

Program ERASMUS+  
STRATEGIC PARTNERSHIPS FOR ADULT EDUCATION

# TRAINING MANUAL FOR THE ORGANIC FARMERS, NATURAL AND CULTURAL HERITAGE EXPERTS

**Conscious Use  
of Natural Resources**



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Conscious Use of  
Natural Resources



# CONATURE

## Conscious Use of Natural Resources

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**CONATURE**

**CONSCIOUS USE OF NATURAL RESOURCES**

[www.conature-project.eu](http://www.conature-project.eu)  
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**infinity-progress** z.s.

*Infinity-progress z.s.* is a non-government organization that is situated in the heart of the marvellous Beskydy Mountains of the Moravian-Silesian region.

The organization supports the enlightenment in the field of sustainable development principles and commitment. In this respect the organization implements educational programs, vocational lectures, seminars, workshops, conferences for all age categories of adult learners including trainers, lecturers, seniors, public.

The organization is trying to remedy mis-presented awareness of sustainable development so that these activities would be directed towards the muse and further acting which are in the conformity with the aims of sustainable life, the necessity to maintain the quality of environment without threatening the future of other generations.

The organization runs URSUS centre and Information Centre for the Protected Landscape Area of the Beskydy Mountains under Ministry of Environment. The aim of the centre is to increase the enlightenment in the field of environment, nature protection, natural and cultural heritage related to the Beskydy Mountains and region of Moravian-Silesia.

[www.ursuscentrum.cz](http://www.ursuscentrum.cz)

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*IIB*, Institute for interdisciplinary education, sees itself as a pool of ideas and concept developers in education and training, in order to increase opportunities in the education and labour market.

The business areas range from digital school development to international educational and labour market policy projects as well as individual research activities.

<http://www.i-i-b.eu/index.html>



## COMUNE DI SCANDIANO

### Italy



The Municipality of Scandiano has approx. 25.000 inhabitants and it is located close to Reggio Emilia. The municipality has the responsibility to manage public services in the fields of: pre-school education, social services, environmental services and city planning. The municipality counts more than 140 members of staff.

Scandiano is a center rich in economic, agricultural, commercial and industrial activities. It's twinned with the cities of Blansko (Czech Rep., since 1964), Tubize (Belgium, since 1976) and Almansa (Spain, since 1989) and has relations with various European cities (as project partners). It received two Flags of Honour from the Council of Europe, the Plaque of Honour and the Europe Award. Scandiano is a member of

the A.I.C.C.R.E. Emilia-Romagna (Association of Italian Regions and Municipalities of Europe) and founding member of the S.E.R.N. (Sweden Emilia-Romagna Network).

The Municipality of Scandiano has a strong experience in the field of EU international projects. As a matter of fact, Scandiano has always been committed to promoting European values and bringing the EU closer to its citizenship through a wide range of activities, and, in this regard, European citizens' meetings and lifelong learning projects have proven to be an effective strategy to pursue these goals. Along the years the Municipality's EU activity has been mainly focused on officers' training, improvement of quality standards, promotion of healthy nutrition, CO2 emission reduction and environmental sustainability, art and forms of self-expression, youth entrepreneurship, preschool education and many others.

<https://www.comune.scandiano.re.it/>

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## ŽISPБ - VŠĮ ŽMOGIŠKŲJŲ IŠTEKLIŲ STEBĖSENOS IR PLĖTROS BIURAS

### Lithuania



*VšĮ Žmogiškųjų išteklių stebėsenos ir plėtros biuras (ŽISPБ)* is a non-governmental non-profit organization with 12 permanent staff members and great number of volunteers who help organizing activities implemented by the organisation. The Centre develops and

implements various projects, initiatives and interventions at both national-local and transnational level, in collaboration with formal and non-formal adult education providers, training centres, schools, public bodies, research centres, NGOs, social cooperatives, SMEs, business associations, etc.

<http://www.zispb.lt/>



# PREFACE

Each of the world historic periods introduces different values, attitudes and perspectives. Pre-communist area was characterized by the extensive agricultural and forest management when acquiring vocational skills and competences belonged to the obvious and self-acting processes how to naturally master working activity. Humans esteemed local or regional natural resources as the most valuable and life-giving. The knowledge management was transferred to the descendants within the direct face-to-face working processes, who were later forced to leave the vocational development within oncoming historic periods, communism or global economy market that caused irreparable harms to allow the vocations to have vanished.

The key objective of the Cautious Use of Natural Resources is to develop such innovative tools with the support of digital technologies that enable the participants to acquire vocational skills and competences in the field of Environment & Organic Farming that apply and exploit in their proficiency. Participant being experienced within the direct working process are able in a more effortless way to transfer knowledge management to other descendants. Within the project implementation other objectives have been achieved, such as enhancement of intergenerational education, voluntarism, social cohesion, in/direct nature protection, preservation of Natural and Cultural Heritage Interpretation, promotion of EU citizenship and values.

Within the direct project activities there have been supported 108 participants from EU funding and in the indirect way around 3,500 participants during the dissemination process.

Project activities enabled the adult learners to have acquired new professional competencies, to deepen and innovate the ones already acquired or to learn and adopt new methods, technologies and trends.

During the two-year project implementation there were produced a

training manual and a training programme on Environment & Organic Farming consisting of a direct and virtual training processes combination, such as practical activities, sharing best practices on the one hand and e-learning form including up-to-date digital tools on the other hand. Last, but not least a web application on the environment and organic farming activities net was launched where the participants are able to acquire practically vocational knowledge in the proficiencies they need. To achieve the results there was implemented the methodology based on project team meetings on the international level, development and validation of innovative outputs, training program of blended mobilities, tools to be determined for project results disseminations. The project results all the partner's organizations achieve within collaborative works enable other oncoming participants to benefit from in the form of direct participation in the training program or acquiring the vocational knowledge, skills within practical and on-line activities or experience within the activities they are prepared by other farmers.

The training manual having been prepared by the project partners' experts is one of the key outputs of CONATURE project. Training manual consists of best practices, practical activities, methodology for the teachers and worksheets for the learners including tests.

Duration of the project: 26 months (25th September, 2017 – 24th November, 2019)

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NGO infinity-progress  
June 2019, Mosty u Jablunkova  
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# SHEEP WOOL AS BIO-MATERIAL INSULATION

## Annotation

Bio-material insulation is available in several forms. The common factor of the bio-material insulation is that all are derived from natural, plant- or animal-based products. A lot of forms of bio-material insulation have thermal conductivities on a par with mineral wool. Others have a higher conductivity yet are capable of bearing structural loads. All forms are non-irritant and offer a high level of fire protection, either naturally or in combination with chemical fire retardants. In most cases is bio-material resistant to rodents, pests and fungi attack provided

that suitable chemicals are added. Due to their hygroscopic properties, bio-based insulation products are frequently used as a key component of 'breathable' buildings. Bio-material products are available in a variety of formats, e.g. fleece, boards, slabs, structural, and material costs are generally comparable to the equivalent traditional construction products.

Sheep wool still belongs to a marginal way of insulating houses in most countries. In its nature, the sheep wool as a raw material is primarily an insulating material that has been proven and improved by the nature itself for thousands of years.

## NATURWOOL

<https://www.naturwool.cz/>

is a company that produces insulation material for the constructions. The insulation material is produced from the cleaned sheep wool. The sheep wool is provided by the sheep from Valachia (Valašsko), the easternmost region of Moravia in the Czech Republic. The company produces insulation material for the constructions and insulation straps to caulk gaps and spaces in the wooden houses, such as log or timber houses.

The main advantage of sheep wool in relation to ecology is a fact, that its

production is favorable for nature and landscape mainly in the foothills where sheep graze unusable vegetation on non-cultivated areas. By grazing mountain and foothills areas, sheep maintain ecological balance in nature. Production of thermal insulating materials from sheep wool contributes to the sustainable development of the landscape.

Sheep wool insulation is used practically throughout the building, serves for insulating floor, thermal insulation of walls and roof of wooden structures for which this material suits by its natural origin. It is also used for conventional brick houses, as insulation of roofs for example.



## 7 Key Benefits of Sheep Wool Insulation

### 1. Immense insulation material

The sheep themselves are the evidence of these insulation properties, since they were and are able to adapt to the worst climatic conditions and their wool is able to protect them against the extreme cold, heat or humidity.

Sheep wool is made of millions of fibers that due to their specific shape create air locks trapping warm air, thus insulate perfectly, protect the sheep body during cold periods, and on the contrary, keep sheep comfortably cool in high temperatures.

Thermal conductivity coefficient of this material ranges from 0.038 to 0.050 W/m depending on the density of the material. In this respect, the sheep wool carries out an excellent function as the insulator.

### 2. Still keeping the shape

Due to its specific shape and structure of fibers, the wool is highly flexible, its fibers do not break under any circumstances and are resistant against repeated tensioning and compression which makes it able to fill the insulated space completely after application.

Sheep wool insulation is available in strips or batts, seals well any gaps in timber houses and log cabins. Sheep wool is very workable and flexible. Due to these properties, the sheep wool seals very well over time as the wood begin to dry up and change shape.

### 3. Maintains optimal indoor humidity level

Sheep wool fibers have the ability to bind excess humidity from the interior without any affect to its insulation properties. When the air is dry, it will release it again, maintaining stable interior humidity.

### 4. Air purifier

Sheep wool binds pollutants from the air, purifies the air of dust, cigarette smoke and other undesirable substances that are created by for example computer electronics. Sheep wool can degrade formaldehyde contained in some bonded chipboard materials, carpets or adhesive and sealants. Sheep wool contains keratin that neutralizes formaldehyde.

### 5. Not harmful to health

Sheep wool is completely free of any harm to human health and a material suitable for allergic persons as well. It does not contain any sharp fibers that would irritate the respiratory tract or skin. For this reason, the handling of the wool itself is very pleasant.

### 6. Non-flammable

Sheep wool belongs to substances that burn very UNEasily, it is fire-retardant. The temperature of its self-ignition is about 560°C; for comparison spruce-wood self-ignites at 270°C. It needs higher concentrations of oxygen to burn. Toxic fumes do not release when burning and the wool self-extinguishes after removed from fire.

### 7. Recyclable / compostable after use

Compared to for example mineral wool insulation, there is no need for further expensive disposal of the insulation.





However, sheep wool insulation also carries one risk. Since it is natural, it attracts for example rodents or wasps who can build their nest in the insulation. Insulation space must be very well secured to prevent access of any live organisms.

When purchasing sheep wool insulation, it is also necessary to get informed how the material is treated against moths. For this purpose, a titanium-fluorine salt solution has been developed that does not dissolve in water and should therefore be permanent.

**Note**

Compared to mineral insulation, the production of sheep wool thermal insulation requires significantly less power with the difference up to 85%.

The biggest processors of sheep wool are Australia, China, USA, New Zealand, Argentina, Turkey, Iran and Great Britain.

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**Sources:**

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<https://www.thermafleece.com/uploads/Thermafleece-Case-Study-Crathie-Drive.pdf>









# URBAN GARDENING

## Annotation

Just like many species around the globe will have to adapt to the changing climate and altering ecosystems, humans must also respond to the dynamic conditions of our planet. One aspect of the climate change crisis is the question how to secure food for the humans and thus decrease urban poverty. Urban agriculture is a wise precautionary tool to help mitigate the risks of weakening food availability, access, and stability in urban environments vulnerable to extreme climate change repercussions.

## Expanding Populations

Cities are the hub for mankind's existence; in 2009, about 3.4 billion people lived in urban areas and by 2050, that number is expected to increase to 6.3 billion people. In addition to the rapid urbanization and expanding populations of developing nations, cities are also at the root of the climate change calamity. Urban areas are both the cause and the effect of global warming. Cities produce roughly 70 percent of greenhouse gas emissions worldwide and about 90 percent of the prospective

growth in global emissions will be from cities in developing countries. Subsequently, cities will also suffer the most from climate change impacts. Urban areas are subject to the heat island effect (temperatures are abnormally warmer than surrounding rural areas), flooding and extreme weather events (low-lying cities), food supply problems, and 'water scarcity issues.

