Ecology for students of Medical Plant Production Expert higher level vocational training programme

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Chapter 1. Ecology for students of Medical Plant Production Expert higher level vocational training programme

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1. Preface

The ecology textbook is made for the students studying inMedical Plant Production Expert Higher level Professional Education Programme. This course combines the features of agriculture, biology and environmental protection. The knowledge of using medical plants helps local people to plan and live sustainable activities.Agriculture and its technologies goes through a change as the environmentally sensible and sustainable farming, cultivation, rowing and the usage of renewable energies in larger quantities make ecology a more important discipline and knowledge. Beside the negotiation of the fundamental questions of the ecology the substance of a coursebook implies 3 chapters with soil science topic. The emphasized part of soil science is important because it is a basic preknowledge for the applied plant ecology and on the other hand for the alternative cultivation technologies. At the end of the chapters questions help to discuss the new explanations and knowledge.

2. 1. Introduction to ecology

2.1. 1. 1. Introduction to the ecology: historical concerns

20th century

The frontiers of ecology recognised the problems coming forward on the level of the populations and communities and entered for the road of developing into science. The root of this knowledge were nature knowledge (Natural History), human demography, biometrics, the agriculture and medical science are based on practical problems.

Ecology

The ecology word was used by Henry Thoreau at the first time in 1858.

Heckel examined the relationship between biotic and non living environment but his work contained too many general thoughts. In the 20th century many scientists dealt with ecological problems for example Elton. He was born in 1900 in Manchester and he studied in Liverpool. Then he studied zoology at the University of Oxford. In spite of the scientist emphasizing the importance of anatomy and taxonomy he gave more importance to experiments and field observations. His main thoughts were life history and life forms of living organisms. His first considerable book**, Animal Ecology** was first published in 1927.

Andrew Warta (1961): He was a zoologist and ecologist. He examined **the distribution of individuals**.He had a static view and he missed out the interactions between populations.

The publication of Hutchinson (The Paradox of the Plankton, 1961) and **his niche concept** started a new ecological point of view.

McArthur was the founder of abstract and mathematical ecology. Krebs (1985) said ecology is the kind of science which examines the interactions defining the spatial and temporal distributions of the individuals of living organisms. The main questions were: Where? When? How many? Why?

Juhász-Nagy, P. (1970): "The main task of ecology the explanation of spatial and temporal pattern based on quantitative and abundance relations." He was interested in supraindividual phenomena.

According to I. M. Szabó: The science belonging to the circle of synbiology the task of which the research of those background phenomena and processes is, that the levels of organization above the individual (SIO)which influenced their distribution and behaviour. For example. the distribution of space, time,the population dynamics can be circumscribed.

His aim to reveal and to interpret the ecological, environmental factors has an effect on the levels of organization above the individual and the effects recipient, ecological tolerance responding to the connected factors.

The concept of the ecology according to the Ecological Committee of Hungarian Academy of Sciences: This discipline is the part of biology, called synbiology which deals with the supraindividual level of living organisms.

The task of ecology is the research of the limiting directed (regulated and controlled) phenomena and processes (e.g living together, diversity, pattern, substance distribution, energy flow, productivity, succession) his research, that the populations and their communities his quantitative distribution and his behaviour (changes which can be joined to a given qualitative state) is caused actually.

The central hypothesis of the ecology (CH)

"Any kind of population in the nature can be found anytime, anywhere, in any kind of quantity". (Juhász-Nagy 1970)

If it would be true, that the nature would randomize and the position of the living organisms would be random in the distribution of individuals of a population

2.2. 1.3. Ecological basic principles:

It is necessary to interpret the concept of the ecology based on two important basic principles:

The principle of a general indication

The living organisms give an answer (response) to the actual environmental factors affecting them, the answer is the indikandum, living organisms are the indicators.

The principle of complementation

The exterior and interior environment complex: they affect each other. A living organism can be an environment for a parasite for example.

Ecological factors (ecological factors) the ecological-environmental and ecological tolerance (it means limiting and limited) factors, which are connected to each other directly in a given situation, (complementing their relation intentionally). Ecological factors can not be interpreted generally, they can be examined in only a given context .

external world - environment and not environment

neighbourhood - topology environment

Multiplural environmental principle:

Fig. 1. The multitude of ecological environments at a given topology in time and in space.

Limiting principle:

The response reaction of the populations and population complexes to the ecological-environmental effect or effects, which reach borders of their tolerance approached in a direction minimum or maximum or they steppe over. Their behaviour and response is influenced by temporal and quantitative incidence. Environmental factors have effect together with other factors so their effect is synergic: any of the reaches the border of tolerance it becomes limiting.

The environmental part of the ecological factors bringing about the change the limiting, his tolerance part enduring the change the limited factor, the populations and population complexes observed (examined, measured) change phenomenon and the limiting factors. Without each other they cannot be interpreted. The environmental factors are effective collectively, synergistic, turns into the limiting border of tolerance (Fig. 2.)

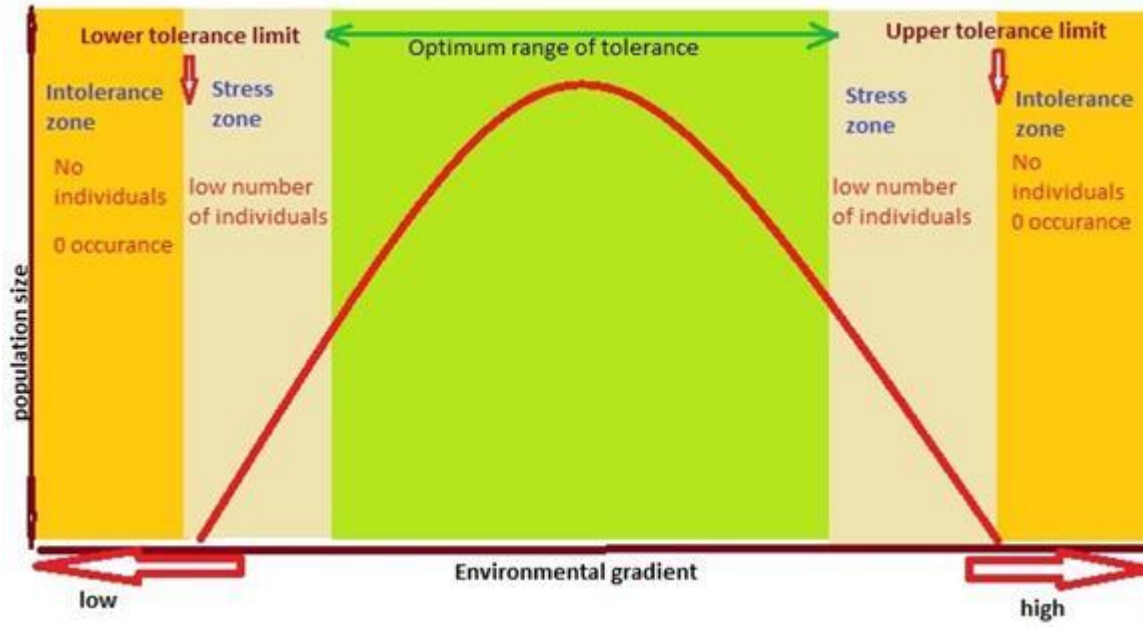

Fig. 2. The range of tolerance of the living organisms according to the changes of the environmental gradient

Liebig minimum experiment (1840):

The beat of the development of the plants from among the elements standing for the provision it defines it always, the one that is the smallest quantity there is ben on a sign. (barrel experiment, Figure 3.)

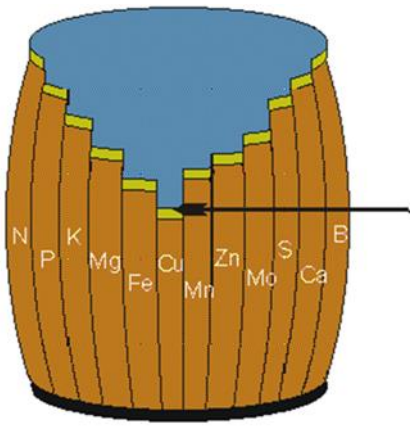

Fig.3. The barrel experiment

The principle of the general indication

Ecological indication - a mark paid attention to the actual effects of the environment. His basis it, that the populations and populációkollektívumok signal it (it is indicated) the factors being effective actually playing a role in their formation and their behaviour. (Like this the ecology the populations and population complexes mass distribution).

2.3. 1.4 The object of the ecology: the examination on indicandum phenomena referring to synbiological indication

Ecology deals with phenomena which can be interpreted on supraindividual level.

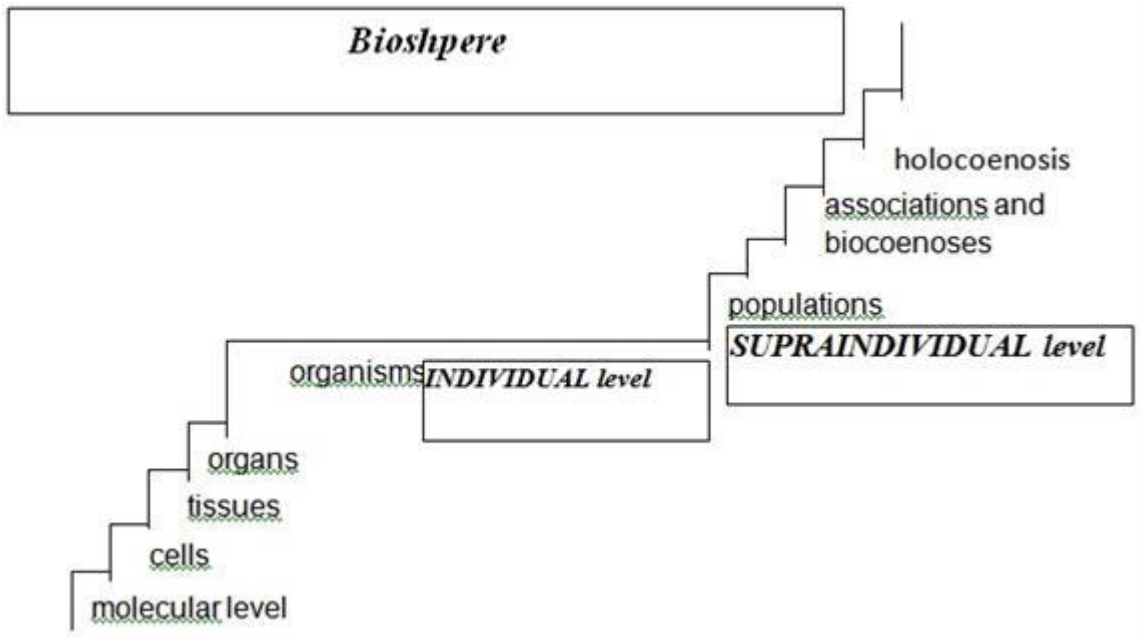

Fig. 4. supraindividual levels of organization:

• population

• species

• biocoenosis

• holocoenosis

• biom

• biosphere

The ecology from among the levels of organization above the individual deals with the lower ones, levels of organization which can be interpreted on smaller space scales : for the population and the he plays an important role in the ecological researches.

Summarized: The ecologyexamines the existential (existential) and coexistential (living together), and segregational (separation) conditions of populations.

The phenomena of thepopulation:

It is a set of organisms of a species which live in the same geographical region in which any pair of members can breed together and they are in an interaction with each other.

The individuals' set is able to reproduce each other.

The biological population and his features onto individuals forming a population the successor feature: they have some kind of collective ownership, for example they belong to the same species;

They can contact with an equal chance, they are in a permanent or frequent interaction with each other, for example being replaced, the events statistically appreciable, so they form a number of individuals which can be valued statistically.

If single individual chance is identical with an other individual truth onto an interaction, then this one of the stabilising factors of the population. Inside the population the number of possible interactions the individual function. It is n in a population with an individual number the number of the possible interactions: n*(n-1)/2.

Pl. n=1000, the number of the possible effects is 999 thousand, then the number of the interactions is 499500.

The staff numbers of a given population (N), in a given space and time depends on:

• births (B),

• mortalities (D),

• migration (E),

immigration (I) .

The number of individuals change with ΔN we nominate it, where Δ = a change came under a measurable time unit: ΔN= B-D+I-E (Simon 2009)

All living beings, even like humans are capable of the periodical realisation of an exponential increase, but the constant increase is impossible. Darwin recognised the enormous evolutionary significance of this fact based on Thomas Malthus's study from 1798.

The number of the young individuals is mostly bigger, but there are not enough space and enough food for them to grow up. This gives the opportunity for selection and - in a larger time scale-for the adaptation on gene level. The increase of the populations can be described with the change of the individuals during a definite time (natality, mortality, immigration). In a young population the number of the births exceeds the number of the mortalities until a time, because the environment sets boundaries to the increase of the population. The limited increase, to the unlimitted increase of which his curve is similar initially, comes true so, but becomes stable after a time.

Between the given values we can characterize an exponential increase with differencial equations generally:

$dN/dt = rN,$

in which one N is the number of individuals in the population, r is the growth rate (Malthus parameter).

The growth rate can be given for the time unit and in the case of bigger population size we can set aside with the discontinuous nature of the individual number (b) and mortality (d) a rate follows the differencebetween natality and mortality

$r = b - d$

Between natural circumstances the populations of the different species together form communities. The number of individualsof the single population is in balance nearly and remains in a value if the exterior conditions are constant. At this time the exterior lifeless and living conditions (power source, nutrients, temperature, predators, parasites etc..) they set boundaries to the additional increase.

In this state the natal and mortality rate of the population is the same, there is not an increase in the mumber of individuals:

$b - d = 0, dN/dt = 0$

For a given population this state his environment keeping capacity is reported. In an idealized case this is staff numbers (K) his achievement the undermentioned one (logistic) with an equation can be written down:

$dN/dt = rN(1 – N/K)$

So this is legible that the population can grow biologically with the possible growth rate (r)

his success the environmental one keeping reduces it. When the final number of individuals (K) is farfrom the recent or real number of individuals (N) N/K quotient is hardly bigger than zero, exponential increase can be observed. This will increase slower with the increase of the individual number of the population, and if he attains it the maximumvalue (N = K) rN multiplying it with zero (1-1=0) the increase stops:

$dN/dt = 0$ (Vida 2010).

2.4. 1.5. Ecosystem (ecological system):

Ecosystem - (ecological system) according to the Ecology Committee of Hungarian Academy of Sciences is the examination of a population or population complex with an ecological view, system model based on an abstraction (from interconnected elements wich are arranged on a determined manner standing unit which can be quantified).

Suitable that way, that from the complicated phenomena of the reality it gave most essential processes and contexts of a viewpoint (pl. trophic connections, energy flow processes) let him reflect it faithfully in a simplified form, and let the system analysis make it one which can be written down with his toolbar and one which can be studied.

According to the opinion of Hungarian Academy of Science, Ecological Committee the usage of the concept like this unnecessary and misleading (e.g. sylvan ecosystem = forest; ecosystem of Lake Balaton = Balaton; urban ecosystem = settlement or city their living world etc.)

For example **soil** is a structural (structural) and active (functional) system, in which the plants (autotrophic organisms) as organic matter producers (producens), the animals as consumer (consumers), the microorganisms (mainly bacteria, actinomyces, worms organisations' organic matters consumers and destructive (reducens, decomposing, mineralising) organisations are active.

3. 2. Sources

All environmental factors that it is for a living being are qualified as a source to the insurance of the essential conditions essential and his quantity reducible by way of the living being, that is the living being makes use of it.

3.1. 2.1. The types of sources:

• Solar radiation

• Water

• Temperature

• Oxygen, carbon dioxide

• Minerals

• Other organisms

Effective heat sum: the combination of the time and temperature (it is called physiological time).

Pl. for an insect 16°C it is bored. the value of a developmental doorstep, that is enters this temperature for development. If on 30°C bald, only 5 days are necessary to his development then.

The proteins are precipitated on an extreme tall temperature, enzymes become out of order.

The salt has an effect on the osmotic balance of the plant primarily.

The next features are at disposal of plant species having patience: ion selectivity capable KThe role of the solar radiation:

To the metabolic processes of E- forrás, the green plants the heating of surface and the air subsistence the forming of meteorological phenomena.

Global v. full radiation (T) his components:

Intentionally / direct radiation

• it warms up the body of living beings

• increases it the vapouring+- ot to absorb, if the environment is tall na concentration is at his disposal)

The role of the solar radiation:

To the metabolic processes of E- forrás, the green plants the heating of surface and the air subsistence the forming of meteorological phenomena.

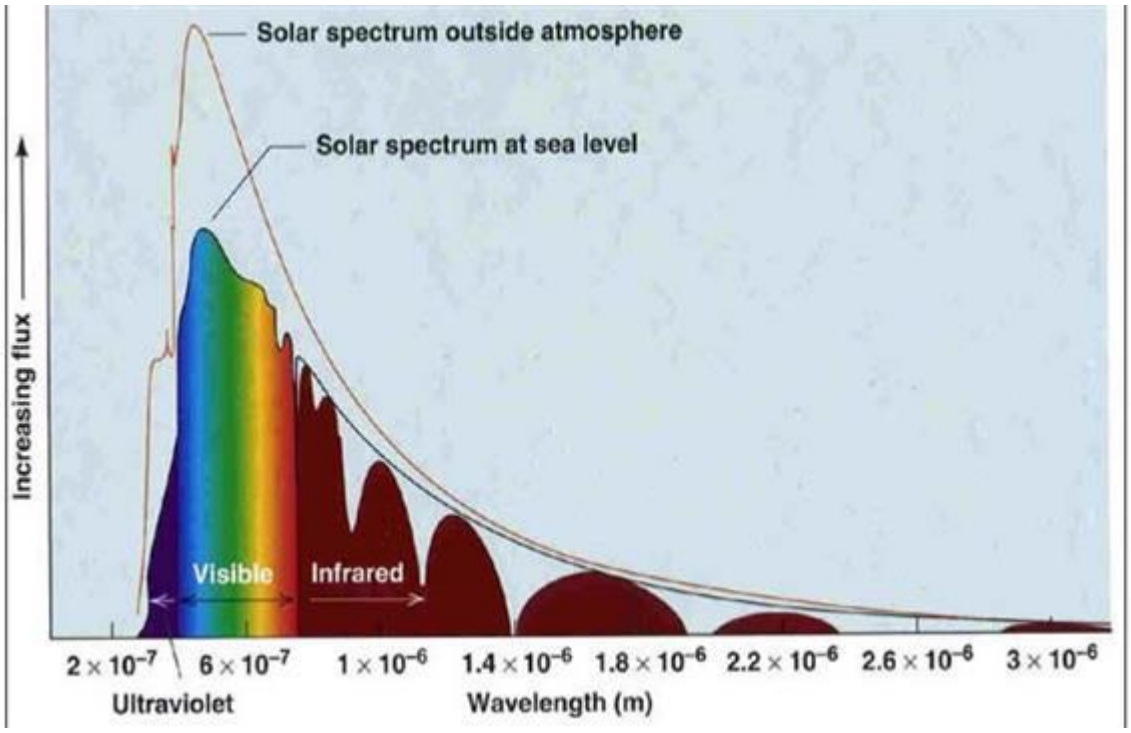

Figure 5: The incoming electromagnetic radiation and its distribution

The light

Light: Our principal natural light-source is the Sun, the radiation of which has a direct heat effect, creates photochemical transformations. The intensity of the light attaining the surface of the Earth the incidence depends on the angle, the light-absorption of the atmosphere and the screening factors. It shading conditions we reckon the haze, the cloudage, the dust among it and the vegetation.

If we examine it the light relations reigning on land, we may establish that enough lives with a some kind of form are the years at least in his single periods everywhere on the Earth his maintenance. The plants living in the aquatic environment and animals are accessible to him light manages to get from the surface into the water, so the above conditions and fluctuations are valid for him. The water is added to this yet selective fényswallowing his effect. For the incident light kb.l0%-a repulses from the surface, like this only 90%-ajut away into the water.

The transparency of the natural waters is strongly different and it changes according to his combination and contamination. In a certain habitat where density is big in the water gradient, the transparency changes significantly with the depth. The transparency of the coastal waters of the oceans and the freshwater lakes changes strongly because of the season apart from this, too.

The light has got double nature:

1. energy: in habitat heat farming is important

2. particle: photons, the different provinces of the spectrum may have an effect on the examined object in photosynthesis.

Photosynthetically active radiation (PAR)

• Photosynthetically active radiation: radiation between380- 720 nm, and 400- 700 nm. The photosynthetic pigment of the green plants the chlorophyll the, the pigment of the bacteria the bakterioklorofill.

