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HOMEOPATHY: PLANT, WATER AND SOIL

Scientific evidences of the high dilutions.

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HOMEOPATHY: PLANT, WATER AND SOIL

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- Interpretative text on research on high dilutions phenomena applied experimentally to plants, water and soil.

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GRATEFULNESS

To God, supreme intelligence.

To Hahnemann, for the science of Homeopathy.

To CNPq, to Federal University of Viçosa and to the Department of Fitotecnia for the support.

To collaborators: Adalgisa de Jesus Pereira, Daniela Boanares de Souza, Deisy Xavier Amora, Eduardo Gomes de Mendonça, Fernanda Maria Coutinho de Andrade, Iná Lima Reis, Janini Tatiane Lima Souza Maia, Rafael Eugênio Guanabens for the, effort and persistence in elaborating the chapters.

To our parents and relatives. To our friends for their love

To all people who directly or indirectly made possible this social technology.

DEDICATION

To the agricultural families who produce healthful foods.

To the kingdoms: vegetable, mineral and animal.

To Earth.

To Water.

IMPORTANT NOTE

This book is a review text of interpretations carried through by graduated students. The purpose is to disclose Homeopathy integrated to agriculture, soils, and water.

It was written to offer updated knowledge on science of high dilutions and to visualize the progress, about scientific approaches on homeopathy. High Dilutions and Homeopathic Theory are from now on an ecological resource.

CONTENTS

INTRODUCT

Homeopathy, science of the high dilutions, was discovered by Hahnemann, in Germany. Between 1796 and 1816 Hahnemann brought to the civilization the natural laws of great impact in some areas of the knowledge. His discoveries were originated from the experimental principle. Hahnemann also discovered the similarity principle. He proved the principles: Unique substance and Minimum dose. These are the four principles of Homeopathy. Homeopathy is a natural law, and a phenomenon of nature.

The application of those principles to agriculture was initiated in Koberwitz, Germany, in 1924, by the Austrian philosopher Rudolf Steiner, after the lectures, he gave to local farmers (CASTRO, 2002).

The research on Homeopathy applied to agriculture (plants, water and soil) is being done concerning plant treatment, secondary metabolism, productivity, general resistance (climate, insects, microorganisms). Also to find best treatments to water and soil.

In 2003, UNESCO and Brazil Bank Foundation certified Homeopathy in agriculture as a Social Technology. The general attorney of the Brasilian Republic in 2004 determined that Homeopathy is not medical or human exclusiveness. All the Brazilians may study and apply this science. Farmers of Brazil are applying successfully in organic production. It was approved by Ministry of Agriculture (May. 1999) the use homeopathy in Brazilian agriculture.

In Brazil, the first doctoral thesis was defended in 2004 on the homeopathic effect on vitality of soil. The first dissertation master of high dilutions effects on

physical-chemical properties of the water was in 2009. Both were presented at Federal University of Viçosa (UFV) after the first academic work concluded in 1999 at UFV about Homeopathy applied to plants.

Currently, with new discoveries in the scientific area, especially in physics, chemistry and biology, Homeopathy is being advanced (Bastide et al. 1987, 1995, 2002). So, new researches on Homeopathy in Agriculture are being developed. The systematization of results is still necessary.

Homeopathy activities are concerned to constructive and defensive informations on vitality systems of the living organisms. It is considered the most important technology among natural resources with great potential to help plants, water and soil. Homeopathy makes possible the development of sustainable

agriculture, the improvement of quality and the ecosystems preservation (LISBOA et al., 2005).

According to Duarte (2003), many experiences on Homeopathy applications are being carried by farmers in Brazil. There are positive results about: disease resistance, dormancy problems of seeds, as well as managing soils and water.

The loss of homeostasis means disturbances on self regulation and on vital energy. The symptoms are attempts to recover the energy balance. The homeopathic preparations, therefore, can promote the homeostasis by providing sistemic balance.

It is time for paradigm change. The conventional agriculture is an increasing concern in Earth. Thus, the Homeopathy is an important and natural resource for healthy agriculture, soils, water and unbalanced systems.

CHAPTER 1

HOMEOPATHIC PREPARATIONS, GERMINATION AND PLANT DEVELOPMENT

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As a natural therapeutical system, Homeopathy aims to access the reaction system of organisms, to stimulate and help life equilibrium. The applications of Homeopathy in agriculture are being consolidated

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throughout the years resulting from studies in plant. It has been observed that Homeopathy, applied to agriculture, improves life quality and environment. Homeopathy provide reduced agricultural expenses and consolidate a more sustainable system of production.

The homeopathic preparations by adequate dinamizations affect plant growth and development as well as cyclic processes of agriculture. They make possible that plants interact with the environment, to improve the adaptation and to stay harmonized. The way homeopathic preparations take action is through biological information. That means preparations are dependent on start solution or substance that was homeopathized (POITEVIN, 1991).

Homeopathic preparations interact with the constructive information and the defensive informations of vitality systems within living organisms. It currently is being

considered a natural resource to raise again any living systems (CASALI et al., 2002).

The stable state in plants, when lost is an indicative of disturbance in vital energy. The plants symptoms are attempts to recover energy balance. The homeopathic preparations are able to promote the homeostasis in a systemic form because the responses come from the vital force of the entire organism and are general adaptative processes.

The pioneering work of homeopathy on germination of seeds was lead by Kolisko (1926). The homeopathic preparations *Argentum nitricum* 12CH and 13CH promoted a great increase in seed vigor and germination of *Triticum aestivum* (wheat) seeds.

Other results were published: effect in seeds of *Carica papaya* (papaya, KHURANA, 1971), time reduction of germination *Coffea Arabica* seeds (MENESES et al.,

2004), increase pre-soaking of seeds by *Arsenicum album* 30CH (BROWN, 2007). In *Pisum sativum* (peas) dinamized vegetal hormones (12D 30D) were effectively in stimulating growth as well as *Giberelin* 17D (BAUMGARTNER et al., 2004), so peas plantlets raised more healthful.

Effects of high dilutions on tomato (RIVAS, 1996) has been observed: in germination inhibition, time increasing of seed storage for long periods of stockage. There was the biological effect of homeopathic solutions prepared with Mexican plants “Chaparros” (*Castela* sp) on wheat seeds (*Triticum aestivum*). In *Castela texana* and *Castela tortuosa* there was inhibition on germination and on growth (ESPINOZA et al., 2001).

HAMMAN et al. (2003), submited *Hordeum sativum* (barley) to homeopathic preparations of Giberelic Acid (from 4 to 200CH), and control Giberelic Acid (GA3) 5g/L

and distilled water. The results allowed classification of the germinated seeds: a) high vigor, with Giberelic Acid (4CH, 30CH, 200CH), b) normal vigor, with Giberelic Acid 15CH.

Homeopathic preparations work under conditions of stress with inhibiting or estimulating effect. In *Triticum aestivum* (wheat) treated by *Arsenicum album* 35D the effect was inhibiting in displayed seeds stresse, however, *Arsenicum album* 30D caused an alternated effects of inhibition (BRIZZI et al, 2000). Some authors reported that homeopathic preparations of high dinamization induced significant effect on biological systems. *Arsenicum album* 45D inhibited seed germination of wheat (BINDER et al, 2005).

In *Dimorphandra mollis,* seeds submitted to 20 homeopathic preparations the germination velocity was increased by *Phosphorus* 6CH and Rutin 12CH (RODRIGUES-DAS-DORES, 2007). In *Zea mays* (maize),

of nine homeopathic preparations, four stimulated germination also decreased the time for germination (*Sepia* 30CH, *Cina* 30CH, *Natrum muriaticum* 30CH, *Calcarea carbonica* 30CH) and two decreased the germination (*Belladona* 30CH and *Gelsemium* 10CH) as reported by NIURKA (2007).

The methodology of dinamization of homeopathic preparations also affects germination rate. In *Phaseolus vulgaris* (beans) *Argentum nitricum* 24D, 25D and 26D were compared to distilled water. The methods were dilution or trituration in lactose. The greatest germination was by *Argentum nitricum* 24D and 25D (trituration) as well as water (RODRIGUEZ; FERNANDEZ, 1997). *Argentum nitricum* 24D and 25D prepared by dilution method increased the development and growth of plants (SANTOS RODRIGUES et al., 1997).

The high dilutions may also increase the growth of plants. In Pineapple (*Ananas comosus*) from in vitro culture, treated with *Arsenicum album* 40CH, there was increased of vigor and plants size (KHANNA; CHANDRA, 1978). *Daucus carota* (carrot) and *Raphanus sativus* (radish) treated with *Phosphorus* 5CH increased total dry matter (CASTRO, 2002). In *Justicia, pectoralis* (Chambá) treated with *Sulphur*, Humic Acid and Isoterapic (dinamizations 3CH, 12CH, 30CH, 200CH and 1000CH), *Sulphur* 3CH caused the greater amount of dry matter (ANDRADE, 2000; 2001).

The influence on rooting was proven by Bonfim et al. (2008). They evaluated the number, length and quality of roots from *Rosmarinus officinalis* (rosemary) and *Lippia alba* (cider grass), after treatment with *Arnica montana* (3CH, 6CH, 9CH and 12CH) compared to controls distilled water and etanol 70%. *Arnica montana* (3CH and 6CH)

was effective on root length and *Arnica montana* 6CH was effective on quality and number of roots.

