Period III	2-3	12	8-12	2	10	8-15	-	1.0-1.4	740-1040
Generative Period IV	1-2	10-12 ³	-	-	10-19 ⁴	8-15	-	0.0	0.0

1. The period varies depending on the species and number of plants per m².
2. The changeover from 18 to 12 hours varies depending on the variety.
3. Watch out for increasing Relative Humidity.
4. Double CANNAZYM dosage to 19 ml/gallon, if substrate is reused.
5. 8 ml/gallon standard, increase to a maximum of 15 ml/gallon for extra flowering power.
pH: Recommended pH is between 5.5 and 6.2. Adding pH+ can increase EC. Use pH- grow in the vegetative phase to lower the pH.
PPM+: PPM+ value is based on 0.74 conversion factor.
The guidelines in the table aren't an iron law, but can help novice growers to develop a sophisticated fertilization strategy. The optimum fertilization strategy is further determined by factors such as temperature, humidity, plant species, root volume, moisture percentage in substrate, water dosage strategy, etc.
Make your personal grow schedule at www.cannagardening.com
CANNA The culture to grow outdoors

ANSWERS

Question

Hello CANNA, A couple weeks ago I started to notice some brown spots on my leaves, so I added some Cal Mag to the next batch of fresh nutrients thinking this will help. Please note I also use silica additive with each batch of nutrients, which is added to the water before nutrients. I have read that adding silica can cause Cal Mag to precipitate, which makes me think this could be part of the problem but not sure. I have recently flushed with 1/4 strength nutrients waiting for signs of recovery. Also, I need to know if I should be using tap water or r/o water with CANNA Coco A&B? I think my tap water quality could be playing a part of the Cal Mag deficiency but again not sure. EC of tap water is 0.5, half of it is from calcium and magnesium but there is also alot of bad stuff in it. I always seem to have this problem with growing in coco and would like to figure it out, as I don't want to go back to soil. Thank you for your help. Stan M.



Answer

Hello, Thanks for the questions. Near as I can read this, you probably do not have a Calcium problem, but a watering one. The brown spotting is not Calcium and your level of ions in the tap water is not enough to cause issues, and brown spots are also not typically high salt issues. I am making an assumption here that the spots start out very small and maybe come together to make bigger ones? These are Edema caused by watering issues. If you hold the plant too wet or too dry, these will form. You want to apply more irrigation when the water that the container holds against gravity loses about 50%. This can be done by weight until you get used to seeing it. These issues will also yellow out the leaves and inhibit any growth. You may also

see a dullness to the leaf 'shine' that is indicative of a healthy plant. Water consistency is also critical. Water at the same point of dry each time, a little moist or a little drier than the 50% is fine, but be consistent in these applications. Remember that you over-water by watering too soon, you under-water when you water too late. Apply your irrigation until drainage and have this completed in less than 20 minutes to allow air back into the roots. As long as the coco is moist, nutrients are available. Never water with plain water and never less than half strength, about an EC of 0.6. I do not think what you did already will hurt much and should recover.

Question

Hello CANNA, I am wondering what additives to use with the CANNA Bio line? Just BioRhizotonic and BioBoost? Can you use CANNAZYM with the BIOCANNA line? What do you recommend? Cheers, J.S.

Answer

Hello, Thanks for the question. It depends on how Organic/ organic you want it. All our additives can be used with the organic line, but they are not all Organic Certified or organic in nature. BioVega, BioFlores and BioRhizotonic are all OMRI certified. BioBoost is not because the preservative, while organic in Europe a few years back, is not in USA. CANNAZYM could be certified organic but they do not certify enzymes. The rest are mineral based but still usable such as the PK 13/14. Hope this helps, Ralph B





BAOBAB DID YOU KNOW THAT...?

- The baobab can survive more than six thousand years in the wild.
- It is also called the upside-down-tree, the baobab's trunk can reach 23 to 36 feet in diameter and the tree itself 16 to 98 feet in height.
- The baobab produces white, large, fragrant flowers that contain more than 1.600 stamens. Bats and moths are responsible for the pollination because the flowers only open at night.
- The quite delicious fruit of the baobab weighs up to 3,3 pounds, is egg-shaped and covered with a hard, hairy shell. Numerous black seeds are embedded in the powdery pulp.
- The fruit of baobab is a rich source of vitamins C and A, and minerals such as iron, calcium and potassium. It tastes like a blend of vanilla, pear and grapefruit.
- The fruit can be consumed fresh or dried. The pulp and seeds can be used as thickener of jams and gravies. Roasted seeds are great snacks.
- Leaves can be consumed fresh as a vegetable or ground up in the form of powder for the preparation of soups and sauces.
- The fruit of the baobab can be used as medicine. The fruit facilitates digestion, reduces fever and improves the functioning of the nervous system.
- The trunk of the baobab is able to store up to 100.000 liters of water. It serves as an important source of water for people and animals during the dry periods of the year.
- The bark of the baobab tree is soft, fibrous and fire resistant. It is used for weaving ropes and cloth. Compounds isolated from the bark are used for the manufacturing of soap, glue and rubber.
- According to a legend, one hollow baobab in Western-Australia served as a temporary prison for convicts that were on their way to permanent imprisonment in Derby at the end of the 19th century.



What's HAPPENING

AGAVE

AGAVE

TERRIFIC TEQUILA:

BLUE SPIRIT

We've all been there. Slamming poor quality tequila. But a good tequila, made with blue agave, can easily compete with any other distillate of quality. Tomas Estes and David Trampe know what the blue spirit needs: meraki. And agave.

By Marco Barneveld, www.braindrain.nu

Tequila is best known for lovely evenings with an aftermath that is best compared to as a train filled with rambling chains crashing through your brain at high speed. Luckily for the lovers of good booze there is a movement rising up fast that pushes appreciation for all the good and artisanal tequila out there.