The 56 % of solar radiation is useful radiation for plants falling onto the Earth (Standovár 2010)

Illuminence

• It follows the sensitivity province of the human eye (380-770 nms) falling onto the Earth as radiation arriving in a certain wavelength interval..

• his measure: lux ill. flux = lumen m-2

• his measuring instrument: photometer,

• in a technique of photography in use, once the photosynthesis and vegetational examinations this was applied,

• not accurate because it is a human eye on the middle of the province, the plant his two edges (the blue one and the red one) in a province the most sensitive one.

Photosynthetic Photon Flux Density (PPFD)

• In a province between 400-700 nms (PAR) incoming photons (light quanta) his quantity onto a unit of surface, under unit time.

• mértékgysége (SI): µmol photon m-2 and-1, once µEinstein photon m-2 s-1

• his measuring instrument: quantum sensor

Oxygen and carbon dioxide: The metabolism happening between the living being and his environment two fundamental ones.

the oxygen and the carbon dioxide are his substances. These two substances take a part in the two fundamental reactions, the photosynthesis and the breathing. All living beings need oxygen almost, that let them allowed to free the energy content of the integral nutrients. The aerobic organisations in the air or they make use of the free oxygen in the water for the oxidation of the organic matters, the anaerobic organisations demolish their nutrient without oxygen. Among the environmental conditions found on Earth occuring oxygen concentration is never too tall for the aerobic organisations.

The living beings may harm it significantly. The oxygen content is quasi 21% in the atmosphere and this value can have fluctuation on the different places of the Earth around l% . The oxygen concentration decreases by the increase of the altitude as the atmosphere becomes rare. In soil the oxygen goes up to concentration 10% or below it. In natural water the content of oxygen depends on not only the physical one but on factors, because of the quantity of the organic matters in it and the living organisms influence the measure of oxygen production and consumption.

In aquatic environment oxygen concentration is a modifiable factor but in the atmosphere it cannot be modified in practice.

Water is the most important constituent of the active organisms. It is the source of Oxygen and Hydrogene. The oceans and the seas form the capital body of water of our Earth. From this the enormous one the continental water comes from a reserve.

The water vaporises due to solar energy from the surface of the land, . From the haze clouds form their cooling which leads to precipitation. A part of the moisture constitutes brooks, rivers on the surface of the land, and it directly gets back into the seas and the oceans.

Fig. 6. Coastal habitat at lake Balaton (Photo: Erika Pénzesné Kónya)

The other part of the moisture gets into the soil, from where sources manage it to get onto the surface again by way of the exhalation of the vegetation.

Biotic factors:

- The organisations' interaction:
- the row of factors,
- single vegetal or animal effects between populations and individuals,
- interaction between plants and the animals.

Antropogene factor: The man affects living world in two ways: indirectly and directly, (e.g.deforestation, and on the place of the forests arable or the foundation of areas)

3.2. 2.2 Ecological niche

The interpretationos the Ecological Committee of the Hungarian Academy of Sciences: for the coexistence of populations or population complexes concept being used for the abstract interpretation. It is relevant for a given population or for population complexes because of the tolerance peculiarities an ecological situation (ecostate) can be granted, in a given combination of the environmental factors, which we call surroundings space.

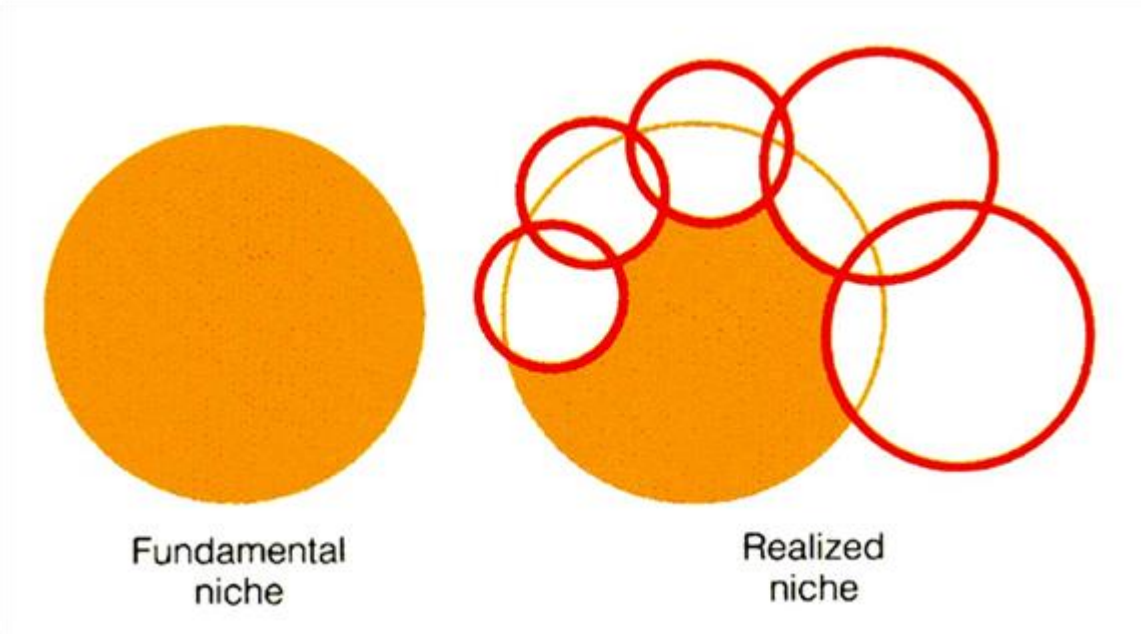

Fig.7. Fundamental and realized niche

Ecological niche (ecostate) is the part of the sources which can be found in the environment of the population of which the individuals of the population may take advantage. The meaning of the niche , so we may interpret it in such a way that the living space created for the different populations, by way of the sources, divides up into imaginary. Two populations with an identical niche may not live permanently on the same spatial place.

The principle of a competitive exclusion (**Gauze type**) : They may not live if the environmental claim of two populations is identical permanently on the same habitat.

Fundamental niche for the population necessary the band of those sources, what the individuals would need it, that let all of their claims be fulfilled maximally.

The bioindication theory, the benefits of his application, his bars:

The one of the questions of environment protection which can be responded to difficultly:

- we take the biological reaction of which living being into consideration opposite the soiling the statement of sensitivity?

There are more substances the physiological effect of which we do not know because of the diversity of the soiling.

The task turns into even more complicated one if we take into consideration that the individuals' sensitivity is different inside a race.

The different sensitivity of the living beings is suitable for the more sensitive ones to signal the danger quasi the man and through a conscious act for the others, a less sensitive organization.All the plant-, there are all present races with a beautiful number in the fauna though, that we call it the biological indicators of the environmental pollution on a comprehensive name.

These species may be negative or positive indicators:

• Positive indicators:

They signal the environmental pollution with their incidence or their multitudinous spreading.

Single blue alga taxa, which proliferate in big mass, signal the increase of the eutrophication in water wich is rich in organic compounds.

Oxygen and carbon dioxide: The metabolism happening between the living being and his environment two fundamental ones the oxygen and the carbon dioxide are his substances. These two substances take a part in the two fundamental reactions, the in photosynthesis and the breathing. All living beings need oxygen almost, that let him be allowed to free the energy content of the integral nutrients. The aerobic organisations in the air or they make use of the free oxygen in the water for the oxidation of the organic matters, the anaerobic one organisations demolish their nutrient without oxygen.

Between the earthly relations occuring oxygen concentration never too tall for the aerobic organisations, while it is anaerobic living beings may harm it significantly. The oxygen the atmosphere quasi 21%-át it is formed, for this the fluctuation of his value on the different places of the Earth l%-on from within yes. The oxygen concentration decreases by the increase of the altitude as the atmosphere becomes rare. In soil the oxygen his concentration 10%-ra you are this falls below it.

In aquatic environment oxygen concentration is a modifiable factor, but in the atmosphere it cannot be modified in practice.

Water: The water the most important constituent of the active organisms, it is the source of oxygen and hydrogene. The oceans and the seas form the main body of water of our Earth. From this the enormous one the continental water comes from a reserve. From the surface of the land, the open water surface the water vaporises due to solar energy.

From the haze clouds form. Their cooling leads to precipitation. A part of the moisture constitutes brooks, rivers on the surface of the land, and like this it gets back into the sea and the oceans. The other part of the moisture gets into the soil, from where you are from sources manages to get onto the surface again by way of the exhalation of the vegetation. The mainland all of his water gets back into the sea and oceans so, and this actually for the circulation of the water the section of finisher.

Biotic factors:

The organisations' interaction: The biotic factor means that we distinguish it in the row of factors as single vegetal or animal effects between populations and individuals, and the

interaction between plants and the animals. The mutual contact of the different races

each other may be indifferent for him, mutually useful, indeed you are essential harmful

and these several of his grades and his variant.

Antropogene factor: The man affects the living world in two ways: indirectly accross that the environment fizikai, his chemistry and biological conditions changes directly, his effect has on the living beings (pl.: deforestation, and on the place of the forests arable the foundation of areas stb.) we have to think that it is ecological before an eye factors not only in space, but they affect the living beings in time, because of this the ecological phenomena we have to take the historical factors into consideration at his explanation.

3.3. 2.2. Ecological niche

His interpretation (MTA Ecological Committee opinion): for the living together of populations or metapopulations (the coexistence of them) concept being used for his abstract interpretation. Onto a given population you are populációkollektívumra relevantly because of the tolerance peculiarities függően an ecological situation (ökostátus) can be granted, in a given combination of the environmental factors, which we call surroundings space. The ökostátus so from the environmental factors being effective actually, than from coordinates the part of formed abstract n-dimension attribute space like that, the values of which the individuals of the population or population complex with a certain probability to survive and they are able to multiply. We get the niche of a given population or population complex as the result of the characterisation of a representing dot distribution happening to functions.

We consider that dot distribution characterize with functions a fundamental niche, that writes the potential situation of the population or populációkollektívum down in the surroundings space, while that dot distribution characterize with functions, with which the population you are the situation of the populációkollektívum in the surroundings space in a concrete case really (actually) qualifiable, we call it a realize niche (.Figure 7.)

ecological niche (ökostátus) the part of the sources which can be found in the environment of the population of which the individuals of the population may take advantage. The meaning of the niche closet, so we may interpret it in such a way that the living space created for the different populations, by way of the sources, divides up into imaginary closets. Two populations with an identical niche may not live permanently on the same spatial place.

The principle of a competitive exclusion (Gauze-type) : They may not live if the environmental claim of two populations is identical permanently on the same habitat. Fundamental niche for the population necessary the band of those sources, what is in2.3.

There are more substances the physiological effect of which we do not know because of the diversity of the soiling.dividuals would need it, that let all of their claims be fulfilled maximally.

It complicates the situation furthermore, that from among the species of the biosphere only the sensitivity of definite number of the species were tested based on exact examinations. The task turns into even more complicated if we take into consideration that the individuals' sensitivity is different within a population of a species.. The different sensitivity of the living beings is suitable for signalling the danger of the changes in the environment. These species or taxa may be negative or positive indicators:

Positive indicators:

They signal the environmental pollution with their incidence or their multitudinous spreading.

Single blue alga species, which proliferate in big mass, signal the increase of the eutrophication in water wich is full of organic compounds (Fig. 8.).

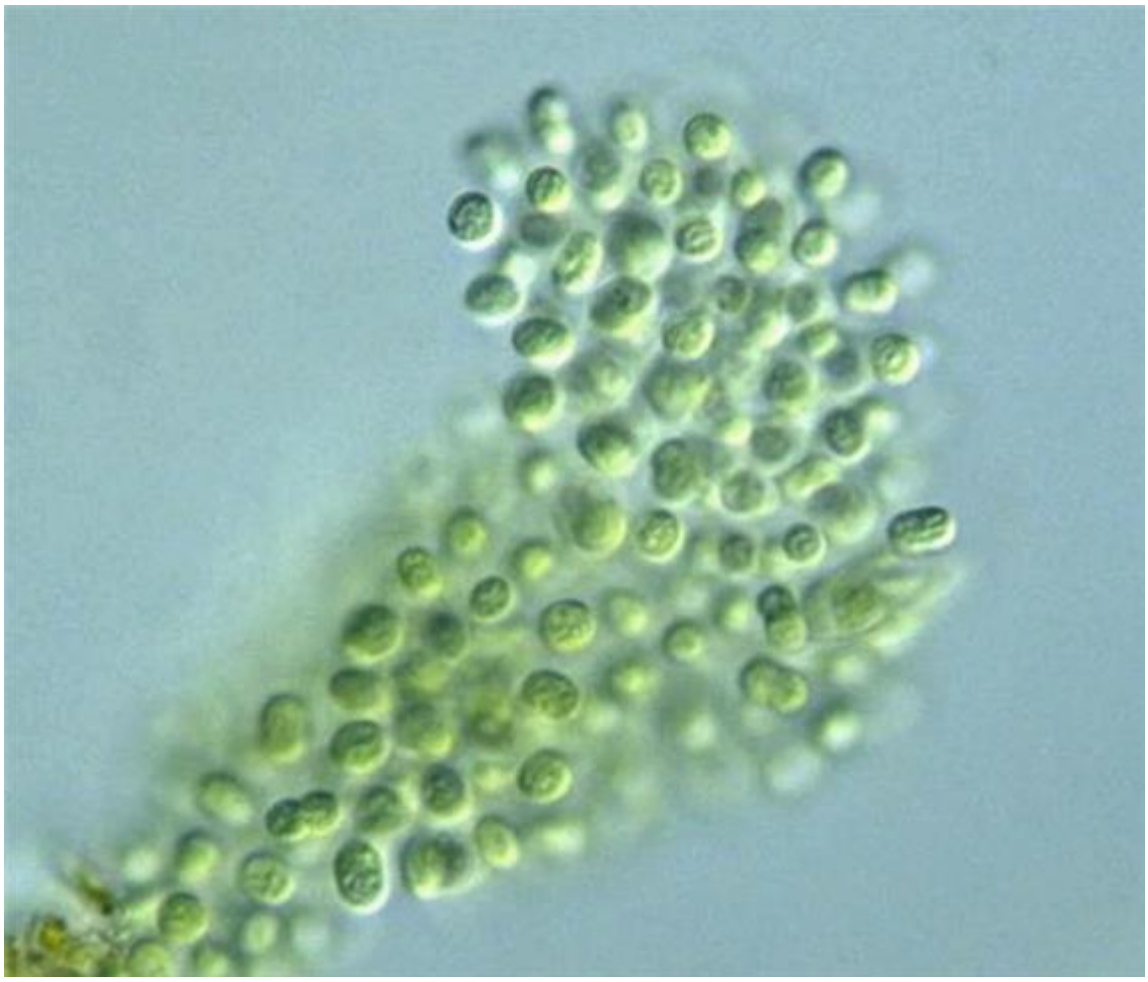

Figure 8. Mycrocystis flos-aquae (Wittrock) Kirchner causes “water flowering”

Negative indicators:

His organization the given one suffers a loss of pollution as an effect, and his individual number becomes rare disappears on the contaminated area, in an extreme case.

The lichens, which are very sensitive to the atmospheric sulphur dioxide load notoriously, belong to this type. The pollutants are accumulated inwinter and summer in the organisms because of their slow increase and their continuous vital functions, their organization suffers a loss in case of slight atmospheric concentration so they can be destroyed.

More monocotyledonous plant (e.g. Tulip, Freesia) can have characteristic necrotic signals for indication of fluorine pollution with a symptom.

Biological indicators:

1) Attribute species: their existence indicates or their deficiency

- positive indicator: a nutrient signals rich environment, eutrophic state

- negative indicator: SO2-t attribute – lichen

2) Monitor species:

- sensitive races: functional change in the organization

- accumulation races: sign cumulation without a damage

letter chlorosis: turns yellow, fades the letter, a reddish colouration appear on him, this the chronic effect of the little concentration

- increase change: less and smaller letters, fewer flowers; the letters, the plant fall down with a smaller stature

2) Microscopical symptoms

- cytology damage: due to the pollutant plazmolízis, kloroplasztisz deformation

- ecophysiological damage: the change of respiratory, assimilative, photosynthetic processes.

The benefits of the usage of the biological indication:

• the bioindicators the complex effect of the environmental factors is reflected,

• the roundabout physical and chemistry measurements substitutes the biological effects

• his examination,

• graphically traceable the degree of the environmental changes (his rate) and his direction,

• the function of the ecosystems, his behaviour are modified the aggregating one

• (accumulating) pollutants.

The biomonitoring the biological indication supplies his basis. You are all active organism population, than open system, signals the changes happening in his environment.

The benefits of biological indicators (bioindicators) :

• With certain characteristic changes the immission air polluting substances which cannot be manifested with a measurement show his danger, concerned

• Cheaper, than the monitor examination, which gives punctiform values only because of his considerable expenses.

Opposite this the bioindikátorok an opportunity is provided a little raster immissziós covering a whole area onto an impact assessment.

The disadvantage of bioindication:

1. The method is suitable for a forecast, believes the received values concern the antecedent period,

2. They may constitute a problem furthermore from the meteorological conditions, and the differences influencing the sensitivity of the plant deriving from the vegetal development. 3. The different sensitivity depends on:

- genetic expressing,

a developmental phase,

- environmental factors,

- polluters' concentration.

Indicators employed until now:

1) Deciduous trees

- SO2 sensitive: elm,(*Ulmus sp*.), willow(*Salix sp*.),, beech (*Fagus sp*.)

- SO2 resistant: laurel sour cherry (*Laurocerasus sp*.)

- Heavy metal sensitive: on a candle, early maple

- Heavy metal resistant: case tree, silver tree, acacia

- An air polluter is less sensitive to substances: red oak (*Quercus rubra*)

2) Coniferous trees

- SO2 sensitive: poplar, spruce, dougles pine (*Pseudotschuga menziesii*)

- Fluorine sensitive: spruce (*Picea abies*)

- Heavy metal sensitive: spruce, sylvan, dougles pine

3) Yew

Accumulates heavy metals – lead, copper, Hg, Cr

Mushrooms

Heavy metal attribute: agaric – CD, Hg; big parasol mushroom – Hg

Most heavy metal is in the discs, next in the hat and the least in the trunk.

Lichens

The reason of the sensitivity (onto the indication truth the origin of their suitability):

- low the chlorophyll content - slower the metabolism - slow the increase - smaller regeneration ability

- there is not cuticle: the polluter gets into the lichen body easily (can be registered the effect of the pollution)

- the settlement's colour, his thickness, his greatness change

- anatomical changes: the number of the dividing alga cells forming the lichen less.

- the settlement's water content decreases

- chlorophyll A and –b his proportion decreases, összklorofill duration decreases

- phosphatase enzyme an activity changes

They respond to the next polluters sensitively: SO2, NOx, ozone, fluoride, növényvédőszer, artificial fertiliser, radioactive substance, chlorine.

Lichen deserts: there is not a lichen at all.

Fight zone: the resistant races appear permanently, you are big with big frequency borítottsággal

Normal zone.

6) Mosses

Most sensitive, there are not cuticle and epidermis the pollutant gets in easily.

They accumulate the metals without selectivity.

Their sensitivity expands on the successors: SO2, ozone, nehézfém, radioactive substances.

A sensitive bryophyte species, *Leucobryum glaucum*

Ulmus minor is sensitive for SO2 pollution

7) Vascular plants (herbs)

- tobacco, bean, petunia – fotooxidant sensitive

- puddle weed – N2 enrichment it is signaled, zinc accumulation

- pondweed – copper accumulation

8) Animals

Heavy metal is accumulated in: snail, mussel, earthworm.

Birds: heavy metal is accumulated in the feather, a bone and inner organs, the pesticides in the adipose tissue.

Examples onto the application:

Tobacco ozone indicator

The tobacco is used as ozone indicator since the front of the 60 years in Europe, it is indicative of his sensitivity that 40 are ppb already-s in case of concentration on the letters clear patches – chlorosis appear, in case of which longer ozone load lasting until time with the necrosis of the letter fabric they change dark colour necrotic patches (Fig. 9.)

Fig. 9. Necrosis can be observed on the leaf surface of tobacco (E. Divéky 2004)

4. 3. The biodiversity and its significance in the environment

Biodiversity is the central concept of the ecology and natural conservation biology. The aim of the environmentalism for the unprecedented variety of the living world, i mean the biodiverzitásnak his conservation. The biodiversity definition: the biological diversity, which expresses itself on some habitats, from the deep ocean to the deserts, from the untouched or native forests almost to the cities.

