

Which factors determine the taste of tomatoes?



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Introduction

In this document you see the report of our research that we have conducted about tomatoes. During this process we have learned a lot about our subject, working together and producing a final result. Even though it was not always easy, as we have different working styles now and then and we sometimes had to adjust to changes we did not always expect, we managed to stay positive and make the best out of it. We have encountered set-backs and had to let our creativity loose to overcome those, and we carried on together and helped one another. We have also learned a lot about investigating and analysing.

We would like to thank mr. Markus for guiding us through this process and giving us the opportunity of contributing to *Water Is Life*.

Frame

Here in the Netherlands tomatoes are a regular part in our cuisine, but why is that and where has it come from?

This does not only go for the Dutch kitchen, but all around the world tomatoes are frequently used for cooking.

In this report we will bring to the light since when, from where and how tomatoes are used and grown.

We have conducted numerous experiments to substantiate our research.

Why did we chose tomatoes?

It seemed as a relatively easy process to grow for ourselves, which we have attempted and will address later.

Adding to that, it was easy to carry out our experiment on them, because they contain a lot of liquid.

And then there is the fact that it is a popular ingredient used in many different cuisines.

Social significance

Nowadays we have to deal with a lot of drought and global warming. This affects many aspects of our life, among which our food. It is important that we know enough about the plant we are trying to produce so that we can alter it's living conditions in a way that it can still grow even in the conditions we find ourselves in nowadays.

What are tomatoes?

Solanum lycopersicum, we call them tomatoes, are round and juicy. Mostly when we talk about tomatoes, we think of red vegetables. But that is not exactly true and there is so much more to them.

Different kinds of tomatoes

There are many varieties in tomatoes, in colour, size and flavours for a start. We have determinate and indeterminate tomatoes. Whereas determinate tomatoes have little amount of leaves, do not need stacking or caging, ripe multiple tomatoes at the same time and need little space to grow, indeterminate tomatoes are the opposite. Even their times of harvest are different. Determinate tomatoes are to be harvested in the early growing season, and indeterminate in the mid to late season.

Some of the similarities are that both need much water and sun to ripen the tomatoes, because it is essential in the process.

Process of history

Up until 200 years ago we thought the tomato was poisonous, because the plant it grows from is and it is part of the nightshade family. The tomato itself loses its toxins during their growth but it makes them vulnerable to diseases and pests. The sun and water are huge factors in this process.

Their origin lies in South America, and when brought to us by Spain we used them as ornaments. We will talk more about origins of the tomatoes later in this report.

Fruit or vegetable?

Then there is the discussion whether the tomato is a fruit or a vegetable. Botanically speaking it should be considered a fruit, because it grows from a flower, which is an essential quality for a fruit. However, the sugar content of a tomato lies significantly lower than the average fruit and the way we use it in our cooking also suggests otherwise. Another factor in this matter is gardening. The plant on which tomatoes grow is an herbaceous plant, and in the world of gardening anything produced by herbaceous plants are vegetables. Which is why many people have come to the conclusion that it is regarded as a vegetable.

Healthy

Tomatoes are really good for your health as well.

They are rich of vitamin A and C, potassium, calcium and phosphorus, along with many antioxidants. These are beneficial for a healthy heart, skin weight and blood pressure as well as preventing cancer. To obtain these substances it is most useful to cook or bake them, because it breaks apart their cell walls and releases the most desired nutrients.

History of tomatoes

We have already established that tomatoes are not originally from here, but from South America. But if that is so, how did tomatoes reach us? And did they always look the way they do now?

How did tomatoes infiltrate our cuisines?

Spanish explorers brought it back from their travels to us in the sixteenth century. They were grown by the Inca's, and back then they were not all red and round. They could be yellow and have strange shapes. The first tomatoes ever brought to us, were yellow and were not bigger than the size of a chicken egg. Which is why, in the beginning, we named them golden apples or the apple of love.

First we thought that the tomato was poisonous, because of the poisonous plant they grow from and their nightshade family. We used them as ornaments and eating from them was out of question. Other than that, it was not helpful that we were not very keen of fruit and vegetables around this time. It was not before the year 1790 that someone put a recipe on paper with tomatoes. His name was Francesco Leonardi and he made a tomato sauce. From this day on the tomato had more and more influence in our kitchen and has evolved into what we know today.

Were tomatoes always red and round?

