Chromatography of Pfeiffer: Principles, method and use in perception of soils

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Summary

Motivation

My awakening to chromatography and even more, my awakening to what is beyond the material world, happened in an afternoon in Rio de Janeiro - Brazil. I had joined the doctorate six months ago and was, with my advisor, in a discussing process about the direction of my research with sustainability indicators in productive systems. Especially those soil quality indicators. On this particular day, we have been discussing what would be the best methods to indicate soil biological life. We knew Pfeiffer's chromatography, but we also knew the limitations in its academic use.

After this long day sitting in a meeting room, I went running late in afternoon as a way to dispel thinking. In the middle of the way, I watched a bird scratch the soil in search of something and finally find a small worm. I thought, "*Now the worm has been stolen, it is no longer part of soil life*". Immediately I corrected myself "*what bullshit think so mechanically*". I continued running, it did not take long and a strong thought came to my mind: "*Soil life is much more than counting organisms and laboratory analyzes, academy will never be able to perceive the true essence of life. Because life is interconnected, the soil is connected with more than lives there; soil is connected with everything, birds, plants, animals, with the whole universe*". And an image of Pfeiffer's chromatography arose and stay in my mind, the first chroma that I observed in my life, an image that I can revive at any moment. I recalled a friend's phrase about chromatography: "*an image that shows universal connections that exist in soil*". 'Click'.

Universal connections didn't make much sense to me, but in this 'click', this inspiration moment, made perfect sense. It was then that I decided to work with Pfeiffer's chromatography. In making this decision and beginning to search for the origin of the method and the creator's life, Ehrenfried Pfeiffer, I noticed a strong connection with Rudolf Steiner. So my eyes and curiosity turned to anthroposophy. As universe moves and apparently not by chance, 6 months after this decision, came the opportunity to come to Germany, thanks to my partner Pedro. Study biodynamic agriculture and anthroposophy in Landbauschule Dottenfeldehof. Even without knowing what awaited me, I knew that the chromatography would be part of that.

Introduction

The present work arose from the desire to evolve in interpretation and to experience the Pfeiffer's chromatography. This method was a door that opened in my life, and when I crossed it, I came across biodynamic agriculture and anthroposophy. Before that, I was immersed in academic studies and organic farming practices. The opportunity to participate in Landbauschule Dottenfelderhof was a turning point, presenting a new way of thinking and seeing the world around us. So, because my life is currently situated between these two thoughts, this work will seek to present aspects of natural science (academic) and of spiritual science about chromatography.

During this year, some works and people pass in my way, providing other points of view about what is and especially the purpose of chromatography. Turning my look for what is beyond the material aspect, to formative forces and the perception of these forces. Creating in me an image of Rudolf Steiner's intentions and Ehrenfreied Pfeiffer questions that motivated the creation of 'Image forming methods' (Bildschfften-methoden). On this path were important: the works of E. Pfeiffer, the couple Kolisko, Rudolf Hauschka and Gunter Waschmuth; Conversations with Roland Ulrich, Bruno Follador, Gunter Gebhard, Ansgar Vortmann and Pedro Paçó; In addition to many classes, joint studies, conversations and questions answered (and sometimes unanswered). Bringing the shape to this work.

The first part will address aspects regarding objectives, uses, methodology and interpretation of chromatography, from a material and spiritual point of view. It is an important part for a deeper understanding of the method. The second part will cover the practical activities carried out during this year.

The motivation for the practical activities arose from this first question: How can I perceive the soil rhythm and life throughout the year? A question regarding my rhythm change when I come from Rio de Janeiro to Germany. It was proposed to monitor 4 areas of the Dottenfelderhof throughout the year, with observations of the development of plants and soil, performing chromatography, simple laboratory analyzes and field observations. As a result of this question, others emerged: Can I perceive small differences in the same soil? And can I understand the evolution of a soil over the years? So, I started follow the experiment with compost and potassium fertilizing (Kalikompostdunger-versuch) during the year 2017 and to perform chromas from stored soils since 2014.

In parallel, to these questions about soil and rhythm perception, other questions derived from the natural sciences (and required by my academic studies) have been made: Can I use chromatography as an indicator of soil quality? Can I validate the use of chromatography comparing its patterns with laboratory analyzes? Thus, quantitative assessments, creation and comparison of patterns have been initiated.

More important is to note that the words formulated and the results presented are far from the truth. I did not intend to find definitive answers. It is the beginning of a study that I intend to continue during my life. In a year divided among many readings, lessons and other activities could not be possible to a deep perception of soils of the farm. As the popular saying "Only the farmer can know what is right for his Earth". Good reading.

The impulses and principles of chromatography

"Harmony… all work of my life is about find the harmony" E. Pfeiffer

As everything on Earth has two sides, material and spiritual, the method of chromatography developed by E. Pfeiffer as well. These two sides are apparently polar. However, when one walks thru the path of material world or the path of spiritual world realizes that one path finds the other. A concordance occurs, what appears to be polar is actually complementary, harmonious. These paths can be traversed through discipline, study and/or evolution of thinking, from spiritual or material point of view. From these two polarities or complementarities, opens range of other complementary qualities or forces that fill our modern life and concepts (Figure 1).

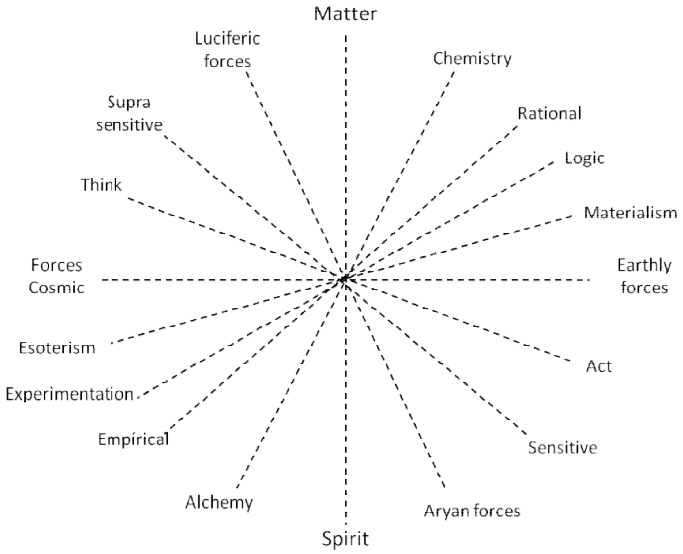


Figure 1. Complementary qualities present in our life.

Finding balance, symmetry, between these qualities is one of the goals of many human lives. And is a recurring theme in Anthroposophy, a spiritual science that, as its name indicates, seeks "the knowledge of the human being". The founder of this science, the philosopher Rudolf Steiner, devoted much of his time to talk about opposing forces that act at all times in earthly life. That influence from our physical form until our thinking, attitudes and decisions. Understanding these forces, and making them conscious in us, is one of the proposed ways, to arrive a balance in our actions in this earthly life.

Arrive at this balance, in this point of forces culmination, would result in the purest harmony, possible in this earthly life. The search for this harmony was constant in E. Pfeiffer's life, he said "*since the first time I experienced the pure harmony, when I was young, I never stopped looking for it*". For most people this experience is something that occurs a few times in life, often unconscious. For Pfeiffer it is "*a sense of resonance with universe, of connection and agreement, in which perfection and truth are present*". This harmony can be found in musical compositions, ex. when a musician transports you to another world. Music is the best door to harmony. Beyond that, harmony can be found and cultivated in nature, in forms, in meditation, in dreams, in all area of work, including in

social relations. The latter is especially difficult to cultivate, but "*anyone who has ever experienced a true resonance between two people knows how special the harmony can be and how wonderful can be the result of this relationship*" (R. Ulrich's words).

All work of E. Pfeiffer (1989-1961), including the development of chromatography has this mark, somehow involves this search for harmony. As a young man (aged 19 to 25) Pfeiffer lived with Steiner. During this period he worked intensively in Goetheanum, studied all the important works of anthroposophy and in parallel he study chemistry at the University of Basel. Pfeiffer was aware of these forces that surround us, for him the impulses for creation the 'Image forming methods' were: "*to understand and study the formative forces and, above all, to development the perceptive judgment power*".

The assumption of these methods is that "*formative forces contained in the samples can be revealed in a physical form, that is, the forces become visible to our senses."* This revelation occurs by formation of crystals, in sensitive crystallization, and formation of an image with forms and colours, in the capillary dynamolysis and chromatography. Making possible to study and understanding these forces, through the development of our perception and cognition (imaginative, inspirative and intuitive). Since the development of Image forming methods, a demand arose for these methods become 'proofs' of the existence of etheric forces."*Through this 'providing of proof' was necessitated, that is from a method started to develop the perceptive judgment, an analytical, scientific method resulted. It was estranged from its original spirit (...) demanded that the path of 'proof' be followed instead of training the imagination cognition*", said Pfeiffer.

After almost 100 years since the creation of methods, it is noted that its use as an analytical, scientific tool, with creation of standards and comparisons has advanced a lot. The easy way. The deep intent, which could bring the development of our perception and cognition, has been forgotten. This development is not easy, requires discipline, patience and perseverance. But it becomes more and more necessary as we face the degeneracy generated by materialism. For Steiner "*the substitution of materialistic cognition for the imaginative cognition is the only way to take the planet to another evolutionary level*."

At a first moment, it is difficult to establish a connection between chromatography method and what anthroposophy describes about the development of imaginative cognition. Pfeiffer said "*the force of imaginative perception (bildhafte Urteilskraft) in those persons who came into contact with it would be developed*", in reference to crystallisation method. However, it seems apply to all imaging forming methods. The development of this 'force of perception' goes through the development of 'active thinking'. This active thinking can be practiced in chroma interpretation, observing forms and colours and seek to develop a relationship with the chroma, create a dialogue between me and the image. Formative forces come to me indirectly, through forms and colours, unconsciously. In chroma interpretation, it would be possible to establish a connection between force and form, to turning what is unconscious into consciousness. "*Consciousness has a spiritual nature, incarnating on earth becomes thinking*" (G. Gebhard). The interpretation of chroma, as well as the development of imaginative cognition, requires discipline, patience, and perseverance. Nevertheless, we must not forget this intent of the method. For Pfeiffer the development of thinking and imaginative cognition leads to encounter of truth, of pure harmony.

Chromatography as 'soil quality indicator'

"How to perceive life? A question about life or about human perception? "

Far from these themes about cognition, perception, formative forces and harmony are the current inquiries of natural sciences. The question of the academic community (Brazilian, at least) for Pfeiffer's chromatography can be summarized as: Can this method be used as an indicator of soil quality? Or, can you create patterns and use chroma to compare soil quality, proving the efficiency of this method compared to other traditional methods? These questions lead us a primordial inquiry, what is soil quality?.

An example of a definition, widely accepted by academic community, was elaborated by Doram and Parkin (1994): "*Soil quality is the ability of a specific soil type to function, within the limits of the managed or natural ecosystem, as sustaining the productivity of plants and animals or increasing the quality of water and air and promoting human health ... indicators must follow the following criteria: 1) involve processes that occur in the ecosystem; 2) integrate physical, Chemical and biological properties and processes; (3) be accessible and applicable in field; (4) be sensitive to variations in management and climate; and (5) be a soil database component whenever possible*". This concept arouse curiosity, because authors sought to encompass various functions of the soil, effects on nature, plants, animals and even human beings, specificities and complexities, in the same sentence. It is a difficult definition, but was largely accepted. Since its publication, almost all publications related to the topic use this definition. Since I starting to work with quality indicators I have used this concept repeatedly, to contextualize my studies with some logic (if everyone uses this concept I must also use it).

According to this definition Pfeiffer's chromatography can be used as an indicator of soil quality, it meets the criteria. In the way of using chromatography as an indicator, along with other laboratory analyzes, some academic papers were developed. Highlight for Perumal et al. (2016) in India, who developed the "Alternative Analytical Technology (AAT)", software for rapid interpretation of chroma, based on a wide database that correlates the images with soil nutrient values. Other works such as de Haßold-Piezunka (2003), Kokornaczyk et al. (2016) and Maseda (2016) have created patterns in chroma, comparing with other analyzes, for composting, different types of soils and detection of heavy metals in contaminated soils, respectively. The creation of standards and validation of the method is also proposed in my doctoral work.

In this sense, chromatography could be used as an indicator of chemical, physical and biological soil characteristics. Aggregating in the same analysis several indicators, which would give to farmers a completely report of his soil conditions. If we consider that chromatography can be performed anywhere, not requiring complex laboratory equipment or reagents, being a quick and inexpensive methodology. It becomes an instrument of farmers' independence. A small independence from laboratories of chemical and physical soil analysis and technical staff. People who always carry recommendations of chemical fertilizers together with the results of analyze. Sad reality of Brazil.

The validation of the method by academy allows the popularization and use by more farmers, what already happens nowadays in India. This motivation is valid and I will

not question it. After all is an important evolution of the use and interpretation of chroma from a material point of view. But the relation of farmers with the chromatography continues to be through numbers. In the end an image becomes numbers, and all the potential that an image has is lost. The thinking of people who are doing or having contact with the method does not change, it remains a materialistic thinking. All the capacity that an image has to touch another level of the human being, to show the balance of nature and forces presents in soil or food, is forgotten. Chromatography worked from a material point of view is no longer related to the complete intentions of Pfeiffer and Steiner. The academy is right in validating the use of chroma, bringing countless benefits. But stop in this point, not proposing a deeper change, a change in the way of human thinking. Bringing understand and perception to life process.

In the way to develop the perception, one can argue: "*Chromatography is also an indirect analysis process, we take samples lead to laboratory and perform chroma, are not realizing a direct perception of life*". This is true. The difference is that the result will not be a number, to be compared, it will be an image. As the poet said "*An image says more than ten thousand words*". Numbers invite us to a closed dialogue, to seek a conclusion, after obtaining the answers the questions are closed. An image invites us to an open dialogue, without a conclusion, where one question arises after another.