First, you must know that all tequilas are mescals. Mescals are any agave-based liquor, and therefore tequila is a subset of mescal. But tequila can, by law, only be made with blue agave and may only be called tequila when it is made in five specific regions: Jalisco, Michoacan, Guanajuato, Nayarit, and Tamaulipas. Jalisco, where the town of Tequila is located, is the center of the tequila universe.

So tequila may only be made with the blue agave. It takes an agave six to twelve years to get ready for harvesting. At harvest, the long spear-like leaves are sheared off by the jimador, which is how they call the person doing the harvesting. The jimador uses a coa, a long-handled stick with a sharp, flat blade at the end. It is at this point

that the agaves take on a new descriptive name of piña, because they look like big pineapples. The piñas are then cooked in order to turn the starches into fermentable sugars. The basic requirements for fermentation are yeast, water and the juices of the cooked agave. The basic liquid is called mosto or tepache.

A good tequila

The result of fermentation is a liquid with about 5-7% alcohol optimally. The higher the sugar content, the more alcohol a batch will produce. The fermenting wort taste a little like sour beer. After that the mosto is distilled. Et voila: tequila. But what makes tequila so awesome? Well, let's ask the experts.

"My love for tequila parallels my lifelong fascination with and love for Mexico," says Tomas Estes, the official Tequila Ambassador. Estes opened up Cafe Pacifico, the first Mexican restaurant in Europe, in Amsterdam in 1976. He gave the Dutch the first taster of good tequila. "The image of tequila and Mexico are the same for me: otherworldly, romantic, edgy and exciting. Tequila has a distinctively unique taste. It gives an energetic, merry





Figure 2: Los Fresnos agave road field and Los Fresnos rancho agave harvest jimador.

AGAVE

high and it is becoming more and more accepted as the healthiest alcoholic beverage available. Please note that I am speaking of those tequilas that are made with respect for the natural ingredient, the blue agave, and respect for the consumer. To put it another way, tequilas that are made with meraki: meaning pride, passion, soul and love.”

Estes went ahead with his love for tequila and together with Carlos Camarena, a third generation Tequilero, created Tequila Ocho, a tequila made slowly in an artisanal way with that famed meraki.

I never liked beer

“After my intense 10 years in Amsterdam it seemed the ‘torch’ of tequila promotion, appreciation was dropped, in Holland,” says Estes. “At this moment the flame is being ignited again. The word is still getting out in The Netherlands that tequila is not only for abuse, that it can also be for sipping and savoring as one might do with a cognac or single malt scotch.”

David Trampe is also fascinated by the blue spirit. Trampe is the only Tequila Maestro Gold in the Benelux. Which means he has visited at least twenty tequila distilleries, has been working together with tequila distilleries for over two years and can taste if a tequila

is from the highland or from the Tequila Valley. “I never liked beer, so I started drinking hard liquor when I was out and about. Tequila was one of those. At first I started drinking it with orange and cinnamon but soon I started drinking and exploring tequila straight. I love añejo and reposado but nowadays I like blanco the best. Because in añejo and reposado you can mask the quality with the taste of wood.

There is no way you can do that with a blanco. In a blanco you can taste the sweetness of the blue agave and the love and passion of the distiller, meraki. You can also taste if the tequila is made the old fashioned way, cooking the agave whole, or if it’s an industrial process, when they squeeze the agave first to get more juice. In the industrial process they also add sulphur in order to shorten the fermentation from four days to one day. There are quite a few not so nice tequilas on the Dutch market. But luckily the good ones’ start dripping in as well. Ocho is a really nice one. So is Arette tequila made at El Llano.”

Trampe has a good tip if you want to check if tequila is made with meraki. “Check out the app Tequila Matchmaker. Look for the NOM number on either the front or back label on a bottle of tequila. The NOM number is a unique, government regulated distillery

number. Many distilleries produce more than one brand of tequila, and some brands are exported, and some are only available in Mexico. Those products containing the same NOM number are produced from the same distillery. If a distillery is making more than ten tequilas its industrial. It can still be good, but the chance that it’s made the artisanal way are slim.”