When we mention tomatoes, the most common image we have is that of a round and red vegetable. However, there are also variations that are yellow, or orange, purple and with all kinds of patterns, such as stripes. The shapes are also various. We have round, but also elongated, pear or even something that resembles a heart.

But how did we come from the yellow and big tomatoes from the Inca's to the ones we have now? The most realistic explanation is that we have unconsciously or consciously been selecting the variations that we prefer and those have reproduced and are now the most common in our life.

What are important factors in the growth of tomatoes?

Tomatoes, just like any other plant, need certain circumstances to grow well. Some of the most essential factors for tomato plants are water, soil and sunlight. But why are they so crucial in growing tomatoes?

Water

Water is part of the plant's nutrition. It is needed for almost all of the processes that happen within a plant: Photosynthesis, nutrient transport, temperature regulation and cellular tension. In the presence of chlorophyll, water and CO₂ are converted by sunlight into sugars and oxygen. The sugars are used to continue growing, and that is the reason why plants will not be able to continue growing if they do not get enough water. Together with water the roots suck up building materials, which the plant uses to grow bigger and stronger. All transportations within a plant are transported through water, which is why there is a constant flow of water in a plant. Everywhere in a plant is water and dissolved nutrition is dispersed by water through the plant. Another thing they need water for is to regulate the temperature. About 98 percent of the water that a plant takes in is evaporated back into the atmosphere, during evaporation heat is released and thus the plant cools down. Water also creates cell tension; this tension makes the leaves firm. If the plant does not get enough water, then the cell tension decreases and a plant wilts.

Temperature

Temperature is another factor in the growth of plants. The CO₂ assimilation rate (photosynthesis) affects the growth rate of a plant. The assimilation rate is determined by light intensity, CO₂ concentration, moisture supply and temperature. As the temperature increases the assimilation rate increases to a peak, if the temperature continues to increase after that the rate decreases again. So, a too high or too low temperature has a great influence on the growth rate of a plant. This is also the reason why plants have it hard when a summer is extraordinarily warm, or a winter is cold.

Light

Light is especially for tomato plants an essential thing. They need light to start the photosynthesis process, but this is not the only thing. Unripe tomatoes, as well as the leaves and stems of the tomato plant contain a substance called tomatine. The tomato plant makes this substance to protect itself from insects and fungi. Tomatine is poisonous to humans, it can cause nausea, vomiting and stomach cramps. The thing about this substance is, that it cannot be broken down by baking or cooking the tomato. Luckily the substance disappears when the tomato ripens. The only way for a tomato to ripen well is if they get enough light.

Insects

Insects are everywhere even inside, some insects in particular can make a plant really here even inside, some insects in particular can weaken a plant. Flea beetles and aphids are a good example of insects that have a big impact on plants. Flea beetles make round holes in the leaves of plants, when they are in big groups, they can even destroy entire leaves. The beetles are especially dangerous when plants are still small, when they become bigger, they can

withstand the damage of the beetles. Aphids are another insect that damages a plant. Aphids remove sap from the plants and can cause the plants to grow slower or not at all. They can also cause the leaves to curl.

Diseases

There are a few diseases that the tomato plants often have. They can be very dangerous to the plants. One of the diseases is Phytophthora infestans, which makes the leaves rot and gain brown or black spots. This disease can occur when giving too much water. Botrytis cinerea is also a disease of tomatoes, it can cause mould to form on the tomatoes. Cladosporium fulvum and didymella lycopersici are both diseases as well. To prevent plants from getting diseases, it is best to make sure to give the plants enough fresh air, and not too much water.

How do professional growers farm tomatoes?

Tomatoes are eaten everywhere in the world, so the demand for them is always high. Alongside multiple other fruits and vegetables, tomatoes are seasonal. This means that they only grow in a particular time of the year. Obviously, tomatoes are eaten all year however the weather may be. So how do growers make sure there are tomatoes all year long and why are their tomatoes so tasty?

Greenhouses

In countries where the weather is generally very cold or hot, greenhouses are a great way to ensure the living conditions of the plants they contain are optimal, which is why numerous growers use them for tomatoes. In a greenhouse it can be controlled how warm and humid it is, as well as how much light the plants are getting. If the sun is not out often enough, they can turn on a lamp that replicates sunlight or if it is too cold outside the temperature inside can be changed. Of course, this is only possible if the greenhouse is well isolated, otherwise it would not warm up. As tomatoes are very prone to getting diseases, farmers must make sure their greenhouses are closed well or their plants will already have a low chance at survival. Thanks to these greenhouses everyone can enjoy eating tomatoes all year long.