The scientific definition of biodiversity according to Global Biodiversity Assessement (1995):

The quality of the distinctness of biological entities and his measure are given inside a circle. It given circle exceptionally diversely definable, in space in time, according to organizational levels can be marked off. On the bordered area the biological entities likewise according to a diverse viewpoint can be enumerated into groups, where the groups' number, and thebased on the frequency distribution of the assigned objects between groups the biodiverzitás likewise according to diverse mathematical logic, based on created quantitative formulae.

4.1. 3.1. The biodiversity concept, the types of it

The calculated diversity value is bigger, when the groups' number is bigger, and it depends on the group frequency distribution of the objects. We review it from the natural conservation viewpoint to show the most important biodiversity types.

4.1.1. 3.1.1. Genetic diversity on four levels can be interpreted:

• Inside an individual's genetic substance

• Between individuals with a different genotype belonging to a population

• Between more of the populations of species

• Genetic distance between single species

We may calculate it for example, that inside the species full genetic diversity (Ht) his how large a proportion originates inside the single populations (Hs), concerned between the single populations (Dst)

The maintenance of many populations is necessary to the conservation of the genetic diversity of the race if Dst is big. Generally can be related, that at what bigger the genetic diversity of a population or a race, can adapt to the changing circumstances with a bigger probability at it, his chance is bigger for his survival at it. The conservation of the genetic diversity is so important because of this.

4.1.2. 3.1.2. Taxon diversity (we constitute the groups based on taxonomic units)

Marking off the given circle may be diverse likewise:

• Inside a taxonomic unit: e.g. how many races belong to a given family

(or into a family)

• The number of the taxonomic categories of given biota. Mostly in the species number

but the genera, families, orders, too

they may constitute grounds for the grouping.

4.1.3. 3.1.3. Ecological diversity

The number of the populations building up the communities and his mass proportion (pl. his evenness) , or in the spatial patterns of the components, his functional contacts (e.g. predation, herbivory, pollination, dissemination, parasitism) appearing diversity

(Standovár and Primack 2001).

In this case the groups the community

they form it based on functional units kept in terms of the function of important one.3.1.4. Patch diversity (habitat diversity)

We mark off patches maplike on an area. The viewpoints may be different here. We may mark off plant community doctrine units, but distinguished habitats by way of an animal group (nourishing, hidden, rest, wintering, mating, increasing etc..) places.

The diversity the number of the patch types, and we may calculate it based on his spatial quantitative proportion.

4.1.4. 3.1.5. Pattern diversity

If the number of the species is identical, and the individuals' frequency distribution, their spatial arrangement (their pattern) may be different.The florula diversity (Juhász-Nagy 1993). serves for quantification.

4.1.5. 3.1.6.Functional diversity, pseudodiversity

At the time of the computation of the diversity indices some groups, (in the frequentest case race) acts with identical weight, there is not a difference the rare one, valuable and the disturbing tolerating or between invading races. If on a nature-friendly, area with special vegetation the race the cosmopolitan, disturbing increases because of the immigration of frequent species having patience, the diversity decreases in fact because the area loses his individuality, more similar ones separate from the others.

In a case like this consider that the diversity increase pseudodiversity.

4.2. 3.2. The biodiversity space with big scale and temporal pattern

4.2.1. 3.2.1. Spatial pattern

Because of the poles until the equator, according to the latitudinal circles one biodiversity gradient exists. The tropical areas are richer in species, than the areas closer to poles. A diverse idea exists for it his explanation, Why are the tropical areas richer in species? Some answers from among these (Standovár and Primack 2001):Big the accessible energy quantity

• The formation of species with time standing for a provision was not longer than ice-age.

• Bigger area more diverse opportunities -the acceleration of species formation

• Rapoport rule (the stronger specialisation may yield a smaller niche)

• The deficiency of the adverse season (the deficiency of dryness, frost)

• Bigger parasite pressure.

• The autogamy has low proportion.

Number of factors may cause unequal spatial distribution of biodiversity apart from the gradient according to the latitudinal circles . Those places, where many races like that appear outstandingly, that somewhere else cannot be found, the biodiversity his viewpoint it is called boiling dots. Marking off these areas have emphasized protection which are important natural conservation priority. In European relation Carpathian Basin can be considered as a biodiversity hot spot.The reason of this that a diverse climatic effect prevails, they alternate it rather with Continental, Atlantic. Mediterranean, Charpathian character periods. Alternates due to the different direction of the inflow of the flora and fauna elements, from among which were capable to remain in refugia for them in an adverse period (relict habitats). They become isolated though because of the pool character, and they regain a separate developmental way (the development of endemic species).The processes became slower in pool here because of the biogeographical pile up the flora and fauna elements (Cobbler 2006).

4.2.2. 3.2.2. Temporal pattern

Biodiversity, (what we characterize with the number of the species for the mood of the simplicity now) understands an increasingly bigger value in the course of the evolution.

Today in Hungary we have data.from the incidence of 3000 plant species, cca. 43 000 invertebrate ones and 560 vertebrate species

Marine animals experienced that 500,345 are the living worlds with five occasions in his story till now in the course of the examination of his fossil residues, 250,180 and with 65 million years before the biodiversity until relatively short time (until some million years) decreased rapidly, the decrease stopped then, and a short pair attained the level before the extinction wave under a million years likewise. From the average life time of the races counted background an extinction rate is typical of the periods between the extinction waves, 0.1-1 dies from 1000 races on the basis of this one a million years. Currently for this extinction rate we have to count it, and this may be growing significantly yet. The human activity is the unambiguous reason of the present extinctions.n idea about his latest reasons alone:

The extinction stops at the time of the ceasing of the efficient cause according to the moral which can be deducted from the procession of the earlier extinction waves, and biodiversity regenerates soon. This sounds most well, but if the man is the efficient cause currently, and the fast regeneration more million years, then the situation not too promising.

4.3. 3.3. The protection of species and populations

One of the most important aims of the environmentalism are the preventions of the extinction of the races. The protection with a race level is based on us drawing a distinction between the races, and we favour them, that the extinction közelébe they were found, i mean endangered

One of the aims of the science, that let him provide help it, that we find it, which ones these races. The protection means the creation of measures in a first step, that the human activities harming these races are limited.

There may be need for the treatment of the populations of the endangered races, actual, practical measures, the treatment of the habitats in many cases, possibly onto artificial propagation, breeding.

While the legal measures concern some individuals of the race on the area affected by the given measure, till then the practical interventions on a population level, single which can be grown with actual substance's treatment length.

4.3.1. 3.3.1. Ex situ protection in zoos and botanical gardens

It is necessary to accomplish the protection of the populations on their own natural habitat (in

situ)because the contacts uniting the populations, the individuals remain so and at them taller forms of organization. There may be need for being on an artificial habitat, in a zoo or in a botanical garden, breeding in exceptional cases. The successors may be the reasons of this:

- The minimal viable population size is significantly smaller
- • From a research viewpoint the ex situ a population may substitute the wild population.protection if the population is seriously endangered on his own habitat.
- If the genetic variety of the natural population decreased seriously.

• Zoos and the botanical gardens are important scene for the dissemination of knowledge and the consciousness framing.

According to single opinions the ex situ protection has 100-300 years or it is possible to overcome it. The protection of plant species in botanical gardens Ex situ in the interest of the formation of a plant population the natural one from a plant population genetically to the winning of a representative sample from 1-5 populations from 10-50 individuals enough propaguls to save up because the plants are quite polymorphic The original population the propagulum a collection it hardly. The plant upbringing but a yes entails many problems. It is possible to define the suitable educational circumstances with lengthy experimentation only. Reports a frequent problem, that in a botanical garden one of the most difficult problem is to exclude the close related species to avoid the gene pollution.generally.

Ex situ conservation of wild plant species through seed banking is currently being recommended as a conservation strategy to help preserve the biological and genetic diversity of wild plants. Here I argue that ex situ collections may be ineffective at preserving genetic diversity and the evolutionary potential of populations for adaptive or neutral evolution. Treating the collection of genetic variation for seed banks as simply a problem in efficient sampling of neutral, allelic genetic polymorphism is a limited view of the types and organization of genetic variation present in wild plant species. Perspectives on genetic variation from neutral alleles to quantitative variation are necessary when considering evolutionary change. Quantitative genetic variation and genetic correlations determine the degree and form of response to natural selection on polygenic traits. Population variation in the amount of quantitative genetic variation or structure of genetic correlations argues that different populations will respond differently to the action of natural selection and are therefore unique evolutionary entities.

To the propagation of protected plants, the reproducing programmes areactivities to which permit is necessary (Fig. 10).

a

b

Fig.10.. Ex situ conservational programme in the Botanical garden of Eszterházy College a:*Allium victorialis* seedling, b*: Allium victorialis* old plant individual

The protection of species in zoos

For the zoos truth a harnessing harms the natural population. The individuals do not know his genetic characteristics, this at the time of a harnessingcan have a “black whole effect”. The experiences show it however, that from a relatively small sized start individual number viable population which can be created.

Successful propagation only then it's possible, if the keeping circumstances are suitable. Careful genetic and demographic planning has to precede the propagation. The zoos the association of worldwide ISIS (International Species Inventory System) makes it possible, that the given race all let the breeding be drawn up regarding a participant's individuals existing in a zoo as one single population.The successful propagation only then it's possible, if the keeping circumstances megfelelőek. Careful genetic and demographic planning has to precede the propagation. The zoos the worldwide association ISIS (International Species Inventory System) makes it possible, that the given race all let the breeding be drawn up regarding a participant's individuals existing in a zoo as one single population.

The data of the kept animal species get a record of it in a central herdbook. These systems are planned with well-known and monitored natural populations in the future to add,they take shape so it is bored. "mega-zoo" (Worley1996).

On the original habitat the elimination of the endangering factors, you are other

the selection of a suitable natural habitat.

• The gaining of the consent of the concerned people_nation, local residents, an authority.

• Preparing the individuals to be reintroduced into the wild concerning the possible adaptation of it. The insurance of suitable devices, expertise and material sources.

• The resettled individuals local plant and onto animal communities truth expected

his effect at what his better knowledge.

The resettling his conditions:

• Viable ex with genetic variety with a suitable staff number situ population his existence.

The ex situ protection and the artificial setup never cannot be put it in situ in front of protection. Our knowledge until all of them incomplete, we cannot imitate the natural circumstances perfectly, and the resettling most heavy from all viewpoints to find a suitable habitat. In case of plants the object of a frequent debate, that it is allowed to resettle it onto a habitat looking suitable one artificially multiplied race, if we do not know whether he occurred on the given area certainly?

This is qualified as a flora forgery according to single specialists. Especially dangerous, if voluntary amateurs try to accomplish the settlement, and their activity is not documented. The natural conservation law prescribes the any kind of manipulation happening to the protected plants for one subject to licence unambiguously because of this.

Disturbance

The disturbance is so destructive disturbance process, which is biomass generally with decrease, is due. The disturbance a symptom may be an attribute for the dominance relations of the change ensuing in the species number and species combination, the changing populations, his spatial and temporal pattern. The effect of the disturbance depends on his pattern and his intensity:

temporal pattern (onetime effect, continuously holder, or periodical

(regularly or irregularly) candidate

• his spatial pattern: with punctiform, patchy, big or small expansion

• his intensity: with mild disturbance destroying everything

Fact accepted in a wide circle already today, that the disturbing the natural community one of the driving forces of dynamics, so the prevention of all kinds of disturbing may not be the aim of the environmentalism.

A Huge forest fire ensued in the course of the examination of his effects in 1988 in Yellowstone Nemzeti Park it hit upon them, that the forest fires for the matrimonies of that place not harmful, but so new regeneration processes are started, that increases the diversity of the matrimonies, and furthers his renewal.Exists so from a community dynamic viewpoint maintainer and the destructive disturbing (5. table). The medium diszturbancia hypothesis (intermediate disturbance hypothesis) the largest diversity of the matrimonies medium diszturbancia may take shape beside a level.The one with suitable pattern and quality onto disturbing given answer reactions for the function of the natural matrimonies the task of his parts, the natural conservation treatment so the insurance of the suitable disturbing, manipulating him in order that the largest one is structural on the possible smallest place and let a function diversity be maintainable.

4.3.2. 3.4.1. The stability of the communities

The stability the community you are his characteristic, with which he preserves it despite the disturbing, on it restores his original features. We distinguish three of his forms:

Persistance enter sporting event the time until the object remains without a considerable change. The community may mean the existence of Hungarian Plains, his survival more universally.The reziliencia with that time measurable mostly (it bigger, at what shorter yeah

time), that the original state passes until his recovery after the diszturbancia. The measure of the recovery of the original state belongs into the concept of the reziliance.

The resistance opposite the disturbing resistance reports it. With given strength disturbing beside being effective the perturbáltság (the change of state coming forward as a result of the disturbing) his contrast.Other stability characteristics are at their disposal the balance one and the not balance communities, but there is not a difference in terms of a natural conservation value between the community with a type of two kinds. A community construction and stability examined his context a lot, he did not manage to manifest a unambiguous context however between the community's diversity and his stability.The quick and often variables are e.g. floodplain communities', mud associations', moving dunes' communities just as valuable, than the forest associations appearing constant until the full-grown, long time, or rock lawns (climax associations). The natural disturbing, than pl. the animals the necrosis of his chewing, his digging, his treading, old trees collapsing, tussocks, avalanche, a storm causes the destruction of the vegetation in patches, but it gets underway promptly onto blanks the immigration, and in a final result all natural habitats different developmental one in a phase, Consists of the mosaic of regenerating patches. the aim of the environmentalism the conservation of these natural patch dynamics.

4.3.3. 3.4.2. The key species in a population

Species are important to the community's survival in a different measure. The key species is his member with a big effect disproportionally compared to the quantity of the matrimony. The community is transformed strongly at the time of his disappearance, they the main characters of the evolutionary play (Jordan 2005).The exploration of the key races would be with fundamental importance for the environmentalism, it turns out subsequently only many times however that the community's collapse was linked to the preliminary extinction of one of his members, it may have been a key race so.

Key species like this a sea otter living on the Pacific coast of the North America for example plays a role. Kelps with a huge stature populate the shallows here, forming real underwater forests.The alga forest means a distinguished habitat to much fish, molluscan and numberless invertebrate species, indeed protects the coast against the erosion of the waves. The algae making use his exploitation and industrial one the alga furthered the extinction of a forest, his decay was observed where there was not exploitation however. It was striking that the disappearance of the alga forest is in a tight context with the drastic decrease of the number of the sea otter.These animals were hunted for for their fur coat, but the fishers eliminated it because he feeds on fish in some places. It turned out finally that the capital food of the otter, which consumes the kelps, is a sea urchin.

The sea urchins' quantity grew drastically with the disappearance of the otter, that the alga forest was grazed off totally almost, destroying the habitat of many other races with this, between them that of much fish.

The sea otter more cute successful one to resettle, the alga forests regenerated nicely on these places. (Primack 1993)

The determining elements of the communities' construction the functional sections, or coalitions. The thread grasses, an other one may form a coalition for example in a lawn association the butterfly ones.

4.4. 3.5 Biodiversity monitoring

The *Convention on Biological Diversity* (1992) prescribes the obligation of monitoring biodiversity in as much habitatas as it is possible: (Article 7. Identification and monitoring). To the fulfilment of the obligations undertaken in the convention the knowledge of the state of the living world and the direction of the changes indispensable, so it is necessary to know the components of the biological diversity, it is necessary to check it they his constant change, i mean there is need for repeated watch.

Biodiversity monitoring is also explicitly included in many policy documents, such as the European Environmental Action plan, the European Biodiversity Strategy, and the 2010 target of halting the loss of biodiversity. Most importantly, the Habitats and Birds Directives legally bind Member States to monitor biodiversity.

In the EuMon project, the focus is limited to the monitoring of two main components of biodiversity: species and habitats. For these main components, various properties may be monitored, e.g., trends in populations, distribution, community composition, habitat quality etc. The observations may be based on the collection of data on presence/absence, counts, mark-recapture data, population composition, phenology and other measures. In order to allow reliable inferences a sound statistical sampling design and appropriate analytical methods should be employed. Such aspects of biodiversity monitoring are covered by the EuMon project. The BioMAT tool provides support for the design and analysis of biodiversity monitoring.

It is necessary to define those processes and factors.

The monitoring reports watch happening to standard methods repeated at regular intervals. The biodiversity monitor tracking the certain peculiarities of selected living beings, matrimonies through long time.

The watch of the natural state adds a basis to the recognition of the behaviours differing from the natural one, his interpretation, and makes the planning of the possible natural conservation interventions. The aim of monitoring may be some kind you are known respected the examination of the expected effect of an environmental change has on living world, than pl. you are his fall of underground water-level the climate change.

We have to distinguish it the biomonitoring and the biodiversity monitoring the concept. The first living beings, uses it concerning the indication characteristics of the living beings certain pollutions, and it is onto the statement of deleterious effects, quasi as a measuring instrument. For example put a net mussel away in the river, the heavy metalswill be accumulated by the mussel and they are defined after certain time. Then it can be detectedfrom the survival of lichens it can deduce the contamination of the air.

The biodiversity

monitoring his case opposite this the aim the living world for himself the survey of the state of his examination, the populations and individuals,and the observation of them.. In consideration of the exceptionally big number of the species and habitats, to monitor everything everywhere is impossible and it is meaningless at the same time.

It is necessary to selectthe reference species, communities, habitats, the biodiversity indicators, that is representative for full biodiversity. The next characteristics have to be at disposal of the ideal indicator species:

- unambiguous taxonomy status
  - well-known life procession characteristics, environmental tolerance
  - well-known answers onto the answers of the environment
  - wide spreading
  - limited mobility
  - little genetic and ecological variability

- specialist
- easily can be found and let him be measurable
- let him display other values

The to be monitored biodiversity indicators' selection with fundamental importance one monitoring in terms of the development of a system.

On an European and international level equally the necessity of biodiversity monitoring is expressed, but there are systems with a working and particularly national level hardly.

4.4.1. 3.5.1. The global biodiversity programs, institutions

• SYSTEMATICS Agenda is the description of the species of The Earth.

• DIVERSITAS (USA, function, origin, decrease)

• WCMC (onto World Conservation Monitoring Cent) (UNEP, programs, databases, maps, publications)

BRIM (a biosphere monitoring Reserves Integral) European programs, in which our homeland bought a part:

• The execution of EU's habitat protection governing principle. In Hungary IBOA program (integrated Botanikai Adatgyűjtés 2000) a character made it in the governing principle onto the exploration of races and habitats and ordering him into a space informatics database.

• CORINE (Coordination of Information about Environment) in Hungary the

CÉT program (CORINE habitat map 2002) his framework based on a satellite photo

Flora and fauna mappings Pl. KEF: Central Europe flora mapping) UTM

a network's usage (zoologists), national atlantes.

• European Environmental Agency the wound one 2010 (Streamlining European 2010)

The national one works since 1997 in Hungary is the National BiodiversityMonitoring System, (NBmR) that the country meant a considerable improvement to his natural state in his concerted survey with a national level. We recognise this system in the additional ones.

It NBmR directing centre defines the national monitor tasks, the monitoring projects. The one prepared for components inside the projects protocols name the objects of the sampling, his place according to the particular monitor aim, his methods, the collected variables and originated the types of data, the sampling and the collected substance is necessary to his processing labour input.

The centre's task the results likewise his compiling with a national level, his storage, the insurance of his access and his use and his regulation.

There is a person the regional one at some national parks let a co-ordinator organize the task of who it is in order to draw it up, and let the respective national park execute the monitor tasks in his function district partly.

They keep the contact with the researchers, schools, volunteers. The work is issued to them, the result is taken over, it is checked, they are helped. The centre's directions make their work on his basis, they meet regularly, experiences are exchanged. The local register of the results and making use of him come true with their organization.

Biodiversity Indicators) in the program the Biodiverzitás a convention generates his indicators, results were not published yet.

4.5. 3.6. The biodiversity index-numbers

The biodiversity indices, the so-called one biodiversity the capital aim of indicators' development, how can be measured the changes of the natural world around us, the sustainability.The development of the indices the

convention being about the biological diversity got its share of an important role (CBD) (UNEP 1992). Currently the next regional one/habitat CBD indices are known (UNEP 2005):

• The area change of single bioms, ecosystems and habitats (forests, forest types separate, moorlands, lawns, aquatic habitats stb.) the ecological processes.

• The connected parts of ecosystems, isolation, fragmentation (possible variables: the patch size distribution of continental habitats (forests and possibly other habitats, living waters).

For EU more regional one/he has a vegetational index:

• It the cover of ecosystems the value of an index CORINE from the 1990 and 2000 data of a surface cover database it is defined (Mika et al 2011),

• The thematic more detailed one with a similar character

The habitats with European significance index it will be based on related data with the habitat protection governing principle though.