Plants of *Bidens pilosa* treated with *China* 3CH increased foliar dry matter, also production of branches and flower heads. Plants of *Mentha spicata* (mint) treated with *Sulphur* 3CH increased the yield (ARMOND, 2003; CASTRO, 2001). Homeopathic preparations of AIB (indolbutiric acid) applied to the propagation phase of African Violet (*Saintpaulia ionantha* W.) reduced the rooting time and stimulated the growth (RENDÓN, 1990).

Staphysagria (3CH, 12CH, 1MFC, 5MFC), *Arnica montana* (3CH, 5MFC), *Sulphur* (3CH, 12CH, 30CH), *Natrum muriaticum* (3CH), *Phosphorus* (3CH, 1MFC), *Silicea* (3CH, 5MFC), *Nux vomica* (12CH) increased the yield of flower heads and plant dry matter of *Acmella oleraceae* (jambu). *Staphysagria* (3CH, 12CH, 5MFC) *Sulphur* (3CH, 12CH, 30CH), *Natrum muriaticum* 3CH,

Phosphorus 1MFC, *Silicea* (3CH, 1MFC, 5MFC) *Nux vomica* (3CH, 12CH) increased plant dry matter in *Acmella oleraceae*. *Silicea* 12CH influenced mass accumulation flower heads in *Acmella oleraceae* while *Staphysagria* 30CH, *Natrum muriaticum* (30CH, 5MFC), *Phosphorus* (12CH, 1MFC), *Silicea* 30CH, *Nux vomica* 1MFC reduced plant weight (ARMOND, 2007).

In *Lactuca sativa* (lettuce), *Carbo vegetabilis* 30CH applied along 48 hours period increased 22% dry matter of lettuce (ROSSI et al, 2003). These results were some how repeated by Grisa et al. (2007b) with *Arnica montana* 6CH and 12CH. *Tanacetum parthenium* (artemisia) when treated with *Arnica montana* (15D) increased plant weight but under *Arnica montana* (15CH) treatment there was no response on mass of aerial part of plants (OAK, 2001; 2003; 2005). *Phosphorus* (3CH, 30CH, 200CH) decreased plant weigth of *Triticum aestivum* (wheat), however,

Phosphorus 12CH and 1MFC increased plant weight (BONATO et al, 2004). Plants of *Eucalyptus globulus* were treated with *Phosphorus* (3CH, 6CH, 12CH, 30CH, 100CH, 200CH, 1MFC, 5MFC), while *Phosphorus* 3CH stimulated the mass or total foliar area, *Phosphorus* 12 CH and 1000CH stimulated main root diameter (DUARTE, 2007).

Dimorphandra mollis plants were treated with: *Sulphur* (6CH, 12CH), *Phosphorus* (6CH, 12CH), *Carbo vegetabilis* 12CH, *Kali phosphoricum* 6CH, *Cyrtopodium* 1D, *Caryocar brasiliensis frutis* (6CH, 12CH), Distilled water (6CH, 12CH), Etanol 70% (6CH, 12CH), Nosode of fungi (6CH, 12CH), *Dimorphandra mollis* (6CH, 12CH), Rutin (6CH, 12CH). There was an increase of fresh plants weight and dry plants weight by Distilled Water 6CH. The greater growth in height and thickness of main stem were achieved by *Sulphur* 12CH, Etanol 6CH, and

Dimorphandra mollis frutis 12CH (RODRIGUES-DAS-DORES, 2007).

Ocimum basilicum (basil) plants treated by homeopathic preparations 30CH *Arsenicum album*, *Carbo vegetabilis*, *Calcarea carbonica*, *Phosphorus*, *Sulphur* and *Silicea*, increased 40% weight of fresh flower head. However, there were 140% essential oil reduction by *Phosphorus* 30CH (ALMEIDA, 2002).

The activity of homeopathic preparations *Rosmarinus officinalis* (rosemary) and *Artemisia absinthum* (3CH, 6CH, 9CH, 12CH, 24CH and 30CH) on germination and growth of *Ipomea* sp was measured. The dinamizations 12CH, 24CH and 30CH of *Rosmarinus* increased the number of germinated seeds. The dinamization 9CH, 12CH, 24CH, 30CH of *Rosmarinus officinalis* increased plant weight. *Artemisia absinthum*

6CH reduced the plant weight while *Artemisia* 3CH increased it (MARQUES-SILVA; BONATO, 2006).

The effects of *Sulphur* (6CH, 9CH, 12CH, 15CH, 20CH, 24CH, 30CH (conjugated and control) were evaluated by variables: average length of the aerial part, average length of the radicular system, weight of fresh matter and dry matter in seeds of *Sorghum bicolor*. The applications improved the performance of almost all the variables, when compared to control, and mainly: length of aerial part, lenght of radicular system and the total length of plants. The conjugated dinamization promoted synergic effect and significantly increasing over the variables (LIPPERT et al., 2007).

The productivity of beet plants (*Beta vulgaris*) was evaluated after application of *Staphysagria* (6CH, 12CH, 30CH), distilled water and hydroetanolic solution 10%

(control). *Staphysagria* 6CH and 12 CH improved the fresh matter (GRISA et al., 2007a).

Plants of *Pisum sativum* (pea) intoxicated by copper sulphate and further treated with *Cuprum sulphuricum* 15CH, they were desintoxicated. *Cuprum sulphuricum* 14CH desintoxicated the plants of *Sinapis alba* var. *dialba* while *Cuprum sulphuricum* 5CH desintoxicated the plants of *Triticum aestivum* (NETIEN et al., 1969; AUQUIERE, 1982; AUQUIERE; MOENS, 1981; SCOLFIELD, 1984). Plants of *Ocimum basilicum* intoxicated by copper sulphate (CuSO4) and further treated with *Cuprum* 30CH they reduced drastically the effect of intoxication along the growth (ALMEIDA, 2002).

Seeds of *Triticum aestivum* (wheat) previously were submitted to lethal doses of arsenic and then treated, with: Arsenic Trioxide (40D, 42D, 45D), Arsenic Trioxide (not dinamized), distilled water and Distilled Water Dinamized

(40D, 42D, 45D). The more effective was Arsenic Trioxide 45D. Distilled Water Dinamizaded 40D or 42D were more effective as compared to control (distilled water) (BRIZZI et al., 1997; 2000; 2005).

The main effect of aluminum in maize plant is to stop or to reduce radicular growth. Two experiments were accomplished with maize (*Zea mays*) plants, hybrid GAC 5011. The effect of *Sulphur* on growth of main root was tested in maize plants exposed to aluminum (AlCl3), pH 4,0, along 5 days. The treatments were: water solution with 50, 100 and 150µM of Al; 20 ml of solution I with150 µM of Al; *Sulphur* (5CH, 12CH, 30CH, 200CH and 1MCH). Water treatment induced greater length to roots. Gradually, Al content decreased but maximum decreasing was under 150 µM of Al. Application of *Sulphur* was effective at desintoxicated plants exposed to Al (150µM). Treatments with *Sulphur* 5CH and *Sulphur* 30CH were

more effective. *Sulphur* (5CH, 12CH, 30CH, 200CH and 1MCH) improved radicular growth respectively 5,3%; 6,6%; 2,7%; 12,3% and 6,2% greater than control (ROCHA et al., 2007). Bonfim et al., (2010) had proven that *Calcarea carbonic*a (6CH and 12CH) and *Alumina* (6CH and 12CH) increased vigor of lettuce seeds submitted to toxic aluminum level.

Homeopathic preparations promote germination, desinfestation and conservation of seeds. They affect plant growth, and development. Homeopathic technologies make possible an agriculture without agrochemical, preserving the natural resources and reducing production costs.

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CHAPTER 2

HOMEOPATHIC PREPARATIONS AS ALTERNATIVE TO INSECTS CONTROL

Rafael Eugênio Maia Guanabens[1]

With more than a million of described species and great number of undescribed ones the insects are the most diversified group of species in Earth (COSTA et al., 2008; DINIZ-FILHO et al., 2010). Insects are important for life in human society. They interact direct and indirectly with men. They are responsible for the polinization in many species of economic value also they are protein

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sources of some people on honey collectors (BARBOSA, 2004), among some benefits. However, many insects may be harmful to human life. About 1% insects may harm the activities of human beings of some way (COSTA et al., 2008) or may cause diseases or losses in agriculture. Losses and diseases done by insects have been increased. Mainly, because humans are changing the environment and the ambient equilibrium. The losses in agriculture from herbivory by insects are estimated in billions of dollars.

In order to refrain from population insects the methods to control come from some basic areas: chemistry, biology, physics and agronomy. However, the control based on chemical products, the insecticides, is more frequent than biological methods and the others. Development, production and use of chemical processes have increased due to the demand for foods of lesser

costs, and without insect damages. The indiscriminated use of insecticides has been questioned by our society concerning efficiency and security of environment. Because of these questioning new methods of control that are harmless to humanity, and environment are being searched and adopted.

Among the new method is the biological control by parasitoid insects, entomopathogenic insects, predators and microorganisms. Good results were found by controlling herbivorous insects with new methods. However, new methods are dependent of abiotic and biotic factors. There is a method that implies in genetic breeding of plants aiming resistance to insects. However, the genetic breeding is slow and the cost is high, also it requires many years until reaching the objectives.