There are also places where tomatoes are first sown in a greenhouse and later put outside. This happens in a specific way to ensure they all survive. When plants are big enough to be transplanted to outside the greenhouse, they will need to be hardened. This happens by putting them outside in the shade, or opening the doors of the greenhouse so that air from outside the greenhouse can get in. The amount of water they are normally given is reduced, but not enough to allow them to wilt. If the plants are not hardened before being put outside, they have a lower chance of survival. After this process they will not be returned to the greenhouse anymore. Growers who do this only plant tomatoes when the season is right, otherwise the plants will most likely not survive.

Soil

Growers are also very particular as to what soil they use, for good reason. Along with water, light and temperature, good soil is one of the most influential elements in the growth of plants. The pH of the soil is one of the things that determines the growth of the tomatoes, the availability of nutrients and the activities of microorganisms. They grow best in a slightly acidic soil so the optimum pH-range for tomatoes to grow is between 6.2 and 6.8. This is also the reason they do not grow well in soil that contains a lot of clay. The best type of soil for tomatoes is loam soil. Loam soil contains sand, silt and clay and is great for growing tomatoes because it retains and drains water quickly. Manure is also used regularly, as it benefits the soil while also providing nutrients.

Fertilizer

Fertilizer is another item that is often used by growers. It is used to make plants grow faster, bigger and to produce more food. Most fertilizers contain Nitrogen (N), phosphorus (P) and potassium (K). Nitrogen is needed by all living things to grow. Even though there is a lot of Nitrogen in the air, this is not useful for plants. Plants

cannot draw Nitrogen from the air, which is why they need to take it from soil. Often, not enough Nitrogen is in soil for plants to grow well. For this reason, fertilizers consist partly of Nitrogen. Fertilizer is essential for most growers, as plants empty the soil of Nitrogen. Every time they want to sow a new batch of plants, they have to fertilize the land again.

Breeding

Growers breed their tomatoes to have the best taste and look the most appetizing. They choose the plants that make the best tomatoes and make them fertilize each other. This way of breeding has created a lot of different species of tomatoes. Roma tomatoes, beef tomatoes and vine tomatoes most likely have the same ancestors. However, they were bred to taste more sweet or sour, or to be bigger. The species all have different shapes and tastes, but they all fall under the category of tomatoes.

Genetic modification

Genetic modification is a really new thing. There is still much to find out about what is possible with genetic modification. In the future a lot of growers will most likely use this technique to make their tomatoes as perfect as possible. The first modified tomato was made in 1994, but only in 2021 in Japan the first tomato was approved for consumption. These tomatoes are primarily modified to be more resistant against pests, and to have a longer shelf life. Scientists are trying to make tomatoes have more health benefits as well, they are even thinking about making a tomato that prevents cancer. There are a lot of tomatoes that have been successfully modified, however these are not to be commercially sold. This is why growers cannot use it yet to grow their tomatoes commercially. It will probably be possible in the future.

Visit to a professional grower

On the 22nd of September we visited a company called 'Brabantplant'. This company specializes in growing tomato plants that satisfy the needs of the customer. These customers are mostly suppliers for supermarkets. We were given a tour around the greenhouse and could see some of the processes happen in real time. The plants start as two different pieces, the bottom piece is meant to give energy to the top piece, which produces the tomatoes. Both pieces are planted by machine and put together by hand. They are held together with a special clip until they grow together as one plant. Many parts of the process are done by hand. The tops of the plants are cut off to ensure that a plant gets as much tomatoes per plant as possible. There are up to 25 people to attach the plants to the sticks, so the stems don't break, and the side-shoots are also removed. Just before the plants have tomatoes, they are transported to the supplier. The company recycles all the water that the plants didn't absorb, by cleaning it and using it again.

Difficulties for professional growers

The growers also run into difficulties. In the Netherlands, energy prices are really high at the moment. This is a problem for the growers. They use a lot of energy for maintaining the right temperature in the greenhouse and to power the lights. Customers are not ordering as much plants at the moment because it is so much more expensive right now. The greenhouse was almost empty, while normally it is completely full around this time of the year. Another

problem was the heat and drought this summer. This summer it was extraordinarily hot and dry in the Netherlands. In greenhouses this effect is enhanced even more, this results in a really high temperature in the greenhouse. To make sure the plants don't overheat, they are sprayed with water every day.