• It the connected of ecosystems" index likewise CORINE from the 1990 and 2000 data of a surface cover database it is defined. The flood races value it apart from this yet összfajszámát, and in the forests the holtfa his quantity.

Unique life procession: the description of the individual's life. With the series of the resulting changes qualifiable like increase beat, sex ripening time, energy, health conditions invested in storage, successors' number etc..

Even other indices were recommended to a capital index in 2002, these with bulk data deficiency are reliable in the deficiency of methodology which is not used. The development of the indices is going on longer yet, but it must be mentioned that its objectivity must be increased.

The biodiversity with the use of indices yet few countries a meaning was published, from among these one of the best ones the English (DEFRA 2007). (Miller & Horváth 2008).

5. 4. Substance and energy flow in the ecosystems

A part of the active organisms forces the energy of the Sun into the food chain making use of the mineral of the abiogenic environment, while his other part brings it back into the environment after a demolition, so a continuous energy flow characterize it. (Keveiné 1995).We call it the system because of that, because a lot consist of a factor, their tasks into subsystems can be grouped, the single subsystems indicated each other, and all is typical of a system full function it can be accomplished collectively only (Hortobágy – Simon 1981).

To the eartly life essential energy (E) the Sun insures it this E the plants transform it into chemistry energy during photosynthesis

(from water, CO2 and an organic matter is manufactured from inorganic salts in a complex reaction series with the use of the energy of the Sun, this primary production – primer performance). This produced organic matter his basis in biosphere living person all the others for the survival of a living being (Nánási 1999).

Ecosystems maintain themselves by cycling energy and nutrients obtained from different resources. At the first trophic level , primary producers (plants, algae, and some bacteria) use solar energy to produce organic material through photosynthesis. Herbivores, animals that feed on plants, make up the second trophic level.

Predators that eat herbivores comprise the third trophic level; if larger predators are present, they represent still higher trophic levels. Organisms that feed at several trophic levels (for example, grizzly bears that eat berries and salmon) are classified at the highest of the trophic levels at which they feed. Decomposers, which include bacteria, fungi, molds, worms, and insects, break down wastes and dead organisms and return nutrients to the soil.

On average about 10 percent of net energy production at one trophic level is passed on to the next level. Processes which reduce the energy transferred between trophic levels for example respiration, growth and

reproduction, defecation, and death (organisms that die but are not eaten by consumers). The nutritional quality of material that is consumed also influences how efficiently energy is transferred, because consumers can convert high-quality food sources into new living tissue more efficiently than low-quality food sources.

6. 5. Population interaction types

- Mutualism
- Predation
- Competition
- Parasitism

Mutualism: Both species can have benefits from mutualism. One of the best-known examples of mutualism is the relationship between flowering plants and their pollinators. Pollinators, such as bees, visit flowers gathering nectar and pollen. They

generally need to visit more than one flower to get sufficient quantities of

nectar and consequently transfer pollen from one flower to the next in the

process. The benefit to the bee is that it find food, the benefit to the

flower is cross-fertilization.

Predation: describes interactions that have a positive

influence on one species, and a negative influence on the other species.

This is clearly a positive/negative interaction. The predator is getting food that it requires to survive, but the prey dies in the process. However, this is only one form of predation.

Herbivory and parasitism are also considered to be predation. An

herbivore (plant eater) feeding on a plant is really a predator-prey

relationship.

Competition: Competition occurs when organisms use the same resource(s) at the same

time

Parasitism: A parasite lives in or on its host gleaning the nutrients it needs to survive

from the host’s tissue. Usually a parasite does not kill its host because in

doing so it would lose its home and food supply. Thus, the relationship

between host and parasite is often long-term. Nonetheless, the host may be

weakened and damaged by the interaction. A parasitoid is an insect whose

larvae consume the tissues of its host, killing the host by the time the

parasitoid larvae mature

7. 6. Life strategies, life form types

We may outline life procession strategies based on these, we may delimit strategy groups then and we may formulate rules with plain, more general validity.

the draughting of ecological and evolutionary explanations:

which habitat (in fact niche) which life procession strategy prefers, concerne from an evolutionary viewpoint which life procession strategy appears more successful.

The life procession strategies are plastic:

The life procession the components of strategies

1. Size

- living beings growing continuously - the considerable part of plants

- beings reaching a stable body size - birds, insects

regularities which can be outlined well in the case of certain bigger taxons:

- insects generally small

- ektoterm vertebrates generally smaller, than the endothermic ones (amphibian - mammal)

- the bigger body size has evolutionary advantages generally inside a given taxon: competitive 2. Growing and development

- a given bodyweight available more easily, if:

- the start weight (natal) is bigger

- the increase beat faster

- The velocity of the increase beat may mean an evolutionary benefit: the individual attains the sexually mature, soon one soon multiplies and his successors a low one they may grow up more quickly between more favourable circumstances.enefits, in right avoidable the attack of the predators.

3.Somatic investments

somatic investment: fat reserves, defending itself, reserve nutrients plants was modified in his organs, his vegetative and generative formulae

- reproductive allocation: it increases successors' number,. It may be his disadvantage that he may cut energy from the self-preservation

- it is necessary to optimize it: a somatic investment may yield more successors on a longer distance

4. Reproduction

• The variables which can be used for the measurement of the successfulness of the reproduction:

• successor,

• successors' state,

• recrutive0-+ rate (the proportion of the reproductive successors getting into the population),

• time of sex ripening,

• number of reproduction events,

• successor performance under a lifetime,

• the parent's and your subsequent survival

Raising questions in connection with strategies: successors' number - what more is it any better?

successors' quality - your subsequent high-quality can stay up better and can multiply better

the time of a reproduction - earlier or later?

big strategies of reproduction: szemelparity and iteroparity

The measurement of an allocation of reproduction: the energy put on a living being devotes the part of a proportion to reproduction.

Rough estimate: gonad mass/weight, nest production/weight

In the case of plants: flower size, seed size

- extreme cases: Rafflesia, orchid (Fig. 11.)

Rafflesia Arnoldii is a recorder plant in the size of its flower

(internet resource: http://eol.org/data_objects/17780088)

- at lizards the year energy needs 5-20%-a translates onto the egg laying.

- at birds the daily metabolic rate 29-35%-a may translate onto an egg training

- Eleutherodactylus coqui frog race the male protects the fertilized eggs and under 20% bodyweight decreases (Fig. 12.).

Fig.12.Eleutherodactylus coqui frog species lives, in Hawai Island.

(forrás: http://eol.org/data_objects/26271601)

The effect of the habitats onto the life procession strategies

1. The typification of habitats:

- built upon plainest some kind of plain ecological environmental variables: pl. the system szárazföldi-vizi-földalatti the basis of his character

Southwood (1977) based on space and a time variation:

- constant (in time constant)

- seasonal (the changes cannot be predicted)

- cannot be predicted

- ephemeral (prediktálhatóan favourable period with short time one prediktálható, a long, a2. Based on a space variation:

- continuous (favourable space part extensive)

- patchy (the favourable space parts settle down in patches and the patches they find a job near to each other)

- isolated (the favourable patches are distant from each other)dverse period do not delegate)

r-K strategy of reproduction system

- r-strategy: the establishing of early sex ripening, many successors, szemelparitás, the successors do not come in for parental care, the big part of the recorded energy allocates into the reproduction

- at plants: weeds / animals: the considerable part of insects

- K strategy: delayed reproduction, few successors, iteroparity, the successors come in for parental care, small the effort of reproduction

at plants: several tree races, indigenous forest creator the big part of our tree races. Animals: the considerable part of birds, mammals

May be clear in few cases in fact r- and to face K strategies. Several transitions, even inside a race.

8. 7. Soil science knowledge and his ecological concerns

8.1. 7.1. The soil, as an edaphic factor

The soil, than edafikus factor with a double effect onto the living together of the populations: **On a direct manner**: in the soil the root zone of the plants because of the combination of the soil and the soil solution absorbs the organic compounds.**On an indirect manner**: Natural resource being renewed conditionally. The rest of the natural resources (radiant solar energy, atmosphere, surface and felszínalatti water resources, biological resources) the integrator of his effect,his transformer,his reactor. The soil provides living space for a life activity on a manner such, pistil place for the natural vegetation and cultures cultivated. The primer biomass is the fundamental medium of production, the primer nutrient source of the biosphere.

The soil (and terrestrial ecosystems) worth, natural or human stress ensuing due to an activity the buffer medium of effects.

8.2. 7.2. The physical and chemical characteristics of the soil

8.2.1. 7.2.1. The granule combination (texture) of the soil

The granule combination (soil fabric, structure) expresses it, that in the rock or the soil in a what kind of proportion can be found the granules with a different size.

The primer biomass is the fundamental medium of production, the primer nutrient source of the biosphere. The soil (and terresztrial ecosystems) worth, natural or human stress ensuing due to an activity the buffer medium of effects.

8.3. 7.2. The physical and chemistry characteristics of the soil

8.3.1. 7.2.1. The granule combination of the soil

Fig. 13. The different soil types have different physical type as well

The granule combination (soil fabric, structure) expresses it, that in the rock or the soil in a what kind of proportion can be found the granules with a different size.

A physical type of soil can be defined with the fractions' proportion (these in all cases can be found in the soil, their proportion changes only).

We may divide the granules into two big groups based on their size:

Frame parts: d > 2 mm

Delicate faction: d < 2 mm

The soil granules, (International Soil Associationy Group) delicate faction longer: the Atterberg system

> 2 mm: stone, debris, pebble

2,0 – 0,2 mm: rough sand

0,2 – 0,02 mm: delicate sand

0,02 – 0,002 mm: mud

< 0,002 mm: clay

USDA system

> 2 mm: stone, debris, pebble

2,0 – 1,0 mm: very rough sand

1,0 – 0,5 mm: rough sand

0,5 – 0,1 mm: medium sand

0,1 – 0,05 mm: delicate sand

0,05 – 0,002 mm: mud

< 0,002 mm: clay

7.2.2. Characteristics depending on granule combination:

• porosity

• volume mass

• seeping parameters

• capillary water increase

• water keeping capacity (field water capacity)

• hygroscopic, Arany constraint number (it is a Hungarian characteristic)

• swelling shrinkage

• specific surface / cation exchange capacity

• heat household

• soil training

• with soil decay (with erosion) ability

• his soil mechanics parameter

8.3.2. 7.2.3. Soil minerals

Primary minerals: becoming the rock formed on his row, remained invariably (passed through sedimentary processes possibly) minerals.

Secondary minerals: on a low temperature through processes taking place, directly from sedimentary rocks, you are on the road of crumbling they come into existence.

The minerals of the dust and the sand faction:

Primarily the minerals of the resistant part of the rocks, but the secondary minerals may be in a modicum.

The grouping of silicates:

Si – bandages between O mean a transition between the ionic one and the covalent type.

The structural categorisation of the silicates:

Island silicates: the SiO4 tetrahedrons are surrounded with other atoms or ions, they find a job discretely if they attach with each other, fragmented; they are connected on apices; olivin (MgFe2+)2SiO4

Chain silicates: the tetrahedrons two-two of their peaks into a row a chain is formed being attached;

Chain silicates: the tetrahedrons two-two of their peaks into a row a chain is formed being attached; the formula of the constructor elements: (SiO3)n2- pyroxene and augit groups his minerals

Band silicates: the two chains consisting of the tetrahedrons attach to each other in parallel with; the formula of the building stones: (Si4O11)n6- amfibol-csoport his minerals

Layer silicates: the tetrahedrons are connected to each other along a plane, in the shape of hexagons;

the silicon and oxygen somebody else consisted of elements between the grid planes of tetrahedrons containing plane nets they find a job; in most cases this the being being built plane consists of octahedron

The concept of an isomorphic chemistry substitution:

Mg2+, Fe2+ Al3+

Al3+ Si4+

Exchangeable cations: the negative charge excess is equalize

Changing filling: grid wind AlOH- and SiOH- function groups (S-oh):

Alkaline pH: (Si-O)- k

The clay faction's minerals

The soil derivational suffix came into existence in the course of processes primarily secondary minerals form it.

Fillosilicates (layer silicates)

Amorphous (you are microcrystal) Fe-, Mn-, al -oxihydroxids

FeOOH: α goethit, γ lepidokrokit

MnOOH

Allophane: amorphous aluminium silicates

His combination: amorphous and hydrated al2O3, Fe2O3, SiO2

His surface: 70-300 m2/g

CEC: 10-150 cmolc/kg

Al: Si proportion 1:2

Clay minerals

The clay minerals form the most important group of the mineral part of the soil because the nutrient farming and the water management depend on his quantity and his quality equally.

The basis of the categorisation of the clay minerals belonging to the layer silicates the character of the layers taking a part in their construction and his number, furthermore the electric charge relations. This we may distinguish three groups based on their latter characteristic:

Equalize electrically: first-rate compounds

With negative charge excess providing: the first- and transitions between second-class compounds

Elemental cell with determined negative charge excess providing, that his equalisation happens to inactive cations: second-class compounds

The number of layers building up the lattice-structure inside these groups and his character can be grouped the minerals:

The layer bundles building the mineral consist of two layers: 1:minerals with 1 type

• From three layers, two tetrahedrons and they consist of an octahedron plane: 2:minerals with 1 type

• From four layers, the octahedron fitting between the triple layer bundles they consist of plane: 2:1:minerals with 1 type

There may be a considerable difference between the combination of the single minerals inside a group on the same one, because aluminium, the central atom of the octahedron may substitute the central silicon atom of the tetrahedron there may be three though apart from aluminium- you are divalent iron and magnesium. An alcohol group may occupy the place of the oxygen in the octahedron grid plane, while between the grid planes. structural water may be settled.

Layered minerals: the grid bundles consisting of the layer appear in many cases beside each other, on stirred one in the construction of the lattice-structure.

Layer filling the 2: the fundamental structural characteristic of layer silicates with 1 type, his measure the layer silicates (clay minerals) the basis of his categorisation. It influences it significantly clay minerals (primarily szmektitek) his characteristics,

concerning the cation exchange, adsorption, hydration szolvatation his degree (swelling, kolloidic behaviour).

The swelling of clays: primarily the infiltration of water into layer alley space, TOT Maybe:

1. one between granules (intracrystallic)

Inside 2. construction (interlaminary)

the expansibility depends on the layer alley cation (size, filling), from the greatness of the layer filling: decreases by growing filling because of the origin of the expansibility, the layer filling: tetrahedron swells less, than the octahedron one and because of the structural order of the clay mineral: more ordered swells less (teteraedron-oktaedron-tetraedron) between units (Fig.13.)

Fig 13. TOT (teteraedron-oktaedron-tetraedron) structure

The grouping of layer silicates

Kaolinite (1:1)

In soils frequent. His structural formula: Al2Si2O5 (OH)4. Crystal diameter: 0,2 – 2 □m. Si/al proportion = 1 (there is not an isomorphic substitution)

His cation changer ability the one on the grid edges and the peaks the result of dissociation. H bridges hold the layers together.

Minerals:

halloysit al4 Si4O10 (OH)8

Shimmers (2:1)

Generally soil derivational suffix primer minerals coming from rocks. The formula of his implement hands: Kx Al2 (Si3Al)O10 (OH)2, k the filling compensator cation.

Specific surface: 70-150 m2/g

Small CEC: 10-40 cmolc/kg

Montmorillonit (= szmektite; 2:1)

Little layer filling (0,25-0,6)

Swells easily

Structural formula: Nax (Al2-xMgx) Si4O10 (OH)2; na the filling compensator cation

Frequent the imperfect isomorphic one substitution

makaolinite al2 Si2O5 (OH)4

Specific surface: 6-800 m2/g

CEC: 50-80 cmolc/kg (smaller filling excess)

80-120 cmolc/kg

In meadow soils, szolonec

Vermiculites (2:1)

Shimmers originate from his crumbling primarily

The k generally Mg2+ is in the layer alley space

Specific surface: 6-800 m2/g

Layer filling: 0,6-0,9

Limited swelling

CEC: 150 cmolc/kg (100-200 cmolc/kg

Chlorites (2:1:1)

There is a substitution in the tetrahedron layers

His idealized formula: AlMg2 (OH)6 Mg3 (Si4-xAlx)O10 (OH)2

His element combination strongly variable

His specific surface: 70-150 m2/g

Layer filling: 0,6-0,9

CEC: small, 10-40 cmolc/kg (depends on the distribution of the specific surface)

Water motion in the soil

- the capillary the motion of water – into any directions of the space – from the wet one towards the dry environment,

- gravitational water motion – the infiltration of the water into the soil – two happen in a phase:

water absorption – the pores gradual moistening him and his charging – the motion of the water in the unsaturated soil (aerical in a zone) – three-phase water motion vízdriving – perkoláció - the motion of the water in the saturated soil (szaturációs

in a zone) – two-phase water movement , at this time Darcy law valid.

Factors influencing water motion:

- pore size, -mennyiség, -scattering, constraint,

- the structural characteristics of soil, texture

The organic material which can be found in the soil can be divided into two groups: living and dead organic material. The living material in the soil living per mikro- and makroszervezetek the substance of his body. The dead organic matter for the residues of plants living on the soil on the one hand much or little decayed consists

of his substance, the microbiological dismolition was transformed on his road on the other hand, and formed from a substance.

The disintegration of the humus:

The soil organ substance – his natural circular process:

The fragmantation of vegetal residues (soil animals)

The the bacteria and mushrooms grew on a surface the big molecules plainer compounds it is taken to pieces.

(from carbohydrates monosaccharides, to proteins amino acids)

↓

The makro compounds with a big molecule, from which humic substances originate, form again through micro organisms' activity.

The humic substances the soil being attached with their mineral components organo-minerális complex ones are constituted.

↓

Mineral nutrients which can be put on for the plants through soil micro organisms' activity are freed.

The mechanics chopping the mezo-, makro-, mega fauna makes it (see. next chapter).

Biochemical phase: after the necrosis of the fabric chemistry processes: hydrolysis and oxidation

Enzyme demolition: onto a plain compound (by way of heterotrophic organisations)

The basis of his components the organic matters onto three groups divisible:

Not humic substances:

proteins and amino acids (they turn into free one at the time of the decomposition of proteins with the vegetal and animal origin)

carbohydrates (sugars, starch, hemicellulóz, cellulose, pectine)

lignin (woody plant materials decaying left over because the micro organisms break it down relatively difficultly)

the other substances of the vegetal and animal residues (fats, waxes, chitin)

New formations:

The poliuronidok and the enzymes belong to this group. These micro organisms living in soil are the regulators of his vital functions and his products. The life of microorganisms, they get into the soil after his necrosis then. They may play a considerable role in the circulation of the nutrients (pl. phosphates).

Humic substances:

Fulvoacids: With a relatively little molecule, acid character compounds. It is water soluble. In their reductive and complex forming ability the single elements (primarily the iron and the aluminium) plays an important role. Their formation is mainly acidic, which is more common in biologically less active soils, in which the humic substances can grow up to70 % in extreme cases.

Humic acids: They may be in the soil in a free state or connected to OH -, Ca-, Mg-, Fe-, AL ions. In water their solubility is different. With a big molecule, polymerized compounds, their acidic character is just like in the case of the fulvo acids the carboxyl and because of the phenolic alcohol groups originates. They have big molecule weight close to colloids. Their combination changes in the function of the geographical zone and the soil type; nitrogen is contained always. On the basis of their solubility we distinguish the following compounds:

Himatomelanic acid: Alkaline solution, then after acid precipitation in alcohol soluble. The smallest one considering their molecular weight and their polymerisation degree. As the transitional products of the formation of the humic acids can be caught. In livestock manure and decaying tree a bigger quantity can be found.

Brown humic acid: After the release of the himatomelanic acid the humic acids 5 %-os NaOH are treated and after it the brown humic acid is released so, the grey one is left over though.

The reddish brown alkaline solution oxidizes easily originally and loses his colour by way of this. In brown forest soils, and the bigger one which can be found in the marshy soils forms the bigger proportion of the organic compound concerned this type.

Grey humic acid: He is precipitated in more concentrated lye solutions which can be salted out easily. His alkaline solution more difficultly can be oxidized, than that of the brown humic acid. In a bigger quantity which can be found there generally, where the humic is advanced and the microbiological activity is active. In our soils it can be foundin a bigger proportion in Humin, humic carbon: The substances that the cold, dilute alkaline one are during solution belong here cannot be released from the soil. If we treat the rest organic matter with boiling lye, thenthe releasable part ofit is humin –the other part is humic carbon.