## Food Insecurity

To alleviate the consequences of food insecurity in rural environments, cities in both developed and developing nations should adopt the precautionary principle of urban agriculture. The logic behind why cities should be proactive in their urban farming policies are outlined in the following Austrian model.

MORGENTAUGÄRTEN is Austria's largest urban farming project in Graz, Linz, Wels, Steyr, Enns, Leonding and Traun. On 20, 40 or 60m<sup>2</sup> plots you can grow and harvest your own regional organic vegetables in the densely built-up urban area.





# 15 Key Benefits of Urban Gardening

1. Health promotion and prevention
2. Food Quality: biological, seasonal, freshly harvested
3. Produce food yourself
4. Activating the protective factors of the body by containing vitamins in the vegetables
5. Meaningful leisure activity
6. Experience the path from seed to harvest with children (life cycle)
7. Communication: exchange methods, innovations, best practices with other people
8. Fields ensure good climatic conditions in the city and are home to rare animal and plant species
9. Ecological benefits - Co2 Free, Climate-friendly production
10. Therapeutic effects – recreation, improvement of mental health, depression values decrease
11. Horticultural work achieves the same results as exercise
12. Improvement of mental abilities
13. Improvement of learning performance / concentration of students – Learning by Doing
14. Social support - for each location, a garden plot of a social institution (kindergarten, shelter, facilities for people with disabilities, etc.) is provided.
15. Publicly accessible: all locations are easily accessible by public transport and you do not need a car!

**More info available in German language:**

<http://www.morgentaugaerten.at/>

<https://www.morgentaugaerten.at/>

<http://www.powerhousegrowers.com/urban-agriculture-wise-solution-food-insecurity/>





# SOIL FERTILITY CONSERVATION IN SUSTAINABLE FARMING

## Annotation

Healthy soil is primarily defined by its fertility, representing two essential components for farming. Soils are a living system of organisms reacting with organic and inorganic matter. Soil quality comprises a range of chemical, physical and biological factors which together affect the productive potential of the land.

A soil's physical properties determine how well a plant's roots grow and proliferate. Plant roots thrive in soil that has good aggregate stability (tilth), porosity, infiltration, drainage, water-holding capacity, bulk density, and resistance to crusting and compaction. An extensive root system that explores more soil volume naturally has access to more soil moisture and nutrients.

## Agricola Prati al Sole

is a young agricultural company established in 2014 located in Pratissolo di Scandiano that produces vegetables, honey, wheat, grapes, bread, eggs, poultry, ect. They take care of the farm using only natural methods with the most respect for the fertility of the earth and of the people who sustain it.

Prati al Sole is a small family farm, farmers use a variety of hand-made tools for the cultivation of vegetables and carry out the work entirely by hand, to avoid the use of heavy vehicles that press the soil and restructures its natural vitality. Moreover, no fuel is used on this farm, only renewable – solar energy. Pesticides or synthetic fertilizers are forbidden on this farm.





Based on the North American - Canadian model of agriculture, Prati al Sole follows the method of cultivating as many products as it is possible in the small areas. Fastly growing amounts of people in the world demand for growing more food on the limited surface of the earth.

The production of healthy and high-quality food, environmental sustainability, the appreciation of surroundings and the need to create the network helping to get out of the absurd schemes of large retailers, factors, avoid disadvantages of logistics are some of the principles that outline our work and our "formula" of production and sales. These are some of the many reasons for joining the CSA (Community-Supported Agriculture) network.

CSA - is a system that connects the producer and consumers within the food system more closely by allowing the consumer to subscribe to the harvest of a certain farm or group of farms. Based on the agreement between the farmer and the consumer, the farmer commits to grow production and consumer commits to buy it regularly. It is an alternative model of agriculture and food distribution that allows the producer and consumer to share the risks of farming as well as keep small farms active in rapidly emptying country-side. Community-supported agriculture systems reduce waste to 7% against 55% of large retailers.





# ORGANIC VEGETABLE BOXES FROM FARM TO YOUR TABLE

## Annotation

From one man and a wheelbarrow to an award-winning organic delivery company.

## About Riverford

Taken over by the Watson family in the 1950s, the farm operated using conventional farming methods until the mid '80s. By the end of the '80s Guy Watson had converted part of the farm to organic methods and the Riverford box scheme was born.

Starting by delivering organic vegetables locally to 30 friends in Devon, the company now delivers to over 40,000 organic vegetable boxes a week to homes around the UK from its regional farms.

The weekly boxes come with a newsletter explaining both the content of the box and giving farm news from Riverford. It also includes recipes and tips relating to the vegetables that week. The result is a large, yet personal method of shopping with the bulk of customers having been found by word of mouth, and small-scale, local advertising.

Like many of Devon's businesses Riverford are highly decorated. In 2012 Guy was awarded BBC Farmer of the Year, and in 2013 the company won Best Organic Retailer at the Natural and Organic Awards and Best Retailer at the Observer Awards.

## Food waste

Selling directly to the customer means that every vegetable already has a home in Riverford vegetable boxes before it is even planted.

## Grade-out system

There are occasions when a batch of fruit or veg simply can't go into the boxes since it may be too large, too ripe, or partly

damaged. Whatever the reason, Riverford has a system in place to make sure it does not go to waste.

**Charity donations:** Every week, local charities collect grade-out veg for use in children's centres, soup kitchens and refuges.

**Free veg for staff:** Staff members get grade-out fruit and vegetables.

**The Riverford Dairy herd:** Cows enjoy the vegetables too! Beetroot makes their milk pink, while onions and garlic taint the flavour.

## Flexibility

If any of Riverford's crops produces more than expected, the policy is to accommodate the surplus in the veg boxes. Often it means that customers get larger portions for free!

## Gleaning

Riverford works with the Gleaning Network UK in case there are crops in the field that can't be harvest in time.

<https://www.riverford.co.uk/>











LIVE LIFE ON THE VEG

We can use this box 10 times  
if you leave it out for us!

**RIVERFORD**  
ORGANIC FARMERS

Wash before use



## Events & Farm Visits

### Group and school visits

Schools and Colleges are encouraged to visit Riverford to learn more about farming and food.

A typical visit lasts 2 hours and will include a walking tour of the farm and for Primary and Secondary school visits the option of an organic seasonal meal prepared by our award winning Field Kitchen. The tour takes in the vegetable fields, clover leys, pasture, hedgerows and superb views of the surrounding countryside. Children record their journey on a map of the farm, encouraging cross curricular learning.

Topics include; Map work, wildlife, plant and cloud identification, crop growth, usage and rotation, the farming year, water cycle, the history and geography of the local area and discussing the nutritional values of each crop, offering children a chance to pick and taste some of the produce.

### Advanced educational visits

The farm offers advanced guided tours suitable for Colleges or Universities looking for a deeper insight into methods of farming or certain aspects relating to each

farming qualification. They typically last 2 hours and will be tailored to meet the objectives of the group interest.

### Farm tours and walks

Participants' are offered a walk and Self-guided or guided farm tours on the farms in Devon and Peterborough and able to pick and taste some of produce straight from the ground while taking in the beautiful scenes and variety of wildlife. On the tour visitor will see vegetables growing, clover leys and pasture, while hearing about the thriving variety of hedgerow wildlife supported in organic fields.

### Master veg classes

These two-hour, hands-on cooking classes offers, people of all abilities, ample veg inspiration turning a brimming box of veg, fresh from the farm, into an inspirational organic feast. The classes are kept small to give plenty of chance for questions and individual guidance in order for the participants to learn lots of essential skills and leave inspired to cook with a veg box at home.





# EXTENSIVE CATTLE BREEDING

## Anotation

Extensive farming or extensive agriculture (as opposed to intensive farming) is an agricultural production system that uses small inputs of labor and fertilizers relative to the land area being farmed as well as small number of animals per land unit.

Extensive farming most commonly refers to sheep and cattle farming in areas with low agricultural productivity, but can also refer to a large-scale growing of wheat, barley, cooking oils and other grain crops.

In discussions around land use, impacts of livestock can be seen very differently. On the one hand, all land use by livestock can be seen as po-tentially problematic in view of current anticipated growth in livestock production, since by using a growing area of land, livestock usually need more land than plants. However, another way of viewing the impact of livestock on land is by considering what types and qualities of land they use. Are they making use of prime arable land? Or are they using land that is unsuited to arable crop production? Livestock managed to enhance the quality

of the land and to maintain the carbon storage properties of the land then they are

not overstocked. Moreover, extensive grazing usually contributes to protecting other vulnerable animal and plant species.

To sum up, animals living in extensive systems modify the landscapes they inhabit, representing a fundamental force for landscape management and conservation, for example through weed control, revegetation, nutrient cycling and creation of fire breaks.

## What is the difference between intensive and extensive cattle breeding?

Beef cattle are usually kept in either 'extensive' grazing-based systems where they are mainly kept in fields and may be housed for part of the year (depending on the climate) or 'intensive' indoor systems where, in some cases, they may be housed throughout their lives. Extensive farming usually require no additional feeding but the grass and hay, intensively breeding cattle are being feeded additionally with supplements, silage, compound feeds, cereal – based feeds, etc. Furhermore, the time required for production and the amounts of production is different in extensive and intensive livestock systems. Extensive farm produces less milk and the milk is lower in fat than in full balanced diet. In meat production, it takes 0,5 – 1 year longer to rise a cattle in extensive farm suitable for meat production. On the other hand, the quality of production in extensive farm and its benefits outweigh disadvantages.





## Benefits of Extensive Technologies

- Lower density of animals result in decrease of illness and the use of medicine in livestock production, no GMO, better meat and milk quality
- Animal welfare
- Cultivation of low quality grassland – peat-bogs, scrubland, etc.
- Symbiosis between species - protection of animals and birds breeding in grasslands
- Conservation of soil, preventing degradation

Biodiversity and extensive farming systems:  
Aquatic Warbler (*Acrocephalus paludicola*)  
Singing male of Aquatic Warbler (© <https://meldine.lt/meldine-nendrinuke/bukle/>)



There are species closely related to human activity which, paradoxically, have been facing difficulties because of the human activity. Aquatic Warbler – one of the most endangered species in the world – has been breeding in the meadows for ages, but now the numbers of individuals decrease rapidly. On one hand, people started to cultivate land intensively – ploughing and mowing grasslands during breeding season, on the other hand, low-quality land was abandoned, and now is covered with shrubs, bushes and poor quality forest. Now it is obvious, that the only way to save this species is cultivate land extensively – graze small amounts of mammals (cattle, sheep or goats) or mow it only once a year when juveniles of Aquatic Warbler are already flying (late July – August) and prevent meadows from shrubs.

Extensive farming might result in better protection of the environment, including soil, climate, water and humans as well. There is always a discussion if it is worth it or not, weighting and arguing, but the main argument is the attitude – if we are ready to take care of others before ourselves or not.