Five specific regions

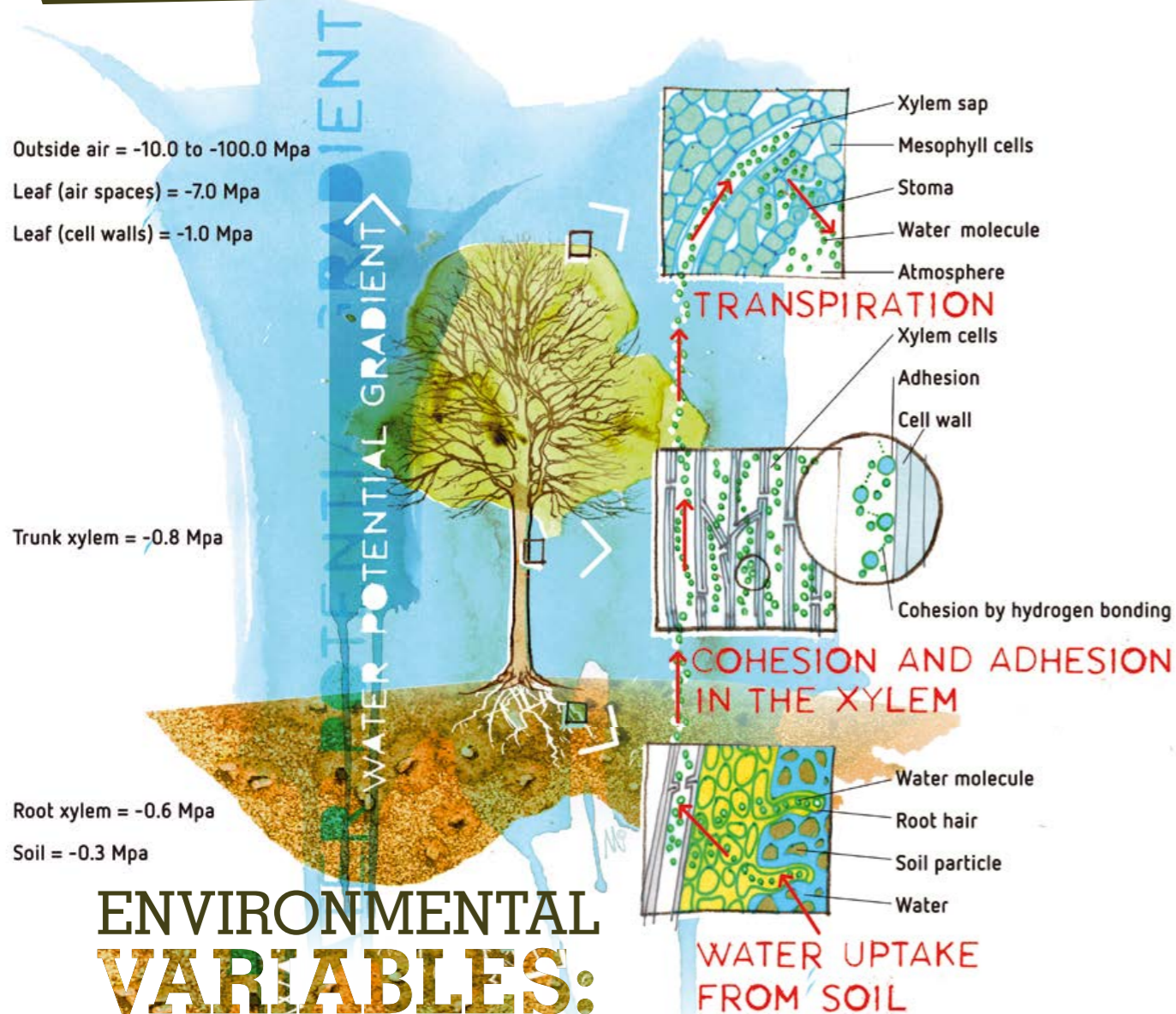
With the craft spirit being as hot as it is, one would think tequila would be made in Holland as well. But that is not the case. Why have Dutch craft distillers not gotten around distilling tequila? “If the Dutch, fine distillers that they are, were to make a spirit from the blue agave they would have a grand challenge getting the agave to The Netherlands,” says Estes. “And finally they could not call the product ‘tequila’ since there is an Appellation de Origin Controllee protecting the name.” “You might get your hands on some agave syrup and you could try distilling that. But you could never call it tequila,” says Trampe. “Tequila can, by law, only be made with blue agave and may only be called tequila when it is made in five specific regions: Jalisco, Michoacan, Guanajuato, Nayarit, and Tamaulipas. Jalisco, where the town of Tequila is located, is the center of the tequila universe.” •

TASTERS AND TRAVEL

David Trampe lives in The Netherlands. On request he offers tequila tastings. He also offers journeys into the heart of the homeland of tequila in Mexico. And his own mezcal is on its way to The Netherlands: *Agave de Cortes, edition especial hecho para David Trampe*. A tasteful mouthful. Tomas Estes wrote a 240-page book on tequila: *The Tequila Ambassador*. Still for sale in online bookstores. •



Pests & DISEASES



ENVIRONMENTAL VARIABLES: ANOTHER DISEASE?

Environmental variables like light, temperature and humidity and air quality can help prevent diseases or they can be the cause of it. Over the next few CANNAtalks, we want to explore how they tie into the successful production of plants, and prevention of specific disease conditions. First one up, Humidity. Geary Coogler, BSc Horticulture

Disease: any abnormal condition in a plant that interferes with its vital physiological processes, caused by pathogenic microorganisms, parasites, unfavorable environmental, genetic or nutritional factors, etc.

A disease is a condition that results from the action of an exterior variable, while causal factors (pests, pathogen, toxins, environment, etc.) can vary. A disease is just a collection of symptoms, a road map of sorts, which can lead us to an underlying causal agent or condition. Not all of

these causal agents are biotic, many can be abiotic. Environmental variables tend to be overlooked, just as nutrient troubles often are not identified as causal conditions. They can, however, be some of the most important aspects of a disease even making other causal agents worse, and sometimes, not as noticeable. Environmental conditions include the more obvious ones such as light, temperature and humidity but also less obvious ones such as air quality, crowding and traffic. Let's start with humidity.

Water vapor in the air

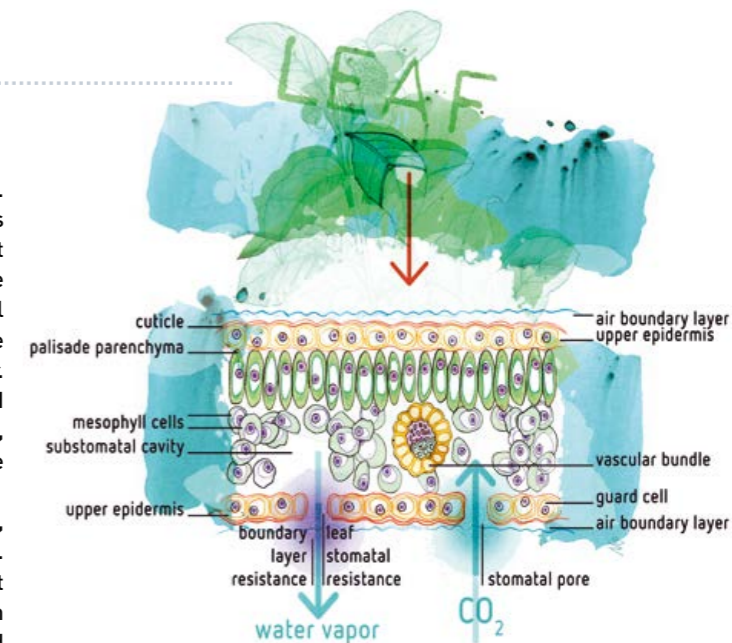
Humidity is the amount of water vapor that air holds... simple, but this level can be affected by temperature. As air temperature increases, air will hold more water, as it decreases it holds less water. Even the amount of moisture present at the time the increase or decrease occurs will change the value of what the air is holding, the percentage will change without the addition or removal of any water. We term this Relative Humidity (RH). The lower the RH level, the faster water in liquid form, exposed to the air, will move into the air (evaporation). The higher the RH, the slower water will evaporate into the air.