In the soils all the fulvoacids, all though the three humic acids at all times can be found, their proportion compared to each other changes in the soil according to processes taking place and the organic matter serving at the time of the start only.

The fulvoacid, the himatomelanic acid, the brana humic acid, the grey humic acid, the humin and the humic carbon the molecular weight, the polymerisation are growing according to a row and the number of the active roots decreases. This the consequence of latter one, that the acid character of the substances and his solubility decrease in the same manner.

Litter	C/N	manure	C/N	soil	C/N
Leguminosae	11-25	animal	20	Forest	11-44
Cereals	40-120			Meadow	12
Tropial forest moulder	27-32			Cultivated area	9
temporal deciduous hard tree	25-44				

Table 1.

The construction of the humus:

The frame elements may attach to bridge bandage directly: -O- -NH- =N- ≡C-C≡ -S-.

The side chains may be carbohydrate-like ones and peptide-like ones.

Function groups:

With an acid character: carboxyl, karbonil, phenolic oh, alcohol, metoxil

Basic: imino, amino

They may have a very good position: on a frame or a side chain

The bandage forms of nitrogen:

seed – N (it forms heterocyclic rings)

• bridge – N

• nitrogen in function groups (amino group)

Function groups' reactions:

Cation exchange

with an acid character (deprotonált) on function groups

pH pendant

specific surface: 800-900 m2/g

CEC = 150-300 cmolc/kg

H-bridge training the not deprotonated by way of function groups

Savoy cabbage retraining: two and trivalent metal ions lose the water film of a tied ion, an exchangeable form does not take shape

At this time the stability the function of the tied ion and the pH

Hg2+ > Fe3+ > al3+ > Cu2+ > Pb2+ > Fe2+ > Ni2+ > Cd2+ > Mn2+ > Ca2+ > Mg2+

The characteristics of the humus:

specific surface: 800-900 m2/g

Tall waterbinding ability

Vegetation	***Forest***	***Steppe***	***Wet habitat***
Character	***rich levels→*** **balanced microclimate washing water movement**	***1-2 levels of plant→ extreme microclimate*** **balanced water movement**	***water in more quantity than it is needed→ rich vegetation-*** **low temperatue, air deficite**
Micro organisms	*acids, lignin → mycorrhizal decomposition → fulvoacids*	*7 pH + anaerob Ca^{++} → organisms* bacterial → *, kotu* decompos ition→ *humin acids, Ca-humate*	
3. soil fauna		**earthwor ms (!)**	
Consequences:	***strong levels***	„***homogen e" profile*** **-** ↓ ***decreasin***	

	g humus-content: (B)C-level

Table 2.

Raw humus: the vegetal parts well recognisable, the humus insignificant

Decomposed litter: the vegetal residues the frittering the traces of the humic are borne already without. The construction of the vegetal fabrics only partly can be realised.

Mould: the organic matter humifying comes into existence on his ferry while it gets into contact with a mineral part. Generally with a dark colour, crumbling substance, you are neutral mildly usually with sour acidity.

Generally with a dark colour, crumbling substance, you are neutral mildly usually with sour acidity. Sour acid may form in exceptional cases strongly mull in mountain forest soils.

Half terrestrial humus:

Peat: takes shape between wet conditions strongly, usually pools, been associated in the shallows of riverbeds or lakes, which aquatic vegetation overgrew (sedge, bulrush, cane) meadow moor-peat, plane moor-peat.

Moss moorlands: his substance the sphagnum, which settles around sources, waters of imbibition,. His necrosis, provides an opportunity for the humus with a newer moss generation screening him then. #-tartalma: > 30 %

Peat: accumulated between wet conditions strongly #. #-tartalma less, than that of the peat.

Underwater humuses: lakes, shallow gulfs form on his bottom.

Dy: in the oxygen and into living beings in poor waters deposited, mud containing organic matters.

The humus originates from the fluffy precipitation of the organic matters dissolved with the brown colour. The mud layer's colour brownish, drying shrinks strongly meanwhile. In Hungary it can be found in the Hévíz Lake.

Szapropale: arose between extreme anaerobic circumstances, sulphur hydrogen is freed due to the reduction in it. The smell of it is unpleasant, his colour is bluish-grey, coffee.

Gytta: the water contains more oxygen and living integral life can be found in it. The greyish humic level humified from vegetal and animal organisations' residues, and originates from beings living yet.

Humification:

The organic material is getting to the soil fritters. The soil animals make it. It is furthered with the additional transformation, since the plant material is homogenized, and his surface is increased.

Thesecond section of humification is when the micro organisms (bacteria, actinomyces, mushrooms) tranform the complex compounds of the vegetal organic matters into plainer constituents. These will be the building stones of the humic substances then. Like this from the carbohydrates forming monosacharides and the decomposition products of the proteins, the amino acids go through.

From the aromatic, compounds with a closed coal chain plain phenols and kinons are formed. It arose so decomposition products create a substance with a big molecule with a dark colour being attached to each other, which ones afterwards polymerizing and they turn into humic substances condensing. It is necessary to emphasize three essential elements in the chemical reaction: the kinon construction components, the bridge bandages and the active groups.

he role of the active organisms is not negligible in the humus formation! A part of substances formed on the road of the microbiological dismolition again infiltrates the micro organisms' body, then these is freed after his necrosis and engages in the humus formation.

The role of the humus:

The separation of the humuses:

The light-absorption of humus solutions:

Between 200-700 nms homogeneous

his measurement 250 nms (uv), 460 nms (VIS), 660 nms (VIS)

the absorption maximum of the different humic substances different:

E4/E6 > 7 fulvoacids dominate

E4/E6 = 3-5 humic acids dominate

Questions

1. Which ones the most important conditions of the soil formation?

2. We the soil structure? With what kind of examination methods examinable?

3. What is the effect of pH onto the quality of the soil

4. What are the typical characteristics of soil colloids, what is their role in processes?

5. The viewpoints of the systematics of soils.

9. 8. The living world of the soil

Before a word, some thoughts would fall from the living world of the soil, his role and his significance from that direction, what we take, how soil, ground is covered (pedosphere)? What kind of role do the living person organisations play in the process of the soil formation? How can be grouped the soil ecological function and the active organisms appearing in the soil,what kind of role matrimonies play in the shaping of it?

For these questions it the row of his repeated short overview can be understood, since the role of the soil living beings and his significance are big in the concern of all of the earthly biosphere and manifold. The soil pollutions the soil organisations his function, which yields the decrease of the fertility of soils, is harmed, the change of the living world of the soil with an adverse trend by way of this the the biosphere may turn into one of the sources of danger of his survival.

The soil is a three-dimensional body like that and it is a formation on the supreme level of the earth's crust, which the native rock, climate are,, relief (the establishment of a soil surface, relief factors), active organisms, human activity and the time factor arose as the result of his interaction.Firm (sand, dust, clay factions), fluent (soil solution: the soil moisture) and from a gas phase (soil air) standing heterogeneous one, polidisperse system, which possible one the microbial one, the vegetal one, animal one makes it and life in the soil and on its surface (MENGEL, 1982).

From a cultivational viewpoint one of the most considerable features of the quality of the soils the soil fertility, (BOCZ, 1992). The biological and biochemical processes going on in him influence the fertility of the soil fundamentally, i mean the natural factor of the fertility the biological life of the soil (the soil living and medium carrying a life). The soil biology processes, and the environmental factors influence the ecological functions of the soil fundamentally by way of this. The soil is in a dynamic contact with the climate, the vegetation, the bedrock and it may change in accordance with living world, these, may arise (may form), may develop and may decay. The soil the single part of constituents lifeless, you are abiotic, another part of his created by way of active organisms though biotikus factors, which there are in an interaction with each other, form it.

The newest soil biology handbooks the definition of the concept of the soil it is stressed that the soil is a typical open ecological system. Alone takes a living biological one and a lifeless abiotic three-phase one (gas, with a fluent and firm condition) subsystem, which ones they become interwoven tightly. The metabolism roads may be regulated ones and chemistry ones biologically in them (pl. adsorption on the surface of the clay minerals),the processes but difficultly separable, the substance and energy flow constant with the environment. (Szabó, I. M., 1986).

Lifeless or abiotic components: For the volume of the soil some 50-60%-át the firm parts, 40-50%-át the gaseous and fluent phase gets it. The inorganic and firm phase consisting of integral parts primarily nutrient

container, the soil solution meaning the liquid phase the supplier of the nutrients and the fiziko-kémiai, the medium of biological transformations, the gas phase, the gas exchange though primarily it O2 and N2 inflow, and the CO2 his leaving means it.

Active organisms, biotic components: The fertility of the soil beside the content of the mineral, depends on his soil living world, its qualitative and quantitative combination, his activity. The soil the diversity of living world, his activity the szerint shape, that, there are enough organic matters, water and air in the soil and all this stands for a provision on a medium temperature to be stood possibly.

9.1. 8.1. The soil organisations' role in the soil formation

Its own air, his water display the frontier of the soil, the living person and inanimate nature, and his living world yes. The rock husk affects each other in the soil (lithosphere), the water husk (hydrosphere), the atmosphere (atmosphere) and the living world with emphasized significance on the surface of the soil and the community of organisations appearing in the soil in a narrower meaning (….Figure).

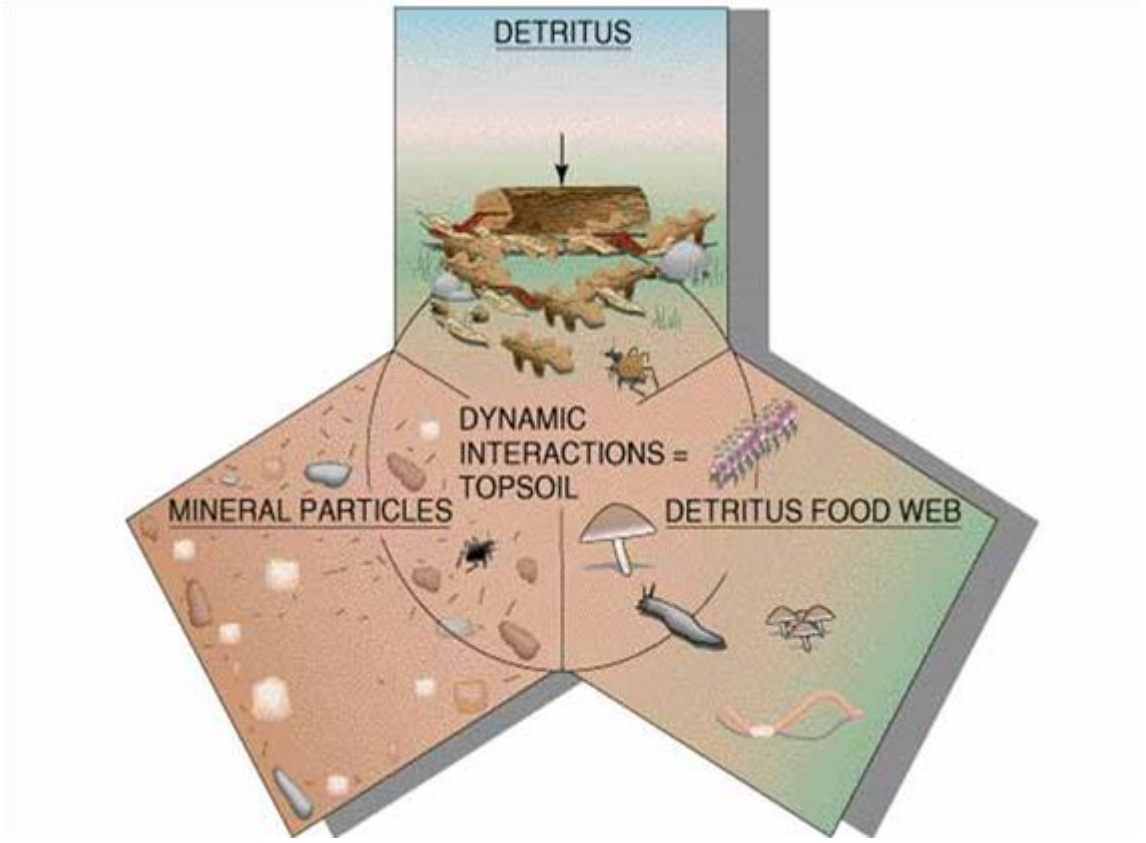

Figure 10. Dynamic interactions the soil creator abiotic and biotikus between components (after Dolores Gende, Environmental Science Chapter, 8)

More million tons of biomass is produced annually on the Earth (in tropical rain forests even 30-40 t/if, in moderate belt forests 4,5–15 t/if, may attain a quantity), and this much get to a demolition. The soil (and leaf mould inhabitant) living beings play a specific role: in the forming of the soils; in the demolition of the organic matters; the biogeochemical-cycles his undisturbed function.

In the process of the demolition part customer, it subsided organisations utilizing organic matters destruents (destruere = to destroy) reducents (reducere = to drive back or destruere=decompose) enter event. The considerable part of these organisations takes a part in the creation of the edaphon.

The soil (and the leaf mould layer) the integral waste would cover the Earth inside years in the deficiency of his activity for his living world, and the biogeochemical cycles (the substance and energy flow) gátoltsága the plants with taller order, the loss of organic compound they would be destroyed.

The organic matters would not get mixed up with the mineral elements of the soil without the activity of the living world of the soil, and these only the washing they could manage to get on his ferry onto the deeper levels. The process of the soil formation and soil decay does not take place under an identical time interval down. To the formation of 2-3 cm soil layers under a deciduous forest kb.1.000 a year is needed, while his erosion, if vegetation does not protect it, 1-2 weeks, but merely even some clocks enough.The transformation of the organic residues getting into the soil the result of complicated destructive and constructive or synthetising microbial processes, and the biochemical reactions being attached to these the mineralizáció and the humifikáció his consequence.

Mineralisation: The organic matters which can be taken to pieces easily mineralize between optimal conditions.The heterotrophic microflora uses the organic compounds as a power source. Pulls down a part of the organic compounds totally, somebody else modifies his part in a lesser or greater measure though. Was ventilated well in soil mineralisation his row available makro- and mikroelements, while among oxygen-free circumstances different amins, plain integral acids, toxic gases may form.

Humification, humus formation. The totality of synthetising reactions. His result the difficultly decomposable humifying organic matters (vegetal and animal residues, decomposition products) his considerable part polymerizing - and nitrogen content being connected to substances - relatively stable new compounds with a darkness colour with a big molecule, they turn into humic substances (biological crumbling). During humification microorganisms buying a part - and living beings living in other soil - the single part of the decomposition products onto new one their body it is built up, it is changed and it is brought back into the inorganic roundabout (the soil derivational suffix living beings turn into a soil creator temporarily). The biological factors of the soil formation are in an interaction with each other at all times. To certain vegetation (and by way of this a particular one plants to an association made by) particular microflora and an animal grouping adapting to this join. In as much because of a some kind of exterior effect - that there may be a natural or effect caused by a man even - the natural vegetation changes,the combination of the living world of the soil changes in parallel with with him, the intensity of processes taking place changes in the soil as a result of this, and the ecological characteristics of the soil change through this.

We may think of deforestations or different agricultural engineering interventions, the effects of soil pollutions here, siccating, talajsouring, soil construction onto decay and onto all processes that reduce the fertility of the soil, spoils his quality, limits his function ability (summed up onto soil degradation).

The ecological functions of soils

Council Of Europe 1995. yearly one the basis of his recommendations the ecological functions of the soil and his functions being connected with the human activity the successor we may summarize it.

The ecological functions of the soil

• Biomass production/the fundamental medium of growing.

• The basis of the existence of the continental living world and the man. functions . Council Of Europe 1995. yearly one the basis of his recommendations the ecological functions of the soil and his functions being connected with the human activity the successor we may summarize it.

The ecological functions of the soil

• Biomass production/the fundamental medium of growing.

• The basis of the existence of the continental living world and the man.

• Storing, puffering (dimmer), filter and transformative system. The heat, the water and the vegetal nutrients storing. Prevents it, you are significantly reduces the diffusion of the pollutants since he is able to bind it until a certain border and to transform the pollutants.

• The habitat of the diverse individual of the living world and his population, like this the biological diversity, or biodiverzitás his element which cannot be missed for his maintenance.

The most important functions of the soil being connected with a human activity:

• Physical medium function (building plot, industrial, social establishments, traffic roads, stb. serves as his place),

• Raw material source (peat, river gravel, sand, water, the locality of oil, minerals, other raw materials),

• Archival function (carries archaeology and palaeontology informations, so than historical geology or cultural history object serves).

Than it emerged from the above ones, the living world of the soil plays an important role for the ecological functions of the soil - and in one in the maintenance of the biosphere -, than the biomass the medium of production and growing. Not only some, than the most important moulder of the process of soil formation, his humus content, his fertility and forming, but some, than the biological diversity (biodiverzitás) his element which cannot be missed for his maintenance.

The soil, so not his function is at disposal of the fertility only. The primer nutrient source of the water, the depository of heat, energy and the vegetal nutrients, the living world, the nature filter and detoxicating the gene reservoir of his system, the biosphere and the biodiverzitás his maintainer. The ecological functions of the soil finite, his renewable ability though circumscribed. Primarily the ecological functions vulnerable, they require protection because of this just.

10. 9. Life in the soil, the soil as a habitat, the living world of the soil (edaphon)

Life in the soil, the soil as a habitat. The soil is concentrated in the 20-30 cm layer of a top the living world (humic surface soil), that 1% of the soil from the content of a full organic matter. The smaller crumbs that are attached to the activity of the soil fauna form the final part of the soil in the humic surface soil, since they are formed from the excrement of the soil fauna aggregates (the soil the contact of a construction and the soil fauna).The soil is the source of the life and his cemetery on areas covered with vegetation. The life of single races is beginning here, they grow here, their life is lived here his full content you are for it a part of his, and the life cycle of some continental races ends here, their organic matters bThe soil organisations the row of their vital functions important forming for the construction of the soil, with their services relax the soil, that of a breeze is repaired, the process of the biological crumbling is helped in in the course of their nourishment, was destroyed the nutrient content of the soil, his fertility are increased by their organic matters.

The soil, than a physical medium defines the construction of the organisations living here and his vital processesreaking down they enter here again it into the perpetual circulation of a substance.

The majority of the animals living here relatively small-sized, their feature the a long body construction, which is beneficial because of that, stretched, you are simply because they move in the cavities of the soil pores on the one hand the soil is ploughed through, while services are bored in him with their limbs,

The soil life is going on in the root zone, the humic layer of the soil significantly, like this its depth, the quality of the humus influences the soil biology processes fundamentally, defines it.Beside these the depth of the soil (to his level), his physical construction, the pH value of his air content stb. too for exceptionally important organisations living in the soil. According to the level of the soil, the soil his big part, settles in a soil layer defined only, pl. the bibio (Bibionidae) larvae are found in the upper humic layer.

The humus content of the soil exceptionally important it avarsplitting (detrivor) organisations úgróvillások, with a pan abdomen (Collembola, Diplura stb.) for him, because of this in a bigger part they the inhabitants of the humic surface soil.

The living world of the soil (edaphon). In the soil living person növényi- and animal organisations for an edaphon (edafos=talaj) enter sporting event (FRANC, 1913).

Takes the soil generality in himself - than habitat - all of the members of a populating matrimony. The soil the medium of the activity of the edaphon, his scene and in one his result, his product. The makro-and microscopic living beings, which play a deciding role in the mixing of the soil constituents, the transformation of the organic matters,, their destruction (than posztmortal substances) the organic matter of the soil is enriched.

The living world of the soil and the leaf mould layer implies common elements and in the soil, demolition processes going on concerned in the leaf mould happen on a similar manner. In the additional ones, it is necessary to take this into consideration always when we talk about the soil organisations the leaf mould and the living world of the soil the destructive processes his concern together to be treated. Living beings leading a diverse, hidden lifestyle populate the two habitats.he living world of the soils diversely can be grouped. Can be grouped the soil organisations their life cycle, their motion, their different size, their different nutritional manner, the interspecifikus between them contacts, their single functional groups (The living spaces of the single soil races because of the abiotic factors, the distribution of the food and the lairs függően changes, the members of the edaphon making vertical motion in the different depths of the soil (and in ground levels differing in one) they may find a job.

The soil organisations' grouping according to a life cycle. His whole life cycle binds a part of the organisations forming the edaphon to the surface of the soil or his deeper layers, somebody else which cannot be missed in the course of their ontogeny for their part the soil with a suitable quality.eir role played in the destructive processes) stb. taken into consideration too.Constant (permanent) soil pl. the jumper fork ones (Collembola), periodic soil inhabitants pl. the galacsinhajtó beetles (Ateuchus the races of genus), partial soil inhabitants pl. the skipjack (Elateridae), transitional soil inhabitants pl. the big nyárlevelész (Melasoma populi).