### How can everyone contribute?

1. Support local farmers, who take nature and ecology into consideration
2. Do not spare money for better quality of food – better the less than low-quality
3. Avoid buying from supermarkets when the origin of the production is unknown
4. Think globally – avoid wasting food, take care of Your environment
5. Spread the knowledge on the importance of nature protection

[https://fcrn.org.uk/sites/default/files/FCRN\\_int\\_vs\\_ext\\_livestock.pdf](https://fcrn.org.uk/sites/default/files/FCRN_int_vs_ext_livestock.pdf)

<http://www.thecattlesite.com/articles/4349/extensive-farming-and-the-future-of-food-production/>

[https://images.agriprofocus.nl/upload/post/1.\\_Dr.\\_Josh\\_Odhiambo\\_EXTENSIVE\\_LIVESTOCK\\_PRODUCTION\\_SYTEM1453472556.pdf](https://images.agriprofocus.nl/upload/post/1._Dr._Josh_Odhiambo_EXTENSIVE_LIVESTOCK_PRODUCTION_SYTEM1453472556.pdf)

<https://meldine.lt/meldine-nendrinuke/bukle/>







# SCYTHING WITH A MANUAL ERGONOMIC SCYTHER

## Annotation

Management has been changing the landscape for centuries. The mosaic landscape that was formed by the pastures, field boundaries, fields, meadows, forests and villages was transformed by the humans into the industrial landscape during the communism, especially since 50s of 20th century. COMECONs confiscated and occupied fields and pastures of farmers. Fields were bordered, quantity of the crop yields was increased instead of quality, large-scale production was initiated even in the mountain areas. Fertile land was unified into large blocks. Strong changes in the landscape management effected the soil quality, water resources and diversity of the fauna and flora.

## After the Velvet revolution the situation has got worse rapidly.

Grounds were sold to the unknown people, foreigners mostly, who had no relationship to the grounds, natural and cultural heritage in general. They started plundering the grounds with the aim to raise the capital of theirs in the form of natural resources and finances and thus to usurp as much as possible.

Excessive amount of chemicals have polluted water resources and worsened the soil quality enormously. The water deficit in the fertile grounds is increasing, food sovereignty in the Czech Republic was discarded and smashed.



Mosaic Scything





## 10 Benefits of Manual Scything on the Landscape

Grassland management is absolutely fundamental to maintain flower rich biodiverse meadows, orchards, gardens and grasslands.

### 1. Water retention and soil erosion prevention

Since the grass cutting is recommend being made twice a year, plants are able to ingrain, grow and bloom. Subsoil with the interweaved root system absorbs water and prevents the soil erosion. On the contrary, water flows away, soil gets dry and dehydrates.

### 2. Increase of fauna and flora diversity

The value of wild flower seeds is enhanced and thus the biodiversity is supported to be restored. Plants have time to bloom and support pollinators. Longer vegetation also provides more habitat for small wildlife. The biotope is preserved for the plants and animals (various species of meadow/river flowers, insects, little animals such as hares, mice, birds...), so is the ecosystem of theirs.

### 3. Less amount of pests

Versatile of fauna diversity means less amount of pests. The diversity of fauna increases the amount of pests' predators. Larvae of ladybug, for example, is able to eat up 5.000 aphids per its life; ladybug up 50 aphids per day.

### 4. Soil is not strained with heavy machinery

Heavy machinery strains the soil that is not able to retain water. Heavy machinery also kills the animals as they are not able to escape away.



Meadow attracts insects and meadow roots can absorb an enormous amount of water than the continuously cut grass



### 5. Making hay

Mowing with the scythe leaves the grass at their full length for drying into hay. Hay might be used either for domestic animals feed or for mulching.

### 6. Compost

Scythed grass is great organic matter to add into compost where humus is created.

### 7. Mulching

The benefits of mulching play important role nowadays. Mowing with the scythe leaves the grass at their full length for drying into hay. Free source of mulch is obtained that might be used on a large scale, from food for the domestic animals, prevent soil dehydration, weed suppression, soil moisture retention to build soil organic matter.

Mulching also helps preventing soil erosion that the soil does not wash away.

### 8. No noise

Mowing with the scythe is as quiet as it can be. You are not more frustrated and disturbed with the annoying engines of lawn mowers whether from you neighbours or your own household.

### 9. No pollution


Petrol mowers are a huge source of soil, water and air pollution. The fossil fuels pollution enormously destroys fauna and flora life in the soil and waters. Switch into emissions-free mowing with the scythe.

### 10. Well-being

The most important benefit is for you. Not only that you increase your physical conditions, but after the end of every scything you will be able to look back and say "Great job I've done for nature and its protection".

### Other benefits

- Better human health
- Aesthetic value (diversity of fauna and flora = well-balanced psyche)
- Keeping the cultural heritage
- Transfer of tacit and explicit knowledge
- Time savings  
(to mow the grass with a petrol mower twice a week demands a lot of time)



Flowers provide essential vitamins, minerals and other substances for domestic feed or compost



Domestic animals can serve as „nature“ mowing machines







# Scything Manually

## Aim of the Activity

To acquaint the participants with all the necessary activities that are connected with the scything, starting from the choice of the scythe and blade, setting up the scythe, hammering the blade, peening and honing. What's the most important, the participants learn why to use scythe, what benefits for the nature conservation, ecosystem and human health scything has.

- **Target group:** students, adults, seniors
- **No. of the participants:** max. 6 persons
- **Duration:** 2 days

1st day: choice of the scythe, set up the scythe, hammering, peening and honing, scything

2nd day: peening and honing, hammering, scything



Ovoid honing stone that is permanently soaked in a water-filled sheath.



**Peening jig anvil**  
Blade is needed to be peened/hammered before the scything.



## Procedure

### 1. When to Scythe?

- Scything is usually done twice a year after the flowers have bloomed up.
- Had better to scythe early in the mornings when dew is still on or before the dark (after the hoarfrost).

### 2. What steps precede the scything?

- Chose the right scythe with the high quality steel blade
- Set up the scythe, snath and blade and grips to your height



- Peen the blade before the first use. Peen the blade each time before scything larger areas. After about 4 to 8 hours of scything you value the proper peening and honing. Peening is done to maintain and reshape the bevelled edge. Insert photo
- Hone the blade before each scything and frequently during the scything as well.



**VERY IMPORTANT:** Acquire the necessary skills from your family members / neighbours / farmers or in a course.

**Scythe** consists of a high quality steel blade, snath and grips.

The video-footage on the demonstrations of scything, hammering or peening is available on the following link: <http://ursuscentrum.cz/cz/03145-blog.html>

#### Sources:

<https://www.newsociety.com/blog/2016/9-Reasons-Why-You-Should-Start-Mowing-with-a-Scythe>  
<https://wildseed.co.uk/page/scything>  
<http://www.halonoviny.cz/articles/view/44826886>



# USAGE AND DYEING OF SHEEP WOOL

## Annotation

Sheep wool has many positive properties and can be used in a wide variety of fields. Particularly interesting here are the latest research results regarding the effect of sheep wool on the room air. Sheep wool should therefore cause a detoxification and improvement of indoor air. This has been proven by laboratory tests. For example, sheep wool carpets, sheepskins, sheep wool blankets, etc. can reduce the pollution.

The use of sheep's wool in knitting for clothing indicates that sheep's wool is temperature-balancing and promotes skin respiration. Sheep wool is also odour-inhibiting, crease-resistant and insensitive to dirt.

Anyone who has discovered sheep wool for themselves, would usually do without chemical and toxic dyeing. So it is best to dye the wool itself. This is also quite simple, but requires a certain amount of practice and composure, as the colour results are always different.

## Aim of the activity

Participants learn how to dye wool or fabrics using naturals or organic materials

such as wild plants, forest fruit, nut shells. The key aim of the activity is to acquaint the participants with the negative impacts of the chemical usage on the environment, ecosystem and human health. Last, but not least how humans can contribute to conserve the nature when implementing the knowledge and skills of our ancestors who lived in synergy with the nature and who regarded to preserve the cultural and natural heritage for other generations as the most valuable and precious question.

- **Target group:**

students, adults, seniors

- **No. of the participants:** max. 12

- **When:** all year round

- **Duration:** 2 workshop days

1st day: collecting plants, cooking colours, preparing wool

2nd day: colouring wool

- **Equipment and other material:** stove for cooking, stainless steel pots, wooden spoons, vessels for storing the wool, alum from the pharmacy, vinegar





### Procedure

1. First of all, it is necessary to collect plants, or rather plant parts, from which colors can be made.

- Dandelion / Tansy / Chamomile / Birchbark - yellow
- Privet berries - blue-gray
- Elderberries - deep purple
- Rose hips / Cherries - red
- Blueberries / Blackberries - purple
- Raspberry leaves / blackberry leaves / nettle - green
- Walnut shells – brown

2. After that, hard parts (tree bark, nut shells etc) have to be covered with water just once and pulled for about 24 hours and then cooked. Fruits just need to be squeezed out. And leaves have to be cooked long. To achieve good color strength, use very little water. However, there must be enough water available to immerse the wool in it.

3. However, before the wool can be dyed, it must be specially treated. This process is called pickling. This requires alum. This salt can be bought at the pharmacy. For 100 g of wool, heat 3 liters of low-calorie water in a stainless steel pot to about 40 degrees and dissolve 15 g for dark shades of alum with stirring for light shades. Now put the wet wool in the stain and heat it slowly to 90 degrees. After one hour, cool the wool in it, remove it and let it dry. Dann kann diese in das angerichtete kühle Farbwasser gelegt werden und wieder auf ca. 90 Grad erhitzt werden. Dies dauert ca. eine Stunde. Danach lässt man die Wolle mehrere Stunden auskühlen. Erst wenn die Wolle kalt ist, sieht man das Farbergebnis.

4. If the wool is cold, it will be rinsed until the water stays clear.

5. Now the color can be additionally fixed with vinegar.

6. Then the wool is hung up to dry.

These colours are not lightfast!





## Further Uses of Sheep Wool

- Sheep wool as fertilizer in the garden
- Fight snails with sheep wool
- Weed protection with sheep wool
- Sheep wool as curative wool

**Sources:**

<http://www.kraeuterallerlei.de/wolle-farben-mit-naturfarben-so-wirds-gemacht/>

<http://waldweg-blog.de/anleitung-zum-faerben-mit-pflanzen/>

<https://haus-gartenblog.de/schafwolle-als-duenger-im-garten/#>

<https://www.lagerhaus.at/tipps-tricks/a/schnecken-bekampfen-und-unkrautschutz-mit-schafwolle>

<https://www.smarticular.net/heilwolle-anwendung-wirkung-und-kauf-tipps/>





# COLLECTING HERBS, COMMON SELF-COOKED LUNCH AND SNACKS, PROCESSING OF HERBS

The training of wild herbs combined with meal preparation and tasting.

## ***Aim of the activity***

Participants learn the importance of the wild herbs picking, their usage in the culinary, facts on the herbs (typical biotope, characters, benefits for the health, usage in the culinary/pharmacy), other important information and facts on the wild herbs in the region.

- **Target group:** students, adults, seniors
- **Number of participants:** max. 18
- **When:** from early spring to late autumn
- **Duration:** 5-6 hours
- **Equipment and other material:**
  - Kitchen equipped with the proper utensils
  - Ingredients for the recipes, see below
  - Freshly picked herbs – stinging nettles, ground ivies, gold nettles, dandelion buds

## **Procedure**

1. Make a terrain research in the local/ nearby meadow, field to show the participants the herbs they are about to pick.
2. When finding the herbs, explain to the

participants the following related to the herbs: features, characters, properties, precautions; usage, optional products that might be made of the herb.

3. Divide the participants into the teams of max. 6. Each team is stated what specific herb to gather.

4. Explain the participants to pick the specific herb in the indicated amount to be used for cooking:

- a) the first team: a basket of dandelion buds
- b) the second team: 2 baskets of stinging nettles
- c) the third team: 2 handfuls of ground ivies and a small bag of gold nettles

5. Teams process the herbs when preparing common self-cooked lunch or snacks: i.e. nettle soup, quiche, baked potatoes with fresh herbs and sauceNM





# Recipe Card

## DANDELION DIP

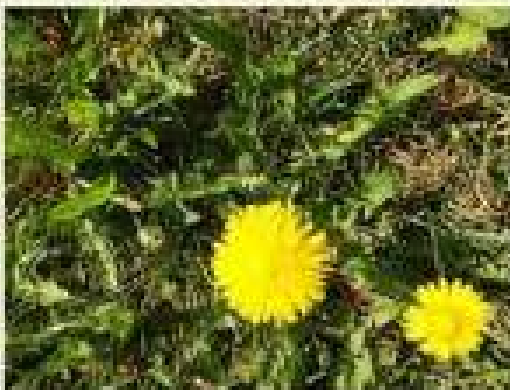
RECIPE NAME

AUSTRIAN

CUISINE

15-20 MIN.