It is being developed a new procedure, of low cost, not aggressive towards humanity or to environment,

independent of biotic and abiotic factors. That is in the Homeopathy, a relatively new science which is being a new hope of our society. Initially, the Homeopathy was proposed aiming the illness of the human body (COOPER & RELTON, 2010; ROSSI et al., 2010; ROSTOCK et al., 2011; ROSSIGNOL et al., 2011; SALOMONSEN et al., 2011). Along the years, it was incorporated in agriculture, and animals (CHAGAS al., 2008; ZACHARIAS et al., 2008; RUEGG, 2009; BONAMIN & ENDLER, 2010; CAMERLINK et al., 2010; SIENA et al., 2010; DREISMANN, 2010; MATHIE et al., 2010; CLAUSEN & ALBRECHT, 2010) and plants (BAUMGARTNER et al., 2004; MAJEWSKY et al., 2009; SILVEIRA et al., 2010; JAGER et al., 2010). Homeopathy is being useful for control of phytopatogenic mycrorganisms and nematoid, (BETTI et al., 2003; SUKUL et al., 2006; DATTA, 2006; DINIZ et al., 2006; TREBBI et al., 2008; SHAH-ROSSI et

al., 2009). In the form of nosodies, the homeopathic preparations are being used to control harm insects in agriculture. So and new informations on this technology are being disclosed.

The nosodies preparations are like the bioterapics and are enclosed in the isopatic system. The nosodies are made of the causing damage agent. The technique of dilution and sucussion is also adopted, and the activity is like homeopathic preparations (RUPP, 2005). Bean plants treated with the nosodie made of insects species *Cerotoma tingomatianus* (Coleopter: Crysomelidae) in the dinamizations 57D and 9D decreased damages done by adults of this insect (FAZOLIN, 2000).

Almeida, (2003) applied over maize plants a nosodie of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) worm and a homeopathic preparation of teosint plants (*Euchlaena mexican* Schrad). The nosodies,

Spodoptera 30CH and Teosint 6CH, reduced the infestation of *S. frugiperda*. The population of this insect remained below the control level.

Wyss et al., (2010) applied over apple trees the *Lycopodium clavatum* CH15 and the nosodie Apple Aphid CH6. There was a reduction of descendant insects over the plants.

A nosodie, in the dinamization 6CH, was made of adult females of *Anastrepha fraterculus* (Wied.) (Diptera: Tephritidae), a fly of fruits, by Rupp et al (2007). The Nosodie 6CH and *Staphysagria* 3CH were applied each five days over peach trees. There was a significant reduction of fruits infested by flies. The nosodie was more efficient in comparison to *Staphysagria* 3CH. In the new assay, it was applied *Staphysagria* 6CH each 10 days and the Nosodie 6CH was applied each five days. The results were significant, and both treatments reduced the larvae

infestation over peach fruits, as compared to control (water applications and etanol).

Cavalca et al, (2010), evaluated the effect of homeopathic preparations of essential oil from *Eucalyptus cinera*, dinamizations 3CH, 6CH, 9CH, 12CH, 30CH, against *Aedes aegypti* (Linnaeus, 1762) (Diptera: Culicidae). It was observed that insect cycle was affected by dinamizations 6CH, 12CH and 9CH and there was, respectively 11%, 5% and 7.5% reduction of the larvae number, as compared to control. Essential Oil 30CH decreased the number of insects.

The homeopathic preparation Triturated Acromyrmex 30CH was made of the adult ants. Triturated Fungi 30CH, Macerated Fungi 30CH and *Belladona* 30CH also were prepared (GIESEL et al., 2007). All the homeopathic preparations, with the exception of *Belladona* 30 CH were effective on consumption behavior of ants, as

compared to control. The most effective was Triturated Acromyrmex 30CH.

With objective about evaluate the productivity, the diseases and the insect damages over the plant of potato genotypes, homeopathic preparations were applied. *Thuya* 60CH increased the number of natural enemies over plants of potato genotypes Cathucha, Epagri/EEI-004 and Monalisa (RAUBER et al., 2007).

Gonçalves et al (2009) observed that under the organic system the number of *Thrips tabaci* Lind (Thysanoptera: Thripidae) was lower in potato plants sprayed with *Calcarea carbonica* 6CH and 30CH.

The rate of immigration and the rise of the colony of aphids, *Brevicoryne brassicae*, in collard plants were measured after homeopathic preparation treatments of: Resistant Collard 5CH, Susceptible Collard with Aphids 5CH, Susceptible Collard without Aphids 5CH, Aphid 5CH

and Aphid 30CH. The best results were after applications of Resistant Collard 5CH (MAPELI, 2006).

The general analysis of these works shows that activity of homeopathic preparations is not forward insect extermination. The effects happen by an indirect form. There was inhibition, feeding reduction and less insects over treated plants. Therefore, the results indicated that the insects were not intoxicated. It has been reported that homeopathic preparations activities are in the secondary metabolism of plants. The substances produced by secondary metabolism are known by direct and indirect effects in insects biology. The insects may be eliminated by plant metabolic intoxicants, or may survive by changing preference for plants or may attract natural enemies. Many mechanisms could happen as a reply of the insects.

The Homeopathy science has shown technologies of easy application, of low costs that are efficient and

viable for the control of insects. Homeopathic preparations do not cause negative reactions in the environment. Because of these reasons, Homeopathy Principles can be applied on agriculture making possible healthfull food production.

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CHAPTER 3

HOMEOPATHIC PREPARATIONS AN ALTERNATIVE FOR DISEASES CONTROLS IN PLANTS.

Deisy Xavier Amora[1]

Currently, in Brazil, the diseases of plants are responsible for approximately 15% of losses in yield. The chemical defense is the method most applied by farmers, mainly in the extensive areas. In Brazil, in 2010, chemicals expense for disease control was around 2,3 billion dollar (SINDAG, 2011). Beyond the high investments, the control of pathogens by conventional methods is harmful to the environment. There is pollution of soils and waters,

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intoxication of animals and people of agricultural family during the application or the food ingestion.

Another important point is that synthetic fertilizers and chemicals are not allowed in organic agriculture. The management in the organic system of production depended on natural resources and on biological processes in harmony with biodiversity, environment, economic development and life quality of human population. There is an increase concern of scientists and society, on sustainable alternatives for disease control in agriculture, as much in the conventional agriculture as in the organic system. Homeopathy is taking space and attention of the researchers, for being more safety and more economical.

Homeopathy was initiated in 1796 by Samuel Hahnemann, and although many research projects have been carried through, it is still a controversial issue. It is

known that according to Avogadro Principle, none of the original molecules remain in the preparations from 12CH ahead. For this reason, it is questioned the fact of high dilutions to have some biological effect (SHANG, 2005). The high dilutions researchers argue that there is transference of information from molecules of original substance to the solvent during dinamization. Some researchers are aiming to understand how informations really are passed away (BONAMIM, 2001; WASSENHOVEN, 2005).

Plant bioessays are considered the most fitted to research in Homeopathy science because they surpass disadvantages of clinical assays: placebo effect, ethical difficulties, time demanding, low number of replications and high costs (BETTI, 2003).

The Homeopathic treatments interact with alive organism, not only rearranging the system, but stimulating

the vital force to return to homeostasis state (LISBON et al., 2005). In general homeopathic preparations reestablish the balance of diseased plants and increase natural defenses. In Homeopathic science, the disease is a result of unbalanced energy (BONATO, 2002). When plants are infected there are alterations in the metabolism of host cells. (AGRIOS, 2005).

The way homeopathic preparations interact in plants still is unknown. Homeopathic preparations have several origins, and each preparation could follow distinct metabolic route of the plant. There is no phytopathological guide for homeopathic preparations utilization. There are some rules that may be applied in choosing homeopathic preparations in phytopathology.

• Principle of similarity (some substance that causes in healthy plant the same signals of the diseased plant).

• To use the information of Homeopathic Acology, with analogy to plant symptoms.

• To test some dinamized substance known as inductive of acquired sistemic resistance (SAR)

• To use the dinamized extract of infected tissue (nosode),

• To test chemical elements that are important for plant nutrition or for resistance to the disease.

The way of chosing homeopathic preparation and dinamization does not follow any general criteria. In human therapy, low dinamizations are applied in acute diseases, while the high dinamizations are preferred for chronic diseases (BETTI, 2009). These general criteria could be applied in phythopathology until specific studies are carried through.

The first known work about Homeopathy principles applied to phytopathology was published in 1969, and

deals with Tobacco Mosaic Virus (TMV) (WORM, 1969). Along the decades of 70 and 80, some articles were published in the consulted bibliography on fungic diseases (KHANNA & CHANDRA, 1976, 1977, 1978, 1987, 1989). There is some work evaluating the Homeopathic preparations on seed treatment growth and development of plants, virus diseases, fungi and nematodes control.

Control of Pathogens with Homeopathic preparations

Fungi

The majority of fungi research was done by researchers of India through methodology *in vitro* on germination of spores and the micelial growth (BETTI et al., 2009).

Among *Alternaria* species, there are a great number of pathogens of plants (ROTEY, 1994). *Alternaria* diseases are very common, and they affect leaves, stems,

branches, flowers and fruits of many plants. Of the studied homeopathic preparations, *Arsenicum album* and *Kalium iodatum* are the most important to control some *Alternaria* species. *Arsenicum album*, widely used in Homeopathic treatment, is made of Arsenic trioxide.

Khanna & Chandra reported the effect in vitro of some homeopathic preparations on the germination of spores of *Alternaria alternata* (isolated of citrus, hemp, guava and wheat). The dinamizations most efficient to inhibit germination in vitro, essays were tested in the field (in vivo essays). The homeopathic preparations were sprayed over wheat plants, before inoculation. The best results came from *Arsenicum album* 199C, (41% infection reduction) and *Kalium iodatum* 200C, (56% infection reduction) as compared to control water sprayed (KHANNA & CHANDRA, 1976, 1977).