The soil organisations' grouping their motion:to soil bound (on the surface of soil particles or in the cavities between them living persons), in the water spaces of soil floating in soil (swimming organisations), climbing (the soil granules in alley spaces, in cavities active organisms) and spade (in the soil services maker) the literature separates living beings.

The soil organisations' grouping their size: The basis of their body size between the soil organisations mikrofauna (protozoa, rotifers), mezofauna (heartworms, mites, jumper fork), makrofauna (beetles, insect larvae,ászkák, spiders) and mega fauna (earthworms, snails, vertebrates), concerned microflora (bacteria, algae, mushrooms) can be distinguished (Table…).

Table…. The average individual number of the more important groups of the organisations living in the soil (N) and his weight (M) on a square metre (Dunger, 1984).(Az data concern moderate belt meadow soil, until 10 cm of depth.)

Taxa/ group	**AverageNo. of individuals** **N** **db/m ^{2}**	**Weight(average weight of body)** **M** **g/m ^{2}**	**Taxa/Group**	**Average No. of individuals** **N** **db/m ^{2}**	**Weight(average weight of body)** **M** **g/m ^{2}**
Mikroflora			**Makrofauna**		
Bacteria	10^{14}	100	Annelidae	3 10^4	5
Myxomycota	10^{13}	100	Earthworms	10^2	30
Fungi	10^{11}	100	Insect larvae	1500	1
Algae	10^8	20	Diptera larvae	100	1
Mikrofauna			Coleoptera larvae	100	1,5
Euglenophyta	10^8	5	Myriapoda	30	0,4
Amoeba	10^7	5	Diplopoda	100	4

Taxa/ group	**AverageNo. of individuals** **N** **db/m ^{2}**	**Weight(average weight of body)** **M** **g/m ^{2}**	**Taxa/Group**	**Average No. of individuals** **N** **db/m ^{2}**	**Weight(average weight of body)** **M** **g/m ^{2}**
Ciliophora	10^6	5		30	0,4
Mesofauna			Spiders	50	0,2
Nematoda	10^6	5	**Megafauna**		
Mites	710^4	0,6	Vertebrata	0,01	0,1
Collembola	510^4	1,5			

Considering the distribution of the living world of the soil largest mass the bacteria (50%) and actinomyces amount to it (25%), considerable the share of the mushrooms (14%). The soil fauna forms mass for considerable one, the mikrofauna (3,5%), the mezofauna (2,5%), the makrofauna (2,5%) and the mega fauna (14%) and its share in the creation of the soil is considerable.

Onto the richness of the edaphon indicates that their total weight may attain the 2,5 kgs in 1 m3 of soil layer with 10 cm thicknesses, what is the fresh one for the weight of soil 1–2%-a.

The process of the demolition is linked to the soil life tightly, it the demolition of organic matters subsided in continental environment the edaphon, is going on in the soil by way of the soil flora and the activity of soil fauna.The combination of the edaphon, his racial distribution, his mass (biomass) the climatic relations (climatic zonation), the pistil place conditions (soil type), and the plant communities occurring on the given habitat (biocenosis) too it is influenced. The demolition of the dead organic matters in a multi-phase, order being founded on each other (through complicated food networks) is going on.

In the demolition compassionate edaphon groups presuppose each other's presence mutually. This statement right then, if differences turning up in their proportions we leave it out of consideration, i mean, that on the tropes the mega fauna, the temporal mezofauna has bigger significance in the process of the demolition on the area of forests. The demolition of the organic matters one of his important conditions for the formation of the soil.

Considering the combination of the animal organisations living in the soil most typical the egedafilum living on the surface of the soil or in the leaf mould races. The insects moving on the soil surface and in the foliage (epigaio and atmobius races) in the single section of their ontogeny cycle – you are in their overwintering phase – they are attached to the soil only (and to the leaf mould layer). The real one with a hidden lifestyle soil (euedafikus) lifestyles, their full life cycle binds it to the soil.

They are on a sign furthermore in the soil and the leaf mould: the herbivorous one (phytophags) races, the edafikus consuming the soil races predators, it avarsplitting (szaprophag) races. Can be found here yet with the root nourishing (rhizofág) races, it subsided with the body of animals nourishing (necrophag) species and the excrement eater (koprophag) species.

The leaf mould layer's and the soil's living world the claims similar ecological condition systems much or little (in the concern of humidity, a temperature, light). The biogeokémiai the basis of their role played in cycles though, is made up of organisations with a similar function. In the leaf mould (litter) living individuals the desiccation to be avoided they withdraw into the soil, the soil from before the increase of the water content of the soil a refuge is being looked for in the leaf mould.The listed, the fauna of litter and the soil's fauna implies many common elements, we negotiate about their living world together because of this.

Fig. 11. The soil living beings living on the surface of the soil and in the litter (after Dolores Gende, Environmental Science Chapter, 8)

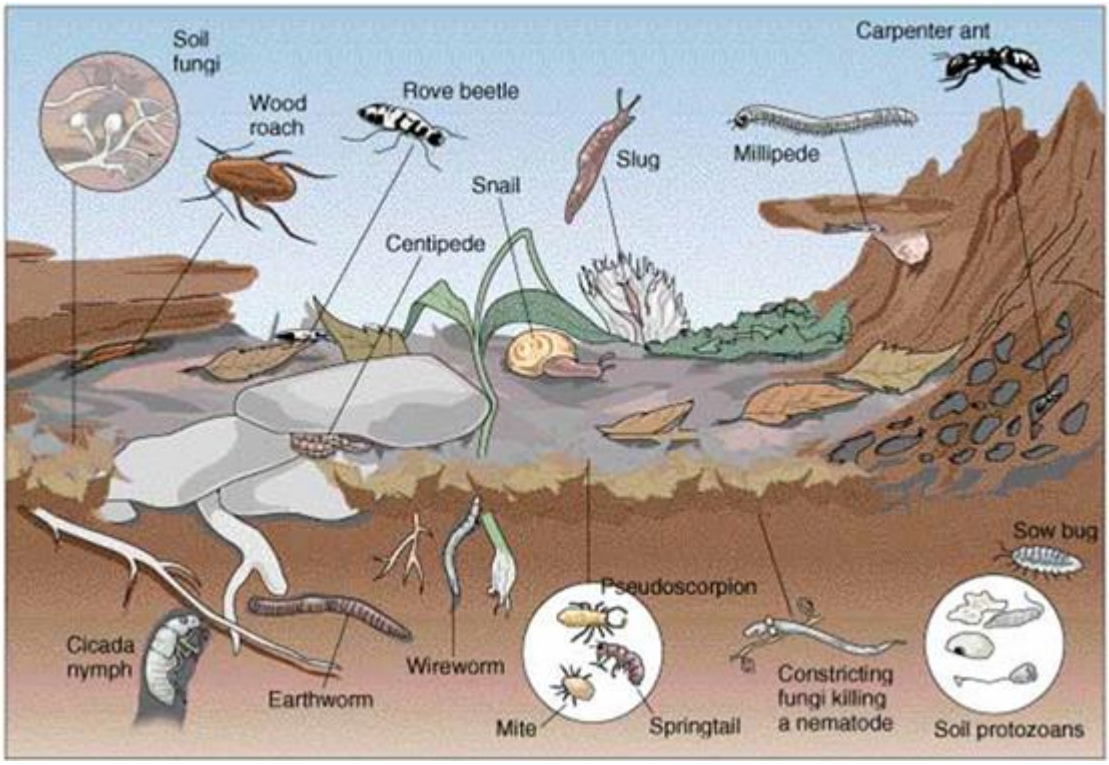

Fig. 14. The animals of edaphon

In the additional ones the role of the soil animals played in single communities, we review it giving the other living beings of the soil to the contact of truth.

11. 10. Soil biodiversity, for the living matter of the soil (biotic factors=edafon) component)

The soil organisations' most important function the demolition of the organic matter and his transformation, and the inorganic substances which can be put on for the plants forming.They contribute to the transformation of the inorganic substances furthermore (pl. nitrogen bandage), to mobilize the nutrients, to the mixing of the soil particles, and to the construction formation (Lájer, K. 1996).

In the layer of the European soils with a thickness of 30 cm on 1 M2 averagely 1 billion bacteria, 0,5 a billion whip protozoa, 1 billion mushrooms,1 million algae, 1 million heartworms, 100 beetles, 80 earthworms and 50 spiders live.The total weight of active organisms is equal to the mass of the natural biomass living on the surface in the soil cca. (with the gross weight of the living beings). This in the case of soil with a good fertility hectare may be over the 20 tons (according to literary data).

Microflora. The microflora (and the mikrofauna) we negotiate about his elements tangentially only here, we allude to their role played in the demolition merely.

Bacteria (*Bacteria*). They can be found on all habitats in some soil types of Earth . A gram of soil contains cca. 40 million bacterium cells. The frequent bacteria of the soil are Pseudomonas, Arthrobacter, Clostridium, Achromobacter, Bacillus, Micrococcus, Flavobacterium stb. families' members (White, 1953). Their distribution in the soil not balanced, because it is an average value near the rootlets multiple may be found. The bacteria and their destructive activity are the indispensable elements of cycles.

Most bacteria with heterotrophic nourishment, is a lot saprophytic which demolish the organic matter with their enzymes, in an anaerobic medium leaven. *Pseudomonas* a family's members take a substance with a very diverse vegetal and animal origin to pieces and together with *Corynebacteria* for the bacterium population of the rhysosphere 80-90% they get it. Clostridium races cellulose, starch, a pectine or proteins are fermented.Onto nitrogen bandage the certain representatives of the cyanobacteria (*Anabaena, Nostoc)* too capable. Similarly to the plants and algae the soil supreme they are restricted to some mm layers of his. The additional nitrogen knitter from among bacteria *Azotobacter* an edge, *Rhizobium* forms s*Actinomyces (Actinobacteria).* they appear in rich soils in a bigger quantity in humus. The full bacterium population 1-10% it is amounted to, the largest one individual density is attained in 5-10 cm of soil depth. The *Actinomycetes* (e.g. Actinomyces, Nocardia, Streptomyces, Micromonospora stb) their significance filled in his soil life primarily the vegetal and animal proteins with a big molecule.

Fungi. The mushrooms with heterotrophic nourishment, their coal need from organic matters, their energy needs are met the cost of from chemistry substances though. In the soil the szaprofita mushrooms break it down the integral one, primarily plant materials, which big The direct profit of the plants with taller order is from the mushrooms beside this, many mushrooms live with the roots, primarily in symbiosis with the woody plants.

Trichophyton and Microsporium families' races szarusplitting. Peziza, Nectria and Chaetomium a characteristic goblet or spherical one forms sporophores subsided on branches, and takes cellulose to pieces primarily. Sordaria feeds on the excrement of soil animals (koprofil). Tuber and Pezizella with certain plant species forms mikorrhizát.molecules of his the mushrooms fritter and it is prepared for the bacteria, which are responsible for the full demolition of organic matters.

Basidium mushrooms (Basidiomycota) representative takes a part in the leaf mould's and the tree's demolition, they are between them cellulózsplitting (mushrooms causing brown dry-rot) and ligninsplitting (mushrooms causing white dry-rot). We find it between the basidium mushrooms the ektomikorrhiza-gombák his most important representatives, for example: *Psilotus, Boletus, Lactarius.*

Algae or Chlorophyceae. The algae, Chlorophyceae and that soil life with taller order pioneering. The first plants, which settle on the raw frame soils,. The algae live on the surface of the soil and the supreme one in some mm layers of stones, leaf mould, bark or excrement adhere to his surface. Most soil algae the representative of *Chlorohyceae,* e.g. Chlamydomonas, Chlorella, Pleurococcus, Ulothrix, Zygnema groups.

In 1 g of soil 1000-10000 alga individuals can be found.

Protozoa (protozoa). The protozoa the soil, was spent in water in his pores, and they live in the thin water membrane surrounding the soil granules and roots. Tall humus content and constant moistness favourable for them, sensitive onto the pH changes. They have 104-106 copies on a sign in 1 g of soil.

Whip, pseudopod protozoa (Sarcomastigophora). The whip ones *(Mastigophora*) his number representative feeds on bacteria. The ones with root foot *(Rhizopoda)* the tall soils with an integral substance content are preferred. The bare amebae *(Gymnamoebina)* pl. *Amoeba*, Naegleria races between the inhabitants of the upper soil layers owe, they feed on bacteria. The crusty amebae (*Testacolobosia*) e.g. *Euglypha, Trinema* in acid soils frequent, bacteria, algae, mushrooms and plant materials are taken. *Cilium protozoa (Ciliophora*) for example. *Colpidium, Chilodon* prefer the chalky soils. Their racial combination depends on the soil moisture strongly since all of their races cannot constitute a cyst. *Bacteria* form their food base.

Mikrofauna. From among the soil multicellular animal organisations the mikrofaunába owing rotifers (*Rotatoria*) and the bear animalcule (*Tardigrada*) too play a role in the soil formation.*Tardigrada* species buy the lichens settling on the forming soils, mosses firstly their possession (ún. pioneer colonising), then a part of theirs it took shape under them withdraws into a soil layer down.

Mezo-, makro- and mega fauna

The fauna living in the leaf mould and soil covers more taxons, which are different depending on their function is fulfilled in the soil life.

Heartworms (Nematoda). Their races living freely into the soil they may creep in into more metre depths. It here soil worms to be enumerated (Rhabditidea) quasi indispensable in the demolition of the organic matters. Their multitudinous presence feature, that the soil some 600 million copies were reckoned up until 15 cm depths from them.Many of their races parasite, but the freely living owing their soil races his food diverse, the detrituszevők, with mushrooms nourishing, animal predators taking protozoa and bacteria equally known between them. The heartworms mites, jumping fork ones serve as plunder beside this, indeed for single mushrooms (huroksowing mushrooms). If the soil dries up you are the pH 3–4 sinks under it, then calmness, anabionta they get into a state (Dunger, 1984).

Earthworms (Annelida). worms which can be enumerated (*Lumbricidae*) mould worms (Enchytraidae) into the soil they live in hollowed services. Their races living in the soil prepare their services horizontally or vertically. They feed on microorganisms mainly, but vegetal residues, mushroom threads and the mineral soil mix are taken.Known it is, that the earthworms mainly in the evening classes a big amount of leaf mould, a rich letter substance is picked up from the surface of the soil in particularly nitrogen, and it is transported into the deeper soil layers. The worm living in the leaf mould level from races known, that the excrement of the jumping fork ones, mites and the different mushrooms are preferred.

The significance of the earthworms filled in a soil life is known for a long time.The earthworms soil eaters (geophytonok), the physical peculiarities of the soils play an important role in his correction. Their excrement the soil increases the content of an organic matter, their services - worm pipes lined with excrement practically (biopores) - the soil improves on his trace air and they play a role in the mixing of the surface soil and the subsoil through his water management, their continuous activity.Darwin examined the significance of the earthworms filled in a soil life already, his last book, The Formation of Vegetable Mould through the Action of Worms, with Observation on their Habits, is about the behaviour of the worms and their role played in the soil.The earthworms respond to the dryness and the water content of the soil very sensitively. From before the dryness they defence from it with vertical motion, bury themselves into the deeper soil layers. From before the increase of the water content of the soil they withdraw onto the surface of the soil. The temperature optimum of their Central European species is around 10 °C generally. the 25 °C-os warmth most species do not survive it even beside favourable moistness relations though, their activity decreases at 0 °C .

Artrophod (Arthropoda). From among the artrophod the mites (Acari),ászkák (Isopoda), the twin coupon ones Diplopoda, Collembola forests appear in my big mouth in leaf mould and the soil. Some people play a most considerable role in the leaf mould's demolition. The integral vegetal residues are chopped up, that crossing their human gut (digested partly), than excrement gets back onto the soil.

Mites (Acari). The single part of the mites predator (*Gamasina* predator mites), but quasi 70%- of them is herbivorous or integral debris consumer (Oribatei- tank mites). From among them the makrofitophag species feed on the leaf mould's scraps, the micropytophags a mushroom web is grazed, they help lose weight concerning bacteria or algae, the necrophags settle on animal corpses, the coprophags excrement is utilized

though.The predatory mites take heartworms, jumping fork ones. The long-legged tank mites (Belba spp.), the fowl tank mites (Galumna spp.) and the armoured mite (Oribatei) species integral debris they help lose weight.

Collembola. These small-sized organisations on all of the world's landscapes and they may be on a sign on some habitats of his quasi.Their species taking a part in the creation of the edaphon may appear in the leaf mould equally and on the surface of the soil (euedafikus races) you are in the layers of the soil with a different depth (epedafikus races). Leaf mould inhabitant from among jumping fork ones Isotomia, Isotomiella, Onychiurus and Pseudachorutes being formed for the quantity of races may influence the fertility of the soil on a considerable measure. The mentioned races it subsided mushroom threads, spores are taken beside vegetal parts.The temperature tolerance of the jumping fork ones changes between wide borders. Known positively in winter their active representatives, but the majority's temperature optimum 5–15 between °C yes. The higrofil, mezofil adapted to different soil moisture and xerofil races occur among them equally. Xerofil *Collembolas*, they live in the leaf mould and on the soil surface exclusively quasi, the mezofil and higrofil races the most important one and between frequentest soil inhabitants owe.So many jumper fork races live some two times in forest soils, than in meadow soils.

The mites and the Collembola species support his significance, that according to literary data m3 the forests manufacture some 180 g of humus avarjából, we may call them the catalysts of the soil formation and the soil life rightfully so.

Isopods (Isopoda). The tall humidity claimant his brisk barrel stand (Ligidium hypnorum), his marbly barrel stand (Trachaeoniscus rathkei) you are his sphere barrel stand (Armadillidium vulgare) for him the forests damp his soil, the wet sylvan leaf mould insure favourable essential conditions. Hiding under the stones or in leaf mould in daytime can be found, his bulk in a night period feed.

Their food predominant part consists of soft, succulent plant materials. most many of their races like it on one expressed on the other hand the decaying one, disintegrating leaf mould like this it mechanics frittering (a part is taken in chopping up leaf mould and tree waste) the process of the disintegration is furthered, the humus formation.

Centipedes (Chilopoda). The centipedes in leaf mould, the upper soil layer, and they live in decaying tree, but they can be found under bark and stones.

With a predatory lifestyle. the centipede ones (Lithobiidae) different arthropedal plunder animals are preferred. Best-known between them under the leaf mould and stones hiding the vulgar centipede (Lithobius forficatus). You are it in leaf mould whining ones disappearing like a shot appearing during digging (Geophilidae) smaller earthworms and mould worms are taken primarily,

Diplopoda. From among these animals mainly the surface of the soil cover they appear in leaf mould the gömbsoklábúak (Glomeridae) and the iron grubs (Julidae). In the mould of Wetter forests his inhabitant the yellow-legged twin coupon (Strongylosoma stigmatosum). The races of the gömbsoklábúak consume decaying plants, foliage rotting primarily, but their single races they eat the soil together with the food.The iron grubs with sylvan leaf mould, decaying tree and grasses, they feed on the mushroom threads on these, bacteria concerned. Their soil biology significance is not negligible in the leaf mould's demolition. The twin coupon ones are frequent in particularly chalky soils.

Insects improving in soil larvae. In the leaf mould, in the soil, on the land lying parched and under the bark of decaying trees, trees korhadékában, we may meet insect larvae often on the surface of plants living under stones, in the ground level, the many times with the larvae of beetles (4. figure). The soil inhabitants to be stood in the concern of the beetles primarily the ground-beetles (Carabidae) and the Staphylinus caesareuses (Staphylinidea), which larvae of his, his imagos lead a predatory lifestyle mostly in the leaf mould and on the soil surface concerned.Other beetles stay in a larva phase in the soil only, and they may be herbivorous (pl. maybeetle grub, skipjack larvae = wireworms), you are szaprofágok, that a part is taken in chopping up the dead organic matter.

The more typical beetle larva types the successors.

• Campodeiform larvae: with long foot, with fast motion, their mouth organ standing, on the end of their body filiform rump affix, they improve in soil generally (pl. ground-beetles, Staphylinus caesareuses)

Euriciform larvae: their foot short, their body cylindrical, worm-like, their mouth organ downward, there is not a rump affix, they are walking around on plants often and they hang on (ladybirds, letter beetles.)

• Scarabeiform larvae (grubs): their feet came undone weakly, their chunk body in a C shape, a rump affix is missing, they appear in soil or decaying plant materials (maybeetle, dung curd cheeses, stag-beetles).