TIME TO PREPARE



## INGREDIENTS

2 CUPS DANDELION BUDS;  
1 ONION;  
1 TBSP BUTTER;  
SOME SOUP;  
1/14 L WHIPPED CREAM;  
GARLIC, GOMASIO (SESAME  
SALT), SOY SAUCE

## PROCEDURE

WASH THE CLOSED  
DANDELION BUDS BRIEFLY.  
NOW ROAST THE ONION IN  
BUTTER, ADD THE BUDS AND  
ADD A LITTLE SOUP, LET IT  
SIMMER BRIEFLY. SEASON  
WITH GOMASIO AND SOY  
SAUCE, SIMMER WITH FINELY  
CHOPPED GARLIC. FINISH  
WITH A GOOD SHOT OF  
WHIPPED CREAM



# Recipe Card

## GROUND IVY-ICE

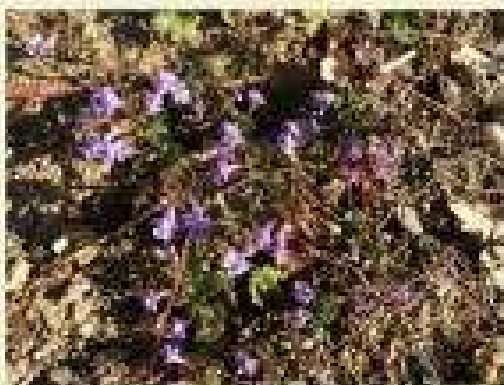
RECIPE NAME

AUSTRIAN

CUISINE

60 MIN.

TIME TO PREPARE



## INGREDIENTS

1 BANANA;  
1 LEMON;  
1 ORANGE;  
1 APPLE;  
300 G WHIPPED CREAM;  
5 - 10 GROUND IVY LEAVES;  
WITH FLOWERS;  
HONEY

## PROCEDURE

PEEL THE BANANA AND APPLE AND CUT INTO PIECES. SQUEEZE OUT THE LEMON AND ORANGE AND DRIZZLE THE JUICE OVER THE FRUIT. WASH THE LEAVES AND PAT DRY. PUREE THE LEAVES TOGETHER WITH SOME WHIPPED CREAM AND THE FRUIT. BEAT THE REMAINING WHIPPED CREAM UNTIL STIFF AND FOLD UNDER THE PUREE TO TASTE WITH HONEY AS NEEDED. SPREAD THE MIXTURE FLAT ON A BAKING TRAY AND LET IT FREEZE FOR AT LEAST 1 HOUR.

More recipes at:

<http://www.conature-project.eu/blog-main/>

[www.ursuscentrum.cz](http://www.ursuscentrum.cz)

<http://www.dumprirody.cz/informacni-stredisko-chko-beskydy/novinky/>



# SOIL FERTILITY CONSERVATION IN SUSTAINABLE FARMING

## Aim of the activity

To educate participants about some methods of soil fertility management and, generally, about preserving one of the most important agricultural factors: the organic matter content.

Consciousness about soil fertility within farmers communities is not so widespread. Therefore, they consider necessary to add synthetic fertilizers in order to improve the nutrients' content for growing plants, even though it results in a consequent loss of soil quality.

## Soil - an unknown entity

Soil is the brown, breathing skin of our planet, the lumpy mass where plants put down their roots. Soil is where grown vegetation can be one metre or few centimetres thick, but no more than 10-30 cm of it are constituted by fertile humus. Our planet has a diameter of 12.600 km and the soil spread on this large sphere appears like a very thin veil. Nowadays, every inhabitant of the Earth has no more than 1 hectare of fertile soil at one's own disposition to satisfy one's needs; in the future we will probably have less.

It is evident that fertile soil is a very precious resource.

## What is soil in a scientific perspective?

Soil is the result of many and varied interactions occurring between the atmosphere (regulated by climate and weather patterns), the biosphere (meaning

local vegetation and animal activities) the geosphere, the rocks and sediments constituting the few upper metres of the Earth's solid crust.

Soil experts define soil as “any loose material on the Earth surface that is capable of supporting life”.

## What is soil made of?

Actually, soil consists of a complex mixture of mineral and organic particles, representing the outcome of weathering and biochemical processes that break down both local rocks and sediments into individual grains of increasingly smaller sizes, and also dead vegetation and organisms that fall on or lie in it.

Moreover, soil is composed by organic matter, nutrients, water and air in different percentages.





### The soil in profile

Soil is the product of various environmental weathering processes operating on geological materials on the

*Earth's surface over a period of time:*

If we dig into the soil till about 1 or 2 metres depth and observe the vertical section shown, we can notice a number of roughly horizontal layers that look slightly different from one another. These layers are the result of the local environmental weathering processes. Their colour, physical structure and chemical characteristics significantly differ from those of the underlying rocks and sediments. Soil scientists call the layers 'soil horizons' and assign them letters of the alphabet to distinguish their different types.\*

The sequence made by single horizons is called "*soil profile*" and it changes depending on geographical location, weather and anthropic activities on it.





# Laboratory and Terrain Experience

## Sensational Soil!

### Aim of the activity

This type of activity can be useful in order to introduce a farming workshop or a naturalistic excursion, because it connects learners to the soil, conceived as a natural element from a sensitive point of view, and allows them to experience colour, smell and consistency through the senses.

- **Target group:** students, adults, seniors
- **No. of participants:** max. 12
- **Where:** everywhere (classroom, terrain)
- **When:** all year round if not the ground frozen
- **Duration:** 2 hours
- **Equipment and other material:** plastic containers, cardboard papers, water

### Procedure

1. Each learner has to take a piece of soil (10x10 cm) directly from the first 10 cm of top soil and put it into the plastic container with some water.

2. Add water in order to make it wet and easily mouldable.

The trainer can stimulate learners to put their nose very close to the soil matter and smell intensively with closed eyes.

3. Invite the learners to touch wet soil and taste its stickiness, its softness, the sand grain and eventually the presence of objects like leaves, roots and rocks.

Learners can paint with wet soil and create a sort of artistic product on cardboard papers, feeling with fingers both sand grains, loam consistency and clay stickiness. The ability of the trainer is essential for the

success of the experience, in order to stimulate the emerging of good sensations, original and spontaneous thoughts, deep memories. Soil simply has the smell of forest.





## Determination of Soil Texture

### Aim of the activity

This activity method permits to easily define the relative quantities of sand, silt and clay and observe in an empirical way a very important soil quality, texture, a key concept in order to determine soil fertility.

- **Target group:** students, adults, seniors
- **No. of participants:** max. 12
- **Where:** everywhere (classroom, terrain)
- **When:** all year round if not the ground frozen
- **Duration:** 1 hour
- **Equipment and other material:** glass jars, water, soil

### Content

An average soil sample is made of 45% minerals, 25% water, 25% air, and 4% organic matter. Mineral particles of different sizes, such as sand, silt and clay,

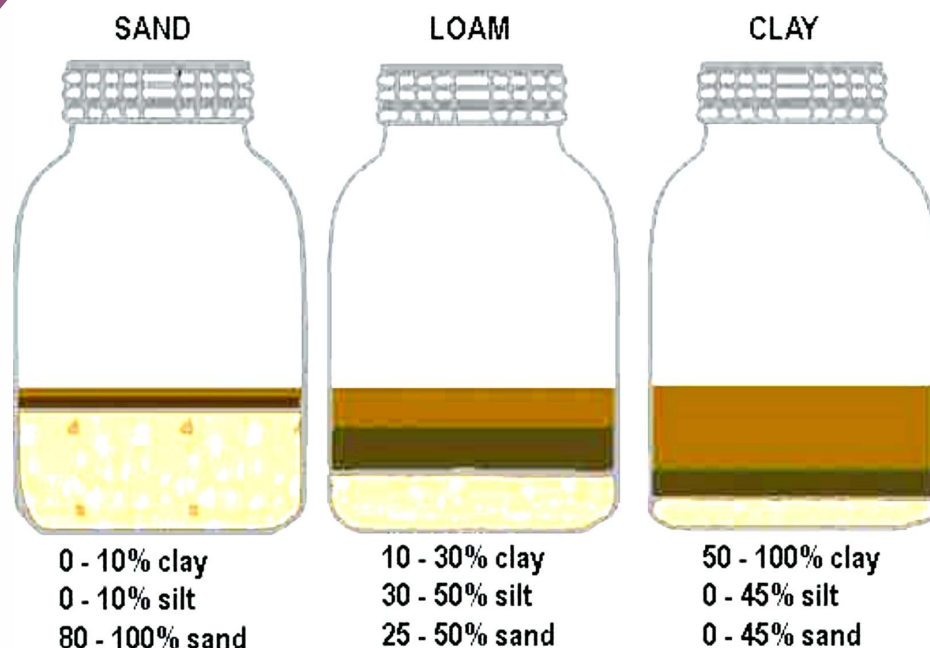
give soil an essential feature called texture. Different percentages of sand, silt and clay determine the quality of the soil with respect to its porosity, malleability and fertility.

For example, a clay soil (with a high percentage of clay in its texture) will be hard to work with, since it is heavy and soaked. Sandy soil is porous and easily malleable, though neither water nor nutrients are going to remain in its structure.

The best soil texture for farming use is the sandy-loamy one, where the presence of silt is balanced by a small percentage of sand and clay.

There are several methods in order to determine different quantities of clay, silt and sand. One of them is empirical and approximate, though still effective for those who don't need a precise measurement.

## JAR TESTING FOR SOIL TYPE





**Procedure**

1. Take a soil sample without rocks and roots.

2. Put the soil into a glass jar and mix it with water until the soil is completely dissolved into the water. Wait. After some minutes sand, silt and clay will separate themselves according to their own weight (linked with their dimension). The first material that will deposit at the bottom of the jar is sand, then loam and finally clay that will remain on the upper level of the sequence.

The different thickness of the layers shows the different percentages of sand, loam and clay in the sample.

**No-Tillage Method****Aim of the activity**

- learning methods for training courses about sustainable farming systems and, in particular, soil fertility and structure conservation

- disseminate environmental-friendly innovation in the agricultural system
- integrate theoretical lectures about fertility soil concept.

**Target group:** students, adults, seniors

**No. of participants:** max. 10

**Where:** farms

**When:** autumn, spring

**Duration:** 2 hours

**Equipment and other material:** broad-fork

**Content**

The relationship between soil health and tillage is a hot topic in the organic farming world. It is generally understood that ploughing, disking and harrowing, although so practical for soil preparation, also have their downsides. Deeply working the soil makes it more subject to erosion, disintegrates its structure and damages living organisms. Moreover, tillage is one of the longest and most expensive stages of the farming system, with the biggest use of fossil fuels and the highest working time, also requesting constant economical investments.

The general thrust behind the concept of no-till is that for soil improvement residue crops are better-off left on the soil surface than incorporated by the tillage.

Mulched organic matter is eventually incorporated by the action of worms, fungi and microbes, that thrive undisturbed into the soil.

This practice imitates the activities of forest floors, which do not require tillage and can sustain themselves for centuries, if not longer.

The farming system followed by the “Prati al Sole” farm used a minimum tillage method that involved only the surface layer of the soil, to soften the soil and create a comfortable bed for seeds and young plants, without compromising the pedologic profile.





**Procedure****1<sup>st</sup> phase**

Teachers can organize a first phase with a theoretical lecture in the field using some printed images and some soil samples, which are very useful to explain texture, soil organisms and organic matter.

**2<sup>nd</sup> phase**

Gather people around the farmer and prepare them for the demonstration about the no-till method.