For some persons this perception process is developed naturally, but for many this perception is something to be developed. Especially for most people who were born and created on materialistic assumptions, who received normal education based on natural sciences, where it is taught, from a very early age, that perception is something subjective and must be replaced by logic and numerical rationality. "*The path of the development of perception goes through a process of making objective what is subjective*" (G. Gebhard). In this way to bring subjective to objective, a first step can be taken by understanding the methodology from a point of view of the natural and spiritual sciences.

The chromatography method besides chemical reactions

The chromatography developed by E. Pfeiffer consists, in simple words, in sample (soil, compost, food, juices and etc.) collection, drying if necessary, fine maceration and weighing. This volume will be mixed with an extractive substance, sodium hydroxide, and will rest for decantation of the coarse particles. After the resting time, the supernatant will run through the circular filter paper, previously impregnated by a developing substance, silver nitrate. By capillarity phenomenon the substances are retained in the filter paper. In contact with light the reaction between the developing substance and the sample finish, revealing characteristic forms and colours. Figure 2 briefly shows this process.

Thus described, the method is summarized to chemical reactions that result in an image development, which through interpretation, creation of standards and comparisons, leads to a diagnosis of the sample. According to spiritual science look all matter carries a spiritual entity. So, every chemical substance integrates in itself a spiritual characteristic that defines and influence the reactions effects. These spiritual characteristics are decisive in the chromatographic process. Pfeiffer was aware of this in the creation of method.

Figure 2. Chromatography process for soil: a) collection in field; B) drying, maceration and sieving; C) mixing 5 g of soil with NaOH and stirring; D) rest for 6 hours; E) impregnation of circular filter paper with $AgNO_3$; F) running the soil solution on impregnated paper; G) drying in indirect light; H) final image.

For example, between 1920 and 1925, Pfeiffer studied chemistry in Basel with direct contact with Steiner in Dornach. Pfeiffer followed his recommendations for which subjects taken at university and combined academic studies with anthroposophical studies. Steiner once recommended to Pfeiffer "*Every study and new knowledge should be written on a page of your diary, on the opposite page write down what anthroposophy has to say about it ... To maintain, so to speak, the eyes on both sides whenever you need to consult this knowledge*". For Pfeiffer it was clear and intrinsic in image forming methods the two sides of chemical substances. In the process of creation the method he studied the substances and their characteristics, actions and reactions. He tested different acids, bases, metals, combinations and concentrations until found the perfect reagents. Reagents to obtain what he sought "*reveal formative forces in physical forms*".

However, all this information was not described by him in the published articles about the method (compiled in the book "Chromatography applied to quality tests"). Pfeiffer only describes the method from a material point of view. Just searching for more materials, other texts from Pfeiffer and his biography, it is possible to note the other side of image forming methods. It is understood that behind the apparent chemical reactions, there is a spiritual motive to these substances be present. Understanding these chemicals reactions is an important step in understanding what is revealed in the end of process.

The first chemical reaction is the mixing of the sample (soil, compost, food and etc.) with the extractive substance, sodium hydroxide - NaOH. This is used at concentrations of 1% or 0.1% and extraction time from 1 to 12 hours, depending on the sample characteristic. For example, soils and mineral materials need to be mixed with 1% NaOH and an extraction time of 6 hours. Fresh milk and foods are mixed with 0.1% NaOH and extraction for 1 hour. Sodium hydroxide, better known as caustic soda, is a strong base, widely used in domestic and industrial cleaning, because the ability to dissolve organic molecules, fats and others 'dirties'. The same principle is applied in chromatography, where the result of reaction is the sample dissolution. NaOH reacts actively, breaking down rigid, solid substances, long and complex molecules, making them smaller and more mobile molecules. Bringing mobility to the sample, so, the substances can run through the filter paper. So, solid samples, such as soil and compost, need to react with more concentrated NaOH and for longer time than fresh liquids and foods.

Sodium is an alkali metal with high internal energy and reducing ability. In its metallic form it is very reactive, oxidizes with air, reacts violently with water and is very corrosive in contact with skin. This characteristic can be observed, for example, in cutting a small piece of metallic sodium and put in contact with the water. The result is an explosion, with intense release of light, heat and smoke. In the human and animal body is present, being vital for the functioning of the organism. It acts on our neurological, sensory processes and osmotic balance responsible for transmission of nerve impulses. In plants the concentration is small, being toxic for plants in large quantities in soil.

From anthroposophy point of view, sodium is known for its great ability to dissolve and, moreover, as a centralizing substance. When it dissolves bring substances to a center, it forms a core. It has a great importance to humans and animals, which need their own center. A center of our own that makes us more independent of earthly forces. Allowing our locomotion with freedom on earth and bringing Individuality. Since plants do not

contain a center in itself, its center is the soil itself, did not need sodium. In the chromatography this ability to dissolve associated with this ability to center, is very important, because centralization is in principle a structuring process. The solid sample is dissolved, brought into a liquid state to run through the filter paper, but at the same time retain a structuring characteristic, so that forms emerge at the end of the process.

Reflecting on the forces present in samples, NaOH could release these forces from a solid to a mobile form, allowing their development. The formative forces that bring the form to the sample are brought to a liquid state, run on filter paper and then return to act bringing the forms that we see in the chroma. So, we can say that the chroma forms are result of the act of formative forces that previously acted in the sample.

One negative point of using sodium is its great internal energy, which could be over-dissolving the sample, breaking and destroying the substances and forces present therein. Therefore a special care must be taken with its concentration and extraction time. Another negative point is your chemically active in the reaction, being able to react with the forces and substances, altering them and generating a false image.

Another option proposed by Pfeiffer as extractive reagent would be potassium chloride - KCl. Potassium is also a substance with great internal energy and dissolving power, greater than sodium. However, unlike sodium, it dissolves the substances and does not back to a center, it dissolves and dissipates the substances. It could react with the sample, dissolving it and making the substances and forces more fluid and mobile, with greater ability to run through the filter. Chlorine would be present as a counterpoint, because has a strong structuring ability, to bring form and structure to liquid substances, it would contribute to form formation. Figure 3 shows chromas of the same compost that reacted with NaOH (right) and KCl (left), made at same concentration and same day.

Figure 3. Chromas of the same compost that reacted with NaOH (right) and KCl (left),.

The second reaction, which occurs in parallel with the first, is the impregnation or sensitization of the circular filter paper with a solution of silver nitrate - $AgNO_3$. This impregnation happens by capillarity phenomenon, which occurs when a liquid solution travels through the pores of a solid material, in this case the filter paper. The 0.5% $AgNO_3$ will impregnate the filter from the center until a mark at 4 cm radius. Upon reaching this

mark the filter is removed from contact with the $AgNO_3$ solution and placed in box to drying for 3 hours, without contact with the light. After this time, the sample reacted with NaOH will run thru this sensitized filter paper, from the center of filter until a mark at 6 cm radius. The reaction ends in 5 to 7 days, when the chroma stays in contact with indirect light, revealing its colors and forms.

Silver is a metallic element, with the greatest ability to conduct heat and electricity in metals. Because it is very malleable is used to manufacture jewellery and musical instruments, for its ability to make sound repertoire in pure form. Its most striking feature is noticed in mirror, silver creates the most perfect mirrors, which reflects the most faithful image. In living things is toxic at low concentrations. But its salts are absorbed by human body and deposited in skin, mucous membranes and especially in our sense organs and brain. Hauschka said "*the silver process works on a higher plane in the brain, the organ that enables us to reproduce thoughts and mirror the word in our conceptual life*".

Another notable quality of silver is its relation to light. Silver salts are extremely sensitive to light, which provided the photograph creation. The principle of photography was described by L. Kolisko "*The slides are covered with a thin film of silver salt and exposed to the light. The chemical reaction takes place, the silver returns to its metallic state. This only becomes apparent after the developing process. The exposed slide contains the effects of light on the silver salt. We develop these light influences in the dark room with special developing and fixing solutions. The silver returns easily to its metallic state, it is easily "reduced," speaking in terms of chemistry*".

In all uses and processes involving silver the characteristics of mirroring and light sensitivity are present, as well as in the chromatography. When we impregnate the filter paper with the $AgNO_3$ solution and leave it in a dark box for drying, we are creating a thin silver film on the paper, as in photograph slide. When the sample runs on this silver film there is immediate formation of silver hydroxide (AgOH), a relatively unstable substance, which quickly forms a precipitate of silver oxide (Ag_2O) (Pfeiffer, 1984). This silver oxide reacts with light revealing dark coloration. The minerals, organic molecules, proteins, vitamins and humic substances contained in the sample react with silver, forming complexes that result in different colours, forms and secondary structures such as arrows, zones and circles. For example, samples with higher concentration of nitrogen solubilize silver oxide, forming the Amin silver complex $[Ag(NH_3)_2]^+$ which results in a white coloration in the central zone of chroma.

Kolisko studied the relation between metals, earth, cosmos and human being, demonstrated that "*silver is a metal which has in itself a hidden power of formative force which we do not find in any of the other metals in the same strength*". By containing this great power of reflection and formation, silver could bring into visible form the hidden forces from the sample. The formative forces that acted in sample formation and characteristics would be reflected and revealed by the silver in the forms and colours of the chroma. In Figure 4, the effect of $AgNO_3$ can be observed. The same compost sample run on a paper sensitized with $AgNO_3$ and another paper not sensitized. Without $AgNO_3$ presence there would be no revelation of the forms and colours, the process would not be completed.

Figure 4. $AgNO_3$ effect on chromatography. The same compost sample reacted with NaOH and run on $AgNO_3$-sensitized filter paper (left) and non-sensitized filter paper (right).

The silver in this process don't act alone the nitrate contributes, bringing the formative forces near to silver, so that they can be revealed. As quoted in the third conference of the agricultural course: "*Nitrogen is the great tug of living towards spiritual ... he is truly the bearer of sensibility*".

After studying all these characteristics and forces present in sodium, silver and nitrogen, you can think that they are responsible for the forms and colours revealed in chroma. After the observation of Figure 5, it is noted that this is not possible.

Figure 5. Chroma of pure solution of $AgNO_3$ (left) and chroma of NaOH solution that ran on filter paper impregnated with $AgNO_3$ (right).

The colours and forms of chroma are the mark of sample substances and forces. , each chroma is unique as it reveals unique shapes and colours of the sample. Despite these unique patterns, the chrome presents repeatability. It is an important prerequisite for the use of chroma in academic studies. In this work, all the chromas presented have 3 simultaneous replicates, that is, for each NaOH mixture with soil 3 chromas were made.

I need to comment that, for anthroposophy silver has a great relation with the moon. "*The moon itself has the strange quality that it continually reflects the light which comes from the sun and all the other planets.*" This ability to reflect the light and others moon's characteristics is closely related to silver qualities. L. Kolisko in 'Silver and the Moon' presents a vast study of this relation. In experiments with capillary dynamolysis made with pure silver salts, without samples for more than 10 years, she showed that depending on the moon phase, month and time of year the revealed images had different characteristics. The silver salts would be the mirror of cosmos, in their relation to the moon, silver would be reflect the influence of cosmos. It is understood that 'cosmos' is composed of stars and planets with movement, forces and light that act on earth, and that is spiritual entities and consciousness behind these movements and forces. The visible planets and stars are only the physical body of these spiritual forces. So in using the expression 'cosmos' it refers to the physical and spiritual that reside there and act on earth.

After read these work a question arises: could this relation with silver and cosmos interfere in the images of chromatography? Can one compare chrome made on different month or even different days? It can be affirmed that *no*, because of capillary dynamolysis process is performed in vertical form, much more sensitive to cosmos effects than the horizontal capillary method in chromatography. And *no* because in chromatography reactions occur with NaOH, revealing only the sample characteristics. Or it can be said *yes*, silver would reveal in chroma always a mark of cosmos. The concrete answer to this question requires full and long-term studies, which have not been developed until now. So for these doubts do not interfere in the interpretation process, all chromas that we compare here were always done in the same day. To guarantee that just unique characteristics of samples can be identified.

Besides the chromas being unique, representing unique forms and colours from samples, there are general characteristic patterns for each substance group. For example, soil chromas are similar to each other, with similar general characteristics, but very different from chroma of milk or compost. Over time these general characteristics become clearer and the specificities more apparent. By observing, describing and re-experimenting the forms and colours of chroma it is possible to perceive specificities of each chroma and relate with forces that originated the sample. Re-experiencing or reliving the forms can be done through drawings, sculptures, gestures or even by creating symbols, "*art create a non-rational bridge up forces*".

Forms, colours and patterns of chromatography

When a person looks for the first time a chroma, he asks the person who does the chroma*: what is it?* After briefly explaining about the process, the next question is always: *what is it made?* In general, it responds quickly: it is soil, compost, potato and so on. The moment that this last answer arrives, all thinking and *curiosity* about what that would be ends. The door to the 'thinking' that a question opens closes very quickly. The person got the answer and no longer needs to think about it. But what would happen if you visualized 3 chromas without knowing what they are, as in the pictures below, and someone asked you:

What are made theses chromas?

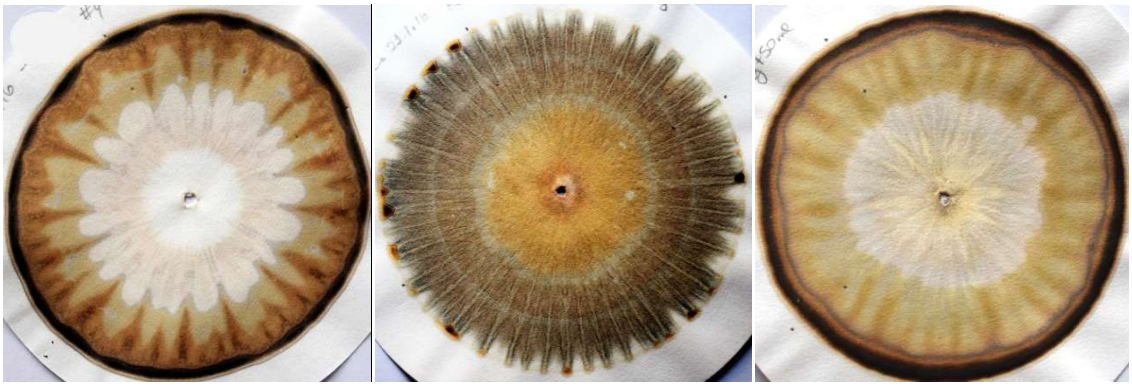


Figure 6. Chromas 1, 2 and 3.