Humidity, while not the biggest environmental variable, affects the plant and plant systems to a definite degree. Plants evolve in specific conditions of humidity that affect how the plant functions. Humidity plays key roles in both the start of pathogen invasion as well as transpiration and water movement in the plant. Plants, like animals, have an outer layer of tissue, the epidermis, which serves to both wrap up and contain all the cells that make up an organism, and to regulate the exterior, or environmental agents that can affect the activity of those protected cells. Water based life forms have an epidermis that works in a constant wet state while the epidermis of terrestrial life forms gets soft and has less resilience when kept wet. High humidity slows water evaporation from the leaf surface, thereby extending the amount of time a spore has to penetrate the epidermis and set up shop in the plant tissue. Yet, humidity can also negatively (or positively) influence a pest population such as spider mites.

Nutrient ions

Water has to move through the plant. It has to move to do many functions such as transport of essential nutrient ions. It has to move to cool the tissue. It has to move to transport metabolites around the plant. And to do so, it has to be brought in and moved out of the plant. Some plants, aquatic plants, have a system of active pumps since it works in environments that are 100% humid at all times. Terrestrial plants, in an environment that is mostly below 100% humidity so water moves out of the plant passively through specialized pores known as stomata. Water evaporates from the pores and moves into the surrounding air and, as it does, exerts a pull on the column of water (and ions) all the way down to the roots. The higher the humidity, the slower evaporation occurs and the slower water moves through, and the slower nutrients are delivered to the use sites, the less cooling a plant can do, and the less water is available for life functions. The drier, or less humid the air, the faster this occurs. This results in faster transport, better evaporative cooling for the plant tissue, and the more water available for plant functions...to a point. When the humidity is too low then too many nutrients can be taken up, and more water is evaporated and not left around for functions. It is a balance that must be achieved and this level is based on the plant and its natural state.

The plant responds to these humidity stimuli in several ways. They can grow loose to allow more air movement around the plant, flowers can become loose and 'fluffy'. They can grow tighter and more compact to slow the transpiration. Plants can show deficiencies from a



decrease in the building blocks (nutrients) it needs to grow if the humidity is high, and they can show toxicities or burn when too much is moving up. Plants can also spend time in a wilt state that allows the plant tissue to over-heat which results in photo-oxidation that short changes the cycle the plant uses to produce needed carbohydrates, as well as protein breakdown.

Metabolism

Worse, in conditions where a plant is being pushed to perform so the growth rate/ metabolism is elevated, but when the supply of nutrient ions is interrupted from slow transport, the signs are fast and deep. When the plant is soft and green from rapid growth, slowing the water movement causes rapid damage to the less protected tissues. If a grower fails to adjust to the humidity change, then over-watering becomes an issue and salts accumulate in the root zone causing a disruption in the osmotic gradient causing more issues with water movement and finally salt burning. Throw temperature (another environmental variable) into the mix as a driver, either high or low, then the conditions can become faster and larger in affect.

It many growing operations, it is near impossible to affect humidity, especially reducing humidity. It is possible to increase humidity but this might require keeping foliage wet (never desirable) as well as bench tops and walks. Mostly, a grower must be prepared to adjust watering schedules and fertility applications during these swings. Higher humidity values than a plant wants may require higher concentrations of fertilizer to get a better amount delivered in a slower stream. Lower humidity than the range the plant wants may require lower nutrient loads since more is picked up and delivered much faster. Yes, the plant has a range it evolved in. Taller or larger plants require a tighter control on these issues as the flow has much further to go. Know your crop, know the humidity range it prefers, and work with it.

So, when a proper plant diagnosis is done, it always allows for these environmental variables, especially humidity values as both a day and night value. It is a poor grower that jumps on a nutrient issue as a short-coming in the nutrient. It might be true, but it is just as likely it is something else. It could even be an environmental disease!•