It is very useful to train people explaining the agronomic concept at the base of this farming system. First, explain that the soil contains thousands of living beings that are essential for its organic matter content, then dig a little and find some earthworms.

The observation of earthworms' behaviour explains the ecological role of these organisms and the importance of the no-till method for preserving the soil ecosystem.

It is interesting for the learners to put the no-till method into practice with the broad-fork, working by themselves with the soil. It will be easy to observe the good effect of this technique on the structure and fertility preservation of soil.

In this experience the teacher has the task to facilitate the interaction between the learners and farmers by integrating the transmission of contents with scientific and theoretical concepts.





# WATER RETENTION

## Aim of the activity

Participants get acquainted with some methods how to retain water in the landscape, in their gardens, meadows, how to increase the amount of water in the soil and not to increase the amount of irrigation

doses. The global threat of lack of water is the key problem of the mankind. Due to the loss of the tacit and explicit knowledge transfer from the ancestors to other generations who lived in a very tight touch with nature, humans are facing unprecedented environmental crisis.



Pools attract frogs to lay eggs and other beneficial animals that keep the ecosystem in a balance.



## Several Methods to Retain Water in the Garden

### Mulching

#### WHEN TO MULCH?

##### **1. Mulch in summer and winter**

In summer, mulch helps your gardens retain moisture and keep the roots cool.

In winter, the mulch protects the plants from frost and help to keep the soil warm. Summer mulches will decay over time, but winter mulch should be removed in spring.

- Ideal summer mulches include leaf mulch, leaf mulch mixtures, and compost.
- Ideal winter mulches include pine needles, straw, and bark.

##### **2. Remove old winter mulch**

In spring when you start gardening again, remove the winter mulch that protected the gardens during colder weather. You can add the removed mulch to your compost pile where it adds more nutrients.

##### **3. Pull out weeds**

Before adding mulch to the garden, go around and pull out all the weeds you find in the bed. Otherwise, the mulch will protect the weeds and allow them to thrive. This will also create unwanted competition for the plants you're actually trying to grow.

##### **4. Add several inches of mulch to your gardens**

Apply the mulch after you have finished planting in spring, or when you finish preparing the garden for winter. Use a shovel or rake to spread a 5- to 15-cm layer of mulch over the garden bed:

- In shadier areas, use 5 to 8 cm of mulch
- In sunny areas, use 8 to 10 cm of mulch
- In really hot and sunny areas, use up to 15 cm of mulch

##### **5. Make a well around the base of the plants**

After you spread the mulch out over the garden bed, use your hand or a spade to pull the mulch away from the base of the plants. This is especially important in shady areas, because it will protect the plants from mould, rot, and insects.

Providing some distance between the plant and the mulch will also allow air to circulate the plant, providing ventilation that is essential for healthy growth.

Leave 2.5 to 5 cm of space between the mulch and the base of the plants, or enough room so the mulch is not touching the plants.







## How to Make Mulch

### 1. Mulch in summer and winter

When using natural materials such as straw, leaves or crushed twigs and small branches as mulch, it helps the soil keep in moisture and therefore conserves water. Since the mulch decomposes it becomes an excellent source of food for the bacteria and organisms living in the soil and thus enhances the soil quality. What's more, mulch helps prevent weed growth, protects plants from pests and helps the soil maintain an even temperature and when used over time, it revitalizes soil and promotes better plant growth.

**Target group:** students, adults, seniors

**Number of participants:** max. 18, depending on the size of the garden and mulch amount

**When:** autumn, spring

**Duration:** 5-6 hours

### Equipment and other material for part 1:

- rake, shovel, wheelbarrow
- lawnmower, hedge trimmer
- ventilated barrel or large bag with holes or tarp

### Equipment and other material for part 2:

- wood chipper
- spade, pitchfork

### Procedures

#### Part 1: Leaf mulch

##### 1. Collect leaves

Many home gardens have leafy trees and plants that provide a great mulch source. Leaf mulch is an excellent all-purpose mulch for your garden. You can either gather leaves by raking up ones that fall in the autumn, or collect the leaves that you prune off plants.

**Avoid using the leaves from walnut or eucalyptus trees as these might prevent other plants from growing.**

**Let some fallen leaves until spring as the leaves are homes for many insect and other animals species.**

##### 2. Rake the leaves into a pile

Use a rake to amass all your leaves into a large pile. Use a shovel and wheelbarrow to collect all the leaves and move it to the place where you pile the leaves on a flat section of lawn. Spread the leaves out into a layer that's no more than 5 cm thick.

##### 3. Shred the leaves

Once the leaves are all piled together in a thin layer, use your mechanical lawnmower and mow over the pile a few times to chop the leaves into smaller pieces. Continue shredding until the pieces are dime-sized.

- Shredding the leaves will help them to decompose in the garden, and this will provide the soil with nutrients.
- Use hedge trimmers to manually shred the leaves if not having mechanical lawnmower or let the leaves dry in the sun and then walk the leaves until shredded into small pieces.

##### 4. Use the mulch right away and store extras

Once the leaves have been shredded, they are ready to use as mulch in the garden. Extra mulch can be stored in a ventilated barrel, a large bag with air holes, or spread out on a tarp and covered from the elements.

Once the leaf mulch is ready, you can also combine it with other mulch materials from around the garden.

- **The longer the mulch is stored, the more nutrients it will lose.**
- **Mulch that is stored in low or no ventilation areas will begin to ferment and release high pH toxins, which are deadly to plants.**





**PART 2: MULCH COMBINATIONS****1. Chop up tree branches, bark, and trimmings**

Wood also makes great mulch, and you can make wood or bark mulch from organic matter from around the garden. Go around your garden and collect fallen branches, bark, or tree trimmings that you pruned from your plants. Put on a safety place and process the gathered wood or bark through a wood chipper to make a mulch.

Bark and wood mulch can be used on its own or combined with leaf mulch.

Wood mulch is ideal for established gardens and plants, but shouldn't be used with young plants.

If you don't have your own wood chipper, you can rent it from a hardware store.

Wood decomposes more slowly than leaves, so this would be great mulch for long term use.

**2. Collect grass clippings to add to the mulch**

Grass clippings make an ideal addition to leaf mulch, although leaf mulch is not as effective when used alone. After mowing your lawn, rake up the grass clippings. Mix the clippings in with the leaf mulch and use a spade or pitchfork to mix them together.

If your mower has a bag to collect grass, simply pour the contents of the bag into the leaf mulch when you're done.

**3. Rake up pine needles for your mulch**

Like grass clippings, fallen coniferous needles can also be mixed with leaf mulch. Coniferous mulch is best used with acid-loving plants. Rake up needles from around the coniferous trees in your garden and combine them with the leaf mulch using a shovel or pitchfork.

**Compost to Apply**

To increase the overall fertility and organic matter in your soils, compost itself has an impressive water holding capacity as compared to topsoil. Before applying any amendment to your soil, it is important to know your key nutrient levels to be able to determine what kind and how much to apply. Just like any other soil amendment, there is such a thing as too much compost.





## Tilling the Soil

Water retention is directly related to the porous space in a soil's structure: the more porous the soil, the more capacity it has to retain water. Tilling facilitates lots of temporary porous space in the top layer of soil, but also decimates any soil structure that was in place prior to tilling. Because tilling is achieved with heavy equipment, this repeated compaction actually leads to structural breakdown of soils resulting in a highly dense base soil layer topped by loose soil with no structure – thus, when heavy rains occur, water is more likely to runoff and result in erosion, nutrient loss, flooding, pollution, and, of course, less retained water for future potential drought conditions.

Many growers choose “low-till” production methods, which involve some precise and timely tillage in combination with cultivation to suppress weed pressure. In these cases, soil disturbance for the

purposes of cultivation can be done thoughtfully to avoid compromising the soil structure. Shallow, gentle cultivation of row crops, whether manual or mechanical, can successfully eliminate weed pressure while maintaining healthy soil structure and water retention capacity.

On a commercial scale, decreasing your tillage may be achieved by incorporating some no-till or low-till practices. Careful planning and dialing in the timing of your tillage can also help you decrease the number of times you must till to achieve ideal soil conditions. On a small scale for home gardeners or market gardeners, tillage may be eliminated all together by using innovative tools designed for the small scale like a broadfork or a tilter.

## Scything

See the Best Practice “Scything with a Manual Ergonomic Scythe”.

<https://www.highmowingseeds.com/blog/5-water-retention-methods/>  
<https://www.wikihow.com/Make-Mulch>









# LANDSCAPE

## Human Impact on the Landscape

Human modification of the Earth's landscape is as old as humankind itself; it might be said that human history is also the history of anthropogeomorphology. Potential human impact on the environment is basically determined by two factors: technical progress and population growth.

Until the early Holocene (12,000 years BP) man used wood, bones and chipped flint implements and basically followed a hunting-gathering course in life. However, he also began to grow cereals, peas and lentils as well as to domesticate some wild animals.

As a result of very fast demographic, socio-economic and technological changes, the level of modification of the landscape is increased.

Consideration of the most important relief characteristics as a natural factor which directly determines the intensity of natural processes and different types of utilization nowadays is quote modified by scientific and technological development. Modification of the natural environment by human impact led to a change of the existing landscape, and therefore we are experiencing expansion of technological type of landscape, acceleration of soil erosion, river management, ore exploitation, etc.

This type of human effects has resulted in numerous natural responses. However, we may expect the influence of geomorphologic changes as well. Therefore each human activity should be adjusted with good understanding of natural processes, its dynamics and structure, especially geomorphologic ones. Only in

that way we can be aware of consequences that may come due to changes of the existing relief conditions.

Land use changes are among the most important transformations of the Earth's land surface and they may be the most significant cause of global environmental change. Currently in many parts of the world, human activities are the main forces shaping land use changes. In particular the areas of the Mediterranean basin are being profoundly transformed by human activity. As a result only 4.7% of its primary vegetation remained unaltered. In fact, agricultural lands, evergreen woodlands and maquis habitats, that dominate the present landscape of the Mediterranean basin, are the result of anthropogenic disturbances over millennia.

In this regard, it is worth mentioning a particular technique called "slash-and-burn", used to fertilize the soil. Wide areas of forests, underbush and meadows dedicated to pasture were set on fire, so that the mineralized organic matter could enrich the soil with elements ready to use for farming and growing. Nevertheless, the fire extent was difficult to control, and it usually exceeded the pasture area, destroying wider woodlands.

The spread of this technique caused the loss of large part of the Mediterranean scrub and the original forests that used to cover mountains and hills in Central and Southern Italy.

Nowadays, as well as in the past, the main reasons for brush fires in Italy is the human intent to eliminate stubble and other residues of cultivation, to "clean" wild areas and to stimulate the growth of edible plants, especially wild asparagus and valuable mushrooms. The fire set by the shepherds (to increase the fodder



availability or to express rivalry among each other) is the cheapest way to make room for the herds, to eliminate weed and infesting plants and to re-create paths previously interrupted by the dynamism the agro-ecosystems abandoned by humans. It may easily happen that fires set intentionally for pastoral or hunting

purposes turn into uncontrolled blazes, especially when the climate is dry and hot. For instance, in spring 2017, a very bad year for Italian forests, 25.071 hectares got burnt in Sicily (Source: Legambiente data elaboration from European Commission Emergency Management Service Copernicus EMS updating at 26/07/2017).