Alternaria brassicicola make necrotic spots on plant leaves of Brassicae family. Homeopathic preparations were tested to control this fungus in cauliflower. Homeopathic preparations were chosen assuming some principles or effects. Arsenic Trioxide (*Arsenicum album*) was chosen based on Similarity Principle since it induces in healthy plants spots that are similar to spots of the infection by *Alternaria brassicicola*. Bentonita (of mineral origin) was chosen for inhibiting effect on germination of spores in vitro. ABA (β-aminobutíric acid), was chosen for being of known inductive resistance (COHEN, 2002). The homeopathic preparations of dinamization 35D, sprayed weekly over leaves did some control of the disease. *Arsenicum album* reduced 40% of the infection under greenhouse. The results were similar to those of plants treated with copper, which is used for chemical control. In field tests, *Arsenicum album* and Bentonita also were

efficient since both reduced 60% of the disease (TREBBI, 2008).

Homeopathic Principles also were applied successfully in assays on control of fungi that cause damages of stored products, so, *Aspergillus parasiticus* was studied. Among some homeopathic preparations, *Sulphur* (200C) inhibited 100% growth of *Aspergillus parasiticus* and aflatoxin production that causes liver damages in animals and humans. Silicea and the *Dulcamara* reduced 50% of fungus growth and 90% of aflatoxin production. The *Phosphorus* caused low inhibition of fungus growth (less than 10%), but it reduced 30% the aflatoxin production (SINHA & SINGH, 1983).

The effect of *Lycopodium* 1CH up to 200CH was tested on the inhibition of spores of *Pestalodia mangiferae* in *Mangifera indica* (mango) fruits. *Lycopodium* 190CH was effective to control the fungus (KHANNA; CHANDRA,

1978). *Ananas comosus* (pineapple), in vitro, was treated with the homeopathic preparations: *Calendula* 30CH, *Staphysagria* 30CH, *Oscillococcinum* 200C and *Arsenicum album* 40CH. The best control was by *Calendula* 30CH, *Staphysagria* 30CH e *Oscillococcinum* 200C (MORENO; ÁLVAREZ, 2003).

Nematodes

The nematodes are pathogens of difficult control, because in the majority of the cases, they infest plant roots and are not visible by naked eye. Frequently, the symptoms of nematodes are confused with water deficiency or nutricional disturb. *Meloidogyne sp* is among the most important genera of nematodes. It is widely distributed in Brazil and some continents, causing root-nodes and diseases in the majority of cultivated plants.

The homeopathic preparation *Cina* was considered the best for control *Meloidogyne spp*. The results have been more reliable and well repeated. *Cina* was tested successfully in some plant species as: blackberry, beans, tomatoes and okra, (BETTI, 2009). The homeopathic preparation *Cina* is made of the plant *Artemisia cina*, whose active compound is santonina. *Artemisia cina* is used since antiquity by Greeks against worms.

Plants of okra (*Abelmoschus esculentus*), cultivated in pots, were inoculated with *Meloidogyne incognita* (second young state) and were sprayed with *Cina* 30CH, *Santonin* 30CH and *Etanol* 30CH, for ten consecutive days. *Cina* 30CH and *Santonin* 30CH decreased the number of root-node, the population of root nematode and increased protein content in roots and leaves. It was interpreted that *Santonin* 30CH debilitated the canals of water transport in

root tissues. Because of the reduced water content infection, process probably was reduced (SUKUL, 2006).

Plant of a tropical berry was also treated with *Cina* 200C, to control M. incognita. There was a reduction of root-nodes number and treated plants had finer growth. The protein content was greater in plant aerial part and in roots. Results were better when the plants were treated before infection (DATTA, 2006).

Bacteria

Few research works have been developed about homeopathic preparation effect and bacterial infection of plants. The best approach of homeopathic preparation was on *Pseudomonas syringae*, a gram-negative bacteria, that infect some plant species. Some listed homeopathic preparations of Homeopathic Acology were selected to control *P. syringae* in *Arabidopsis thaliana*. Homeopathic

preparations, originated from: metals, nosodes, and salicílic acid were chosen. They were compared to commercial chemical product Biplantol. The most promising were tested in five independent experiments. Biplantol induced 50% significant reduction of infection rate, when compared to Bion, the inductor of “acquired sistemic resistance” (SAR) (SHAH-ROSSI, 2009). This type of resistance (SAR) is happening when the plant is under contact with some chemical product, or it is damaged by any pathogenic microrganism. Soon after the defense system is activated plants became protected against nearly infections (AGRIOS, 2005).

Virus

Tobacco plants with the gene N (*Tobaco Mosaic Virus* resistance) were inoculated by TMV. Leaf discs were taken from plants and treated with *Arsenicum album,*

which was selected according to the similarity principle. *Arsenicum album* generated pathogenesy of necrotic injuries, which are similar to those injuries for TMV in resistant plants.

The number of leaf injury was the measure of treatment efficiency on plant defense. All tested homeopathic preparations induced biological reaction by increasing or decreasing plant resistance. The greater number of HR* injury was found in leaf discs of *Arsenicum album* 5D and *Arsenicum album* 45D treatment. It was concluded that these dinamizations were more efficient to increase resistance tobacco plants. Significant and similar results were found in leaf discs treated with Dinamized Water 5D and 45D (BETTI et al. 2003).[i1]

*RH: the infection by not-infective pathogens frequently induces a series of defense responses resulting in collapse located at vegetal cells and known as hipersensibility reaction (HR)

Many benefits are found in farming systems when sustainable agriculture is practiced. If ambient, social and economic factors are taken into account, the products are more healthful. It is essential the adoption and the application of techniques that promote a well-balanced farming system in a viable way. The application of Homeopathic Principles is perfectly fitted to this kind of farm, since there is no pollution, and it still reestablishes equilibrium of plants and soils.

Homeopathic Principles and Procedures are of great potential and could replace the chemical products in agriculture. It is a technology of low-cost and essential in familiar agriculture.

In view of expanding the use of Homeopathic science in agriculture, researchers must describe the patogenesy effects on plants and elaborate the Vegetal

Acology aiming the selection of the best homeopathic preparation based on the simillimum of each disease.

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CHAPTER 4

HOMEOPATHIC PREPARATIONS IN PLANT METABOLISM

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Metabolic activity is a main feature of living organisms. Metabolism is a set of chemical reactions that are processed in cells. The metabolism of vegetal cells has been divided into primary and secondary metabolism (PERES, 2004). Primary metabolism is the set of metabolic processes that play essential function in plants, such as photosynthesis, respiration and solute transport.

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The biochemical compounds which are involved in the primary metabolism are distributed in plants in a general way. They are: amino acids, nucleotides, lipids, carbohydrates and chlorophyl. The secondary metabolism originates biochemical compounds that are useful, but they are not necessary to all plants. The secondary metabolism is not important to plant physiology in order to complete its life cycle, but it is important for the interaction between plants and environment. Among the main factors of environment with interactions mediated by secondary metabolism compounds, are the biotic factors (PERES, 2004).

There are three great groups of secondary metabolites in plants: phenolic compounds, terpens, and alkaloids. The terpens are synthesized and come from mevalonic acid (in the cytoplasm) or from piruvate and 3-phosphoglicerate (in chloroplasts). The phenolic

compounds are derived from chiquimic acid or mevalonic acid. The alkaloids are derived from aromatical amino acids (triptofane, tirosine), which are derived from the chiquimic acid, and also from aliphatic amino acids (ornitine, lisine) (PERES, 2004).

Secondary metabolites have many functions: against herbivory, or pathogens, plant competition, an attraction of organisms for polinization, seed dispersion and microrganisms simbionts. Secondary metabolites also are responsible for protective activity in relation to abiotic stress, as those associated to changes of temperature, water content, light intensity, exposition to UV and deficiency of mineral nutrients. The application of homeopathic principles and procedures to agriculture is increasing with the purpose of plants recovery and to prevent damages from chemical products that are harmfull to environment and human organism (PERES, 2004).

Physiological diseases or disturbances are not considered only resultant from biotic and abiotic factors, but as a consequence of losing homeostasis by organisms. Specific concepts of Homeopathy are available and applied to agriculture. There are many effective results coming from the University and from farms. However, little is known about the physiological mechanisms of dinamized substances in plants (BONATO, 2007). Homeopathy is a legal procedure in organic farming (BRAZIL, 1999). Homeopathic procedures are compatible with organic, holistic, sistemic and ecological vision of Agriculture. Homeopathic preparations stimulate natural defenses of the organisms (ANDRADE et al., 2001).

What would be the relationship between stress and responses of plants to homeopathic preparations? According to the homeopathic theory, any plant disturbs

related to biotic or abiotic factor, first affect self-regulation of the plant. Thus, when the plant is submitted to any stress (biotic or abiotic), this means that its self-regulation is out of equilibrium, and consequently, this plant lost the natural homeostasis (BONATO, 2007).

If a homeopathic preparation applied to a healthy plant generate symptoms, which are similar to these of disease the result will be a minimum effect caused by biotic and abiotic factors (BONATO 2007). The homeopathic preparation that makes the same standard disequilibrium in healthy plants (pathogenesy) would be recommended to the diseased plant, thus the plant would turn back to its previous state of equilibrium (BONATO, 2007).