Are tomatoes easy to grow from seeds for inexperienced individuals?

A lot of factors need to be taken into account when growing tomatoes, but does it really make any difference? To test if it is easy to grow them yourself, and if these factors really are that important, we decided to set up an experiment.

The question: Are tomatoes easy to grow from seeds for inexperienced individuals? Does fertilizer have an influence?

Hypothesis: The tomatoes will grow within 10 weeks after planting them. The ones with fertilizer will grow faster.

How we are going to test it:

We are going to plant 16 tomato seeds in the same soil. Half of them will be given fertilizer, the other 8 will not get fertilizer. We are going to track their growth and write down any difficulties we might run into.

Results:

What did we do:

On the 19th of June 2022, we planted 16 tomato seeds in the same soil. Half of them were given fertilizer. We both took care of 4 plants with fertilizer and 4 without. At first they were inside all the time, but when it was warm enough, we put them outside. We watered them almost daily, especially when it was hot.

The plants have been observed for 15 weeks and have not even gotten any flowers, which also means they did not get tomatoes. There is a clear difference in the plants that were fertilized and the ones not. The fertilized plants are almost twice as big as the other plants. The average length of the fertilized plants is 35 centimeters. The average length of the plants that were not fertilized is 20 centimeters. The fertilized plants did seem to be a bit weaker. When they weren't watered for a day, they would already start to droop, whereas the unfertilized plants would still be standing strong.

Difficulties:

Heat and drought

In the summer there was a serious heat wave in the Netherlands, and this was not the only thing. There also was a drought. It didn't rain for a very long time, which of course affected not only our plants but also many others. When it is very dry for a long time, the soil cannot take in moisture well, it will just lie on top. This is why it is essential to water plants often when there is a drought. Although we did water our plants every day, they still seemed to dry out a little.

Aphids

After a few weeks multiple white dots appeared on our plants. When we went to water them we found out they were in fact aphids. Aphids remove sap from the plants with their mouth. When there a little, this is no problem, unfortunately our plants were full of them. We believe this was mainly because of the heat, but we cannot know for sure. Our plants started weakening after a while, so the

aphids did stunt their growth. This could be one of the reasons our plants did not grow tomatoes.

What did we do wrong?

There could be many reasons our experiment didn't go as planned. The wrong soil could have been used, or perhaps the repotting was done too late.

Conclusion:

Tomatoes are not as easy to grow as we had expected. There are a lot more factors to be taken into consideration than we had thought. Instead of getting our own tomatoes, the plants didn't even bloom. We were right about the fertilizer. Fertilizer does make plants grow faster, but doesn't necessarily make them stronger.



Tomato plants just planted

Uses for different kinds of tomatoes

We have already discussed some of the different qualities of tomatoes. We have mentioned that each tomato is different from the other kind, defined by texture, shape and taste factors. We will elaborate why we use which tomatoes for what dishes.

Salads

Tomatoes are a regular ingredient in salads here in the Netherlands. However, as you might be able to imagine, if a tomato contains too much liquid and this liquid will be released within the salad, you get a soggy salad which most people do not prefer. To prevent this, a tomato with less liquid is favored, cherry tomatoes or vine tomatoes. Cherry tomatoes are remarkably smaller than most other tomatoes, which makes them more firm and less moist. In addition, they have a very sweet taste that truly contributes to the tastiness of a plain salad. Vine tomatoes are our typical tomato, round and red. They contain a little bit more liquid than cherry tomatoes, but also have an amazing taste to provide for the salad.

Sauce

First of all, there are many divergent uses for a tomato sauce, with contrasting uses. For example, a pasta sauce and pizza sauce. Within those branches there are also numerous different varieties. For these dishes, chefs normally use Roma tomatoes or beef tomatoes, due to their rich pulp. It contains a lot of taste and contributes really well to the structure of the sauce.

Soup

Soup can be made in many different ways. Blending, mashing or using herbs made from tomatoes are some of them. The tomatoes most recommended for making soup are mostly beef tomatoes but Roma tomatoes are also mentioned. They are used for the same reasons they use them for making sauce.

Snacks

Some people enjoy eating a tomato raw, with nothing else. Maybe with some dressing but no other additional vegetables. Easy snacks are cherry tomatoes, sweet from itself and easy to carry with you in a container. Coeur du boeuf is a bit bigger, but also delicious on its own.