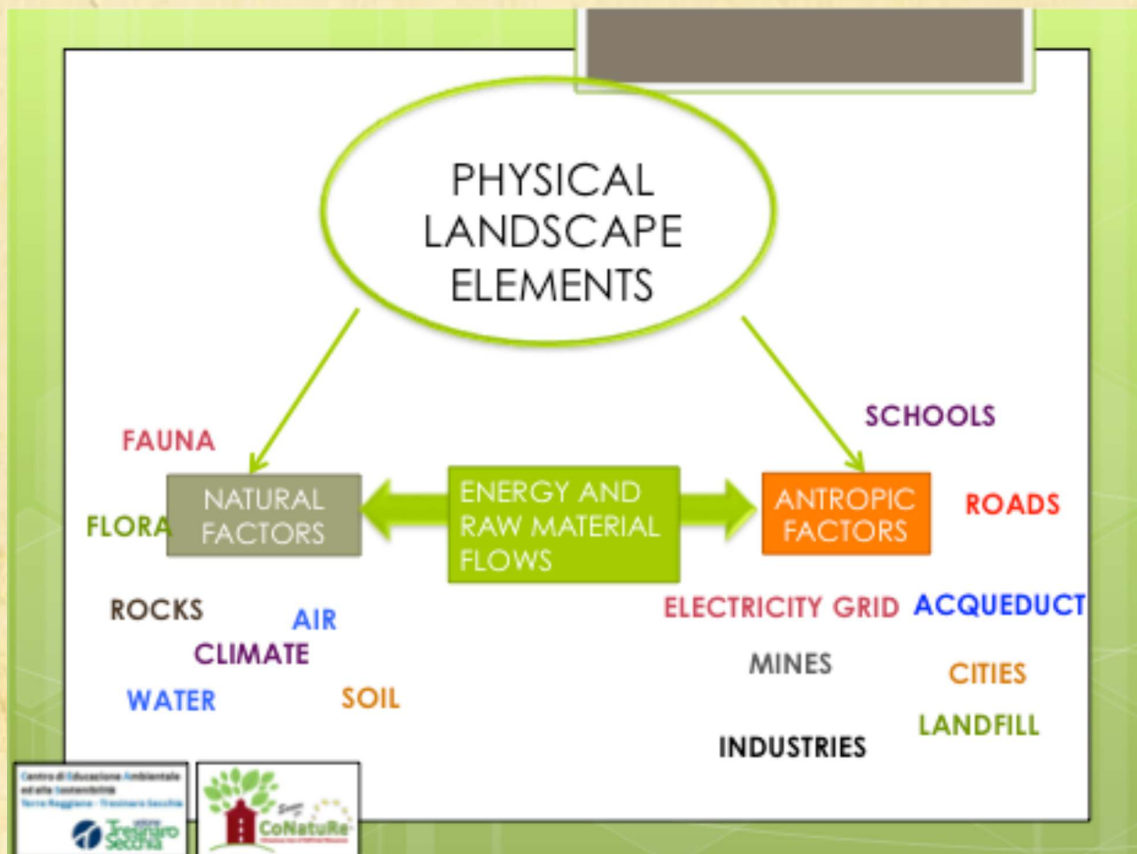
## Landscape and Ecosystem

Geographically speaking, a landscape is the visible features of an area of land, its landforms and how they integrate with natural (water, air, stones, fauna, flora, etc.) or man-made (plantations, cities, infrastructures, etc.) features. The effects generated by these factors create a unique “mosaic” that can/must be observed using

different interpretative keys.

More in specific, Geography studies the landscape's dominant aspects, which is modelled by the natural factors according to the preliminary geologic base.

Every landscape is the result of the dynamic interaction among lithospheric nature of the substrate, climate factors and biospheric elements, which determine, all together, the landscape's facies (lat. “aspect”).



Scheme n.1 Natural and antropic landscape factors  
Source: Catellani L., Landscape factors 2018



According to this, a natural landscape is a context where the human action did not alter neither the ecosystem structure nor the quality and quantity of the existing natural resources.

The intervention of human factors varies from “light influence” to “deep impact”.

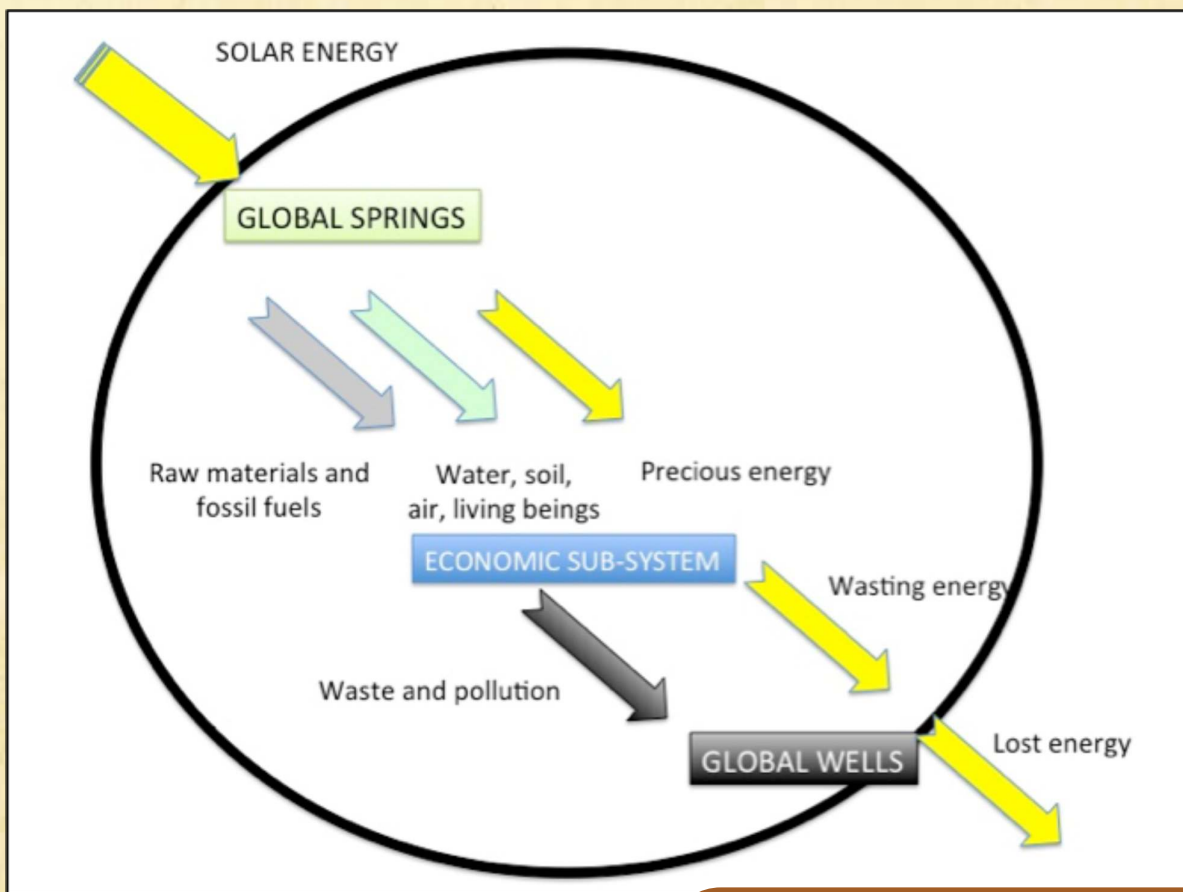
In the last centuries the processes leading to human impact have grown in number and intensity, leading to a remarkable fragmentation and decay of the natural landscapes.

According to the World Heritage Committee,

the landscape is a peculiarity of a given geographical area and it's the result of the combination man/nature. The landscape is an important element determining the life standard of people living in the cities and well as in the countryside, in the deteriorated areas as well as in the well-preserved ones.

This vision is very antropocentric.

Both natural and human factors interact through uninterrupted flows of matter and energy, which, from an ecological perspective, are like “springs” and “wells”.



**Scheme 2. Springs and wells**

*Source: Limit to Growth. The 30-Year Update, D &D Meadows, J .Randers*

The picture above shows the flows of raw material and energy that are, first, withdrawn from the global springs, then they pass through the man-nature system, and last they reaching the global wells, where wastes and pollutants gather. The atmosphere is, at the same time, the spring of oxygen and carbon dioxide, which are essential for life, and the well where exhaust gases, fine dust produced by fossil fuels and

other climate-change emissions accumulate. The current economic system is exploiting the vast majority of the resources available, saturating the wells' absorbing capacity and pushing the system to its sustainability limit.



In this model the “springs” are intended the organic and inorganic stocks like the soil, water, air, raw materials and life forms, which are supported by the solar energy that reaches the ground and fosters the passage of energy (e.g. material energy) and matter (e.g. vegetal matter). The flows of matter and energy lie at the basis of the ecosystems and connect organic and inorganic components.

The ecological dimension where springs, wells and economic and antropic system interact is the natural ecosystem, i.e. where a given community lives and fosters changes in the balance and in the short- and long-term ecological system indicators.

In the ecosystem biotic (Greek “bios”, life) and abiotic elements are deeply connected, especially in the biogeochemical cycles of matter and the flows of energy. Whereas the energy can be dispersed in heat and light waves, the matter can't be neither created nor destroyed. It changes while passing from abiotic to the biotic community through trophic relations.

The primary producers, i.e. plants, take inorganic elements from the ground, such as potassium, phosphorus and nitrogen, and transform them into organic matter. Afterwards, the organic matter passes through all the trophic levels of the ecosystem and the food chain till becoming mineral once again, thank to the decomposition of dead organic matter performed by microorganisms the living in the ground.

Even a single clump of dirt in a mild forest can be a natural ecosystem, where the abiotic elements are represented by the mineral and organic elements composing the ground, and the biotic part is composed of microorganisms and macroinvertebrates. A single spoon of fertile soil contains from 100 millions to 1 billion bacteria of – at least – 10.000 different species (Datasource

<http://eusoils.jrc.ec.europa.eu>), which carry out the decomposition process of the organic matter and the transformation of carbon from organic to inorganic, in order to make it available to the primary producers again.

Various classes of organisms living in the ground chop, mince and mineralise the organic waste, and they bring back carbon, nitrogen, phosphorus and umic acids to the inorganic form. Every year an earthworm can convert more that 1000 tons. dry soil, that is 20/30 times its weight, into fertile soil available for plants' growth.

Also Fungi play a key role in symbiotic relations with plants helping them to be more resistant to parassites enemy and to absorb substunces by the soil.

Fungi exist in two different forms, either as single celled organisms called yeasts (4-5  $\mu\text{m}$ ), or in hyphal forms whereby they grown to form extensive branched networks.

For example, the fairy rings which can appear in lawns and grasslands in summer and autumn are good examples of extensive fungal individuals, with the rings of darker grass marking the edges of the advancing mycelial front. Some of these can grow at rates of over 1 m a year and can form ring structures over 200 metres across!