In 2009 Majewsky et al. published a report about the use of homeopathic preparations in healthy plants. It was argued that health plants could be useful tools for

basic research on acology of homeopathic preparations. Homeopathic science would advance from high quality studies of plants due to: negative control, randomization, statistical designs, many and specific controls (MAJEWSKY et al., 2009). It would be advisable to accomplish studies on dinamization process, to use standardized techniques of dinamization so, the results would be easily compared (MAJEWSKY et al., 2009).

There are several benefits of homeopathic principles and procedures applied to agriculture, with prominence, for example, plants free of residues, what it is very important in medicinal plants and in the organic system. Medicinal plants responses are mainly those reactions of secondary metabolism for plant defenses (FONSECA et al., 2006). Those reactions of defense are characterized by synthesis of diverse compounds. After homeopathic preparations application, plant metabolism

may decrease or increase defense compounds, depending on the dinamization (NUNES, 2005, ARMOND, 2003, CASTRO et al., 2000). If there is an increase of compounds, the therapeutical value of these plants is greater, as well as for therapeutical use or as row matter to pharmaceutical industry (FONSECA et al., 2006). As for example *Dimorphandra mollis fungi* 6CH, *Carbo vegetabilis* 12CH homeopathic preparations increased the synthesis of flavonoids (rutine - 3 quercetine rutinoside) in plants of *Dimorphandra mollis* Benth. The farmacological and agronomical importance of *Dimorphandra mollis* Benth are the fruit content of flavonoids: rutine (quercetine-3-rutinoside), isoquercetine, quercetine ramnose. About 50% of the world-wide production of rutine proceeds from *D. mollis* plants (RODRIGUES-DORES, 2007).

Calcarea carbonica, *Kali phosphoricum*, *Magnesia carbonica*, *Natrum muriaticum* and *Silicea terra* applied over *Porophyllum ruderale* (cravin collard) plants modified the tannin concentration of leaves, as well as the time after application. *Kali phosphoricum* after 192 hours and *Calcarea carbonica* after 240 hours both increased tannin content in *Porophyllum ruderale* plants (FONSECA et al., 2006). These results are consistent with other studies. Therefore, homeopathic preparations modify the content of tannin in plants. Nunes (2005) analised tannin content in the medicinal plant *Sphagneticola trilobata* after application of *Sulphur* 3CH. After 15 minutes of application of three drops of *Sulphur* 2CH per liter, there was higher tannin content, persisting regardless of the effect along 16 hours. Plants of *Bidens pilosa* increased essential oil and other compounds of defense after application of homeopathic preparation (Armond 2003). Batirola da Silva

(2005) found that application of homeopathic preparations increased compounds of defense. Castro (2002) proved that *Sulphur* increased the content of essential oil, which is a secondary metabolite responsible for plant defense, as well as the tannin.

Carvalho et al. (2007) reported the response of healthy plants (without physiological disturbs) of artemisia to the homeopathic preparation *Arnica montana* as related to growth and content of partenolide. The application of homeopathic preparations of centesimal scale, did not affect the plant height and mass accumulation of fresh aerial part, in contrast to the decimal scale. According to Carvalho et al. (2003), there was a reduction in percentage of partenolide per plant after application of *Arnica montana* CH3 and CH5. Andrade et al. (2001) also found the reduction of coumarin content, the main chemical defense of *Justicia pectoralis*, after application of

Arnica montana, in centesimal scale. According to Andrade (2001), the reduction of defense compounds would be expressing the return to homeostasis, also the distribution of energy between defense and growth processes. The decrease of partenolide content *Arnica montana* CH3 and CH5, discloses the especificity of *Arnica montana*. Partenolide is the main component of the chemical defense of Artemisia. Homeopathic preparations activities are on equilibrium of the plant. That means homeopathic preparations provided less necessity of chemical defense. In this manner, it was possible to reduce accumulation of the partenolide, which, like the others terpenoids, according to Gershenzon (1994), has high energy cost of production in plants.

With the objective to reestablish plant equilibrium, Carvalho et al. (2004) applied in plants of artemisia (*Tanacetum parthenium*), under 90% and 65% of field

capacity. *Natrum muriaticum* CH2 and Nosode CH2, that did not affect growth but decreased the chlorophyl and proline content, since both were increased 40% and 100%, respectively, in plants of 65% field capacity.

Bonfim et al. (2011) observed that in bean plants under water stress, sprayed with Water (control), Etanol 70% (control), *Arnica montana* 6CH, *Arnica montana* 12CH and *Arnica montana* 30CH the proline contents were: 61,72; 65,26; 23,11; 28,81; e 87,84 µg.g-1, respectively. When compared to bean plants without water stress, Water (control), Etanol 70% (control), *Arnica montana* 6CH, *Arnica montana* 12CH and *Arnica montana* 30CH the proline contents were: 38,70; 33,11; 61,39; 61,72; e 63,97 µg.g-1, respectively. As a response of self-organization of bean plant to activity of homeopathic preparations, lower proline accumulation means less stress from water deficiency. Such behavior implies that

cell osmotic potencial avoided water lost. Pehaps by accumulating or losing metabolites would help the plant to keep turgidity or supporting, less water content in such a way that the cell alongation or cell expansion was maintained, as a result of *Arnica montana* 6CH application.

A similar result was found by Carvalho et al. (2004) in which there was increased of proline content by *Natrum muriaticum* 2CH (17%) by Nosode of *Tanacetum* 2CH (71,5%) as compared to control, in plants of *Tanacetum parthenium* not submitted to water stress (90% field capacity). These plants, under water stress (65% of field capacity) and treated with same homeopathic preparations, had reduced proline content.

Lower proline accumulation is directly related to plant capacity to react positively to stress. Proline oxidation in barley leaves, according to Stewart (1972),

may have been regulating function forward synthesis control that keeps low levels of free proline inside turgid tissues. There is inhibition of proline oxidation and then accumulation inside dehydrated tissues. Hanson et al. (1977) reported that lower accumulation of proline, as a result of plant capacity to keep the high water level during stress, could be considered a survival factor of plant.

In agriculture, the production must be healthy and of good quality. Therefore, plants must be free of chemical residues and no chemical products should be used. The desired quality can be reached by alternative systems or not-conventional process of production. Homeopathic principles and procedures fit this desire and offer the advantages, of low cost and pollution free (it does not leave residues), easy accessibility, independence for agricultural family (FONSECA et al., 2006).

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CHAPTER 5

HOMEOPATHIC PREPARATIONS AND PHYSICAL CHEMICAL PROPERTIES OF WATER

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The water is the most abundant substance in the livings systems, about 70% content or more of the organism is water. The first livings organisms probably appeared in aqueous environment, thus, the evolution was marked by properties of the water where the life begun. The physical and chemical properties of the water are of basic importance in the structures and the biological functions. Life evolution in Earth was influenced, to a large extent, by water and their reactions (LEHNINGER et al., 2002).

There are multiple uses of water, as: domestic, industrial supplying, agriculture, recreation, energy generation, navigation, dilution of wastes, landscape harmony, fauna preservation, flora conservation, irrigation, and many others (MARENGO 2008). Unfortunately, most of the continental water is already contaminated. The water treatment is an expensive and complex operation,

that aims to eliminate off the water contamination agents because harmfull to health. In the last 50 years, the degradation of water quality increased in alarming degree. Currently, the big cities or industrial centers or areas of agricultural development, where chemical products are used intensively, they face the lack of water quality. There will be serious problems concerning public health. In Brazil, water has lost in part the quality of renewable natural resource (mainly in the densely populated areas), because of urbanization processes, industrialization and agricultural exploitation. These processes have been stimulated by civilization but not well structuralized as far as and water preservation.

The water is a noble resource for food production. The water for irrigation must keep the health of soils, must take nutrients and must hidrate the plants adequately. It must allow the fast growth of plants and agriculture quality.

When the soil is irrigated, the water evaporates and salts are concentrated in the soil. Depending on composition of the water and the climate, salt concentration may be dangerous. Along the time sterility may arise degrading soil vegetation and life quality for population. The measurement of pH, Electric Condutivity, Dissolved Oxygen and Turbidity allow evaluations of water adequacy for irrigation (SANT'ANNA, 2003).

The knowledge of water structure is basic to understand the phenomenom of high dilutions (homeopathy). Water structure is a dynamic system. Therefore, there are changes on the position of molecules quickly, being the average time of the water reorientation for each molecule 10-12 seconds (PORT, 2004).

According to Bastide (2006), homeopathic preparations (dinamized substances) applied to aqueous solutions may cause anomalies of the water, as far as, electric

condutivity, pH, and fluorescence. Part of these anomalies is intrinsic to water, considered as a complex system, that self-organizes after disturbances. Homeopathic preparations applied to water have been studied recently in order to evaluate the application potential of Homeopathy principles and procedures to water treatment. On the attempt of some rational and scientific explanation of the phenomenon of “information” transmission through the high dilutions (homeopathy), the hypotheses are based on physical-chemical models. The homeopathic preparation for water treatment is important. The simplicity of water molecules, does not account for the complex behavior along the changes of phases. The water reflects properties that interact among themselves, and those properties reflect the complexities of water reactions (BELLAVITE, 2002).

By experiments of homeopathic preparations, it is known the effect of homeopathized substances on physical-chemical properties of the water. For example, homeopathic preparation *Natrum muriaticum* made of common salt affects the electric condutivity of distilled water, but it does not affect the temperature. Meanwhile, *Apis mellifica* made of common bee, affects the temperature of the distilled water, but this effect is not found on electric condutivity (unpublished data).