CARBON CYCLE

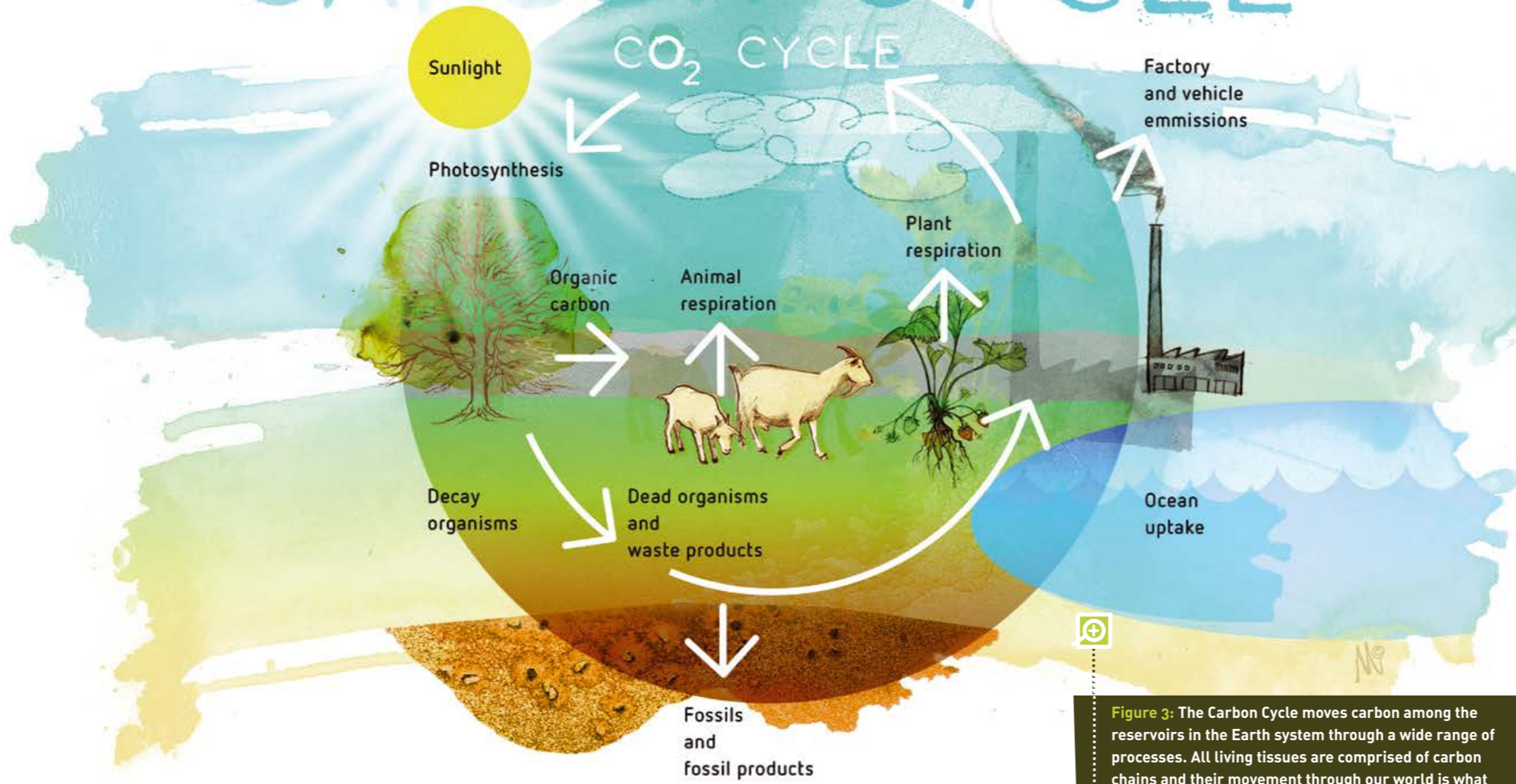


Figure 3: The Carbon Cycle moves carbon among the reservoirs in the Earth system through a wide range of processes. All living tissues are comprised of carbon chains and their movement through our world is what defines the carbon cycle.

HUMIC AND FULVIC ACIDS. WE'VE ALL HEARD FROM THEM, YOU MIGHT EVEN USE THEM. BUT DO YOU TRULY UNDERSTAND WHAT THEY ARE? EVEN SCIENCE STILL DOESN'T GRASP THEIR FULL IMPORTANCE. LET'S TAKE A STROLL INTO NATURE TO DISCOVER HOW THESE PRODUCTS ARE FORMED AND THE ROLE THEY PLAY IN OUR GARDENS.

By George Hetfield

Imagine you are walking through a picturesque forest. Lush vegetation and old growth trees surround you as rays of sunlight break through the canopy. The air is rich with a sweet and peaty aroma. As you maneuver through the brush, the soft, spongy ground seems to cushion your every step. You hear the rustle of leaves as a slight breeze moves the tree branches, giving the sensation of the forest letting go a long and relaxing exhale.

This idyllic forest may seem like worlds away from our indoor containers, raised beds, and garden soil, but they are actually closely related. The peat, minerals, and organic matter that combine to form our beloved soil mixes all began in settings like this forest, and are a direct result of the carbon cycle and the process of decomposition. If we take a deeper look into these processes, we will soon discover that they will yield some great insights into the media used in our gardens, as well as two intriguing products found on garden store shelves- humic and fulvic acids. From the forest floor to the bottle, let's take a journey to discover how these products are formed and the role they play in our gardens.

Carbon cycle

First, let's begin with a look into the carbon cycle to get a perspective on how organic matter is formed and how it lays the groundwork for humic and fulvic formation. As we learned in high school biology, carbon is the building block of life on Earth. All living tissues are comprised of carbon chains and their movement through our world is what defines the carbon cycle. I will spare you the classroom lecture by just saying that carbon moves from our lakes and oceans, into the air, and then is used by plants in the form of carbon dioxide. Photosynthesis then works its magic and converts these carbon molecules into energy that is stored in the plants' vegetation. This plant vegetation either lives a

FROM THE FOREST TO THE BOTTLE



FROM THE FOREST TO THE BOTTLE



long and full life, or is consumed by animals or humans. Either way, it all returns to the Earth and ends up in our soil as organic matter.

This same process millions of years ago was also responsible for the formation of carbonate rocks or coal and constitutes the largest storage of carbon on our planet. Plants and animals alike eventually end their respective life cycles and return to the forest floor. The process of decomposition begins here, where microbes and bacteria begin the work of breaking down the dead matter into what will eventually become humus. This humus, or dark colored organic matter, is composed of long chains of carbon molecules whose large surface area carries electrical charges, which attract and hold mineral particles. These complex organic compounds are also referred to as humates and are essential components of soil structure, cation exchange capacity, and chelation within the soil environment. Breaking down each of these essential components will lead us to a clearer understanding of the awesome power that is held within our soil containers and garden beds.