Baking on the side

In some dishes, you bake tomatoes on the side for an additional taste. For instance, with a scrambled egg or on a sandwich. Most preferred tomatoes for this, is the Tasty Tom or cherry tomato.

Recipes

Bruschetta (2 servings)

Ingredients:

- 2 to 3 tomatoes
- 2 branches fresh basil
- 1 Green onion
- Salt and pepper
- Olive oil
- ½ garlic clove
- Bread

Preparation method:

1. Cut a cross on the downside of the tomato, and cook in water for 30 seconds. Take out of the water, rinse it under cold water for 10 seconds and peel of the skin.
2. Remove seeds and cut into little parts. In the mean time cut the green onion and basil.
3. Mix tomato, green onion, basil, olive oil and salt and pepper. Leave in the fridge for 30 minutes so that the tomatoes can cool down and all the flavors of the ingredients will mix.
4. Cut your bread in thick pieces, about 2 centimeters, and rub the glove of garlic on the surface of the bread.
5. Take to tomato mix out and put it on the pieces of bread.
6. Buon appetito!

Tomato carpaccio (2 servings)

Ingredients:

- 2 to 3 tomatoes
- Olive oil
- Salt
- Mozzarella
- Arugula
- 1 tablespoon pine nuts

Optional dressing:

- Basil
- ½ teaspoon mustard
- Bit wine vinegar
- Bit olive oil
- ½ tablespoon capers
- ½ tablespoon pickles
- ¼ garlic clove

Preparation method:

1. Wipe a bit of olive oil over the plate and add a bit of salt and pepper.
2. Use a very sharp kitchen knife to cut the tomato in slices as thin as you can, the thinner the better for the experience.
3. Put the tomato slices on the plate and cover with arugula and mozzarella cubes.
4. Sear the pine nuts and divide over the plate. Add dressing if wanted

Optional dressing:

1. Mince the garlic, basil, capers and pickles.
2. Add all the ingredients in a bowl and mix together.

Pasta sauce (240 milliliter)

Ingredients:

- 2-3 tomatoes
- 0,5 onion
- 1 garlic clove
- 0,5 can tomato puree
- 0,5 teaspoon oregano
- 60 milliliter vegetable stack
- Olive oil
- Pasta (any kind you'd like)

Preparation method:

1. Cut a cross on the downside of the tomato, and cook in water for 30 seconds. Take out of the water, rinse it under cold water for 10 seconds and peel of the skin.
2. Mince the garlic and onion and put in a headed pan with some olive oil. After 3 minutes add the tomato puree
3. Cut the tomatoes. Add to the pan with the stack and oregano. Leave the pan on a low heat for 25 minutes.
4. If you want a smooth sauce, pour the sauce in a colander and smash all the liquid through the holes in a bowl. Otherwise, just smash the remaining pieces of tomatoes in the pan.

Definition of taste

Scientifically

Scientifically taste can be determined based on five different categories. Those categories are sweet, sour, salt, bitter and umami. Dishes have different combinations between those five categories. Different ways of preparing food will conclude in different taste combinations.

It is possible to measure the contents of food to see the level of certain taste factors. We will be doing this experiment with sweetness and sourness. Or otherwise said, sugar content and pH level. If you look at the pH level, you can determine how sour a tomato is. You have to look at the scale of the pH, which goes from 0 to 14. If the results are <7 then that means your product is sour, 7 is neutral, for example water. $7 <$ means that your product is alkaline.

Experiment

Preparation:

- Gather all materials needed
- Cut the tomatoes in half
- Squeeze out a little liquid from all centers to use for the experiment

Sugar content

Materials:

Refractometer
Tomatoes
Tissues
Distilled water

Plan of execution:

1. Clean the refractometer with distilled water.
2. Clean the meter with a tissue
3. Take out the liquid that is released from the center and put it on the refractometer.
4. Look in the microscope to read the content and note it.
5. Clean the refractometer and repeat step 2-5 with all tomatoes

pH level

Materials:

pH meter
Tomatoes
Tissues
Distilled water

Plan of execution:

1. Plug in the power cord of the pH-meter
2. Remove the cap of the pH-meter.
3. Put the pH meter in the piece of tomato.
4. Read the pH level from the screen of the pH-meter and note it.
5. Clean the pH-meter and repeat step 2-5 with all the tomatoes.