Fonseca (2005) reported some interpretations of scientific articles of Shui Yin Lo on molecular behavior of the water inside preparations that exceeded the Avogadro principle (after the 12^{th} dilution the probability to find molecules of the dissolved substance is below zero). Water molecules, normally are in a random way but after high dilution steps they start to make “clusters” of 6 to 100 units, all well lined according to original form. Such

clusters are replicated after each new dilution, even if there were no molecules of the substance added at the beginning at the water.

Anagnostatos (1998) reported the probability of small water clusters being formed as part of the mechanism of structuralized information to be passed way through homeopathic preparations. The mechanical movement (sucussion) of dinamization process would generate copies that are similar to those clusters. The function of the solvent (in this case is the water) is highly important, because water would carry the information according to clusters alterations after dinamizations (agitation). The succussion in the process of dinamization also would be important because of the energy addition to the solvent-substance system.

Rey (2003) proved that solutions of lithium salts and sodium salts, highly diluted in the centesimal scale and

then agitated (sucussion) gave rise to patterns of termoluminescence that were similar to patterns lithium and sodium molecules. The experiment proved that those patterns are repeated even after 30 times of dilution plus sucussion. So, that was beyond the dilution limit in which no molecules are found.

Data on electric condutivity(C.E.) and temperature of homeopathic preparation from saline solution (0,1M NaCl), in increasing dinamizations (1CH to 9CH), showed increased C.E. (110mS/cm) and decreased temperature (20^{o}C) in the solution 1CH. Electric conductivity decreased (6,9s/cm) and temperature increased (21^{o}C) in the solution. The differences were significant by Tukey test of 1% probability. C.E. was decreased as a consequence of successive dilutions in distilled water solution. The temperature was raised due to the energy that came out the solution after succussion.

Gomes (2009) evaluated the alterations of physical-chemical properties of water from a waterhead mine and distilled water after treatment with homeopathic preparations of calcium carbonate. The changes in pH, electric condutivity and the turbidity were dependent on the dinamizations and the water source. In both kinds of water, increased dinamizations of calcium carbonate did not cause reaction as they occur in human organisms. The dinamizations 1CH to12CH decreased C.E. of water (waterhead) as compared to control. The dinamizations 2CH, 4CH, 5CH, 6CH, 7CH, 8CH, 9CH, 11 CH, 12CH decreased the pH of distilled water as compared to control. Those effects were statistically significant.

Figueiredo (2009) reported the changes in physical-chemical properties of distilled water, compared to control, after treatment of homeopathic preparation *Rhus toxicodendron.* Dissolved oxygen was increased by

dinamizations 9CH to 12CH. Temperature and electric conductivity were increased by dinamizations 5CH to 12CH. The results were statistically significant by Dunnet test at 5% probability.

Rodrigues et al. (2011) reported the patogenesy of two kinds of water (lake water-polluted, and water from waterhead-not polluted) by measuring the water turbidity after the following treatments: Dinamized Water 7CH, *Natrum muriaticum* 7CH, *Alumina* 7CH, *Silicea* 7CH, *Carbo vegetabilis* 7CH, *Arnica montana* 7CH, *Nux vomica* 7CH, *Pyrogenium* 7CH, *Calcarea carbonica* 7CH, *Sulphur* 7CH and *Lycopodium clavatum* 7CH. Homeopatic preparations increased turbidity of water from waterhead 24-hours after the treatments of Dinamized Water and *Alumina. Silicea, Alumina* and *Sulphur* were effective after 48 hours. Lake water turbidity was increased 72 hours after application of *Arnica montana, Calcarea carbonica*

and *Sulphur*. Specific activities of homeopathic preparations as well as the time to appear patogenesy were related to watering source. So, patogenesy data were dependent on diversity of the experimenters (waters). Homeopathy principles of similarity and experimentation (patogenesy) allow the hypothesis that the preparation which increases turbidity will be able to diminish turbidity of the water under disequilibrium.

Bonfim et al. (2011) evaluated the effect of six dinamizations of *Rhus toxicodendron* on water at 40°C (representing the fever state). The time for reduction water temperature 45^{o}C until 25^{o}C (stabilization of the water) was monitored. *Rhus tox* 11CH and 13CH hold the temperature more time, that is, it took to the 40°C water more time to reach 25^{o}C (the surrounding temperature). *Rhus tox* 3CH was more effective in reducing that time, due to its capacity to affect water temperature, and that

effect was statistically different from the control. So, there was homeopathic activity over water temperature.

Zincum metallicum increased the C.E. meaning patogenesy, and the effect was persistent until 72 hours after treatment by only one application (one dose). There were response specificity and interference on the initial state of the experimenter (water). The homeopathic technologies of low cost treatments in rural areas are feasible, and it is worth being searched (ROCHA et al., 2011).

Andrade et al. (2011), reported that after 24 hours treatment of mineral water C.E. was increased by dinamizations 6CH, 30CH, 100CH and 1000CH of *Natrum muriaticum*. However, after 48 hours, there was C.E. reduction by dinamizations 100CH and 1000CH. It is acceptable the hypothesis of 24 hours results as being the primary action (pathogenesy), and the 48 hours results

being the secondary action, or reaction forward water equilibrium. The mineral water was characterized by C.E., and this was considered as an important marker. It is pertinent to admit a secondary action coming from the water after homeopathic treatment since this is a very common phenomenon in organisms (LISBOA et al., 2005). In that experimentation, it was interpreted the high C.E. of mineral water as a diseased state since it is far away of normal water condition.

Bonfim et al. (2010) reported the response of electric conductivity of saline solution (H2O/0,05M NaCl) to *Natrum muriaticum* (3CH, 6CH, 9CH, 12CH, 15CH, 18CH, 21CH) treatment. There was activity of homeopathic preparations in saline solution 24 hours after treatments application. In the saline solution treated by *Natrum muriaticum* 6CH the mean 5,5 mS/cm was statistically different from control (6,05 mS/cm). However, it did not

differ from the remaining treatments. *Natrum muriaticum* 6CH was efficient to reduce electric condutivity of saline solution.

Gomes (2011) reported the results of homeopathic preparations *Alumina* and *Calcarea carbonica* on physical-chemical properties of acid water (2 mg L-1 de AlCl36H2O). There was a positive response of *Calcarea carbonica* in the treatment of water acidity, as showed by alterations in pH and in C.E. of acid solution. *Calcarea carbonica* 9CH reduced pH of acid water immediately after application differing statistically from the control (distilled water) and remaining treatments.

Basic studies on treatment of the water by high dilutions and interpretation the results by theory of Homeopathy or others, are important for the construction of some process of technological treatment of the water

also sustainable, not aggressive towards environment and either viable economically.

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CHAPTER 6
HOMEOPATHIC PREPARATIONS AND SOIL QUALITY

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Life in earth depends on soils. Plants, foods, and oxygen produced by plants are soil dependent. Plankton of the sea depends on organic matter proceeding from soils of the continents. Fishes and all aquatic food chains: shrimps, lobsters, penguins, some bears and sea birds,

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they all depend on soils. The phreatic waters, aquiferous, water courses, ponds, pools, water tanks, rivers, they depend on infiltration of the rain in soils.

The microorganisms that decompose all the deceased forms depend on soils. The food, the water and the oxygen come from soils and from plants that soils give support (PRIMAVESI, 2006).

Soil is an alive organism (STEINER, 1993; GLIESSMAN, 2000). Life is defined as a big chain composed by substances, processes, forces and energies. Everything in the life must happen of synchronized way and with equilibrium between the parts (CAMPOS, 1999). Life is perceived ecologically by the physical structure, by the accomplishment of metabolic and vital processes or biochemical processes and by the necessity of air, water and food (GLIESSMAN, 2000). As the geophysiological definition, the life is the property of a

delimited system, but opened to energy flow and to substance flow. Life keeps constant its internal conditions, despite the changes of external conditions (VIVAN, 1998). Life is also characterized by receptivity to impulses or creative forces. Soils are also receptive to the life under natural conditions or while there is management for the construction and maintenance of the organic superficial layer (CAMPOS, 2004).

The soil system, therefore, is alive and the process of life is by: dynamism, organization, adaptation, evolution, diversity, communication among parts, self-conservation. Soil processes are under movement. Soil is subjected to forces and energies proceeding from its own constituents and from the relations with the environment. In the soil alive several processes happen as: respiration, digestion, circulation, compositions, decompositions, transmutations, defense mechanisms, homeostatic state

and many others. These processes are essential to soil formation and soil preservation. They are essential to maintenance of lives that protect: plants, animals, microrganisms, humans and earth (ANDRADE, 2004).

Thus, soil must be healthy, with equilibrium among all factors, and well aggregated to make possible the air and water to penetrate. Soil must be clean, without toxic substances (PRIMAVESI, 2006).

The soil salubrity is a priority to organic agriculture, to agroecology based on millenarian wisdom of traditional cultures as indians and aboriginals, because they hold experiences in cohabit with nature (LUTZEMBERG, 1981; ALTIERI, 1984). The healthfull soil follows the cycles of nature, evolving and fulfilling the mission to nourish, to stimulate and to support the life.