Indispensable components

Humates compose 60-80 % of the soils organic matter so it is an obvious conclusion that they are indispensable components of soil structure. The coarse nature of organic matter particles help reduce the plasticity, cohesion, and stickiness of clay soils while providing a much needed binder to sandy soils. They provide a fantastic combination of water retention and aeration so that soil microbiology can flourish and assist in how nutrients are utilized by plants.

Nutrient availability and Cation Exchange Capacity (CEC) are also affected by the presence of humates in medium. Cation Exchange Sites are located across the surfaces of soil particles and allow charged ions to weakly attach and act as a storage site for nutrients. The overall effect is considered the Cation Exchange Capacity of the medium. Luckily, the humates that can facilitate this CEC are found naturally within the coco and peat based soil mixes found in garden centers throughout the country.

Think of humate particles like magnetic docking stations for nutrient ions to lock onto. These docking stations can attach to a single Cation Exchange Site and multiply the number of ions it can hold, resulting in increasing potential fertility of the medium. Plants cannot just simply grab nutrients out of the soil but rather need a middle man to help facilitate the hand-off. The docking station properties of these humates hold cations like potassium, calcium, and magnesium in easily exchangeable forms until they are swapped out and up-taken by the plant.

CATION EXCHANGE

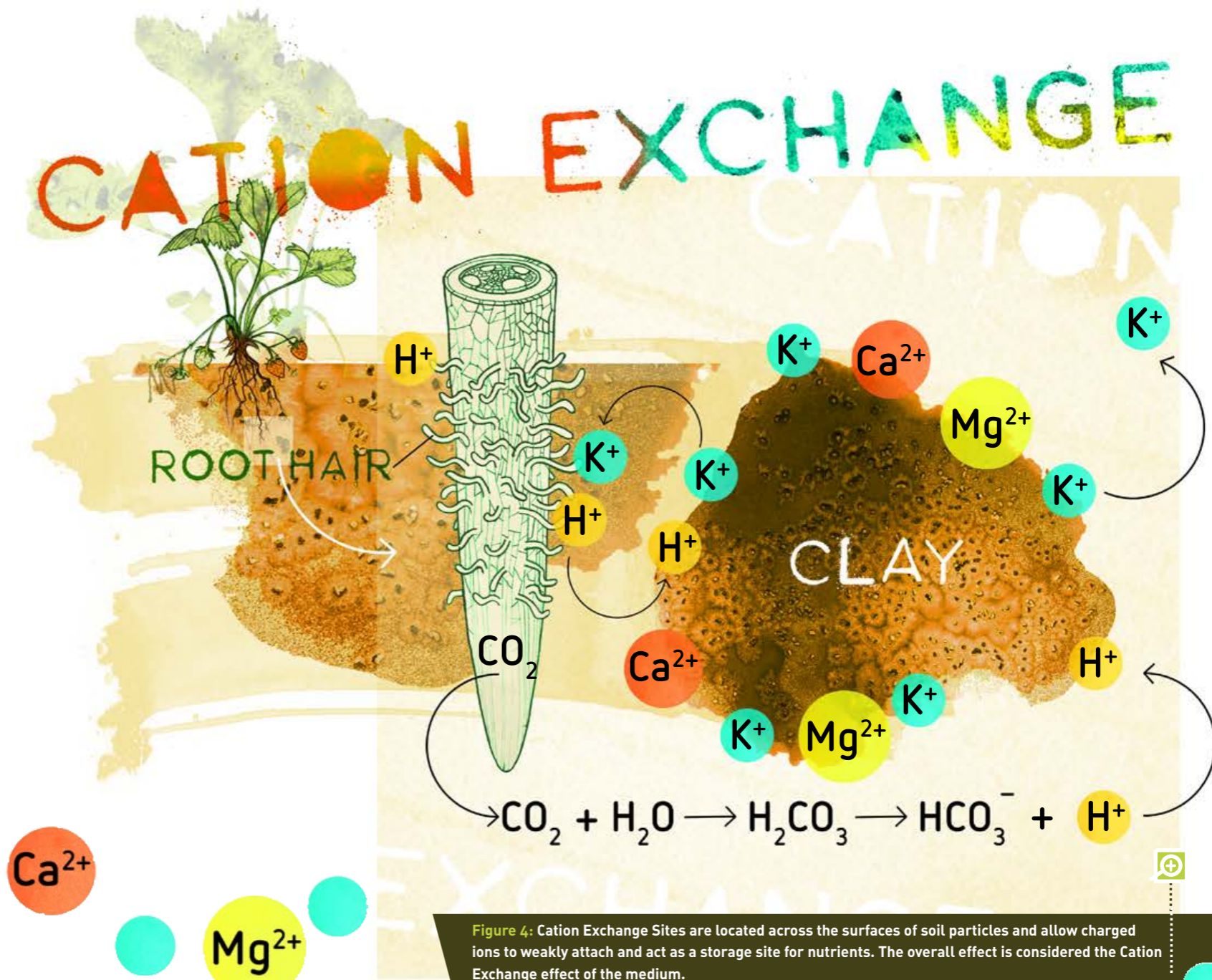


Figure 4: Cation Exchange Sites are located across the surfaces of soil particles and allow charged ions to weakly attach and act as a storage site for nutrients. The overall effect is considered the Cation Exchange effect of the medium.

The more of this swapping or exchange that can occur, the more efficient the media is at making certain nutrients available. Macronutrient needs like nitrogen and phosphorus are supplied by the process of mineralization, which breaks down organic tissue or compounds into inorganic forms that are readily available to the plant.

Wet sponge

As decay progresses, these humates evolve into humic and fulvic acids and are the last product of the incredible transformation of organic material through decomposition. In a poetic finish to the life-death cycle

of the planet, these final humic and fulvic acids are now ready to begin their import roles in sustaining life through improving plant health and nutrient uptake. To better understand humus and the formation of humic and fulvic acids, let's imagine humus as a wet sponge. Now let's pretend that the dirty water from the sponge is wrung out and collected in a glass. If allowed to settle, the heavier and darker colored particles, or humic acids, would rest in the bottom, while the lighter color (and weight) particles, the fulvic acids, would compose the upper half of the glass. This is a very basic way to look at the structure of humic and fulvic acids and helps to provide a picture of how they break down on a molecular level.