Providing 5 options may be easier. In the image above the options are chromas made from compost, soil, apple, potato or milk. Soon thinking is activated. “everyone knows an apple, a potato and the soil, but this image shows something I've never noticed”. It is possible to advance in the thinking, reflecting on milk characteristics, its constituents, function and importance for nutrition. Would be possible to associate these characteristics with the chroma? Associate forms and colours with functions and uses of materials?

In theory, yes. Characteristics, functions, uses and components presents in the material that created the chroma are closely related to the forces of this material. When we reflect on these functions and characteristics or try to revive the forces that this material contains, it would be possible to find this connection between material and forms of chroma. Let me give you an example.

Milk has a very special role for mothers and children, "*milk is iron-free blood*" Steiner said. A food generated by the mother to feed your child body, the first food brought from outside into the newborn organism. It contains fewer minerals when compared to the soil, but a lot of proteins, carbohydrates, vitamins and enzymes, in a liquid form. The soil in contraposition is solid, it contains a big mineral part and humic substances. Its proteic and enzymatic part comes from the organisms that grow there. The soil also has a very special function, as described in the second lecture of the agricultural course "*a living organ in the agricultural individuality*" and *"the center of the plants, the earth diaphragm*". The intermediary between cosmic forces and life on earth, feeding the earth and plants with the forces that comes from the cosmos. It radiating out these forces.

We can say that the function or mission of milk and soil are almost opposite. The soil radiates forces from itself to outside, feeding plants and soil. Already the milk radiates forces from outside to inside, feeding the animal and human organism. These two ways of irradiation can be observed in the chroma, by the direction that the channels radiate (Figure 7). In the soil the channels (which look like arrows) grow from the center to the border, in the milk the channels grow from the border towards the center. This general form of chroma, or tendency of irradiation, reflects the mission of the material or the *macro-cosmic relationship* with earth, cosmos and other living beings. In the example, both have the mission of feed and nourish, but milk feeds the body with materiality and vitality, while the soil nourishes the earth with cosmic forces.

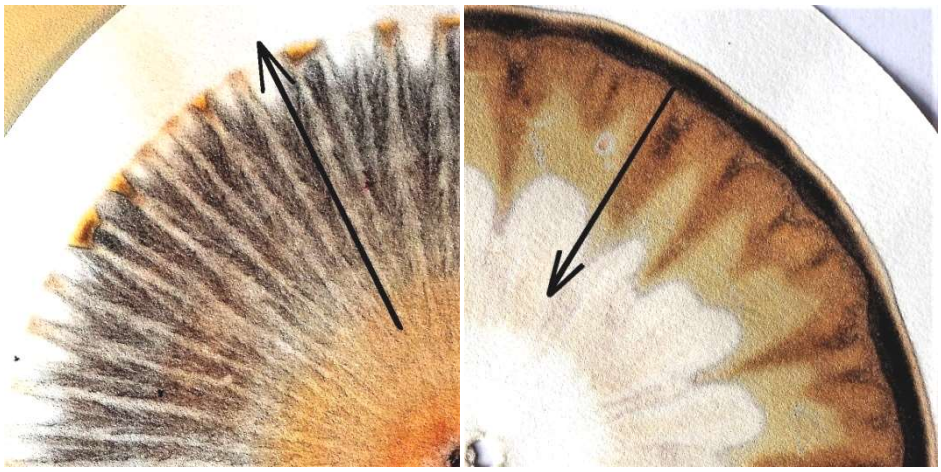


Figure 7. Trend of irradiation of the soil chrome (left) and milk (right).

The specific relation of the sample with the landscape, with the growth conditions or with specific forces of the time of the year can be micro-cosmic influence. This *micro-cosmic relationship* can be observed in chroma in more specific patterns, such as in the presence and forms of channels, spines and concentric rings in the middle of the chroma. This specific patterns contributing to understand and differentiate chromas made of the same group of materials. For example, in the differentiation of different soil types or soils collected at different times in the year, as will be presented later in this work.

The chroma interpretation involves the image description, to standardize this description we use names for the typical forms observed (Figure 8). First we separate the chroma into 3 zones: central zone (a), inner zone (b) and outer zone (c). The forms found in the inner zone are called ‘channels’ and ‘concentric rings’ and the form represent the channel that advances throw outer zone is called ‘spike’.

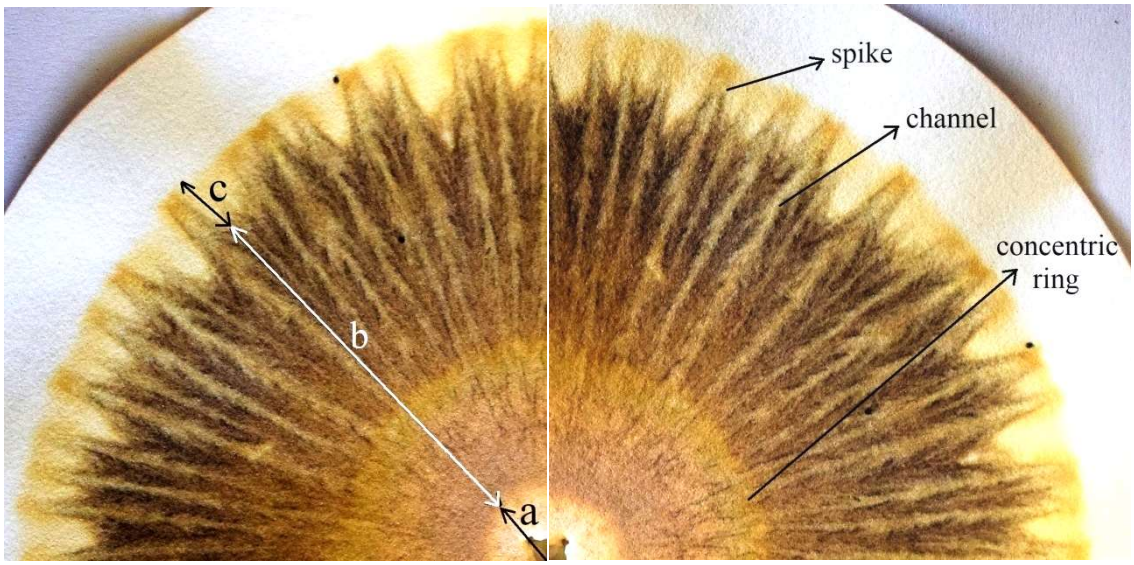


Figure 8. Zones and forms of soil chroma: central zone (a), inner zone (b) and outer zone (c), channels, concentric rings and spikes.

For each zone and shape found in chroma, general characteristics and functions of soil can be related. By the central zone pass all the substances and are distributed in the

chroma, the first reactions with the silver occur here and the formation of silver oxides is more intense. This zone is also called ‘aeration zone’, because reflects the aeration conditions and the presence of nitrogen. Soils with little aeration and tendency to anaerobic metabolism would have dark zone, and aerobic soils present a yellow coloration and cream. In soils with a high presence of soluble nitrogen this zone assumes white coloration.

The inner zone, called the ‘mineral and organic matter zone’, concentrates the reactions with minerals and humus of the soil. The concentric rings present in this zone indicate the presence of soluble minerals, if they are detached and without integration with other rings, may be indicative an excess of soluble minerals. Already when rings are integrated and the colours evolve continuously, it indicates that the minerals are in equilibrium and present in the form of humus-clay complexes. The humus accumulates at the end of this zone, giving brown colours, if the brown colour evolves from beginning to end of the zone in continuous way indicates that the humus is integrated with the minerals and available for the plants. If the brown coloration is disconnected from the more inner zone indicates that humus is immobilized.

The outer zone is the expression of complex substances of high molecular weight, such as proteins, enzymes and vitamins (Pfeiffer, 1984). Substances created by metabolism of microorganisms present in soils, therefore indicate the biodiversity of the soil. This zone is very connected with the presence and distribution of canals and spikes. The number and the rhythmic form and distribution of channels represent the balance of soil microorganisms. In addition, the channels are a pattern of the integration between all zones. Soils with a balance and integration between mineral, humus and microorganisms fractions present channels that start in the central zone and go to the external zone.

Life and rhythm

“Rhythmus trägt Leben” R. Steiner

Rhythm is the mark of life. Every living process has its own rhythm like birth and dying, winter and summer, sleeping and waking, rains and droughts, butterfly and chrysalis, germinating and maturing, as well as many others nature phenomena. "*Life respects the harmony that rhythm brings, only with harmony can life exist on earth*". This rhythm exists due to earth characteristics and has an intense relation with the cosmos that circulates us. The soil as an organ that makes the connection between cosmos and earthly life present an annual rhythm. This soil rhythm varies according to the soil type, meteorological changes that occur throughout the year and human work. Varies according to the region that this soil is in the world, soils of Rio de Janeiro present a very different rhythm from soils of Bad Vilbel.

But then *what would be life?* We usually relate life to living things on earth, plants, animals, humans, insects, micro-organisms and so on. Spiritual science tells us that the life of living beings is brought by the etheric body or vital body, present in plants, animals and man. Point of differentiation between mineral and plants. But could this life be present in minerals? For example, minerals in the earth's mantle in liquid form, in constant motion, potential to form new rocks, are active, basic characteristic of living beings. This vital body is related to the ether or the ‘etheric’ that is present on earth and in universe, always

around us. This ether can be divided, for better understanding and study, into four ethers according to specific characteristics and effects. They are warmth ether, the light ether, the chemical or sound ether and the life ether. These ethers act on matter in a number of ways. For example, in living beings, which contains a vital body, the ether acts from inside thought etheric body, wherever in minerals these ethers are acting from the outside. The ethers that surround us are not visible to sensory vision, but we perceive its existence through its activity and effects on physical and sensible world.

What, then, would be these effects of ether? We know that every activity and effect happen because performance of forces, in physical and spiritual spheres. Steiner said "*the etheric body is the architect and builder of the physical body*", indicating another performance of the etheric. In addition to bringing life, it brings the forms into the physical world. These forms arise in the physical world through the action of the etheric forces, called formative or shaping forces. These forces are generated by the action of the cosmos on the ether. When we see the effect of these forces on the physical world, we cannot differentiate what is formative force from what is ether, so we say that it is the action of ether and forces together. It is only by supra-sensible vision that it is possible to differentiate them. The most important thing is not to forget that in every physical form we observe there is the performance of formative forces together with ethers and cosmos. We could then deduce that the ether is the creator of all forms. But it was a mistake. For the ether is the builder and architect, the force that generates form, but the idea behind the design, the reason that the physical has the form it has today does not come from the ether. This idea or consciousness for the forms of the physical comes from the cosmos, from the spiritual entities that inhabit the cosmos.

Returning to the central theme, *what would be the relationship between chromatography and soil life?* According to the definitions given above, life is a character of the etheric body and it cannot be perceived by my sensory organs. But the effect of the etheric can be observed in physical forms that arise from the formative forces. Thus we can say that life perception can occur in form perception. By all the explanations given about the principles, methodology and uses of chromatography it would be possible to say that it contributes to form perception and, consequently, of formative forces of life and soil.

Rhythm of soil and plants throughout the year

The soil rhythm is perceived in the change of its characteristics and forms that change according to climate, landscape, type of soil, culture that develop there, human work use, among other factors. In order to work this perception, we propose the creation of '*own images'*, through the detailed description of the observations of nature, its characteristics and forms, from different points of view. Like a process of dialogue between me and what I am studying. Dialogue that aims to make the perception process active. From these images, developed sequentially throughout the year, one seeks the understanding of the context, of a whole. When these images are placed side by side it is possible to have more than pictures or photographs of moments, it is also possible to contemplate a film of the development of soil and plant throughout the year.

Four groups of images were developed about soil and plants rhythm throughout the year. The first group regarding formation, classification and physical characteristics of soils. The second general rhythm of soils throughout the seasons. The third with images are the development of plants and soil for each area. The four group show the results of the pH analysis, nitrogen soil moisture. Four cultivation areas of Dottenfelderhof farm were chosen, according to different soil types, location in the landscape and crops implanted according to crop rotation:

1 - Heide: eroded Ultisol, originating from Loess; Planting of winter wheat.

2 - Himmel acker Strasse: Ultisol originating from silty-silty sediment; Planting of legumes, grasses and herbs for animal feed.

3 - Hölle II: Ultisol originated from clay-sandy sediment; Planting with of rye.

4 - Nidda acker: Gleysol near the River Nidda; Planting of beet for animal feed.

Formation, classification and soil morphological characteristics

A first step in understanding soils is understand their physical part, related to their geology and formation processes, which resulted in the soil type and characteristics that we observe today. The location in the landscape or topography of each area on the farm, as shown in figure 9, indicates a dynamic between the areas, important in the formation of these soils.

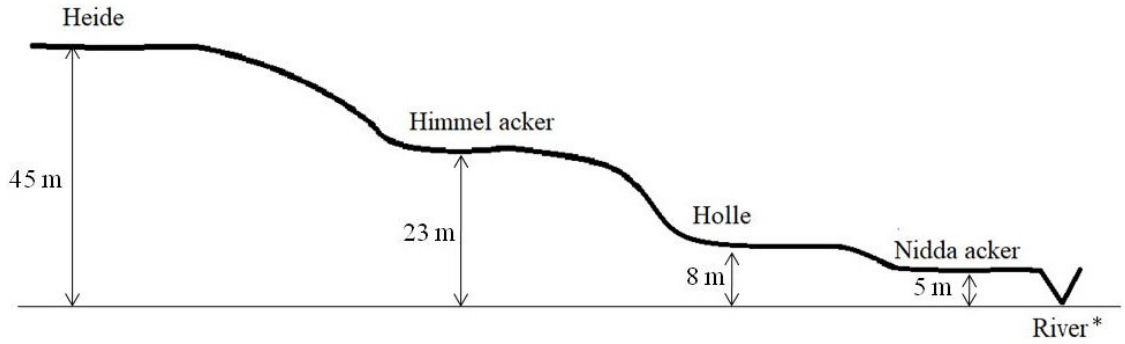


Figure 9. Schematic distribution of the four areas in topography and heights relative to the Nidda river level in Dottenfelderhof farm. *River is 100 m above sea level.