• Cucujiform larvae: their feet short, their body skulked, mouth organ standing, they have the rump affix, that with a diverse shape (sheet beetles, crimson beetles).

• Apod larvae: their feet, their eyes, their rump affix strongly reduced (or they may be missing) their body cylindrical, they live in vegetal fabrics (pl. Capricorn beetles, weevils).

The puppet of the beetles free puppet (pupa libera), their body appendices do not adhere to the body in the puppet, but they are doing freely. This yields the result that the body construction of the imago is recognisable much or little on the puppet already. Rarely mummy puppet (pupa obtecta) too may be found for example. in the case of ladybirds. His contour looks like the body appendices only at the mummy puppet the puppet masking.

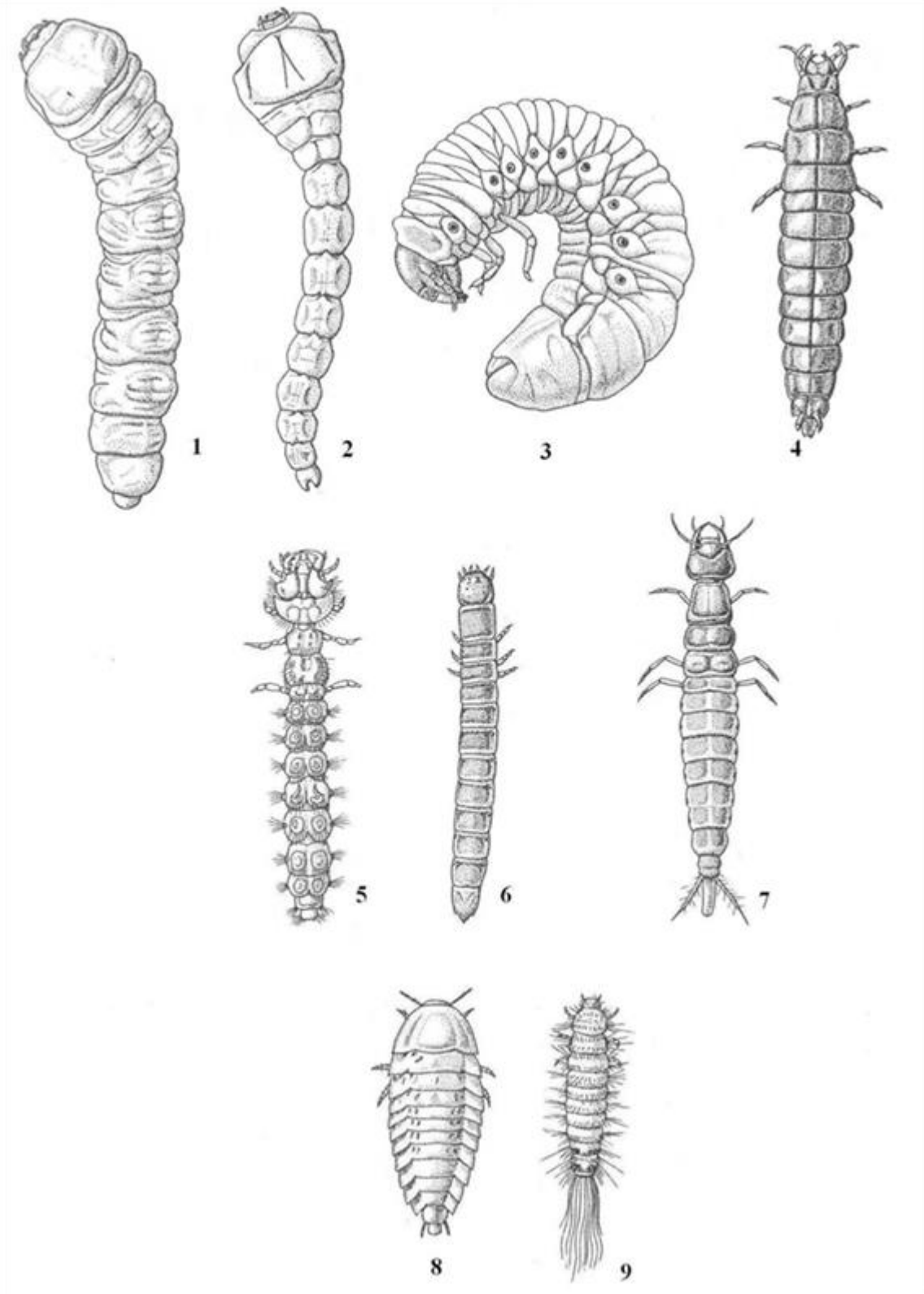

Fig. 15.. Coleoptera larvae

1. *Cerambyx cerdo* 2*Calcophora mariana*. 3. *Oryctes nasicornis*, 4. *Carabus sp* 5.*Cicindela sp* 6.*Silpha obscura* 7.*Agriotes sp* 8.*Staphylinus sp* 9.*Trogoderma sp*

The significance of soil biodiversity

The soil puts on a double function in our earthly environment in. Independent natural formation, which the countryman is, spheres – in the multitude of physical, chemistry and biological processes expressing itself- the result of his interactions, his scene concerned his mediator. Natural resource, which the solar energy, the atmosphere are, the topographic features the water resources under the surface one and the surface, transformed concerning the effects of the biological resourceprovides and the most important natural factor of the earthly biomass provides pistil place for the plants, so. (BARATI, S. 2002)

The soil, the protection of which, his logical treatment are fundamental human interests, is a natural resource being renewed continuously. We do what we make with the soil with ourselves. The soil-plant-manfate is related; the deficiencies of the plant growing on soil animals takine it and men are reflected on his health (cooper, 1992,1995). „The nation that destroys his soil destroys himself". (Franklin D. Roosevelt1920's) „If our soils erode for us we have to go. Unless we do not find the ways and means of him how we may live on the raw rock". (Arthur Neville Chamberlain British conservative politician, 1950's).

The protection of the soil onto more areas extending can be realised, but indirectly or directly, utilizing the soil as a renewable resource the soil living world biodiverzitásának his conservation and undisturbed müködésével insurable, on a longer distance which can be maintained. The soil is a biological formation. The conservation of the soil biodiversity his pawn for the formation of the soil, and for the shaping of a soil construction, the soil for the establishment of a fertility, the deteriorated (degraded) and contaminated soil bioremediation.The bioremediation the contaminated soil, (underground water, surface water, you are surface víziüledék) the reduction of his environmental risk with biological methods. The bioremediation technology that is living cells or an organization, possibly the one of his products (pl. enzyme) bioaccumulation biological stabilizing capacity places into the centre of the technology.

Fig.16. Animal wholes in the loess wall of Tokaj Hill. (Photo : Pénzes-Kónya, E.)

12. 11. Soil types, soil categorisation

12.1. 11. 1. International soil classification systems

One of the fundamental characteristics of the soil, that it is a 4 dimensional continuum. It is typical of the soils that three are the spaces in his direction, and patterns differing in time are formed. The genetic relationships are essential beside the three dimension soil morphology features.

Systems used internationally:

USDA (USA)

consistent, unambiguous, implies it the soils unambiguous, his definition necessary all governing principle, all soil can be assigned. His disadvantage it, that because of the methodology taking the many viewpoints into consideration slightly complicated. „Keys to Soil Taxonomy, ninth edition 2003.quotr (United States Department of Agriculture)

6 hierarchical levels:

• order - order

• suborder - suborder

• great group - staff

• subgroup - subgroup

• family - family

• beer – series

WRB (FAO) World Reference Base for Soil Resources

USDA system (8th edition-) taking over more of his elements, it becomes increasingly more similar, but not so strongly hierarchical, traditional names 3 levels preserve it distinguishes: grange soil groups (28) soil units (153)soil subunits

All of the soil types are suitable for his definition

The soil types can be read here

Integral surface soil (epipedon, topsoil) levels:

Surface soil:

integral ground levels: „H”, L, „O”,

mineral A

antropogene wearing Y

Subsoil:

Washing E,

accumulation B

transitional AC, AG, BC

Soil derivational suffix rock:

cool, bedrock crumbled C

bedrock under a constant water effect G

hard, a rock did not crumble R

because of the soil formation not affected, different chemical bedrock substrate

WRB diagnostic soil levels

Histic (H) level: 20-40 cm thick,

integral ground level, his volume mass < 1tonna/m3, organic matter>20%, under a constant water effect, peat, peat

L level: not decayed organic matterlevel

(foliage leaf mould)

O level: an organic matter was decaying half level

National systems: Russian,

• **German,**

• **French,**

• **Canadian,**

• **British,**

• **Australian,**

• **Hungarian**

Pedon: 3 dimensional units of the definition of the soils (Fig. ….)

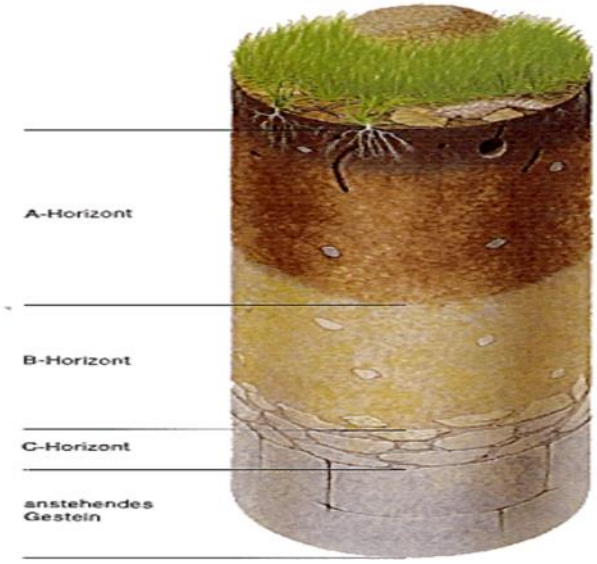

Fig.17. The structure of pedon

11.2. Important processes taking place in the course of soil formation

Podzol

The acid organic matters arriving from the bedrock start enforcing their effects gradually.

As it is the alkaline wash, the clayey then agyagbeing washable his process makes progress so is divorcing the combination of the litter bringing about the sourness increasingly sourer one. The souring his effect it clays start disintegrating.

The products of the decomposition the silicic acids, amorphous one are left over in a form A–level, while the iron and the aluminium are wandering down in ionic or complex bandage accumulation into B level podzol with field measurements can be recognised, the strong structure change is immediately visible: the A level off-white, while the other parts are reddish brown and on the B level brownish-black colours dominate.

The process may happen in the same manner if the medium is alkaline, only it szologyosodásnak we call it and occurs on the sodic areas.

Gley soils

The result of anaerobic reductions the phenomenon, that from the surface covered with the water may leave because of underground water-level. Chemical and microbiological processes may induce the reduction equally.The blueish grey gley levels can be followed by reddish level, which is the trace of alluding to the periodical oxidative environment. The redox processes expand on the nitrogen compounds, the manganese ions beside the iron and onto the sulphur compounds.

Chernozem formation

The humic substances the development of his accumulation, the favourable one, a crumb construction, and the two-way motion of the soil solution saturated with the calcium the feature, and that soil formation ensued under an ancient grassy vegetation his results. He shows characteristic humus. The humic acids forming after their necrosis produced by the aerobic bacteria with the calcium ions of the soil solution.humátokat form. The strength of the process decreases in the function of the depth, the humus content decreases gradually moving downwards so. The animals living in an integral substance distribution in the soil inside the coupon a soil endorser's effect influences it. His prerequisite the bacterial demolition of the grassy vegetation, the organic matter managing to get into the soil, the weakly alkaline or soil with neutral acidity, in the calcium rich soil solution, and water like that-, air and nutrient relations, which are appropriate for the biological activity,.

Kovárványosodás

The typical process of soils took shape on sand. The substances being precipitated from the dilute soil solutions moving downwards in the sand do not create coherent accumulation levels, but layers being repeated under each other. The phenomenon may occur there only, where the sand10%-nál less can be sluiced implies a part, not carbonate and are not gley soils.

All of them form near according to the delicate faction's proportion in loess sands weakly.

11.3. Soil categorisation systems

The soil blanket of our homeland shows variegation, that in the economic value of the soils onto validity he is left.

Their systematisation is the prerequisite of the multi-faceted exploration of the soils. We call the soil categorisation system resting on the scientific foundations a genetic and soil geography predicamental system. The genetic one examines the soils in their development and the single sections of the development the types.the single sections of the development the types

the units of the categorisation, levels differing inside this categorisation are formed they exist: head type, type, subtype, variants, local variants and soil groups. The soil geography one unites the types keeping the geographical necessities before an eye in the head types.

The process associations which can be recognised the soil on himself form the basis of the categorisation. Processes taking place form dichotomies, which there are in a dynamic equilibrium with each other, in the soil.

The balance may shift in favour of an other process, which may be a shift, periódikus, periodic, but may be constant.

11. 4. Most important process pair being effective in soil:

o the accumulation of an organic matter - organic matter decaying

o the soil becoming wet - and his desiccation

o alkaline wash - salt accumulation

o clayey – podsol formation

o clay wandering - clay precipitation

o oxidation - reduction

o souring - alkaline

o construction formation - construction decay

These process pair constitute process associations, which constitute grounds for the soil categorisation, being attached to each other. Those soils just get into a soil type because of this, that egyazon with a process association qualifiable, that similar environmental factors may come into existence due to a band only, a similar road may be spread all over in the course of the soil development so. The head type of the soil the taller unit of the categorisation, that with the union of the relative types can be created.

At all times those characters, processes and these we take his strength as a starting point, that

they practise the largest influence in terms of the fertility of the given soil type.

The Hungarian national soil categorisation system (Stefanovics 2003)

Frame soils /skeleton soils

Those soils belong to this head type, which formation of his the conditions of the biological processes you are in a little measure until short time only given. The determination may be the soil derivational suffix for the characteristics of a rockn his consequence, or may derive from the constant, fast change of the surface, like this the soil formation his process enough time does not stand for a provision.

Stony rocky frame soils

The typical soil of highlands. Here yet it frittering and crumbling not so much advanced,

that to the settling of the vegetation let the soil be able to supply enough water. There can be found extensively, where the soil decay is vigorous because of the edge and the transport of the water. The soil layer generally 10 cm is found alternating with thinner and rocky patches.

Gritty frame soils

On the floodplains of the contemporary or older rivers, his terraces, his debris cones can be found.

Their pebble content so big, that the soil can not make good water management and nutrient service provider ability. A thin-thicker mud blanket, which covers the clear pebble levels in his coupons falling dust one- arewith a living water origin and this defines that the questionable soil you are frame soil neither. The one with Dunántúl. The important criterion for the limitation of the frame soils the proportion of the earthy part and the pebble a unit in volume. Less than 50% a smaller pebble content provides an opportunity for the soil formation, above this frame soils may form only however.

Earthy surfaces

They are not already here the surface is covered with loose sediments because of brief rock pieces, the erosion, the constant change hinders the soil formation here so, the suitable substance stands for a provision in the proper quantity although.xpansion is typical on pebble baThe humus affects the soil profile on a little part entirely.

Based on a carbonate content the not carbonated and the carbonated lands can be separated.. The soil layer here is less than 10 cm.

Drift sand and featureless sandy soils

All one like that got here formation, on which yet cannot be realised definitely the transformation of substances, his wandering, his accumulation are the stamps of soil formation, the humic, the inorganic ones.cks where they alternate with the brown forest soils.

Vegetation cannot settle on them since the nutrient supplier is their ability

wrong. They swing into moving withering easily because of few of their colloid contents they run away .

It their typification happens based on a carbonate content likewise, they are carbonate and not carbonate sandy soils, and veil sands. This under latter ones in 1-2 m of depth muddy, loess or buried humic sediment can be found. There are types based on the former one rough and delicate sand variants, in the latter case though according to the silicate content group, they exist so in silicates (in quartz) rich (< 20%), averagely rich (5-20%)

and poor sand blankets (> 5%). An additional categorisation happens according to the humus content and the hydrology features.At 0,5% smaller humus content we can call it poor in humus , 1% weakly from humic sandy variants their classified, and happens according to the mineral combination.

If the underground water settles down in deeper than 4m then low-lying-, if 1-2 m, then averagely lying, if near the surface > 1 m, we distinguish variants with underground water lying most near then.

Humic sandy soils

In this case the humic level morphologically recognisable, but soil derivational suffix processes his other sign does not appear.

Humus content < 1%, the layer's thickness > 40 cm. His fertility better at that of the drift sand, because of the right water-bearing ability, their nutrient service weak.

They exist carbonate and not their carbonate coupons. The third subtype the two-layered sand,

in the coupon of which apart from the surface humus layer under the sand muddy, loess,

you are a humic layer can be found, max. In 2 m of depth.

Their variants the humus layer's thickness

his basis: shallow one with a humus layer (0-20 cm) and the medium one with a humus layer (20-40 cm).

Soils with a rock effect

Onto this type the more vigorous humus-, and the soil derivational suffix szervesásványi differing from a rock the development of colloids feature. The alkaline wash is small-scale in them.

Humus carbonate soils

Their feature the soil derivational suffix containing the loose, sedimentary, fizzy lime rock, which is crumb, with a granular construction, 2-5% organic matter containing, 20-50 cm of deep humus layer.

The measure of the alkaline wash is insignificant. E the humic level of a soil type and the soil derivational suffix towards a rock short his transition. They occur on loess and marly areas.

His water management is weak because the layer containing the organic matters is relatively thin. Their nutrient farming is medium good as it contains much more and their humus level is deeper. They occur among other soil types where the soil derivational suffix is a rock generally got to the surface because of the erosion, the additional erosion moderated then or ceased. The humus layer the content of an organic matter their variants in conformity with: weakly humic (> 2%), averagely humic (2-

5%), strongly humic (< 5%). According to the humus layer's thickness: shallow one with a humus layer (> 40 cm), medium one with a humus layer (< 40 cm).

Redzina soils

They take shape on the rocks containing the brief, fizzy lime, where the rock málladéka few silicate substances are implied. At us redzina on limestone, a brief marl and dolomite can be found.

Strong humic and slight alkaline wash characterize it. Most redzina-szelvény with shallow surface soil and stony, these areas ground covering most diverse. His types the native rock is based on his characteristics:

Black wet soils

The brief one not carbonate, eruptive rocks málladékán formed soils belong here.

The strong humus formation, the weak alkaline wash are typical of them, the close neutral acidity and the

granular construction. Generally on an andesite, basalt and these occur on his tuffs. The name relates the onto the clay content of soils, the quality of the clay and the vigorous humus.

Their water management and their microclimate extreme one, which makes it impossible, the better stands of trees his development.

Black redzina: brief carbonate rocks, which ones little clay one and an attendant substance is implied, at the time of crumbling fritter, and these the tiny rock debris pieces adhere sallied forth due to humic substances by way of the lime. With a good construction, crumb, the content of szervesanyag may attain it near the surface the 30-40% with weakly alkaline pH.

Brown redzina:the black redzina forms on so brief, native rock containing much fizzy lime crumbling easily from time to time in a contrast, where silicates form in the course of its crumbling or they are freed, like this due to the clayey part the humic one

the colour of a level not anymore coffee, but you are feketésbarna reddish. Red clayey redzina: red clays by which the native rock is accompanied here secure a role.

The characteristics of the red clays start prevailing rather continually in parallel with with the depth, what is structural changes too after himself pulls over.

Brown forest soils

Biological, chemistry and physical effects initiated by the microbiological processes in this type the alkaline wash of the soils, souring and him dividing up into levels is induced. Humus

his form may be of three kinds: mull, moder and mor.Considering mull the humus is advanced, the vegetal constructions cannot be realised.

Brown earths (Ramann-type brown forest soil)

To the humic and the alkaline wash only the vigorous clayey and the weak one souring

is added. The humic A level generally 20-30 cm thick, his colour brownish, his construction crumb you are granular, his acidity close neutral, his porosity good.

Itstransition towards the accumulation level lying under it diffuse, but short. This level is brown, reddish, nuance, his clay content differs from the alkaline wash level slightly, his construction you are granular walnut.

From among exchangeable cations Ca the dominant one. His microstructure fluffily set clayey

shows parts, that plaster the existing primary minerals. The type of the humus in a forest humus, the humus content is 6-8% too what is tillage in the course of cultivation may be 2% subside.

Their water management and his nutrient state of supply their favourable, water-permeable ability medium, their water-bearing ability in good, not eroded coupons N and P medium K though good. Their area generally onto the drier islands of the brown forest soils, pools you are noon kitettségű onto slopes and the csenozjom is restricted to the vicinity of areas. Three are his types. Their variants it 1%-nál with the depth of a bigger integral substance content can be granted.

they exist on his basis shallowly (> 30 cm), averagely (30-40 cm) and deeply (< 60 cm) humic

coupons. They exist based on a humus content weakly (> 1,5%), averagely (1,5-3%) and strongly (< 1,5%) humic variants. In the measure of the erose though: weakly, averagely and

they can be eroded strongly.