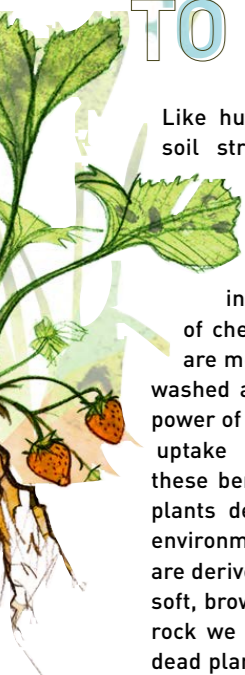


Ca²⁺

Mg²⁺



FROM THE FOREST TO THE BOTTLE



Like humates, humic acids are great at improving soil structure because of their larger molecular composition. This translates into better water holding capacity and more efficient nutrient uptake. The chelating power of these organic acids is also very significant. Certain ions in the soil, like iron, need the help of this type of chelates to "hold on" to these elements so they are more easily absorbed by the roots without being washed away during waterings. Without the chelating power of humic acids, plants would have a much slower uptake of essential micro nutrients. Additionally, these beneficial effects all combine to strengthen the plants defenses against drought and other stressful environmental conditions. Commercially, humic acids are derived from Leonardite, or sedimentation layers of soft, brown coal. Remember those layers of carbonate rock we discussed above? After 70 million years, the dead plant material from ancient earth times has gone through a long transformation to release the power of ultra-decomposed organic matter. Research has indicated that the source of this Leonardite power is from high levels of hormones such as gibberellic acid, salicylic acid, IAA (Indole-3-acetic acid, a type of auxin), and amino acids. These all play important roles for plant nutrient uptake under nutrient stress conditions.

Plant reactions

This brings us to the final component of our amazing journey through decomposition. Fulvic acids have a beautiful, golden yellow color and, like we discussed in our sponge analogy, are of a lighter molecular weight. On a soil level, fulvic acids play important roles in stimulating root initiation and elongation. They have been shown to increase drought resistance, improve uptake of nutrients, stabilize soil pH, and reduce leaching of fertilizer. For the most part, scientific research regarding foliar spray applications effectiveness on plant growth and yield were rare. In 2014, a study conducted in Korea investigated the effects of three different concentrations of foliar applications on tomato plants. They were able to show that the lowest concentration of the three fulvic acid solutions could be used to promote plant growth while improving fruit development and yield through ion and nutrient utilization and physiological disease remediation.

It is important to note that science is still exploring humic and fulvic acids and the roles they play in plant reactions. For example, the source of the humates, from which humic and fulvic acids are derived, plays a vital role in the characteristic of the final products. In addition, media types dictate different reactions and are heavily

influenced by the amount of humics and fulvics added to the environment. The general trend is that more does not necessarily equal more in this case. Researchers have found that lower doses of humic acid were equally as effective as their higher levels in increasing plant growth and enhancing nutrient uptake. Even with new information coming forward, foliar sprays are still being investigated to determine how the nutrient absorption in the leaf effects reactions at the soil level.

Sense of satisfaction

Now that we have followed the transformation of organic matter to its end products of humic and fulvic acids, let's take a look at what this all means. Currently, we do know that the concentrations of humic substances commonly present in the soil solution in humid regions are effective in stimulating plant growth. This shows that our pristine forest from the start of our discussion provides a living example of what we are striving to achieve in our soil containers. In garden stores throughout the country, we see humic and fulvic acids separated into their individual bottles. Although both have applications that can be useful tools in specific circumstances, wise gardeners know that these humates are both found within adequate levels of well-balanced soils and should be applied with discretion. So the next time you open your favorite bag of media or are mixing up some super soil, you should feel a sense of satisfaction knowing that you are providing your plants with some of nature's greatest end-products without even having to open a bottle of liquid nutrients. •



Growers

TIP #37

By your friend SEZ

"WITH MINERAL FERTILIZATION, YOU FEED THE PLANTS. WITH ORGANICS, YOU FEED THE SOIL AND IT FEEDS THE PLANTS". Steve Abboud

While growers can discuss the benefits of one method over the other; when it comes to organic fertilization, this saying highlights the need for "something" to be present in the growing medium to convert the organic material into plant food. Under normal circumstance, these handy organisms are naturally occurring and self-regulating, but things can be less than ideal when it comes to growing in containers with "man-made" growing mediums. Meaning the grower needs to play a role in designing things properly along with keeping things alive and well. Watering properly is just one part of it all, but one of the most important ones.

Understand, not all growing mediums are suitable for organic growing. The medium must be composed of organic material suitable to both feed the micro-life that will work on it and release the correct type and amount of fertilizer to the plant. We want to also have a wide array of micro-organism to convert the various organic material into plant available forms. To favor a wider array of beneficial organism, the growing medium should have a varied composition, different textures and different properties for many types of microorganisms to find homes and prosper, along with preventing that they out-compete the plant for the available nutrients!

In the last decades, the horticultural market has seen the appearance of many products with claims of "Beneficial Life". While a lot of those products failed to show any "living" properties or usefulness when independently tested, some did prove to be very helpful for the plant to not only feed itself but also defend itself against pathogens. As a grower you will need to chose wisely and avoid the hyped snake oils.

We've also seen a rise in the popularity of active compost teas along with the devices to brew and enhance them. Compost teas, when properly done, can bring a sharp increase in beneficial life into the growing medium, in turn helping the plants to feed faster and increase their resistance to pathogens. However, growers need to understand that there is such a thing as too much of a good thing! If the growing medium is inoculated too frequently with massive amounts of microbes, bacteria and fungi, with compost teas or off-the-shelf additives, it is very possible to see the plants suffer from nutrient deficiencies as all those organisms will compete (and win) against the plant for the nutrients.