The original rock of the region is loess (in German Lößlehm), which corresponds to a continental deposit accumulated by wind, during the last interglacial periods of the Quaternary. This loess has undergone different processes of weathering, erosion and consequent soil formation, since its first deposition. To understand the most recent formation of the farm soils, a brief history must be told, as did Martim von Mackensen at the beginning of the Landbauschule class:

"Let's turn our imagination to 2000 years ago, when the first great civilization dominated the region and caused an intense change in the landscape. The Roman empire was responsible for the creation of the first cities and the famous thermal baths popular in this region of crystalline water sources, but they needed a lot of firewood. This resulted in the cutting of original forest that dominated the landscape and mountains of the region. This large deforestation gave rise to an incredible wind erosion process, generating the accumulation of almost 2 meters of sediment on the original soil. A huge volume of soil

and sediment accumulated in just 2000 years, incredible thing". This story is backed by studies and facts, including an event at the Dottenfelderhof farm itself. During the construction of the subsoil of present cheesery at 2 meters depth, below the current soil and red-yellow sediments was found a layer of almost 30 cm of black soil, rich in calcium and with remains of Roman objects. It portrays the sediments deposition located in the lower parts of farm, such as Hölle, Feldgarten, PfafferWald, Nidda, pastures and the whole site.

The area Hölle received clay-sandy sediments, a colluvial erosion of several surrounding hills, including from areas Heide and Himmel acker. The Heide area, which is located in the highest part of the landscape, lost its source material that was deposited in the Himmel acker, clay-silt sediments. The Nidda area received colluvial and fluvial sediments, due to its proximity to the Nidda River. The result of this sediments dynamic is the formation of very different soils, that change completely in a few meters.

The soils of Nidda acker are classified as Gleysols, with appearance of mottles at 40 cm depth and Gley horizon at 50 cm. Clay-textured, with 60% clay, 15% silt and 25% sand. With almost 3% organic matter and nutrient level good to high and in this year excess soluble nitrogen. The 5-30 cm layer presents structure in large angular blocks and coloration. Due to the high concentration of clay, sub-surface water and proximity to the river, they maintain humidity for a long period, but when is dry became very hard. In times with excessive rains can raise the water level to surface. The management of the soil is done with care to avoid formation of compacted layers and losses in structure. Organic waste decomposition and mineralization rate is slower in this area.

The soils of Heide, Himmel acker and Hölle are classified as Ultisols or Argisols (in the German Parabraunerde), because they have a Bt horizon, with clay accumulation about 40 cm depth. Although they have the same classification, they have very different characteristics, which give to each soil a different relationship with plants, organisms, microorganisms, organic matter and with the 4 elements, warm, air, water and earth.

Heide soils presents 50% clay fraction, 20% silt and 30% sand, classified as clayey texture, about 2.90% organic matter and nutrient level at a good or high level. In the layer of 5-30 cm presents structure of angular blocks, medium, red-yellow color. With these characteristics it is a soil with good capacity to form stable aggregates and maintain the organic matter, but special care is taken in the soil work to not cause compactation and formation of sub-surface compacted layers. In recent years, the soil work has been reduced in depth, only every 6 years a deep plowing is done to keep aggregates and humus stable.

Himmel acker Strasse presents 40% of clay, 30% of silt and 30% of sand, being clay-silty texture, with about 2.70% organic matter and good nutrient level, with slight potassium deficiency. Have a granular or cracked structure, yellowish-gray colour. Due to the high silt content it is difficult to form aggregates and permanent structure, as well as to create complexes with humus. Is a soil with high activity where you can see the rapid decomposition of humus and vegetable remains. The soil work has special attention, because if done in non-favourable times don’t have results, the soil loses its aeration and structure easily.

Hölle presents 40% clay, 20% silt and 40% sand, being loamy clay, about 2.20% organic matter and nutrient level good to medium. In the layer of 5-30 cm presents granular structure or small angular blocks, yellow-red coloration. For being a more sandy

soil the formation of stable aggregates and humus is difficult. Soil preparation is apparently easier, but if left unattended, it causes aggregate destruction, rapid mineralization of organic matter and clay leaching to deep soil layers.

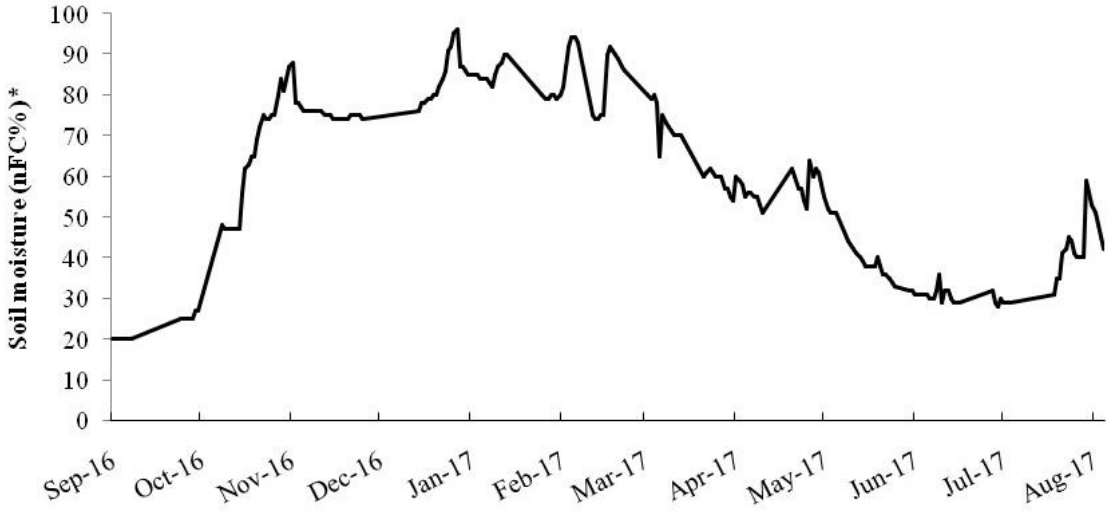
General soils rhythm throughout the seasons

For central Europe conditions intensive cultivated soils (in German ackerbau) present a similar annual rhythm, as approached by Manfred Klett in the lectures of JanuarKurs from Landbauschule Dottenfelderhof. This annual rhythm can be more or less intensive according to the region and soil type. It is variable according atmospheric physical factors such as temperature, humidity and precipitation and cosmic factors such as solar incidence and influence of the moon, planets and other stars.

Observing the atmospheric and soil temperature (Graph 2), during the period from September 2016 to August 2017, the variation between the seasons is clearly. In winter, from end of November, minimum atmospheric and soil temperatures were negative, indicating the beginning of the frost period and the crystallization of water and soil minerals. It was during the months of December and January that the cold intensified, the soil was frozen for 24 days continuously in the turn of the year. And other freezing and thawing cycles occurred in these 2 months. With the arrival of spring, in end February and March, there was a constant temperature rise and few rains. Already the month of April surprised everyone, bringing late frost. In May temperatures reached their peak, above 30 degrees, with few rains. The summer, from June to August, can be characterized as mild, by the constant oscillation of temperatures and rains.

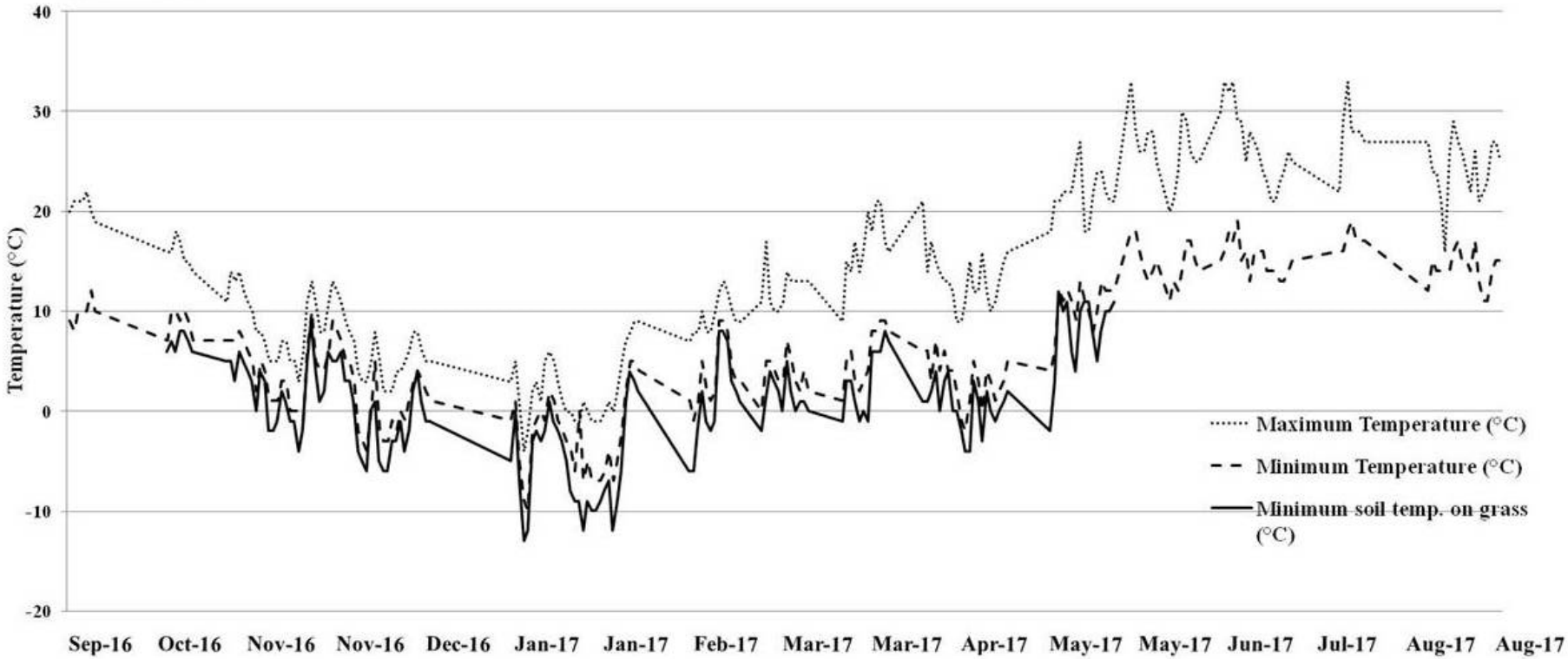
Another physical factor is soil moisture (Graph 1). The beginning of winter is marked by an increase in humidity, the field capacity reaches 100%. This humidity remains high until the spring arrival when begins to decrease and present variations as a result of rains. August showed an increase in humidity due to heavy rains at the beginning of the month.

Graph 1. Soil moisture of 0-60 cm depth from September 2016 to August 2017.



*nFC: Soil Capacity above grass; Fonte: Wetterfax für die Landwirtschaft, reference Frankfurt am Main.

Graph 2. Maximum and minimum atmospheric temperatures and minimum soil temperature on grass from September 2016 to August 2017.



Font: Wetterfax für die Landwirtschaft, reference Frankfuut am Main

The curve that soil moisture presents throughout the year follows the inverse trend of the temperature curve and duration of day. In decrease of day duration, solar incidence and temperatures, the rate of water losses in soil decreases and the water begins to accumulate in soil. In winter the solar incidence is in average 3 hours per day. As the relationship between water and air on soil pores is direct, so a soil saturated by water does not present air. When reaching sufficient low temperatures all the soil, including water, humus and minerals froze, become crystals. This crystallization force transforms every liquid form into solid, densifying matter, concentrating it and bringing into a center. This concentration is also an individualization process, when matter closes in itself and does not relate to those around it, characteristic of every solid element. The earthly lives as plants, microorganisms and animals, cannot grow and feed in crystals, need water. We can say that soil reaches in winter your great individualization point in relation to the Earth. It is gathered inside of itself. But it is not static all frozen and thawing cycles during winter (crystal formation and solubilisation) bring movement to the minerals. The process of soil and structures formation is occurring actively. All these physical process underlie what spiritual science has to say about winter forces.

In this soil formation process, the formative forces are acting on the minerals, formative forces are always together to ether, life carrier. We can say that minerals are alive. "*The Earth is most inwardly alive in winter-time*", said Steiner in the agriculture course. While the life of the earth above the ground is dormant, emancipated from the minerals "*the plants at this time are most left to themselves within the Earth*". This vivification of soil in winter is very important for the horn-manure prepation. And more, "*the mineral substances must emancipate themselves from what is working immediately above the surface of the Earth, if they wish to be exposed to the most distant cosmic forces ... This is the season when the strongest formative-forces of crystallization, The strongest forces of form, can be developed for the mineral substances within the Earth. It is in the middle of the winter. The interior of the Earth then has the property of being least dependent on itself - on its own mineral masses; It comes under the influence of the crystal-forming forces that are there in the wide spaces of the Cosmos*", Steiner said. The cosmos flow trough soil minerals in winter, its forces accumulate to be then radiated throughout spring and summer.

Spring represents the unfolding of forms in nature, the awakening of living beings in and on the ground. In soil, the crystals formed in winter dissolves, the water returns to the liquid state and begins to give space to the air. In these soil colloids bacteria and other microorganisms alive become active, initiating a process of humus formation. On the soil surface, buds begin to bloom, animals and insects become more active, and in few weeks the green spreads through nature. Formative forces act both on and off the ground, a balance of vitality.