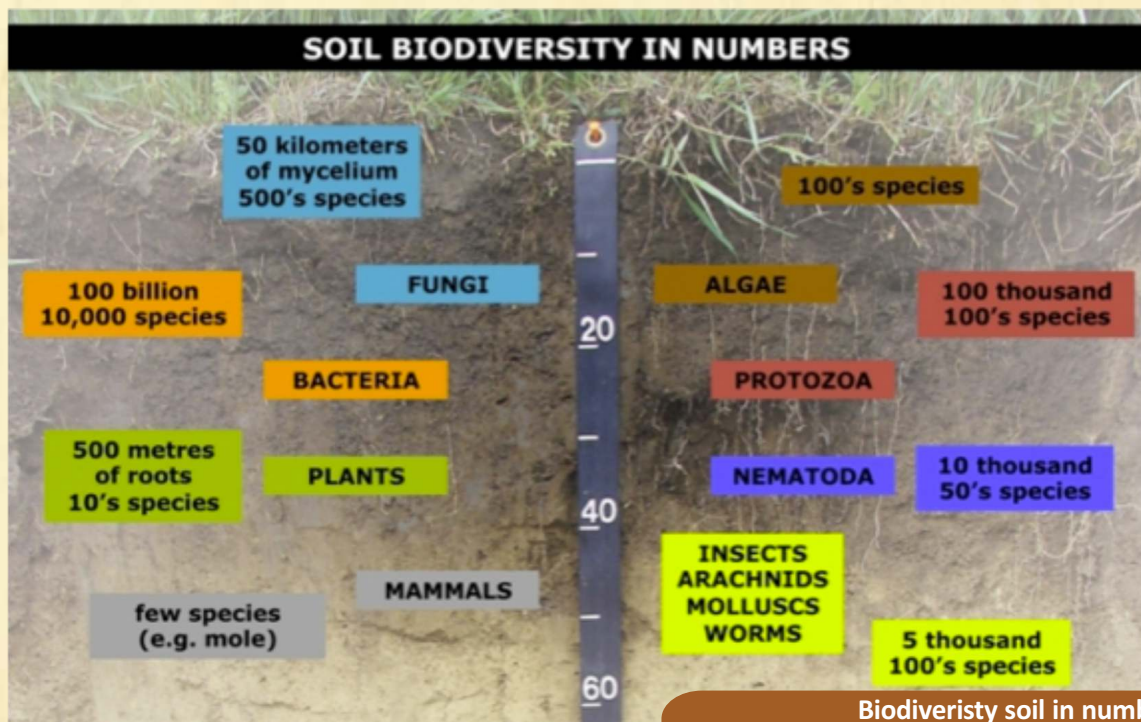


Fungi hyphal net ; Hyphal cells at microscope  
Source: [esdac.jrc.ec.europa.eu/themes/soil-biodiversity](http://esdac.jrc.ec.europa.eu/themes/soil-biodiversity)



The decomposing organisms are the prey of several micro- and macroorganisms, such as protozoas, myriapods, spiders and so on. Concluding, the structure of an ecosystem is

composed of producers and consumers of I, II and III grade, which are deeply intertwined in the so called “food chain”.



Biodiversity soil in number  
Source: [esdac.jrc.ec.europa.eu/themes/soil-biodiversity](http://esdac.jrc.ec.europa.eu/themes/soil-biodiversity)

As on the soil, the ecosystem can be tiny or huge: it can be a small pond where several aquatic vegetable species create habitats and ecological niches that host other animal species, or it can be a long river that includes several sub-ecosystems.

From the ecological point of view, the landscape is like a “mosaic” characterized by ecosystems connectivity, dynamism and balance and above all by ecological fragility.

## Ecosystem Services

*“Ecosystem services are the direct and indirect contributions of ecosystems to human well-being. They support directly or indirectly our survival and quality of life”*.  
Source: Biodiversity information System of Europe

The ecosystem services contribute, both directly and indirectly, to the overall well-being of human civilizations, as they are key to our subsistence and life standard.

The ecosystem services can be

categorized in four main types:

**Provisioning services** are the products obtained from ecosystems such as food, fresh water, wood, fiber, genetic resources and medicines. They can be renewable or non-renewable, so we can run out of them, such as fossil fuels and soil.

**Regulating services** are defined as the benefits obtained from the regulation of ecosystem processes such as climate regulation through the storage of carbon emissions, natural



hazard regulation (e.g. hydrogeological instability), water purification and waste management, pollination, soil biodiversity or pest control.

Regulating services are countless and for ecosystem health as well as for man society the relevant and basic one is surely *pollination* served by honey bees. Bees pollinate nearly 80 % of the wild flora and 70 % of the crops grown in Europe, a service valued at an estimated eur 14.2 billion for the EU-25 alone in 2005 (Gallai et al., 2009). Despite of this needful service provided by

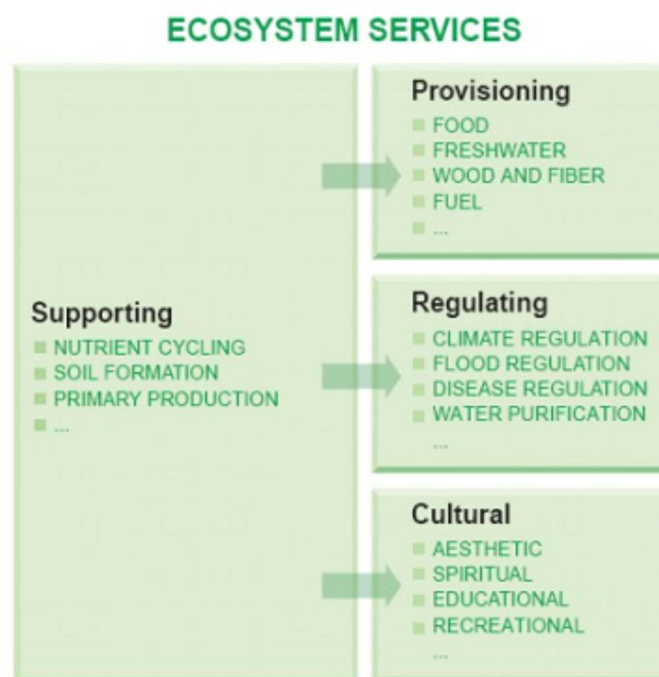
bees and by other 20.000 Hymenoptera pollinator species, numerous are the risk agents that are threatened health and diffusion of this precious insect Family.

**Habitat services** highlight the importance of ecosystems to provide habitat for migratory species and to maintain the viability of gene-pools.

**Cultural services** include non-material benefits that people obtain from ecosystems such as spiritual enrichment, intellectual development, recreation and aesthetic values.

## Focus: Ecosystem Services

### The benefits people obtain from ecosystems



Ecosystem services scheme

Source: *Ecosystem and human well-being, Millennium Ecosystem Assessment*



## Ecosystem in Europe

The Report n. 3/2016 released by the European Environment Agency provides us with a geographical map of the European ecosystems, which tackles the evolution of land usage and the corresponding consequences on the ecological integrity of natural ecosystems.

The ecosystems map gives an idea of their distribution in Europe and, more in specific, in each member State, together

with the some hints about the safeguard protocol activated.

Generally speaking (even though there are some differences from one area to another), the most common ecosystem is represented by forests and woodlands (40%), but just a 4% of these areas is protected and show an untouched natural status.

45% of the European territory is used for agriculture and farming, plus another 5% occupied by urban and industrial areas.



European Ecosystems mapping  
Source: Millenium Ecosystem Assessment-EEA



Urban areas have been gradually occupying natural areas and cultivated land, leading to high discontinuity in the ecologic net and, therefore, to a real ecosystem fragmentation.

In the report n. 2/2011 "Landscape Fragmentation in Europe" released by the European Environment Agency, the phenomenon of landscape fragmentation is defined as "the result of transforming large habitat patches into smaller, more isolated fragments of habitat. This process is most evident in urbanised or otherwise intensively used regions, where fragmentation is the product of the linkage of built-up areas via linear infrastructure, such as roads and railroads (e.g. Saunders et al., 1991; Forman 1995)."

The expansion of urban areas - to the detriment of woodlands, damp areas and meadows - is progressively reducing the habitats dimension, i.e. the "house" of many species that tend to migrate or even disappear from the environment because of the antropic pressure.

Bushes, water streams and forest belts represent a sort of "ecological corridors" that facilitate wild fauna's migration.

The first consequence of the ecological dispersion is the food chains' disintegration and the consequent weakening of ecological networks, the reduction of the resilience capacity and resistance to environmental distress in flora and fauna and, more in general, repercussions on the ecosystem services. The recent reports entitled 'Road construction market in central Europe 2010: Development forecasts and planned investments' (PMR publications, 2010) and 'Deployment on the transEuropean transport network (TEN-T)' (European Commission, 2010a) presented calculations according to which the road construction market in central and

eastern Europe will increase at the average nominal rate of 5 % in the years 2010-2015. For example, Poland will exert the strongest influence on the road construction market by representing 40 % of the market's value due to sizeable investments in motorways unprecedented in Poland's history.

In addition, between 2010-2013, 1 700 km of new motorways were constructed in the five newly incorporated EU member countries: Bulgaria, the Czech Republic, Hungary, Romania and Slovakia. These trends in landscape change threaten many wildlife populations by reduced connectivity among the remaining habitat patches (e.g. Marzluff et al., 2001; Forman et al., 2003).

Habitat patches are broken apart, reduced in size and increasingly isolated. In addition to the direct loss of habitat along linear infrastructure (area taken up by the infrastructure), an even higher amount of core habitat is lost due to edge effects. Smaller habitat patches easily lose keystone species, which contributes to the loss of biodiversity in many industrialised countries.

Many species need access to different types of habitat to be able to complete their life cycle. Roads also enhance human access to wildlife habitats and facilitate the spread of invasive species, and reduces genetic variability (Forman and Alexander, 1998; IUCN, 2001).



Road constructions impact on ecosystem fragmentation  
Source: Millenium Ecosystem Assessment -EEA



Landscape fragmentation is a major cause of the rapid decline of many wildlife populations.

This is the reason why it's really useful buildt *ecological corridors* for animals movings.

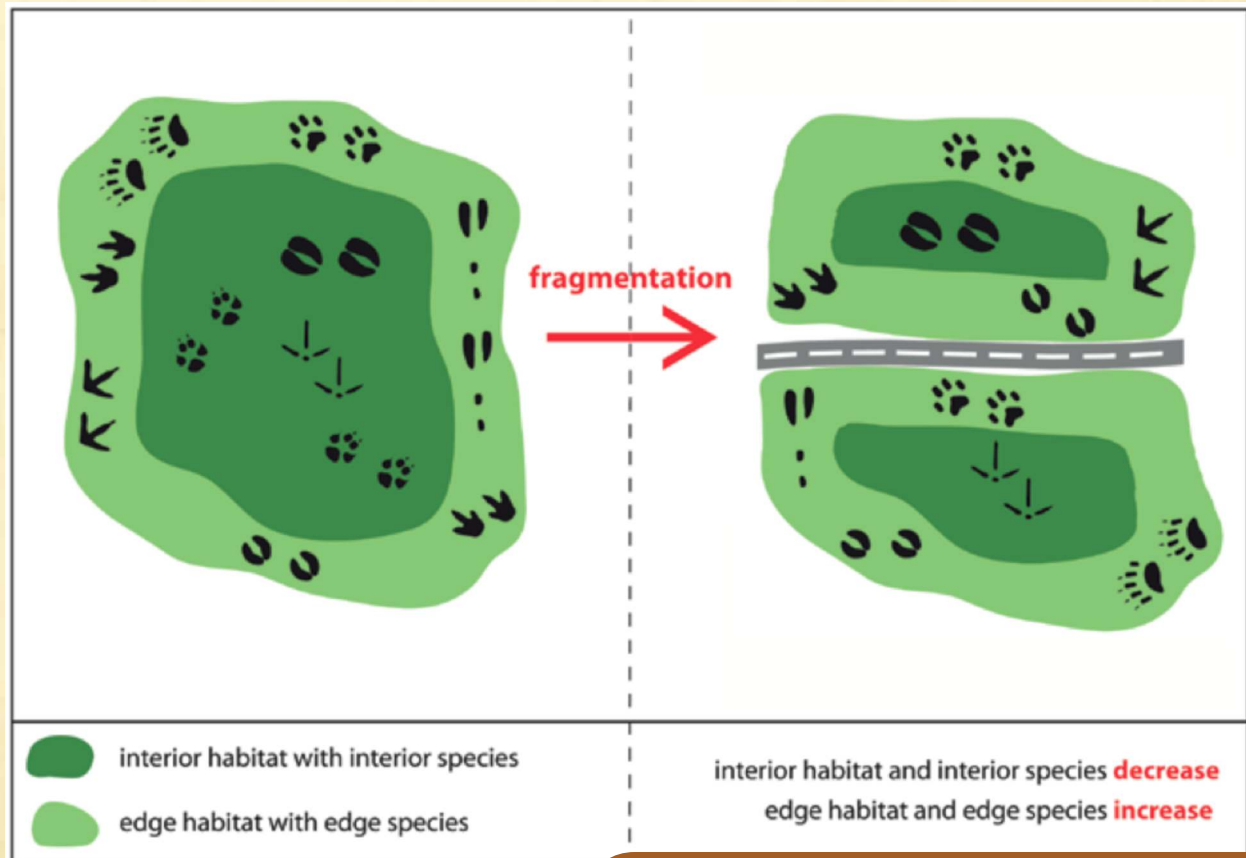


Illustration of the loss of core habitat (or interior habitat) caused by road construction cutting through a patch of habitat  
Source: Fragmentation Ecosystem Report - EEA

Not only road net amplification, but also urban sprawl is one of the major fragmentation factors. Land take as a result of the expansion of residential areas and construction sites is the main cause of the increase in urban land coverage in Europe.