While making compost tea is relatively simple with the proper tools, the "recipe" and method cannot be so random. If done improperly, it can bring the exact opposite results than intended by actually creating a very active army of plant pathogens that can wreck the crop.

If anything, organics is about balance and a bit of wisdom.

Good Luck and Happy Gardening,



Puzzle & WIN

CANNAtalk wouldn't be complete without a good old Sudoku puzzle. Sit down, relax and train your brain for a moment. It's not too difficult and you could win an awesome prize! Are you new to this kind of puzzle? Here's what to do: each row, column and 3x3 grid must contain all the numbers between one and nine, once only.

WIN A 1 LITER BOTTLE OF CANNABOOST



					8		3	
	5	3		1		6		
2		9					8	4
	1		5			9		
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	3		7					

GREAT PRIZES

You might be lucky this time! Another great prize is waiting for one of you. You just have to send us the correct solution (sending the middle part of the puzzle to editor@cannatalk.com and mention CANNAtalk 37.

If we pick your name, a bottle of CANNABOOST could be coming your way.

Winner puzzle #35

The winner of last Sudoku is **Mrs. Cohen**. Congrats on your 1 liter bottle of CANNA PK 13/14 We will contact you as soon as possible to make sure you receive your prize. Enjoy!

Facts

PLANTS NAMED AFTER DEVITO AND SCHWARZENEGGER

Biologists from The Australian National University (ANU) have named an unlikely pair of plants after Arnold Schwarzenegger and Danny DeVito, the stars of the 1988 movie Twins.

Lead researcher Emeritus Professor Mike Crisp said one of the species of *Daviesia*, a genus of Australian pea flowers, was much more robust than the other, calling to mind the movie about Julius and his twin brother Vincent, the products of a genetic project. "We discover early on in the movie that the embryo split in two, but it didn't split equally -- all the purity and strength went into Schwarzenegger's character Julius, while the dregs went into Vincent, DeVito's character," said Professor Crisp from the ANU Research School of Biology. Hence the scientists called the weaker and smaller plant *Daviesia Devito*, while the bigger and more robust plant was called *Daviesia Schwarzenegger*. Scientists with a sense of humor, you've got to love it.

TWO BILLION PEOPLE DEPEND ON IMPORTED FOOD

Earth's capacity to feed its growing population is limited -- and unevenly distributed. For the first time, researchers at Aalto University have been able to show a broad connection between resource scarcity, population pressure, and food imports, in a study published in Earth's Future.

"We performed a global analysis focusing on regions where water availability restricts production, and examined them from 1961 until 2009, evaluating the extent to which the growing population pressure was met by increasing food imports," explains Researcher Miina Porkka. The analysis showed that in 75% of resource scarce regions, food imports began to rise as the region's own production became insufficient. According to the research, the food security of about 1.4 billion people has become dependent on imports and an additional 460 million people live in areas where increased imports are not enough to compensate for the lack of local production. The international food system is sensitive and price and production shocks can spread widely and undermine food security -- especially in poorer countries that are dependent on imports. As a result, further investments in raising production capacity could be a viable alternative. Especially in sub-Saharan Africa and India, there are opportunities to sustainably improve food production.



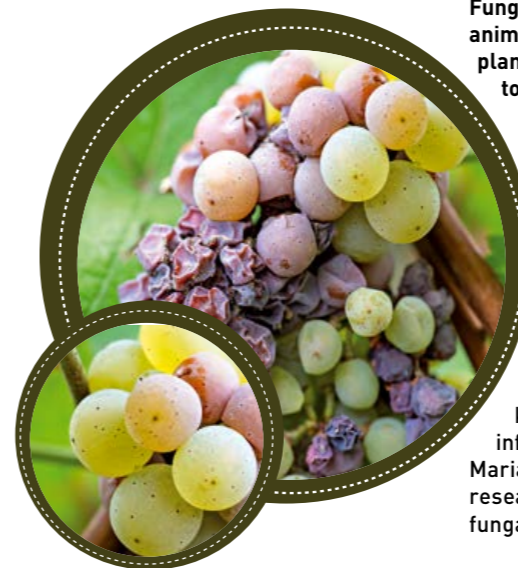
COMPONENT PLANT DEFENSE AGAINST FUNGAL INFECTIONS DISCOVERED

Fungi cause important crop losses and pose a serious risk for human and animal health. A team of scientists has discovered a new component of the plant defense system against fungal infections. This finding provides new tools for developing plants resistant to fungal infections.

Each year, fungal infections destroy at least 125 million tons of the world's five most important crops -rice, wheat, maize, soybeans and potatoes- a quantity that could feed 600 million people. Farmers use fungicides to treat fungal infections, but these are not always 100% effective and, moreover, consumer demands pesticide-free products.

Like humans, plants have developed defense strategies to protect themselves against pathogen attacks. Now a team from the Centre for Research in Agricultural Genomics (CRAG), in Spain, has found that the regulation of the protein activity in the plant by the mechanism known as SUMOylation is crucial for the plant protection against fungal infections.

Maria Lois, expert in protein regulation, explains, "the results of this research will be used to develop new strategies for crop protection against fungal infection." To be continued.



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CANNAtalk doesn't just write about nature, it is also committed to preserving our natural environment. Did you know, for example, that this paper comes from sustainably managed forests? And that your favourite magazine is printed in a carbon-neutral printworks?



CANNAtalk

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what you sow.

Dutch Zoals men
zaait zal men
oogsten.

In other words, growers who know CANNA can be confident they'll yield quality plants.

Welkom to the Dutch way to grow.