The summer characteristics are opposed to winter. Temperatures are high, the days long, the speed of soil water loss is high and soil humidity varies with precipitation. The soil formation that was intense in the winter, here can occur the destructuring and loss of soil. The soil pores present air and water in balance. Conditions for develop of life and forms of nature. Plants, animals, insects, microorganisms and living things that we observe are active. In soil, macro-fauna and microorganisms accelerate decomposition and

mineralization of humus and materials, releasing nutrients in the soil solution, feeding plants and other beings. The dynamics between minerals, humus, plants and animals is intense. Soil and plant are united in growth. Earth life is concentrated in what grows above soil surface. The activity of soil is concentred in feeding earth life. The soil gives its vitality to what grows in itself. Formative forces are acting intensively on all these forms of life, not so much on the soil minerals.

Autumn is marked by falling temperatures, increasing soil moisture. There is again a vitality balance, between what is above and below ground. Plants begin to lose their forms, walk to death after the maturation of summer, the trees lose their leaves and move their energies to roots. Soil prepares for winter. The microbial life lost its activity in function of temperature and soil moisture. Therefore, soil preparation is recommended, as it does not generate losses of humus by mineralization. The preparation breaks the soil structure, generates the chaos, a new beginning. Trough this chaos forces of crystallization and of cosmos can act, initiating a new annual cycle.

Development of plants and soil throughout the year

The monitoring process in each area was done on a constant basis. It started in October 2016, after harvesting the crops or soil preparing. And it ended in early August 2017, when the grain harvest was over and a new cycle was about to begin.

1 - Heide

In the year 2015 and 2016 the area was implanted with a mix of alfalfa, grasses and herbs for animal feed, current moment of crop rotation of area Himmel acker Strasse. In September 2016 the soil was prepared with elimination and incorporation of the plant mix and in October it was surface plowed at 12 cm depth (Figure 10). In November the winter wheat was sown, but followed by a period without rain. After almost two weeks and a few rains, the wheat began to absorb water and to throw its first root into the soil and the first leaf into the air (Figure 10). After this first leaf was released, in some plants until the second leaf, the winter arrived with intensity, bringing frost and the soil crystallisation. The small plants stopped their development. The wheat entered a state of dormancy, detaching itself from the soil that went through a freezing and thawing cycle.

Reindeers and rabbits wandered through the area and fed on these small leaves, but without killing the plants. In mid-February the soil thawed and the plants took a new boost for growth. They threw the third and fourth leaves and cast their tiller. In less than 2 weeks they reached the rosette state in mid-March. As the leaves developed above the ground, below the roots grew and formed a mass reaching 20 cm deep. The soil structure changed after winter, in superficial layer small angular blocks appeared interspersed by roots, and until the 30 cm of depth average angular blocks were observed. At this time an impulse to soil life arose and many earthworms and other fauna insects dominated the open profiles.

The heat at the beginning of April stimulated the stretching of the tillers, and the frost in the middle of the month slowed down this growth. The roots formed a mass that dominated the soil and grew deeper than soil profiles. May was marked by an intense growth of wheat. The end of elongation and the rise of the ear, bringing to surface between the ‘flag leaf’ the green ear of wheat in full bloom.

Figure 10. Heide area in September (a), December (b), end February (c), April (d), beginning June (e), end of July (f) and development of wheat germination in December (g), 1 leaf stage in January and February (h), tillering in April (i), ear development in June (j) and maturation in July (k).

July witnessed the filling of wheat grains, which fattened the ear that stood erect, always pointing toward the sky. The soil underwent periods of drying and wetness. Many insects of macro and micro fauna were observed in soil. In June the already formed and large grains began maturation process, the plant translocated its forces to these grains and the drying of leaves began from the bottom up, the senescence or death began. Over the earth the roots mass that dominated the soil, which were the bridges between the soil food and plant, detached themselves from the upper plant part. They also entered a death process, delivering their energy and structure to soil microorganisms, for a new beginning of life. Death always brings more life. Root gave itself to soil, feeding it. Plants give itself to its seeds. Within 2 weeks the wheat was dry, the earlobe that once indicated the sky turned downward, as saying "*I am ready to deliver my grains to earth*". Harvest moment, which occurred at end of July.

2 - Himmel acker Strasse

In the year 2015 was planted the mix of red clover, grasses and herbs for animal feed. In 2016 the area was cut 3 times for hay and fresh feed of animals. In 2017 it was in its second year of use. Figure 11 shows the general view of the area during the year 2017, in periods between cuts.

Figure 11. View of the Himmel acker Strasse area in April (a), June (b), August (c) and treble ground cutting in April (d).

In November 2016 clover plants were well established, but few grasses and other plants were observed. The last cut of the year had been made at 5 cm high, and the plants had grown little since then. But its roots dominated the initial 15 cm of soil, in smaller

volume they extended to a greater depth. In the months of December, January and February the plants and their roots developed little, they entered a dormancy, accumulating their energies while the soil crystallized. The end of February brought permanent soil thawing and earthworms dominated this soil, feeding on soil and compost that had been applied in the previous year. Despite the great formative strength of winter, the soil structure did not change much, there was no formation of block structure, soil remained as a uniform layer with granular structure, related to the silt content. The clover plants began to shed more leafs and grows; the first new leaves of grasses were noticed. March and April were marked by an incredible development of plants above ground, which closed its surface, forming a green and juicy carpet. The same occurred in the soil, clover roots in the upper part of soil formed a mass and the active nodules of biological nitrogen fixation were observed. In greater depth the grass roots and herbs developed.

In April and May, when the leaves were 40 cm, the first cut was started. The highest proportion of green mass cut off was red clover, new leaves of grasses and grasses were observed in lesser quantity. Half of the area was cut for fresh feed the other part was cut for hay or intended for composting. After cutting a new growth boost was observed in clover plants and also in grasses and herbs that need light to develop. The green mass of plants that developed in this new impulse presented a more balanced proportion of clover, grasses and herbs. The heat, humidity and long days of May and June contributed to this impulse. In July another cut was carried out amidst the flowering of clover plants. The image of August shows half of the cut area and the other half with clover in full bloom (Figure 11). Due to this intense movement of machinery for the cut, lines were formed where the wheels of the tractor passed continuously. In these lines, cracked structures were formed in the soil, indicative of the compacting process. In the areas outside these lines the soil was maintained with the characteristic granular structure, without any indication of compaction. A final cut will be made and the soil will be prepared and plant mix incorporated into the soil. Feeding the life and the crops that will arise in the crop rotation.

3 - Hölle II

In the year of 2016 the area was cultivated with winter wheat, current moment of crop rotation at the area Heide. The wheat harvest was in July and in August the soil was prepared with surface plowing at 10 cm depth. In October the area was sown with rye, followed by a rain that brought moisture to soil and stimulated seeds germination. They threw their roots and the first leaf in less than a week. In November rye plants already had 3 to 4 open leaves and in average 10 roots, that occupied the initial 5 cm of soil. Although the temperatures and the hours of sunshine diminished, the small plants continued to develop. In mid-December, when the frost arrived and ice crystals covered the soil (Figure 12), the first tiller began to appear.

With winter intensification, the plant development speed slowed but did not stop completely. During periods when the soil thawed, the plants took advantage of it and threw a few more tillers, patiently, slowly one after another during December, January and February (Figure 12. Thus, at the end of February the plants were with the tassels formed, opened in rosette, covering the soil with green. The roots reached 30 cm deep and the life of the soil organisms intensified around these roots.

Figure 12. View of Hölle II area in December (a), May (b), rye falling in June (c) and July (d) and growth of rye on 3-leaf stage in December (e), tillering in February (f), flowering in May (g), ear development in June (h) and maturation in July (i).

In March and April, with increasing hours of sunshine and temperature, the plants began to along the tillers. It was an explosion in vertical growth, a less than 2 weeks the plants reached 1 meter in height, after another 3 weeks they were already 2 meters. The ear was on its way among the curled stem leaves, in early May the first ears sprang out of the flag leaf, received by the strong sun of this month, blooming.

In May the roots also exploded in growth, a mass dominated the initial soil layers and may have reached 2 meters deep. Still in May due to heavy rains, winds, the size of the plants, brittle stem structure and factors linked to soil and cultivation method almost the entire area falling over early. The stems did not crack, they doubled, the fibers remained united and the roots continued to bridge soil and plant, feeding the development of the ear. After the falling a layer accumulated cereal, contributing to maintenance of soil moisture, more insects, earthworms and microorganisms were noticed in this layer and in soil. Still at the end of May and June, the grains began to grow, swelling, accumulating water and minerals, milky. By mid-June the plant appeared to translocate nutrients from its leaves to the grains, the characteristic bluish-green colour of rye began to give way to yellow. New roots were no longer produced, and in observing the soil, instead of white, new and active roots, there were only yellowish, older roots.

At the beginning of July the rye was already dry, its leaves yellow, maturation had brought energies from plant to the seeds, grain. The plant died to form the grains a last impulse to these seeds generated new plants and could feed other live beings. By mid-July were harvest despite the falling of almost entire area, and straw was rolled up and stored.

4 - Nidda Acker

In 2016 was cultivated rye, current moment of crop rotation that is the Hölle II. The rye was harvested in July and in the middle of August fertilization was carried out with the bed of the cow stall (Stiffstall), in the order of 300 kg Nitrogen/ha. This bed of cows consists in a mixture of manure and straw accumulated during the cold 6 months in which the cows are inside stall, this mixture undergoing a composting process during the warm months, to be then applied in field. After fertilization the soil was plow at a depth of 15 cm. A mixture of green manures (serracene wheat, mustard, grasses, sunflower and others) was raised and sown. Due to a dry period after sowing of this mixture, germination was poor and the plants did not develop to cover soil before the first frost. Thus, the view of the area in December, January and February (Figure 13) was of a light soil cover from rye.

As in Hölle II rye developed rapidly, covering the soil in March. The lives of microorganisms and fauna, especially the earthworms, awoke among the rye roots, feeding on the last manure and straw that were still visible in soil. But as the goal was not the cultivation of rye, in the end of March soil was continuously prepared until it could receive the new crops. The entire plants and roots mass was broken and incorporated into the soil, a rich material that was quickly digested by soil organisms. In the first week of April the first plantings of root crops were made, carrots for seed production and early potatoes. But most of the area remained at rest, waiting the ideal planting season. The area in which profiles and soil collections were made, remained in rest throughout April.

Figure 13. View of Nidda area in December (a), March (b), April (c), May (d), June (e) and August (f); development of roots and plants consortium in March (a) and April (b) and beet for cows feed in June (c), July (d) and August (e).

The plants were not fully incorporated and grew again, covering the soil and creating new roots. The soil at this time presented a really beautiful structure (Figure 13), small angular blocks enveloped by white roots in the first 10 cm, followed by large angular blocks formed up to 30 cm, with the presence of many roots and no evidence of compacted layer. The roots grew through the rests of manure and straw, dominated earthworms channels, as if these channels were roads to the roots. Many earthworms were seen.

In May the soil was re-prepared continuously, the plants and roots were incorporated, and uncovered soil strips took the view, of what was once a green mass of plants. The plants green juicy and their roots quickly disappeared in middle of so much soil life. Irrigation was permanently set up so that beet planting for cows feed could be made. At the end of May, the beet seedlings were transplanted thanks to a great joint work ('mutirão' as we say in Brazil) among us students of Landbauschule and Walford school of Kassel. It took 2 weeks of intense work to plant the 2.5 ha of beet. These seedlings were received in a clean soil, prepared in such a way that the soil structure was not thin, with small blocks on the ground. Irrigation was performed whenever necessary, so that small plants did not suffer due to lack of water. After 2 weeks the seedlings had already released new roots and new leaves appeared among the old ones. The constantly moist and full active soil and nutrients provided to these small plants all the food they needed.

By mid-June, one month after planting, the plants were in full growth, with a height of 30 cm above the ground full of large, vital green leaves. Its main pivotal root was deep more than 20 cm and secondary roots, white and active, were launched in several directions. By July the plants had closed the soil surface, with large, broad leaves leaning against each other. The main root started the secondary growth, fattening and accumulating substances and water in the region near the soil surface. This secondary growth was rapid, at 1 month some plants already had roots with 20 cm of height and 15 cm of width. An explosion of growth so great that the soil could not hold them inside, the roots needed space and the plants were pushed up from the ground. The soil with its structure formed over 1 year was transformed and opened by the fat roots. In August this lateral root growth continued, but not as intense as July. Some plants fell as they were pushed out of the ground, waiting for the harvest time, which is expected to occur in October.

Analysis of pH, nitrogen and soil moisture

In order to carry out these analyzes, soil samples were collected in 6 periods: November and December 2016, February, April, May and July, 2017. At depth of 0-10 cm, 10-20 cm and 20-30 cm. Samples were taken to laboratory for moisture and nitrate determination. Subsequent drying on the bench, maceration, sifting in 0.053 mm sieve and storage. Then, pH was determined in H_2O. The results of these quantitative laboratory analyzes are presented in Table 1.

The results are closely related to temperature and humidity presented above. Soil Moisture and pH values show the same trends in all areas, rising in winter and decreasing in summer. The variation was small, so it would be not much commented. Nitrogen apparently does not follow a trend. It can be associated to the fertilization and rotation moments and the differed plants in each area.

Table 1. Soil Humidity, pH in H_2O, Nitrogen from 4 areas collected from November 2016 to July 2017.