Sugar content and pH level of tomatoes

	Sugar content	pH level
Roma 1	4,0%	4,17
Roma 2	4,0%	4,18
Roma 3	3,8%	4,23
Beef tomato 1	3,2%	3,90
Beef tomato 2	3,0%	3,70
Beef tomato 3	3,4%	3,77
Vine tomato 1	4,0%	3,87
Vine tomato 2	3,8%	4,14
Vine tomato 3	3,0%	4,25



At school, conducting our research with the refractometer

Personally

Taste is a very personal interpretation. You determine whether you enjoy the flavor or not by tasting it. It consists of the flavors your taste-buds experience, smell, texture and possibly on previous experiences. Your brain conceives this all and states the taste of the dish you taste. Your sense of taste is unique and some combinations will be found enjoyable or heavenly whereas some others won't, and someone else will experience it completely different.

In our experiment to scientifically determine taste you can see a chart with the results. However, we also mentioned recipes. We cooked the tomatoes accordingly to the recipes and wanted to compare the personal results with the scientific ones.

First of all, we tasted our dishes ourselves to see if we could notice anything of difference. We looked at tasted, texture and appearance.

Before preparation:

- Roma tomatoes are smaller and thinner than vine and beef tomatoes.
- Beef tomatoes had 5-6 locular cavities
- Vine tomatoes had 3-4 locular cavities
- Roma tomatoes had 2-3 locular cavities

After preparation:

Bruschetta

- Beef tomato was the most sour
- Roma tomato was the most sweet
- Beef tomato had a grey undertone
- All qualities from before preparation were still noticeable

Carpaccio

- Roma tomato had a soft taste, both sweet and sour in balance
- Vine tomato was much more sweet than Roma tomato
- Beef tomato was the most sour
- All qualities from before preparation were still noticeable

Pasta sauce

- Roma tomato had the most smooth sauce
- Vine tomato had the most thick sauce
- There were a lot of small pieces of the vine tomato that could not get through the colander
- Beef tomato was light in color, orange tinted
- Roma tomato was more sour than sweet and deep red of color
- Vine tomato smelled more balanced, tasting gave us the same conclusion
- Beef tomato was more sour than vine tomato but not as sour as Roma tomato

Of course it might not be considered trustworthy if we taste it ourselves and conclude from this, so we also asked some people from close to us to taste and give us feedback.

We asked them to fill in a survey to see how they experienced the dishes.

The survey asked them to give a number between 1-10 to indicate what they tasted. In this survey they have described how good they found it overall, how sweet, how sour and what they thought of the texture.

Pasta sauce 1:

Sweet: 6

Sour: 7

Taste: 7

Texture: 6

Pasta sauce 2:

Sweet: 7

Sour: 2

Taste: 8

Texture: 7

Pasta sauce 3:

Sweet: 4

Sour: 8

Taste: 7

Texture: 7

Carpaccio 1:

Sweet: 4

Sour: 6

Taste: 8

Texture: 8

Carpaccio 2:

Sweet: 7

Sour: 5

Taste: 8

Texture: 8

Carpaccio 3:

Sweet: 6

Sour: 7

Taste: 7

Texture: 8

Bruschetta 1:

Sweet: 5

Sour: 5

Taste: 6

Texture: 4

Bruschetta 2:

Sweet: 8

Sour: 3

Taste: 8

Texture: 5

Bruschetta 3:

Sweet: 9

Sour: 1

Taste: 8

Texture: 7



Our dishes after preparation

Conclusion

Now that we have finished our research we can finally answer the question: *Which factors determine the taste of tomatoes?*

During the growth of tomatoes it is important that some elements are present, to stimulate their growth best. These elements are water and other nutrients present in the soil and fertilizer. Other elements that are essential are light and warmth. To come to this conclusion we have conducted literature review and we have interviewed a professional in field for their methods in optimizing their tomatoes.

Throughout history, people have selected their preferred tomato based on their taste. As well as breeding tomatoes to create the best combination of flavors.

After comparing our scientific experiment and the survey for the tomatoes, we came to the conclusion that taste is a combination of a lot of elements. Some dishes were found more sweet than would be expected from our experiment. Some of the results were more similar. This could be caused by different preparations or other ingredients used in the recipes, but we cannot be entirely accurate because our research does not reach such lengths.

Taking it all in consideration, there are many factors that influence our experience of taste. Not all factors can be altered to the way that our environment is changing nowadays. But hopefully for the conservation of tomatoes, tomatoes will evolve or be genetically modified in such way that they can optimally grow, despite the climate change. Because how could we picture our cuisine without tomatoes?

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