Soil salubrity also is called soil quality (DORAN et al., 1996). Some definitions of the quality of soil were

taken from consulted bibliography. The definition is based on equilibrium among geological, hydrological, chemical, physical and biological aspects of the soil (BRUGGEN & SEMENOV, 2000). Soil quality means capacity to support the biological productivity, but preserving environment and salubrity of: plants, animals and humans (SPOSITO & ZABEL, 2003).

Inside agricultural or forest ecosystems the soil is understood as the greater hierarchy in relation to plants, to animals and to humans. The salubrity of the soil reflects the health on plants, animals, and food. Healthfull food comes from clean environment. It is essential to understand the cycles of nature, the interdependence of trofic chain, and the soil, as a supporter of life while soil rewards life and solar energy (ANDRADE, 2004).

In accordance with Homeopathic Science, the symptoms of the high hierarchy guide the therapeutical

homeopathy. The knowledge of Homeopathic Science is coherent with the vision of agrosystems as organic totality. From the equilibrium of the soil, will depend on the equilibrium of the plants, animals, humans and the production of healthful foods.

The conventional management of soil is responsible for the loss of quality. In the case of Brazilian tropical soil, there are conventional practices that eliminate biodiversity, as deep plowing with machines. Common operations that keep the soil naked without protective plants make waterheads and rivers to dry. Over the naked soil, there is the formation of superficial crusts, there is superficial water running off, erosion and floods. There is an exposition to winds and the impact of rains (SOLTO et al., 2011). Men disorganize the soil when suppressing natural laws, as the law of diversity, what help the diseases of the soil (ANDRADE, 2004).

In these environments disturbed by humans, the tropical soils lose fertility, lose structure and biological quality. Plant growth is dependent on chemical fertilizers, what aggravates the quality problem (SOUZA & RESENDE, 2006).

In accordance with the science of Homeopathy, the systems or healthy organisms are dynamic and harmonic. So there is an equilibrium among parts and self conservation since organisms are reactive and organisms show reactions with minimum energy expense. The more healthfull the lesser the time to return forward stable state of equilibrium (VITHOULKAS, 1980).

Thus, the soil under conventional management is interpreted as a diseased soil. Then soil loses gradually: productive capacity, dynamism, equilibrium, reactivity and self conservation (ANDRADE, 2004).

The human being is responsible for soil diseases and desvitalization. The soil must be left naturally in order to recover salubrity. Supressive treatments deep the symptoms and the disequilibrium (BROWN, 2000). Interpreting the supressive processes in soil, Andrade (2004), reported that after soil analysis, if any nutrient is lower, then, the conventional option is to apply to soil such as nutrient. This is a supressive procedure.

To cut forests, to eliminate the diversity, is incoherent with the laws of Nature, therefore, they make diseases. These are some suppressors: to give chemical to animals or plants, to pour waste into rivers, and so on. They all suppress organisms capacity to do self regulation. (ANDRADE, 2004).

The knowledge of Homeopathic principles and procedures are valid to soil science. The analogy is the way to surpass the interpretation to ecosystems.

In accordance to homeopathic science, the disequilibrium of the living systems may be acute or chronic. The acute disequilibrium happens after exposition to harmful influences, and symptoms disappear when the causes are removed. The acute state tends to complete its course in less time. The chronic disequilibrium arise from gradual weakness of the defense mechanism. At the beginning, the symptons are insignificant and imperceptible, but they move the organism away from its stable state. In the chronic state, the natural capacity to preserve the equilibrium is out of order (VITHOULKAS, 1980). Hahnemann reported that the continuity of supressive treatments usually ends in a chronic disequilibrium, like poisoning. Andrade (2004) reported that chemical products were responsible for chronic diseases in the ecosystems. All the symptoms of disequilibrium of plants, animals and the ecosystems arise

from soils, from humans and the environment (ANDRADE, 2004).

In the agricultural ecosystem, if diversity, is preserved like in nature, then health and vitality are finer. Diversity means greater resistance.

Interpreting the facts through homeopathic principles Andrade (2004), argue that signs of insect attacks or microrganisms infections in plants, are weakness markers in agreement to Principles Trophobiosis of Chaboussou. The causes are previous to the symptons. The nutricional disharmony in life systems arise from soil disharmony.

Biological, ecological, organic or biodynamic agriculture they all implie that soil management must be coherent with: diversity, covering the soil, incorporation of organic matter. The process of soil formation in nature is constructive and gradual. The microorganisms are

responsible for: nutrients cycling, soil struturation, biochemical transformations and many other activities (ANDRADE, 2004).

Soil is qualified by markers related to physical, chemical and biological properties (DORAN & PARKIN, 1994). Some markers or scores are frequently used for management of: organic matter, density potential for cation exchange, water retention, porosity, pH, electric conductivity and productivity (LARSON & PIERCE, 1994; TÓTOLA & CHAER, 2002).

Homeopathy is the science of high dilutions related to resonance, to self regulation of livings systems and the Principle of Similarity. In the basic research, homeopathic preparations are assayed in healthy organisms to generate signals (pathogenesy) which will be the guide for future treatments.

In healthy soil, after application of homeopathic preparation, markers (chemical, physical, biological) are changed from normal state or from stability to abnormal state, that means the healthy soil holds a pathogenesy which is a sign but not a symptom.

Soil respiration is the parameter frequently used for microrganisms activity quantification (ALEF, 1995). Soil respiration is the marker of residues decomposition state, also of nutrients metabolic turn and of ecosystem changes (PAUL et al., 1999). The microorganism respiration was proposed to be a parameter of soil changes (WANG et al., 2003). By soil respiration, the sustentability degrees of agricultural practices are realized (TÓTOLA & CHAER, 2002).

Where no chemicals are applied, soil microorganisms are the greater responsible for nutrient cycling. It is true that nobody applies fertilizer in forests;

but plants keep growing there. Microrganism mineralization around 2-5% of organic matter, annually, supplies the requirements of cultivated plants, what is good to environment and to agriculture (FRASER et al, 1988). Homeopathy in ecological-organic agriculture implies the understanding of vital processes aiming to establish the order in the living system.(ANDRADE, 2007 c).

Homeopathic preparations and their specific dinamizations affect microorganisms activity in soils by means of soil respiratory rate as reported by Andrade (2004). The increase of soil respiration was a function of *Natrum muriaticum* and *Magnesia carbonica* dinamizations. According to Andrade & Casali (2005), conventional hypothesis that respiration increases as dinamizations are increased is not valid, since it is another pathern of the phenomenon. On the basis of

experimentations (KOLISKO & KOLISKO, 1978; ANDRADE, 2000; CASTRO, 2002), it was proven, that dinamizations of homeopathic preparations are individualized activities. Microrganisms experimentations generate antagonistic signals as reported by Hahnemann in humans (paragraph 115 of the Organon). Therefore, soil respiration shows variability. So, there is an oscillation of respiratory states influenced by dinamizations.

As compared to control *Phosphorus* and *Ammonium carbonicum* treatments (ANDRADE, 2004) increase variability of soil respiration. There was less variation on soil respiration after *Sulphur* treatment compared to *Ammonium carbonicum* and *Phosphorus*. *Sulphur* (D6 to D201) decreased the respiration, and *Phosphorus* reach a maximum respiratory rate at 30D. *Ammonium carbonicum* increased daily respiration (161, 9) up to the maximum at 12D. Human respiration, as

patogenesy, is analogical to soil respiration (ANDRADE & CASALI, 2005).

Sulphur (6CH, 12CH, 30CH 1MFC), applied over soils fertilized by organic matter decreased plant height, but over soils fertilized by organic matter plus sand, Peres (2006) found opposite results.

Filippe et al. (2011), applied to soil twelve homeopathic preparations made of Schussler salts but only *Natrum sulphuricum* 6CH increased accumulation of CO2 and microorganisms activity but not more than control. *Ferrum phosphoricum* 7CH, *Natrum phosphoricum* 6CH, *Calcarea phosphorica* 7CH, *Kalium sulfuricum* 5CH, *Natrum muriaticum* 12CH, *Calcarea sulphurica* 12CH, *Silicea* 7CH, *Calcarea fluorica* 6CH, *Kalium chloratum* 6CH, *Kalium phosphoricum* 7CH and the *Magnesia phosphorica* 7CH, they all decreased the respiratory activity. The homeopathic preparations made

from Schussler salts (except *Natrum sulphuricum*) are recommended to treat soils of low respiratory activity or of high C/N.

According to Andrade et al. (2007a), homeopathic preparations applied to soil along one year, may increase or decrease respiratory activity, what means increase or decrease immobilization of nutrients or mineralization of organic matter. Homeopathic preparations made of arsenic, gold, mercury and silver, applied to soils affect respiratory activity by increasing or decreasing (ANDRADE et al., 2007b).

Farmers of family agriculture usually apply homeopathic preparations of dinamization 6 CH made of their own soil (REZENDE, 2003). These preparations are named nosodes and are applied over the same soil when it is not under equilibrium (ARRUDA et al., 2005). The nosodes generally are the first choice of the agricultural

family concerning homeopathic preparations (ANDRADE et al., 2010). Soil nosodes are recommended by Rezende (2003) as a resource for soil desintoxication. Andrade et al. (2010) reported that soil nosode along the time improved the vitality, increased organic matter and diversity of living system, so, plants grew healthy.