		November	Dezember	February	April	Mai	July
Heide	Moisture (%)	16,65	17,02	19,5	16,2	15,22	15,0
	pH H_2O	6,67	7,1	7,10	6,67	6,55	6,4
	N (kg/ha)				81		
Himmel	Moisture (%)	14,0	14,08	16,53	15,65	14,10	13,23
	pH H_2O	7,03	7,11	7,25	7,35	7,15	7,05
	N (kg/ha)	72	71	69	77	79	77
Holle II	Moisture (%)	16,85	17,6	18,55	17,2	12,1	11,98
	pH H_2O	6,95	7,05	7,15	6,66	6,4	6,66
	N (kg/ha)				73		
Nidda	Moisture (%)	20,56	21,66	23,20	20,4	17,8	15,33
	pH H_2O	7,19	7,39	7,45	7,39	7,19	7,15
	N (kg/ha)	95	89	80	90	89	70

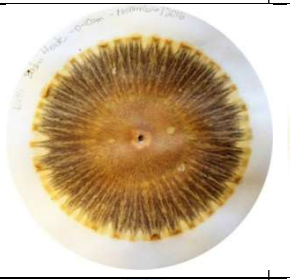
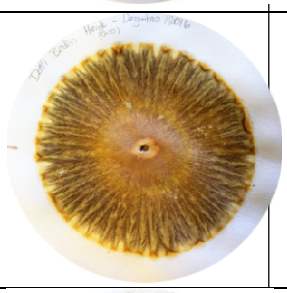
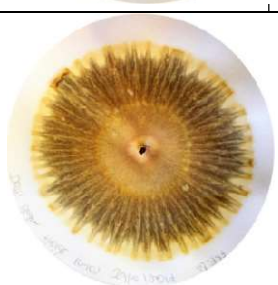
For example, in the Himmel strasse area, where crops were implanted, N increased when spring started in April and kept increasing until July. It can be related with the more activity of biological nitrogen fixation and the fertilization with compost at end of May.

The perception of rhythm and areas in chromatography images

All these descriptions of formation, classification, morphological characteristics, temperature, humidity and the annual rhythm of soil and the development of plants and soil sought to create images from each area. These images will be the basis for the interpretation and perception of the shapes and forces of the chrome. The same samples collected for the quantitative analyzes were used to chromatography. The soil chromas of all areas are presented in a compact form in Table 2. But presented so small, compressed into a table, the images and their details become difficult to observe. For this reason, Figure 14 shows cuts of chromas of area Heide, distributed in a circular way throughout the months. At a first look these cuts are very similar to each other, but in a closer observation details and differences arise. First I will try to describe common characteristics of all chrome.

The central zone is small, approximately 0.5 cm in radius, light yellow or cream colour. The intermediate zone or mineral zone then starts with a light brown coloration. This coloration evolves into darker shades continuously until the end of the zone. A concentric circle stands out, approximately 3 cm from the center. With light brown coloration in contrast to the final part of the zone that has dark brown coloration. But in spite of the circle the zones present integration, mainly because of the channels.

Table 2. Chromas of soil from 4 areas collected from November 2016 to July 2017.

	Heide	Himmel	Hölle II	Nidda
November				
Dezember				
Februar				
April				
Mai				
July				

These channels appear fine at the beginning of inner zone, with the same light brown coloration of this beginning. As the brown of the inner zone goes dark the channels remain clear and progressively widen. After the concentric circle, other secondary channels arise from the main channel, like arrows cutting air. These channels bring integration and dynamics to the chroma, especially to the inner zone. They are distributed rhythmically along the circle, that is, with each constant space appear a channel, constant and rhythmic like the heart beat. The canal results in spikes formation that characterize the outer zone.

By observing the canals, spikes and outer zone is possible perceive differences between the seasons of the year. In November the canals end in short spikes, they appear to be cut in the half and don't show their tips.

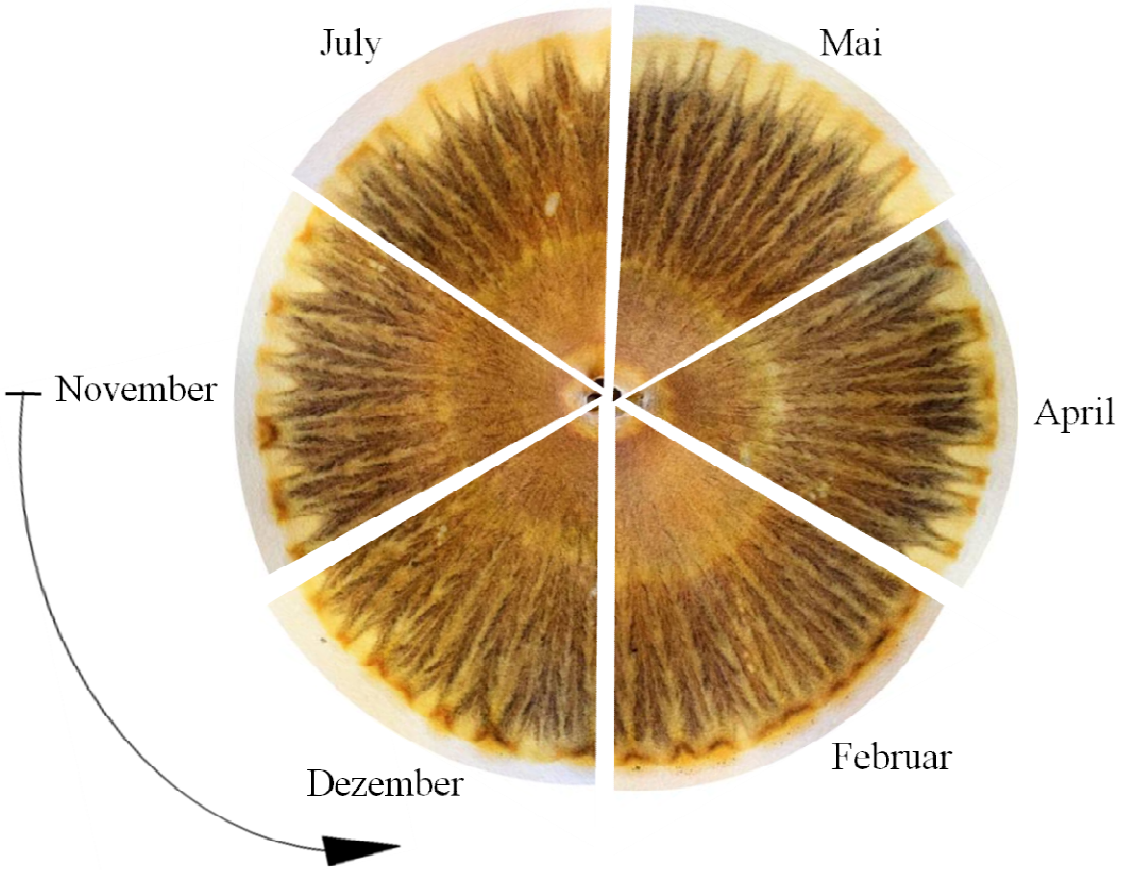


Figure 14. Expanded soil chromas from area Heide collected from November 2016 to July 2017.

Fine and wide channels alternate in the rhythm in which they are distributed in chroma. In December spikes are shorter and cut, the channels are wide and the secondary channels are not well identified, they seem like channels that take a lot of water. February no longer presents spikes or any outer zone, remembering this zone represents the microbial activity. The inner zone dominates the entire chroma, concentrating on border. But channels are thinner and homogeneous, at a more constant space than the previous.

In April the spikes are very similar to November, they seem cut, but the canals are finer and rhythmic as in February. In May the spines appear complete, extending throughout the outer zone until their end at the border of chroma. The channels are fine and perfectly rhythmic, even the secondary channels emerge at equal times, like perfect arrows

carrying light beyond chroma. July shows the same full spines, an irradiation that comes from the center to the border. The channels are rhythmic, with alternating thin and wide channels, not perfectly fine as May, but bring to the chroma a greater dynamic, the chroma seems to be in motion in the summer.

Now look at Figure 15, where the cuts of cromas from Himmel acker Strasse are organized. There are many similarities to Heide's chromas. Mainly in relation to colours with degrade from light to dark brown. The general shape of zones and channels is also similar, with a small cream coloured central zone, followed by the broad inner zone. But when observing this inner zone, we see that its colours do not evolve rhythmically, from a light tone to dark. The circle is wide and clearly divides the inner zone into two parts. One part is central with light brown coloration and the other part is dark brown contrasting.

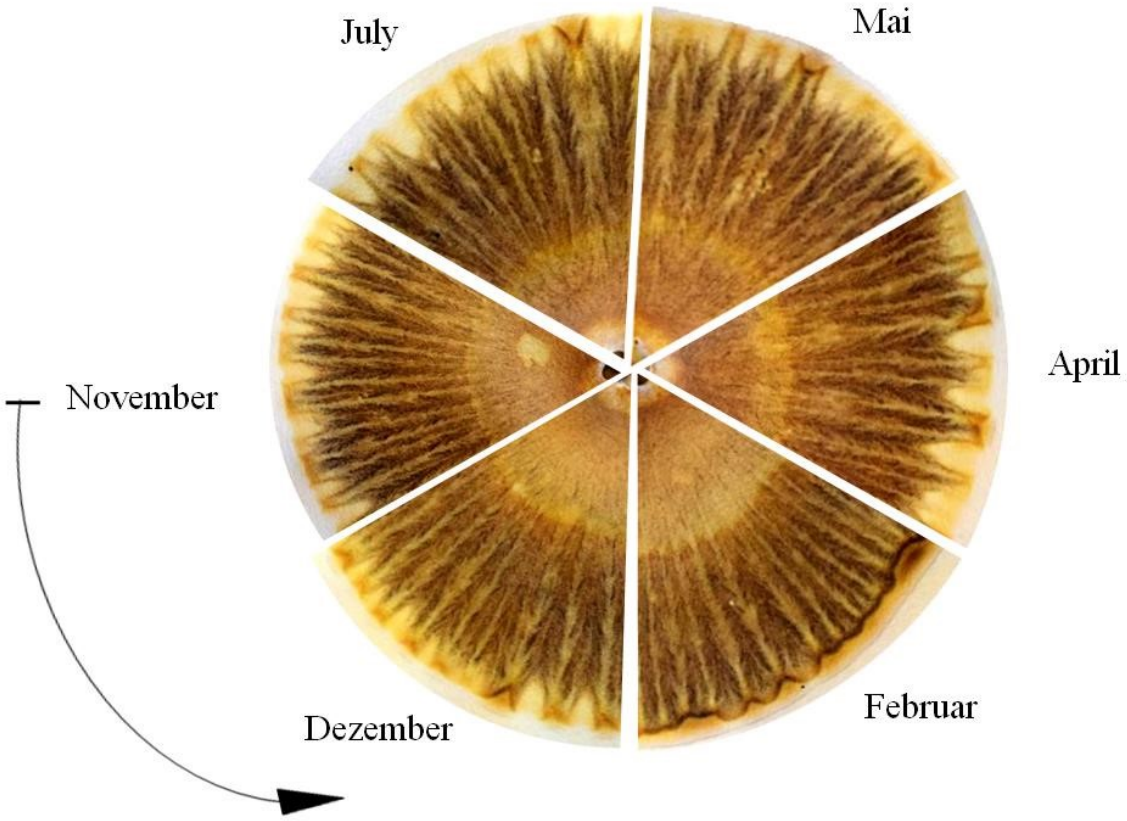


Figura 15. Expanded soil chromas from area Himmel acker Strasse collected from November 2016 to July 2017.

This circle divides the part that indicates minerals from the part that indicates humus in chroma, demonstrating a space between these two soil fractions. The integration between these two parts does not occur rhythmically as in Heide's chromas area. The channels that contribute to this integration are present, starting at the most central part of inner zone, but not having the same coloration as this part. They are lightly coloured, but not exactly the light brown of the central inner zone, have the coloration of the concentric circle. So they seem to appear in the circle in direction of border, they do not seem to integrate the inside with the outside, fortifying a division of chroma in two parts. The distribution of the channels is rhythmic, always appearing at similar intervals. The channels are thinner than those in Heide, and the secondary channels emerging from the main channel are thin and rhythmic, giving a delicate aspect to the channels irradiation.

This thickness of channels changes depending on the time of year, November, February and July stand out for the finest and rhythmic channels. But even in the other months the main channels remain thin the secondary ones intensify and appear with greater force. The difference over the months is mainly noticed in the pattern of the external zone and the spikes, in November and December the spikes appear cut, in February there are no spikes or external zone, only the inner zone dominating chroma, reaching to the border and accumulating substances. As if there were a force to run and spread in the chroma, needing so much space that the outer zone does not appear.

In April the spikes reappear, partly cut and partly not. Short and long spines distribute without homogeneity or order. In May and July, the spines returned to

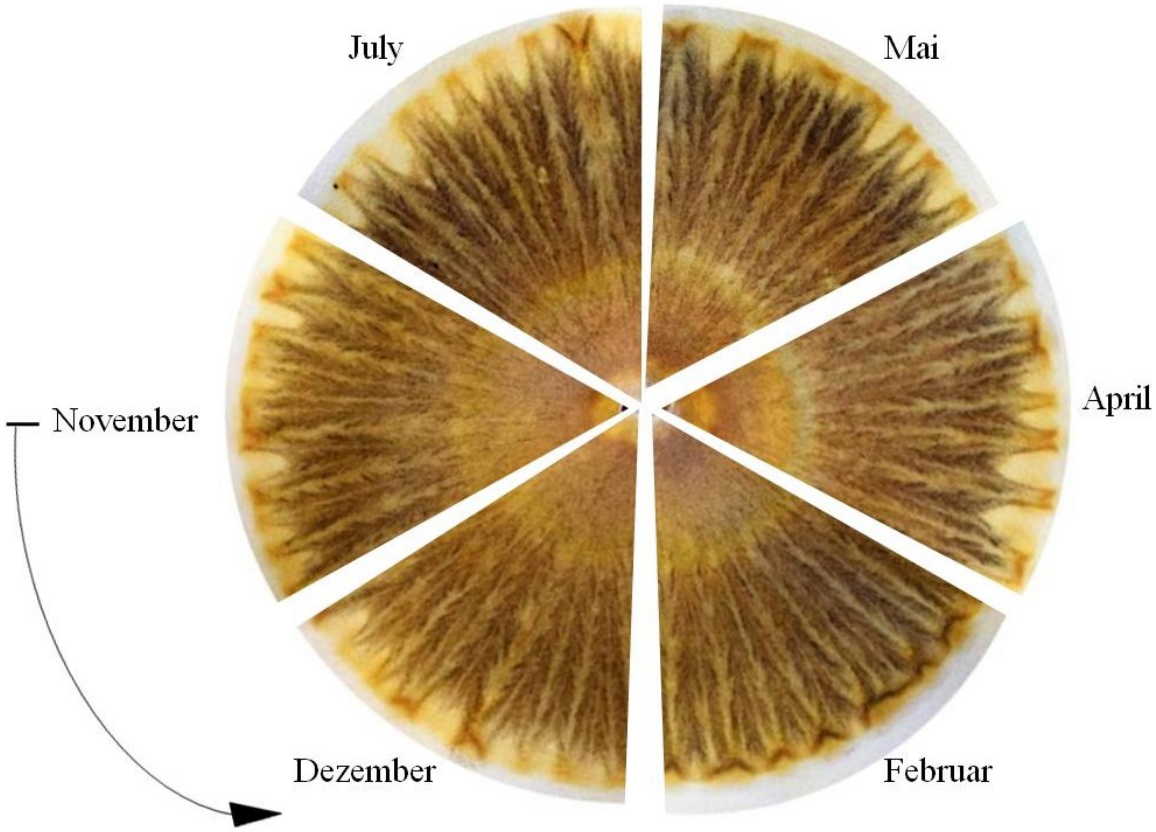


Figure 16. Expanded soil chromas from area Holle II collected from November 2016 to July 2017.

homogeneity, being still cut, but more rhythmic.