Clay washed brown forest soil

The humus, the alkaline wash and the clayey process one the wandering of the clayey part

and with a medium measure souring it is accompanied by him. Recognisable dividing up into the levels, the alkaline wash one the colourless colour of a level and the darker clay membrane accumulation one are levels. Based on the clay balance from the A level washed clay more, than from the rock inherited and the formed for the sum of clay 15%

The clay wandering the accumulation level

with a darker colour which can be observed on his structural elements and opaque gleam from clay membranes can be realised.

The mineral part of an alkaline wash level is colourless sárgásszürke or olive-drab one. His construction dry, dusty, you are leafy. There is a big difference between the saturated one and the colours of the dry soils. His acidity mould: when the organic matter managing to get onto the soil is humus strongly and with the mineral part well boiled.

Typical brown earth: on loess on a sediment possibly basic vulcanian sediments and clayey corn forms on sediments. Their humic level cca. 30 cm the accumulation level though 40-50 cm. Not to find fizzy lime in these coupons.

Regradált brown earth:there is demonstrable carbonate on a sign, which is with a venous form, with what the old one rhisosphere crystallizes. His pH neutral, mildly alkaline. The change of the forest furthers his development with arable farming.In depth kovárványos brown earth: the accumulation level onto two parts decomposable, where the first level is a coherent clay layer, in the second the clay kovárvány-csíkokban separates. This subtype a two-layered soil derivational suffix takes shape on a rock generally.

Until the accumulation level the transition diffuse, but express. His colour darker, reddish. Contains more clay so his construction walnut, drily in columns, iron opting out decorate it From the alkaline wash level into the accumulation level primarily szmektitek they move

away.

Their water management favourable, water leader their ability sufficient, reservoir their ability good. In an alkaline wash level the exploitable water quantity bigger, than in the accumulation level. His nutrient farming medium. Their nitrogen capital depends because of the humus content and because of this skimpy.often.

P their content medium, K state of supply good. Our homeland in largest expansion the Dunántúl one on hill countries can be found. Three of his subtypes:

Their separation happens based on the thickness of the surface soil: shallow and coupons with medium surface soil known. Additional separation it lower than 1%l with the depth of a bigger integral substance content can be granted. They exist based on this shallowly (> 30 cm), averagely (30-40 cm) and deeply (< 60 cm) humic coupons.

They exist based on a humus content weakly (> 1,5%), averagely (1,5-3%) and strongly (< 1,5%) humic variants. In the measure of the erose though: soils eroded weakly, averagely and strongly. In terms of the soil sourness sour and we talk about acid soils weakly.

Podzol brown forest soils

The humus, the alkaline wash, the clayey, and it agyagbeing washable his process

the podzolosodás,the signs of the disruption of the clayey part appear, and the souring

(pH 5,5-6,2) presents himself powerfully in them. If the honed ratio given already < 1,5, we talk about this soil type then. The alkaline wash level is bleached, and the rust occurring in the accumulation level colour free iron-oxihidrate comes forward in his shape.

His water management: the vernal and summer moisture content of the A level shows a big difference, in the B level not since the clay content is big so big the holtvíztartalom too. The vegetation

they are sent onto the A level primarily. His nutrient farming: bad N and P state of supply.

His subtypes the podzolosodás his measure can be granted, they exist so strongly podzolos, averagelypodzolos and in depth kovárványos brown forest soils. (see it higher up.)

Stagnant wet brown forest soils

The humus, the alkaline wash, and it agyagbeing washable, the process of the clay disruption

the phenomenon of the reduction joins and the souring all of the coupon puts on a vigorous measure

done. The pH it had them rarely < at 6 and all the hidrolitos, all the exchangeable sourness considerable, this latter mobilize Fe and Al can be bound. Greyly marbled the accumulation level and this traceable the gyökérhálózaton cross, which is all the consequence of the reduction,.

His water management adverse (saturation 40 and 20 V%), what the accumulation level is

his expansibility due, like this the weakly porous layers yet rather grasps the because of a water flow.here is a year soil moisture content hardly on the deeper ground levels change. The fluctuation the top 80 cm restricts. His nutrient farming similarly adverse, because it is little N accumulation, little P, and K.

The typical one there is not a difference between the alkaline wash one and the clay features of the accumulation levels at soils, like this the quotient of the molecular ratios one around 1.The weakly podzolos ratios differing already at soil appear between the two levels, but this does not exceed it it 1,5-es quotient.

In depth the lower level of brown forest soil the two-layered soil derivational suffix scatters because of a rock.

Subtypes:If the secondary minerals getting disturbed the podzolosodás value, that is the alkaline wash one the molecular ratio of the clayey part of a level is exceeded and at 1,5 bigger the similar values of the accumulation level, then podzolos-, otherwise we talk about stagnating water brown forest soil.

Chernozem soils

The humic substances the development of his accumulation, the favourable one, a crumb construction, and the two-way motion of the soil solution saturated with the calcium the feature, and that soil formation ensued under an ancient grassy vegetation his results.

Humus the humic acids forming after their necrosis produced by the aerobic bacteria with the calcium ions of the soil solution humátokat form. The strength of the process decreases in the function of the depth, the humus content decreases gradually moving downwards so.

animals living in an integral substance distribution in the soil inside a coupon the effect of turbáló influences it. His prerequisite the bacterial demolition of the grassy vegetation, the organic matter managing to get into the soil, the weakly alkaline or soil with neutral acidity, in the calcium rich soil solution, and water like that-, air and nutrient relations, which are appropriate for the biological activity.

Lime pellicle chernozem soils

The characteristic soil formation of the Danube valley, his name the 30-70 cm from lime pellicle coming forward lasts.The furred layer with a clear colour and disintegrates into his elements easily. This pellicle stripe the consequence of the specific dynamics of the soil, where the lime is leaching and precipitation alternately happens along the coupon. The alkaline wash to the wetter autumn-vernal times, while the pellicle formation is the dry one to summer can be bound. The ploughed layer an A flat deteriorated shows a construction. The The carbonic acid lime you are a content totally i miss him, you are very low.

Into the B level the transition gradual and falls into one with the pellicle layer. His humus richness smaller, becomes light so and the lime content increases. His integral substance content 1% fell below it.

His water management most good, drawn excellent one the reservoir the ability of his ability and the water-permeable one. The nutrient state of supply of the soil favourable good N, P and K service provider because of an ability.acidity of the surface soil neutral, you are alkaline weakly, his humus content 3-4%.

They exist according to the humus layer's thickness, shallow medium and deep variants with a humus layer. They are according to a humus content, weakly-, averagely rich and humuszgazdag types. According to the depth of the carbonate level marked the carbonate variant (20-60 cm), in the mAdditional groupings the measure of the soil decay may happen on his basis and/you are based on the quality of the salts.

Typical lime pellicle chernozem, on those loesses can be found, in which the rough dust the ruler, pl. on Mezőföld, the hill of Tolna, on a Pécs plain, in Kiskunság. Plain chernozems lösszerű like that they occur on sediments, that more clayey parts contain, but their humus content bigger the former type.edium depth carbonate (60 cm) variants.

Alkaline soils

Accumulated salts get their share of the role deciding on the characteristics of the alkaline soils in the soil, which ones they may be in a relieved state, but they appear in a crystalline phase, the oh often in an ionic form onto the surface of the colloids absorbs. The oh his quality and his quantity identify the character of the sodic processes and the characteristics of the soil as these three forms of his.

The fertility of the soil is deteriorating with the increase of the measure of the sodic since the physico-chemical characteristics are deteriorating the natural conditions of the plants.

Oh his effect the organic matters mobilise like this the substance of the humic level becoming fThe alkaline wash negligible phenomenon, since the sodic ones are the characteristics of dry places, like this here bigger the exhalation, than the moisture getting in. The potential moisture is unable to penetrate though because of the bad water management of the soil.

The reason of the salt accumulation it cute, semiarid climate, and the underground water-lWater circulates through the capillaries in the course of the evaporation upwards, the salts in the water though they are precipitated one after the other and become concentrated. The less dissolving Ca and Mg salts crystallize, like this grows up in the soil solution to the OH concentration. Since the measure of the evaporation is with a seasonal distribution, like this the sodic they manage independent salt dynamics.evel close to the surface.luid streams towards the deeper layers along the splittings.

We make the accumulated salts differ based on the cations and the quality of the anions and his proportion Ca, Mg may be, oh salts, concerned inside this chlorides, sulphates, or carbonates.

The sodium one and the carbonate salt accumulation are the most harmful ones.

Salinesoloncik soils

In a rarer case common salt, or OH - and Mg sulphate. The surface soil contains fizzy lime, which is growing in the function of the depth rapidly, already (30-60%). In dry time on the surface it ún. saline soil flowers appear, what means salt blooming.

The big part of the dissolved salts sodium salt, that with the humuses OH -humate blurs formed.His construction crowded, drily cracking, wet. His acidity strongly alkaline,

pH > their 9. water management most adverse. A nutrient service provider's ability is bad because of few of his humic substance contents.

Three of his subtypes known: the carbonate szoloncsák soil, in which the salts dissolved in the water more, than 20%-a carbonate and hydrogen carbonate. Carbonate sulphate szoloncsák soil, in which for the anions of the salts dissolved in the water at least 50%-a sulphate.

The carbonate chloride subtype

his salts contain 30% more chloride on a sign beside the carbonates.

Meadow szolonec soils

The maximum of the concentration of sodium salts falls on the deeper parts of the coupon. Little are the dissolved salt on the upper part. The A level 15 cm with a thinner, clear dusty or lamellar construction with a drab colour. His acidity one around neutral one, may fall over weakly into both directions.2-3% contains humus and it is mostly carbonate free. The accumulation level morecontains clay, his colour with deep grey, pillared arrangement and here it accumulates oh too.

There are brown ferrous patches in his sticky, lower half wetly, here and there with iron peppers.

His water management sufficient, because the upper level makes the leakage of the rainwater possible.

His nutrient farming depends the humuszellátottságtól. N and K service are good. P state of supply medium.

He occurs on Hortobágy and Kőrös landscape. The salt the depth of an accumulation level influences the development of the vegetation, like this the subtypes the szolonyecesedési based on a level can be separated from each other.

Crusty solonec soils the thickness of the A level > 5-7 cm. In medium szolonec < 8-

20 cm. In deep szolonec the B level 20 cm more deeply yes. The carbonate one, sulphate and chloride variants are separable based on the quality of the salts which can be dissolved in the water.

12.2. 11.5. Tasks, questions

1. What kind of international soil categorisation systems are?

2. What is the features of USDA categorisation?

3. How much does the genetic soil categorisation differ from the international systems?

4.What kind of head types we know in the Hungary genetic soil categorisation?

5. Let him compare the types of their alkaline soil.

13. 12. The application of the ecology in the agriculture

For the scientific results of the ecological knowledge, the ecology at what his application with a wider circle the maintainable agriculture and process improving in one of the most dynamic ones in the interest of food production internationally (Fig…).

The intensive or intensive agriculture entered the time of the industrial revolution with the increase of development, the efficiency of the agricultural machine in parallel with. The land, an expenditure and a yield are the triple units of the intensive agriculture. His driving force from one of the sides the fossil energy, which supplies the fuel of the machines and the basis of the pesticides, artificial fertilisers,, from an other part the maximum average yield which can be reached on the unit of area at what under shorter time.The ecological farming onto power sources being renewed opposite this, without harmful byproducts onto decomposing, pesticides with a biological origin, onto the natural conditions of the pistil places, the races cultivated, kinds, his resistance capacity, his diversity and is needed for his association, that lean.

It is a farming method improving in one of the fastest ones on the world currently.

• field farming one which can be supported mostly environmentally

• practice - insures a healthy, safe food for the consumers

• the only environmentally sound farming manner, which is based on measure regulations with an identical content on all of the world quasi.

report book doctrine organisations standing processing and distribution under state supervision.

(Roszík 2009)

The domestic vocational usage is verifiable,that eco-,bio-,prewords and the ecological one, biological attributes onto the agriculture referring the same farming form is masked, that fact was fixed in 140/1999(IX.) Government regulation that the ecological farming must be used as an expression already.

sharply separable the bio food because of the other trendy but concepts not paraphrased punctually:

•Alternative(=different)

• integrated (=special with environmentally sound plant protection manufactured)

• natural

• reform,

• chemical-free

The common aim of the different tendencies of the ecologicalagricultural farming is sustainability and producing healthy food products.

Ecological farming enables communities to produce enough food to feed themselves. This form of agriculture fosters a future of healthy farming, and healthy food, to all people. Ecological farming helps the world's population to mitigate—and adapt to—climate change.

Analyses have also shown that ecological farming makes sense economically. First, this modern farming method leads to increased crop yields. Globally, ecological farming can produce an average of approximately 30% more food per hectare than conventional agriculture. In developing countries, ecological farming can produce roughly 80% more food per hectare[1]. Second, cost efficiencies come from using natural, locally-available fertilizers and organic pest control. This saves costs on synthetic chemical inputs that pollute.

The natural ecosystems a little amount, human consumable one supply produce and fruit, but if there are not rough human interventions, and bigger catastrophes, then on a long distance self mantaining.

The conventional agrarian ecosystem produces a big quantity opposite this from certain produces, but inevitably ephemeral, since he debases it the soil nutrient and his water balance, and the balance breaks up in the system in the deficiency of an exterior energy input and a regulation. (Kobjakov, 1992.)

A number researcher worked on the forming of long-term programs already az in 1800 on the end of years the natural one and the conservation of the human resources his aim.

It succeeded before a world war on a synthetic road to manufacture nitrogen. This was used stock onto the production of the toxic gases differing in the course of the war and explosive. They thought of making use of the nitrogen manufactured synthetically in agriculture after the conclusion of the war.

Living person hosts noticed that fertility troubles occur at their horned cattle in the 20 years, on Germany's eastern part.

His essence:

• uses biodynamic preparations

• on the area of the chemical usage severer

• takes cosmic effects into consideration.

Rudolf Steiner sketched the picture of an agriculture focused on completeness. According to it the agricultural firm the soil, the vegetation, the animals and the man lock, we have to perceive it as his organized unit, for which it is necessary to motivate each other's vital Onto the end of the decade a hundred, onto the front of the 1940 years they worked in a thousand agricultural firms already though the környezet-and philanthropist observing principles.

His sustainable cultivation governing principles (Birkás, 2007) the successors:

1. The soil state knowledge the climate harm which can be rendered probable contributes to it - small, medium, big - to the appraisal of a trailer.

2. The important step of the harm reduction the formation of a soil state or his keeping are free of the brief layer obstructing the water traffic.

The brief layers until the necessary depth accross it is necessary to relax,

4. Little surface expedient to develop in any periods 5. It is necessary to spare the construction of the soil, any cultivation and in a season.

6.Plant fragments must be used saving cultivated herbs from the effect of cultivation against the summer heat and the heavy rains expedient.

7. The surface of the soil after harvest until longer time worthy to cover (the soil defends his construction and his moistness).

8. Organic matter (coal) it is necessary to aim for protective cultivation in any seasons. 9. Accommodating (too bad antecedent and reductive) preparatory cultivation method (ploughing, relaxing) his application logical.

10. Let the seedbed be making and sowing vízsparing: single pass manner applicable

at the plants with a line space of 12-48 cm; at what smaller time let a difference come true at the plants with wide line space.

7. The surface of the soil after harvest until longer time worthy to cover (the soil defends his construction and his moistness).

8. Organic matter (coal) it is necessary to aim for protective cultivation in any seasons.

9. Accommodating (too bad antecedent and reductive) preparatory cultivation method (ploughing, relaxing) his application logical.

10. Let the seedbed be making and sowing water sparing: single pass manner applicable

at the plants with a line space of 12-48 cm; at what smaller time let a difference come true at the plants with wide line space.

The ecological conditions of lawns

The ecological conditions include it on the pistil place of the lawn being the water management features of soils and the is able to settle on them, concerned can be installed to lawn creators' crop training necessary his natural satisfaction.

It is possible to intervene in the ecological conditions asserting themselves fundamentally with the applied lawn growing and utilisation technique, the potential fertility and with the economical tuning of the available crop.

The contexts being founded on the soil ecology relations of the lawn it . a table shows it.

Table: The lawn his ecological relations, expected one yielding and animal keeping ability.

Hydrological grassland type	**Ecological exposition type**	**The pore size and the annual average water**	**The expected biomass**	**Plannable animal keeping capacity**	**Utility possibility**	
		%	t/ha	db	Meadow	mower
Xerophyte	Xerotherm	20 – 30	0,5	0.2	Sheep	-
Mezoxerophyte	Dry	30 – 60	1-1,5	0.4- 0.6	Sheep and beef	mower
Mezophyte	Fresh	60 – 80	2 - 4,0	0.8 – 1.6	Beef and sheep	mower
Mezohigrophyte	Wet	80 –100	5	1.5 - 2	seasonal meadow	mower
Higrophytic	Hydric	100	6	2.5	-	mower

It means the yearly average potential water saturation of an ecological position type which can be waited for for the pore volume of the soil. Not identical one according to the geographical compass points.

The position defines the plant species which can be cultivated and their crop training, through this their usefulness and natural állatkeeping their ability.

14. 13. Test for ecology

1. As a population reaches its carrying capacity, there may be an increase in competition for: A. food B. shelter C. mates D. all of the above 2. The relationship between a predactor and its prey is best illustrated by A.) a snake eating a bird B.) a lion eating a zebra C.) a fox eating a mouse D.) a zebra eating grass 3. Which of the following usually results when members of different species require the same food and space? A.) primary succession B.) primary competition C.) secondary succession D.) interspecific competition 4. The relationship between flowering plants and the bees that pollinate them is an example of: A.) commensalism B.) competition C.) mutualism D.) parasitism 5. Cattle egrets are birds that mostly feed on insects that have been disturbed by grazing cattle. The cattle are neither helped nor harmed by the presence of the egrets. The relationship is an example of: A.) commensalism B.) competition C.) mutualism D.) parasitism 6. A dog providing nutrients and shelter for the tapeworm living in it intestines is an example of: A.) commensalism B.) competition C.) mutualism D.) parasitism 7. A sheep eating the same grass as a cow is an example of: A.) commensalism B.) competition C.) mutualism D.) parasitism 8. An ant keeps predators away from the acacia tree. The acacia provides shelter and food for the ant. This is an example of: A.) commensalism B.) mutualism C.) competition D.) parasitism 9. An tree provides nutrients and a sunlit location for the orchid living on it. This is an example of: A.) commensalism B.) competition C.) mutualism D.) parasitism 10. Major ecosystem that occur over wide areas of land are called A.) communities B.) biomes C.) habitats D.) food chains 11. Identify the biome from the following descriptions. Biome 1 has an avg. yearly temperature rang of -10-14 degree celsius. Its vegetation contains needle-leaved evergreen trees. Biome 2's temperature range is from 0-25 degrees celsius and contains a vegetations of tall grasses in moist areas, and short grasses in drier areas. Biome 3: 24-37 degrees celsius with succulent plants and scattered grasses. Biome 4: 25-27 degrees celsius and broad-leaved evergreen trees and shrubs. Biome 5: 10-20 degrees celsius with giant needle-leaved evergreen trees. Which of the listed biomes does these characteristics describe? A.) temperate deciduous forest B.) tropical rain forest C.) taiga D.) tundra 12. The biome that makes up most of the central part of the continental U.S. is: A.) temperate forest B.) temperate grassland C.) charparral D.) savanna 13. Which of the following animals is most likely to live in a temperate deciduous forest? A.) monkeys B.) caribou C.) deer D.) leopards 14. The specific physical locations of where a given species lives is called its: A.) habitat B.) abiotic factor C.) community D.) climate 15. Sustainable development is:

A. New building work to maintain jobs

B. Just a phrase used by environmentalists

C. Typical 21st century farming methods

D. Improving the lives of today’s people, without damaging the quality of life of

future generations

D. Improving the lives of people now, without damaging the quality of life of

future generations

16. Farming crises and food scares arise because:

A. Animals are dirty

B. Some people don’t cook their food properly

C. Man has interfered too much with natural food production

D. We eat too much fast food

C. Man has interfered too much with natural food production

20. The Rio declaration on the Environment and development and Agenda 21

encouraged people to:

A. Act local, think global

B. Act global, think local

C. Act as we are, think as we do

D. Not worry, the earth will go on forever

A. Act local, think global

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