In Organotherapy, homeopathic preparations are made of healthy parts of any alive organism or a living system. The main principle here is not the similarity but the equality (ARRUDA et al., 2005). As reported by ALMEIDA et al. (2003), corn field may be healthy or diseased. If sick by *Spodoptera frugiperda* it means *Spodoptera* population is too high and damages may be decreased by the natural enemy *Doru luteipes*. So, the corn fields are diseased because a part of them *Doru luteipes* is less functional. Homeopathic preparation *Doru luteipes* 3CH or 4CH can bring equilibrium to the corn field

through organotherapy. *D. luteipes* is interpreted as a part of the healthy corn field.

The homeopathic preparation of healthy soil (organotherapic) stimulates microrganisms respiration of diseased soil (ANDRADE, 2004). According to COSTA (1988), it is possible to stimulate normal functions by homeopathic preparations named organotherapics, since dinamizations are C3 or D6. Dinamizations 200D, 500D, 1000D, inhibit the functions of its equality. Andrade (2004), reported that the homeopathic preparation Healthy Soil D201 promoted lower stimulaton in relation to remaining dinamizations. However, there was greater stimulation than control. To soils of slow respiratory rate or high C/N it is recommended homeopathic preparation of the soil, low or medium dinamizations (ANDRADE, 2004). To soil of high respiratory rate, it is recommended homeopathic

preparation of the soil, high or very high dinamizations (ARRUDA, 2005).

In Brazil, soils intoxicated by aluminum are very common. Like human pathogenesy of *Alumina,* these soils are of slow living process and of low respiration, so *Alumina* is recommended (ANDRADE, 2004) because similarity.

In accordance with the experimentations in Homeopathy, the more intoxicated the organism, the slower will be the effect of homeopathic preparations (VITHOULKAS, 1980). So, the intoxication degree of the soil will influence the effect of homeopathic preparations. Microrganisms respiration of three soils was compared after treatment by homeopathic preparations. The soils were: forest soil, aluminum intoxicated soil and a soil well fertilized. The fastest reaction was of the forest soil (ANDRADE, 2004).

Survival index of acid soil saturated by aluminum was greater when survived maize plants were treated by *Alumina* 30CH. Root length of *Conyza bonariensis* grown in soil intoxicated by aluminum was increased by *Alumina* 30CH treatment. Soil respiration was increased by dinamizations 30D and 201D of *Alumina* 30 CH (ANDRADE, 2004). In accordance with Rodrigues et al. (2011), soil pH was increased from 4,3 to 5,3 after treatments of *Alumina* dinamizations 3CH, 5CH, 9CH and 11CH.

Agricultural families understand the importance of soil desintoxication. Therefore, they use *Nux vomica* and homeopathic preparations of contaminant elements (NPK, agrochemicals) (CUPERTINO, 2006). Desintoxicated organisms are well adapted to new conditions of ecologic management. Therefore, the process of transition from

conventional to ecological model is easier (ANDRADE et al., 2011).

Experimental results indicate the great potential of homeopathic preparations to interact with management practices of ecological basis favoring changes of livings organisms and speed recovery processes of degraded environments (ANDRADE, 2004).

The management of soils, throughout one year, associated to homeopathic preparations and incorporation of spontaneous plants improved microrganism quotient (qMIC) of soil (ANDRADE et al., 2007).

After *Magnesia carbonica* treatment, there was exhaustion of microrganism carbon (CM) of soil, that is, there was consumption of all reserved carbon and growth of spontaneous plants. *Magnesia carbonica* increased mineralization of nutrients from microrganisms biomass,

as demonstrated by decreased of CM and plant growth (ANDRADE et al., 2007a).

Furthermore, *Kali carbonicum,* when applied weekly to soil, along one year, increased plant weight. This effect indicates that the relations soil-plant reach equilibrium by microrganism biomass and plant growth. The homeopathic preparation Radix una (elaborated of roots from spontaneous plants) increased the CM and decreased plant growth (ANDRADE et. al., 2007a).

The microrganisms carbon (CM) or microrganisms biomass (BM) are considered the active and alive part of organic matter in soils. And that includes bacteria, actinomicets, fungi, protozoa, algi and microfauna. Homeopathic preparations change soil organic matter as indicated by CM (ANDRADE et al., 2007).

Homeopathic preparations interact with biological processes of soils and the soil-plant system. Along the

time, the incorporation of spontaneous plants and application of homeopathic preparations can help the constructive process of soils and, of all animal, vegetal and microrganism community. Homeopathy principles and procedures contribute to soil and ecosystems regeneration. So, safety food are produced, and there will be economy of resources, and sustentability (ANDRADE et. al., 2007a).

Magnesia carbonica D30 and D201, *Phosphorus* D12, *Calcarea carbonica* D30, *Kalium carbonicum* D6 and D30 and *Carbo vegetabilis* D30, treatments of diseased soil, as indicated by low efficiency of microrganisms, only one application will improve soil dynamic and microrganisms activity. *Magnesia carbonica* would be helpfull to young ecosystems (beginning of formation). *Magnesia carbonica* reduces qCO2. *Magnesia carbonica* is usefull in soils under disequilibrium of consumption and

exhaustion of organic matter. As for example, areas just deforested or of intense cultivation. *Magnesia carbonica* may cease mineralization (release of nutrients) of organic matter to reduce leaching losses or volatilization. The pathogenesy of *Magnesia carbonica* was the mineralization of the organic matter, (ANDRADE, 2004).

The homeopathic preparations Solo D30 and D201 turn microbiota more efficient and they also equilibrate the vitality of soils. In accordance with the Principle of Similarity, Solo D30 or Solo D201, are indicated to conditions where the immobilization surpasses mineralization (ANDRADE, 2004).

Magnesia carbonica D30 and *Carbo vegetabilis* D30 applied over soils, for one year, decreased ME. So, they cease the mineralization of organic matter, that is, they preserve the organic matter in the soil. They are indicated to soils when the organic matter is being quickly

depleted, as in tropical regions of high temperature and high humidity, without vegetal covering of the soil. They could be used for decomposition of rich nitrogen residues, depending on dinamization.

M.E. evaluations of soils treated by homeopathic preparations for one year, (ANDRADE, 2007) were effective at distinguished groups of homeopathic preparations. Dinamizations D12 and D200 of *Ferrum metallicum*, *Carbo vegetabilis Aurum*, *Argentum nitricum*, *Plumbum metallicum*, *Manganum aceticum*, *Arsenicum album*, *Silicea* and *Mercurius solubilis* were effective in modifying the diameter of soil aggregates (ANDRADE et al., 2006 c).

The presence of soil aggregates means that the soil is structured. These struturation results from transformations of the time. The maintenance or the recovery of the structure is essential to sustentability of

agroecosystems (GLIESSMAN, 2000). The structure is important for keeping the water and the air into the soil. The water and the air of soils are necessary to organisms and to plant roots.

Argentum nitricum, *Carbo vegetabilis*, *Silicea* and *Mercurius solubilis* in the dinamization D200, decreased water retention by the soil. According to Similarity Principle, these homeopathic preparations are recommended to dry soils or soils of limited water availability (ANDRADE et al., 2006 c).

Andrade et al. (2006 c), reported that *Ferrum metallicum*, *Aurum*, *Argentum nitricum*, *Manganum aceticum*, *Carbo vegetabilis*, *Silicea*, *Sulphur*, *Phosphorus*, *Ammonium carbonicum*, *Plumbum, Alumina*, *Natrum muriaticum*, *Mercurius solubilis*, decreased the electric conductivity of the soil.

Natrum muriaticum 8CH increases the electric conductivity (C.E.) of saline solution of soil, immediately after application what means a pathogenesic effect. After 24 and 48 hours of the application differences in the C.E were not evidenced, but, after 72 hours, *Natrum muriaticum* decreased the C.E. (PEREIRA et al., 2011)

Natrum muriaticum decreased the electric conductivity after application in two soils and the starting time was a function of soil and dinamization as reported by Souza et al. (2011). According to Pereira et al. (2011 b), *Silicea* 6CH increases the electric conductivity of the soil. However, soil reaction is dependent on clay type and the reaction is influenced by light. Andrade (2004) evidenced the effect of the homeopathic preparation made of spontaneous plants on the dynamics of soil organic matter.

The agricultural family chooses the homeopathic preparations for the soils based on analogies. The homeopathic preparation made of soil generally is adopted due to effectivity on the ecosystem. Some other homeopathic preparations are also chosen by analogy with pathogenesy, such as 12 homeopathic preparations of Schussler salts, or *Nux vomica*, *Sulphur*, *Arnica montana*, and some others. Also homeopathic preparations made of spontaneous plants, leguminous plants, solid mineral mother, vegetal coal, ashes, Rhyzobium, micorhize, and others (ANDRADE et al., 2010). The homeopathic preparation made of efficient microrganisms (E.M.) is applied for short period of time and is avoided under conditions of humid climate and high temperatures. It is used for decomposition of residues and disponibilization of nutrients (ANDRADE, 2011). Family farmers also make homeopathic preparations of zinc

sulphate, copper sulphate, iron sulphate, magnesium sulphate, manganese sulphate, boric acid, sodium molibdate, sulphate and calcium chloride.

Homeopathy is a social technology (REZENDE, 2003). The agricultural families are taking extension courses and are using the informations in order to reach equilibrium of the agrosystems (ANDRADE et al., 2011).

Agricultural families apply homeopathic preparations to soils by diverse methods, following local particularities. These are the common methods: spraying, irrigation, composts, application over strategical points and upon field maps (ANDRADE et. al., 2010).

To transform the diseased soil into healthfull soil it is required natural and living processes. Homeopathic Principles and Procedures arise from nature.

They are pure biological technology based on laws of physics and of life.

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