Considering the shape of the outer zone the February and July chrome are almost opposite. Observing the triangles of chromas of Hölle II in Figure 16, it is note also that they are similar to cromas from Heide and Himmel areas, mainly due to the colours and distribution of zones. The concentric circle is present, but not as wide or prominent as in Himmel area, there seems to be greater integration in the inner zone, as in Heide. These integration appear because of the continuation of colours from beginning to the end of this zone and because the channel passing through the circle taking the colour of the center in itself. The specific characteristics of the chroma, channels and spikes, are markedly different from the chromas presented above. The channels do not have homogeneous size, there are wider interspersed by thinner channels. These wide channels dominate the vision.

Both, main and secondary channels, arising giving a bulky appearance to them. There are fewer channels in each triangle, but the volume of each is larger. The chroma seems to be dominated by the channels, which gives another characteristic to chroma irradiation. Irradiation does not seem to radiate just light colours and light, as in other areas, but it seems that radiate something liquid with the light. As if something bulky spreads along the path, like a cut through the chroma.

The spikes are also characteristic of this area, they do not arise rhythmically, the spaces between the spikes are not the same. As in a song in which the intervals between notes determine the rhythm, in these chrome the interval between the spikes determines its rhythm. The distribution of large and small spines is also not rhythmic, sometimes wide

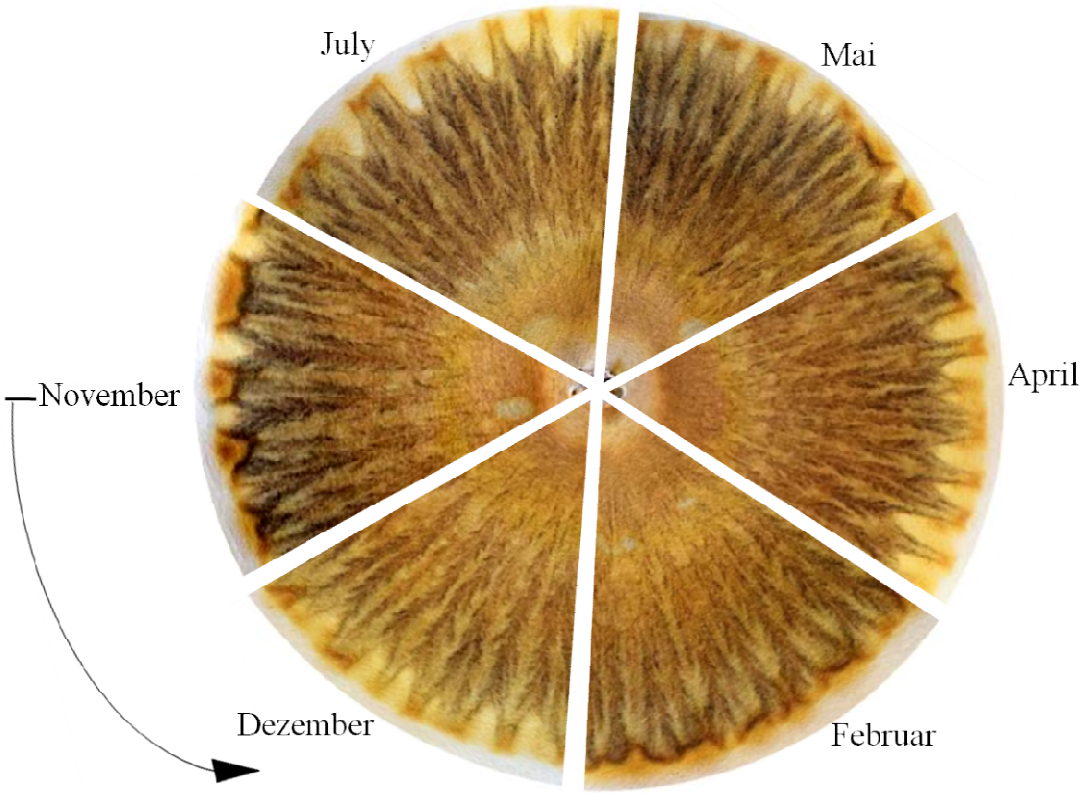


Figure 17. Expanded soil chromas from area Nidda collected from November 2016 to July 2017.

spikes appear and then thin or double or small spines, without order.

The difference between months is also marked in the outer zone and in the spikes. Highlight for February that has no spikes or external zone, again with a strong internal zone that dominates and reaches the border of chroma. July presents opposing features, with large and uncut spines in general, presenting a well-formed outer zone. In other months the spikes appear, but they are cut in middle as if representing intermediate states between winter and summer.

Now looking at the chromas of Nidda area in Figure 17, we see similarities with the other areas in colour and distribution of zones. The concentric circle is present and is wide yellow, but at the same time is integrated with the colours of the inner zone. This integration appears through the channels, they begin at the central inner zone, already wide

and bulky. They pass through every internal zone increasing in volume and at same time releasing wide secondary channels along the way. Larger that channels in chromas from Hölle II. These secondary channels emerge from the main channel in points, as if there were impulse points along the main line were emergence secondary lines. The appearance of secondary channels does not follow a rhythm, these impulse points arise at different distances. The result is wide and bulky channels, but with different shapes and patterns, gives an impression of disorder. The channels dominate the inner zone and the chroma view, are strong and striking. The general form of the canals seems bulky and liquid, as if they radiate something liquid, taking water from the center of chroma to border, leaving a trail of water along the way. Liquid is a more dense form of matter than air or light, to carry a liquid requires more force than to carry light. So I have the impression that the Nidda channels are stronger than the channels of other areas.

In the same way the inner zone seems to be stronger, dominating the chroma and reaching to the border in November, February, May. More intensely in February, it accumulates on border indicating the strength of inner zone. But in the other months the outer zone is small and subtle. July can be considered the month with greater outer zone and spikes, in contrast with February, but still appear there are cut off and without a rhythm. The space between each spine and their size is not rhythmic. We can say that in general the chrome of Nidda does not present rhythms, either in channels forms, in distribution of secondary channels, in the form of outer zone and in distribution and size of spikes or even in the accumulation of substances on the border.

Putting together all these individual observations from each area, one can see a pattern that is repeated in all areas. The chromas collected in winter (February) are almost polar to those collected in the summer (July). In winter the outer zone is not visible and the inner zone extends to the end of the chroma. This zone, which represents the minerals and the organic matter fraction of soil, dominates the whole chroma. Just in the winter where the vitality is concentrated in the soil and when the crystallizing and formative forces are acting more intensely in the minerals. The outer zone that represents the microbial activity disappears, is dormant in the winter.

My feeling about these winter chrome is that I made a mistake in the methodology, as if chroma needed more filter paper to reveal the outer zone. As if they were saying "I have a strong impulse and I need more paper to reveal myself completely". But at the moment that we are doing chromas the methodology is the same for all, all the samples run up to the 6 cm radius mark, we cannot let the sample run beyond that point. Only when the colours and forms are revealed in contact with the light we notice this strong impulse.

In summer, the outer zone, which indicates the microbial activity, appears and dominates the edge of the image, bringing spikes and channels, to a greater or lesser extent depending on the area. The formative forces at this time of year are not only concentrated in the mineral part of the soil, but mainly in microbiological life and plants that develop in it. The chroma of later spring and summer present more dynamic forms, irradiation, as if they radiate more force from itself. Relation to soil function at this time of the year, to feed the life that develops in it without concentrating anything in itself, radiating vitality out.

Throughout the description of the chrome of each area, some comparisons between the areas were made to facilitate the characterization of each one. To make clear the

individualities of each area and its characteristics, Figure 18 presents chromas triangles from November of the 4 areas organized in circle.

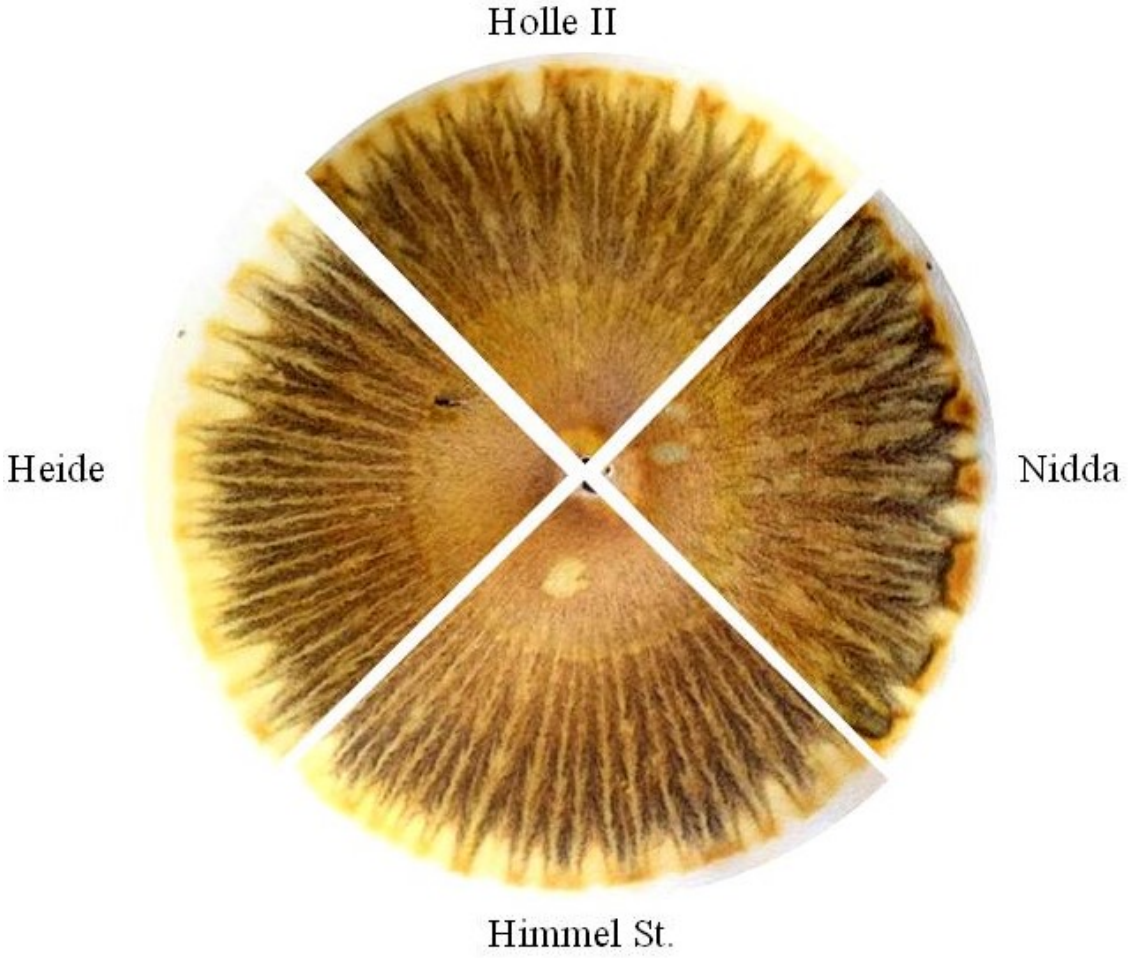


Figure 18. Chromas triangles of the 4 areas from soil collected in November 2016.

Note that channels and Spike forms the most specific characteristic of each area. As was said this are forms with great relation with micro-cosmic aspects, as the landscape, soil type, nutrients and humidity. On extreme sides are the chromas from Heide and Nidda, their forms are clearly opposite. The Heide chromas show thin channels in larger numbers, but not voluminous, appear to radiate light and lines, which run through the chroma releasing non-stop secondary channels. These channels end in complete spikes, as if the light were brought from chroma center and carried to the border, ending in the outer zone, like a clear yellow cloud. The channels and spikes are distributed and present in rhythmic and uniform way, without surprises. The forces of this chroma is related to light, expansion, rhythm and clean forms. This forces can be denominate ‘masculines’ and related to warmth and light ethers.

Already chromas from Hölle II seem to be in a halfway between Heide and Nidda. Himmel's chroma seems similar to Heide's, but with slightly thicker channels and stronger concentric circle. The chromas from Nidda area have large and voluminous channels, as if carrying liquids within them. They radiate circular shapes. The channels cross the chroma releasing secondary channels at impulse points. The channels froms are not homogeneous; each channel has a unique form and the distribution of the secondary channels does not

follow a pattern. The chroma doesn't show much rhythm in channels form and distribution. The channels reach the border with force, carrying substances that accumulate in the end. The spikes and external zone don't appear, they are inhibited before such force of channels and inner zone. The chroma force is related to water, concentration, thickening of substances, circular, square and heavy forms. This forces can be denominate 'feminine' and related to life and chemical ethers.

When remembering the position of each soil in the topography it is noticed a similarity between the characteristics of chromas. Heide is located high on the landscape with a light and characteristic lightness. The soils are lightweight, with block structure, aeration and easy to be worked in relation to the Nidda area. The Nidda area is located in the lower part of landscape, next to the river, in constant relation with the underground groundwater. The area is shrouded by trees and shrubs, as if enclosed in itself, concentrating. The ground is heavy, with structures in hard blocks and without much aeration, difficult to be worked on.

These forces present in the landscape and chroma are related to sensations that we feel when we are working or walking through the areas. The feeling of getting to Nidda area is heavy, as if the ground pulls me into it and as if humidity suffocates and concentrates me. Very different from the sensation when arriving at Heide area, which is light, as if I walked in the air and the light, without connection with the ground, always made me want to sing. The Holle area provides a sensation similar to Nidda, but not so intense. There is heat and a connection to the soil and water, but not the whole body seems to be in the ground. The Himmel area, however, has a Heide-like feel, but the light is not so intense, there seems to be a balance between light and ground, a line between these two forces. These observations of the sensation in each area were practiced in a class with Martim Hollerbach about 'Formative forces Methode' (Bildkrafte Methoden in German). The works of Tristan Spalt and Martin Haas of the Landbauschule present deep observations from the areas of Dottenfelderhof.

Another observation that could be made is about the relation betwween chroma characteristics and the development of plants and in each area. Could we say which plant would grow best in each area? What would be the area most suited to cereals or which would be the best area to grow beets with vitality? For example, wheat and rye are cereals and were grown in very different areas this year, Heide and Hölle. By observation made throughout the year we could say that in Heide the wheat developed better than the rye in Hölle. Other example, is the planting of beet in two different areas Holle and Nidda, maybe gardens can say that in Nidda the beets appear to be more vigorous. However, it is not possible attribute these success just because specific forces of each area, many other factors are related.

We could not come to a conclusion of which plant is best for each area, just lucking for chromas and forces. After all, the purpose here is not to provide the 'ideal' plant for each area, recommended a miracle plant for the area. In agriculture, one can difficultly work in ideal conditions, but can seek to make conditions most ideal as possible. So that plants can develop all its nutritional potential, in more harmony with nature.

What I can say is that is a relationship between the forces of the area and chroma forms and patterns. Working the perception of these forms in chromas can lead to an

understanding of the forces that acting on the areas. The same forces that generate sensations in me, which act in soil formation and characteristics, that influence in plants growth, quality, vitality and potential of nutrition animal, human and all beings of nature.

Kalikompostdünger Versuch

Among the experiments located on Dottenfelderhof have the so-called "Kalikompostdünger Versuch", translated to "Potassium and compost fertilization experiment". It was implemented in 1997 to evaluate the application of biodynamic composting and association with Potassium sources in a 6-year crop rotation traditionally performed on the farm (Table 3). The treatments are: 1) no fertilization; 2) fertilization with potassium sulphate; 3) fertilization with biodynamic compost; and 4) fertilization with potassium sulfate and compost. The experimental design is completely randomized blocks, with 4 blocks and 4 replicates per treatment, adding 16 experimental plots.

Table 3. Crops rotation and fertilization of the last 10 years on the experiment, highlighted the year 2017.

Year	**Crop rotation**	**Fertilization**				
		Stall bed compost	Compost	Potassium Sulphate	Potássium + compost Potassium via compost	Potassium Sulphate
2005	Oats			400 kg/ha K		
2006	Alfalfa					
2007	Alfalfa					
2008	Winter wheat					
2009	Rye					
2010	English potato	350 dt/ha	300 dt/ha	400 kg/ha K	127 kg/ha K	273 kg/ha K
2011	Oats		150 dt/ha	400 kg/ha K	62 kg/ha K	348 kg/ha K
2012	White Clover					
2013	White Clover		300 dt/ha			
2014	Winter wheat					
2015	Rye		300 dt/ha	300 kg/ha K	310 kg/ha K	150 kg/ha K
2016	Beet	350 dt/ha	300 dt/ha	200 kg/ha K	180 kg/ha K	50 kg/ha K
2017	**Summer wheat**		**150 dt/ha**	**400 kg/ha K**	**- kg/ha K**	**- kg/ha K**
2018	Alfalfa					
2019	Alfalfa		300 dt/ha			

After some conversations with Christopher Mattes in the beginning of the year, are proposed to perform some tests with chromatography in soils of experiment. The idea was to observe some effect of treatments in chromas, establishing a relation with quantitative results. In addition, the idea of observing the evolution of soil over the years arose, because there were soils stored in laboratory of years 2014, 2015 and 2016.

The experiment in located in the Himmel acker area, in the side of Himmel acker Strasse that was present earlier in these work. Soil formation and characteristics are similar between the areas. The monitoring of experimental area was started in mid-February, in occasions of the planting of summer wheat. Soil preparation had been done in December 2016 with plowing at 15 cm depth. Three weeks after sowing, the soil was scratched to

break superficial and compact layer of soil and controlling invasive plants. At the beginning of April the plots were fertilized with the amounts indicated in Table 3, at time that wheat was in rosette stage. After some rains and late frost, at the end of April the wheat began to lengthen its tillers and in May to bloom. In June the grains were filled and in July was the beginning of maturation and plants senescence. The harvest happened in the first August week. During this cycle 4 soil samples were taken: at end February after planting the wheat, in April after fertilization, in May and August after harvest.

In March and April, on different days, the chromas of the 16 plots of each year 2014, 2015 and 2016 were made. In May the chromas from February and April of 2017 collections were made. At end of May, all the chromas made were distributed on the laboratory table in order to observe them. There was an extreme difficulty in establishing some differentiation between treatments, the difference between blocks was clearer than between the repetitions of each treatment.

In addition, the most striking difference was the effect of the day that we made the chromatography. For example, the patterns of chromas of 2015 made in March were completely different from the patterns of chromas made in April. But observing the chromas made in the same day was difficult to find differences. It was then that the doubt about the effect of cosmic influences in the day of the chromatography could be influencing the images. We decided that to compare chromas it would be necessary to perform all chromatography on the same day. Thus the chrome previously made was left aside. On August 11, the final test was done for all soils stored in 2014, 2015, 2016 and the collections 2017. For the large number of samples it was decided to make chromas only from the first experimental block, as presented in Table 4. But in a table is difficult to differentiate something. So, Figure 19 presents cut chomas and organized in a circular way over the years.

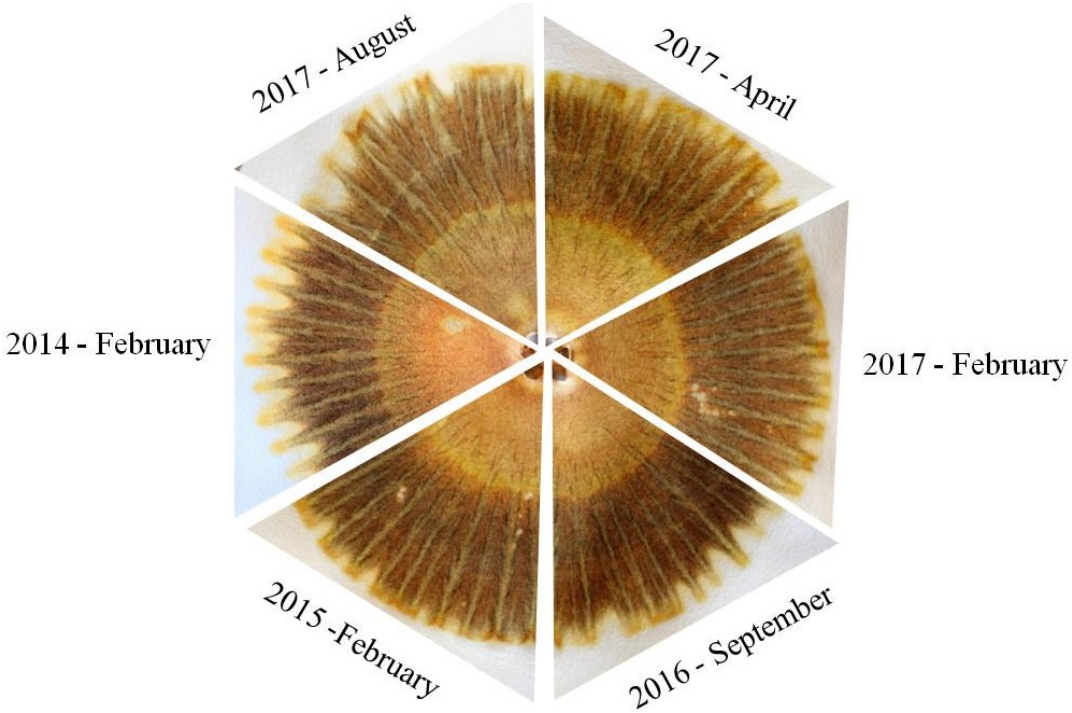
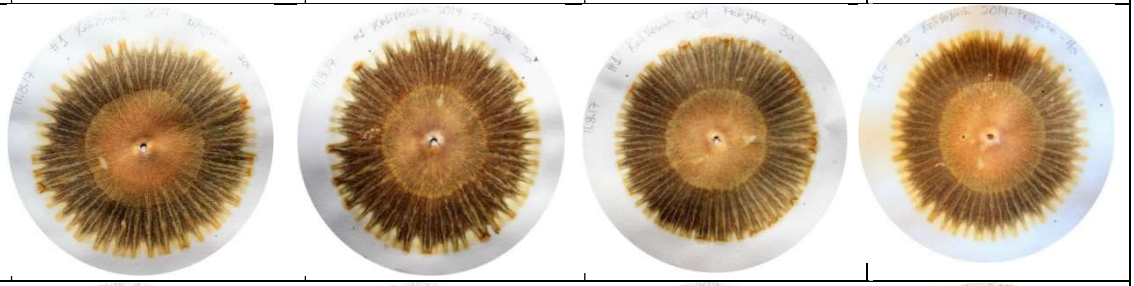


Figura 19. Chromas from Potassium and compost fertilization experiment, of the treatment with no fertilization, over the years 2014 until 2017.

Table 4. Soil chromas of the 4 treatments from Potassium and compost fertilization experiment, from 2014 to 2017.

	1 – no fertilization	2 – K Sulfat	3 – Compost	4 – K + Compost
2014-February				
2015-February				
2016-September				
2017-February				
2017-May				
2017-August				

Arranging the chromas amplified it is notice that they look very much like the chromas from the himmel acker strasse area presented before. With the presence of a concentric circle that separates the central from the external part of the inner zone. This circle generates a break in the evolution of chroma channels and colours. The channels are fine and rhythmic giving an impression of radiating light and strength out of the chroma. The distribution of spikes and canals does not seem to follow some pattern between period of collect and the years 2014, 2015 and 2016. The chromas collected in 2017 present a slight variation in spines and canals patterns between February and August.

Regarding the less difference between treatments, I preferred to omit the amplified images of the treatments. The differences between treatments varied greatly over the years. It was not possible until now to find a pattern in the distribution of spikes and canals that repeated over the years.

Some perceptions and new questions

During this year some meetings and reading of works provided a change in my way to work observe the chromatography, changing the perception that I have about the chroma images. By describing the method in detail, considering spiritual and material knowledge, I experienced the quality of each chemical present in the chromatography reactions. This experience brought me closer to the process, made him more alive in me. Bringing effects on how I interpret and look chromas.

By observing and describing the soil characteristics of each area, landscape, plants that developed there and the variations of the year, we sought to create an image for each area. Seeking a dialogue with what was observed and studied in order to perceive qualities and forces of each area. On the other hand, by the observation and description of the chromas it was possible to perceive a pattern of specific forms and colors of each area. With the addition of images and patterns some relationships between the characteristics present in the area with the characteristics present in the chroma were found. Characteristics that come from forces effects. A possible bridge between the perception made in nature and the perception of chroma forms.

Some patterns in the chroma should be highlighted. The macro-cosmic characteristics of the sample are perceived in the irradiation patterns of zones, for example in the difference between milk and soil. The microcosmic characteristics of the samples were observed in the patterns of the spikes, channels and circles, for example, in the differentiation between the soils. Even clearer was the perception of the rhythm of the year. Winter chromas have characteristic patterns and were noticed in all areas, even though the specific patterns of each area. In winter the mineral and organic parts of soil were strong, whereas in summer the microbial activity was strong in balance with the mineral. Already the specific differences between treatments of the experiment and over the years were difficult to be noticed. Because of the lack of dedication, studies, patience and time.

For me, the experience that I accumulated in this process of creating images of the areas and soil was a fundamental point. After a year of frequent observations, walks, some work, opening profiles, discussion with colleagues, I created a relationship with each area

and there soil. It would not be worth developing the interpretation and perception from forms, colours and forces of chromatography, being far from the reality and the forms, colours and forces of nature.

In the same way after a year practicing chromatography, repeating tests, searching for the best methodology, standardization, discussing its aspects with teachers and colleagues, created a relation with the methodology. More than that, I created a personal relation with the chromas, so close that when I close my eyes and bring to my mind specific images of chrome of each area and time of year. These images are alive in me and relate to the areas. So I feel that my general perception about nature and life evolves.

One may ask: what is the validity of working the perception about the forces of each area? Could you use these perceptions to improve soil management? choice best plant for each area? Or in the creation of crop rotation more adapted to each region of the farm?

Only those who work on the farm can get to these answers, those who give hours and hours of their lives to work with agriculture can understand their land, soil and plants. Only with time can you arrive to any of these answers. What this work presented were experiences carried out in a year from specific observations, classes and work in laboratory, very little practical work with the earth. Were far to understand all the dynamics and characteristics of the areas and the farm.

What I can say is that specific forces are acting at all times on the nodes, soil, plants and landscape. Perceiving, understanding and working together with these forces can facilitate farmer's mission and contribute to creating a decent farming. Agriculture that can create vital food for us humans in evolution and respect all other kingdoms of nature.

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