Agricultural zones and, to a lesser extent, forests and semi-natural and natural areas are disappearing in favour of the development of artificial surfaces.

Between 2006 and 2012, the annual land take in the European countries assessed in the 2012 Corine land cover project was approximately 107 000 ha/year.

In absolute values, the annual land take in these 28 countries was 114 000 ha/year (1990-2000), 102 000 ha/year (2000-2006) and 98 500 ha/year (2006-2012), of which

the 46,2% belongs to Arable Land and permanent crops category, the 26,7% to Pasture and Mixed Agricultural areas and the 16,3 % to Forest and transitional Woodland.(Data source: Corine Land Cover changes 2006-2012).

The construction of residential areas, infrastructures, commercial and industrial districts is the main cause for land consumption and ecosystem fragmentation. The loss of land due to the infrastructural expansion affects the ecosystem service, both directly (biomass and food supply) and indirectly (climate regulation, storage of carbon emissions, control of erosion and hydrogeological instability, water purification, preservation of biodiversity).



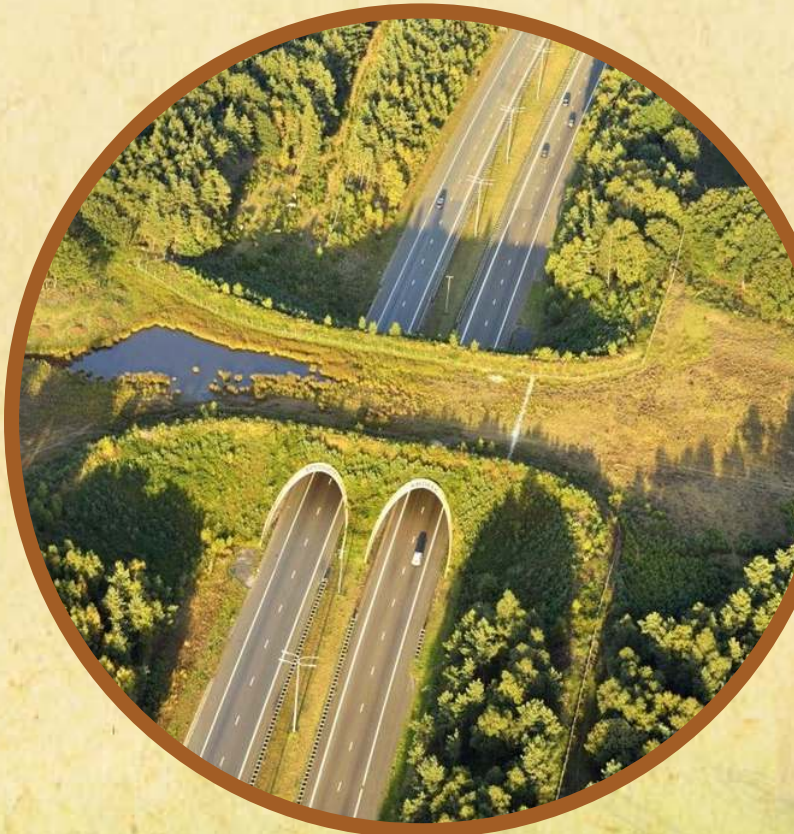


Building site for the construction of a new infrastructure in Northern Italy, near Treviso to the left the area in 2015, to the right the same area in 2016

Source: Landtake Report 2017, ISPRA Italian Institute for environment protection and research

In Italy the loss of ecosystem services due to land consumption has been evaluated (from an economical point of view) by the Italian Institute for environmental protection (ISPRA), and the report issued shows the approximate cost varies between 30.591 and 44.400 euros per hectare lost.

As for the distribution of this cost, the highest amount is connected to agriculture (45%), erosion (20%), storage of carbon emissions (14%) and water percolation (14%). In conclusion, it can be reasonably stated that land consumption for agro-forestry affects exactly those basic functions that the environment should provide for this usage: raw material supply (i.e. food and water) and waste absorption (i.e. CO<sub>2</sub> from productive processes).



Example of eco-bridges as artificial ecological corridors for wildlife

Source: Landscape fragmentation in Europe -EEA Report 2/11



The ecosystem fragmentation and the biodiversity loss are phenomena closely related to the spread of intensive farming. Since the first post-war period, intensive farming has been characterized by mono-cropping (especially cereals and forage), the



reduction of variety and diversity of cultures, the mechanization of the production chain, the use of protection products and chemical fertilizers and the removal of all natural (or semi-natural) elements that could be an obstacle to farm machinery.



Maize crop in a conventional agricultural farm in Padana Plane region. Northern Italy

In order to restore the ecosystem balance, it is necessary to re-create the landscape's



traditional pattern, where thick hedges enclose cultivated fields.



Crop of vegetables in a organic farm in Modena, Northern Italy surrounded by thick hedges

Long rows of indigenous trees and bushes (varying according to the local climate) increase the crop resistance against parasites. The presence of a big variety of bushes favors the animal biodiversity, more in particular of entomophagous (i.e. insect-eating) insects and consist in a necessary ecological corridors for wildlife like birds and mammals.

Little island of bushes became a core areas

where biodiversity can find their specific habitat and create stable community. A remarkable presence of insects and other animal species living in hedges and bushes makes the agro-ecosystem not only richer in terms of biodiversity but also stronger against parasites, and it supports food chains by favoring soil's biodiversity and fertility and by attracting pollinators, which increase farming productivity too.



## LITERATURE SOURCE

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### Landscape

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### Biodiversity

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<https://www.eea.europa.eu/soer-2015/countries/italy>  
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### Soil

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[http://www.isprambiente.gov.it/files2017/pubblicazioni/rapporto/copy2\\_of\\_RapportoConsumoSuolo2017\\_0615\\_web\\_light.pdf](http://www.isprambiente.gov.it/files2017/pubblicazioni/rapporto/copy2_of_RapportoConsumoSuolo2017_0615_web_light.pdf)

### Agroecology

[http://ec.europa.eu/eurostat/statistics-explained/index.php/Agro-environmental\\_indicator\\_-\\_consumption\\_of\\_pesticides](http://ec.europa.eu/eurostat/statistics-explained/index.php/Agro-environmental_indicator_-_consumption_of_pesticides)  
[https://www.youtube.com/watch?v=83Pe\\_9UMsq4](https://www.youtube.com/watch?v=83Pe_9UMsq4) agroecology

### Environment

[http://www.isprambiente.gov.it/it/pubblicazioni/rapporti/analisi-delle-serie-storiche-dei-principali-inquinanti-atmosferici-in-italia-2003-2013-2012/leadImage/image\\_view\\_fullscreen](http://www.isprambiente.gov.it/it/pubblicazioni/rapporti/analisi-delle-serie-storiche-dei-principali-inquinanti-atmosferici-in-italia-2003-2013-2012/leadImage/image_view_fullscreen)  
<https://www.eea.europa.eu/publications/state-of-nature-in-the-eu>



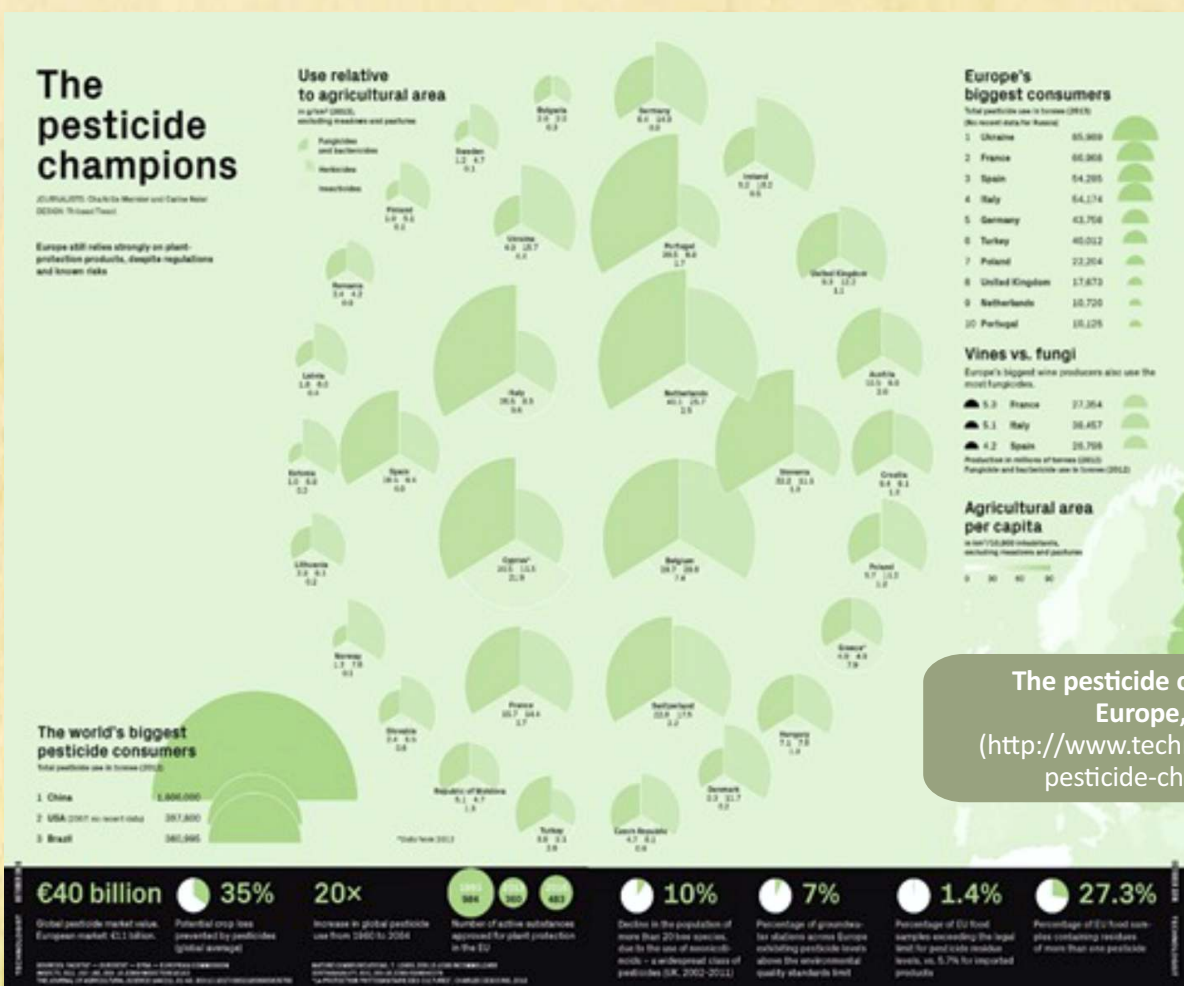
# LANDSCAPE THREATS

## Pesticides

Today Europe accounts for almost a quarter of the growing global pesticide market, with the vast majority of products applied in the agricultural sector. The three main classes – herbicides, fungicides and insecticides – are used to protect plants from weeds, fungi and insects. Their application rates vary depending on farmers „training and on the crops“ characteristics. Grapes, for example, are a fungicide-intensive crop, and tulips – widespread in the Netherlands – are pesticide-intensive due to their value and high pest pressure.

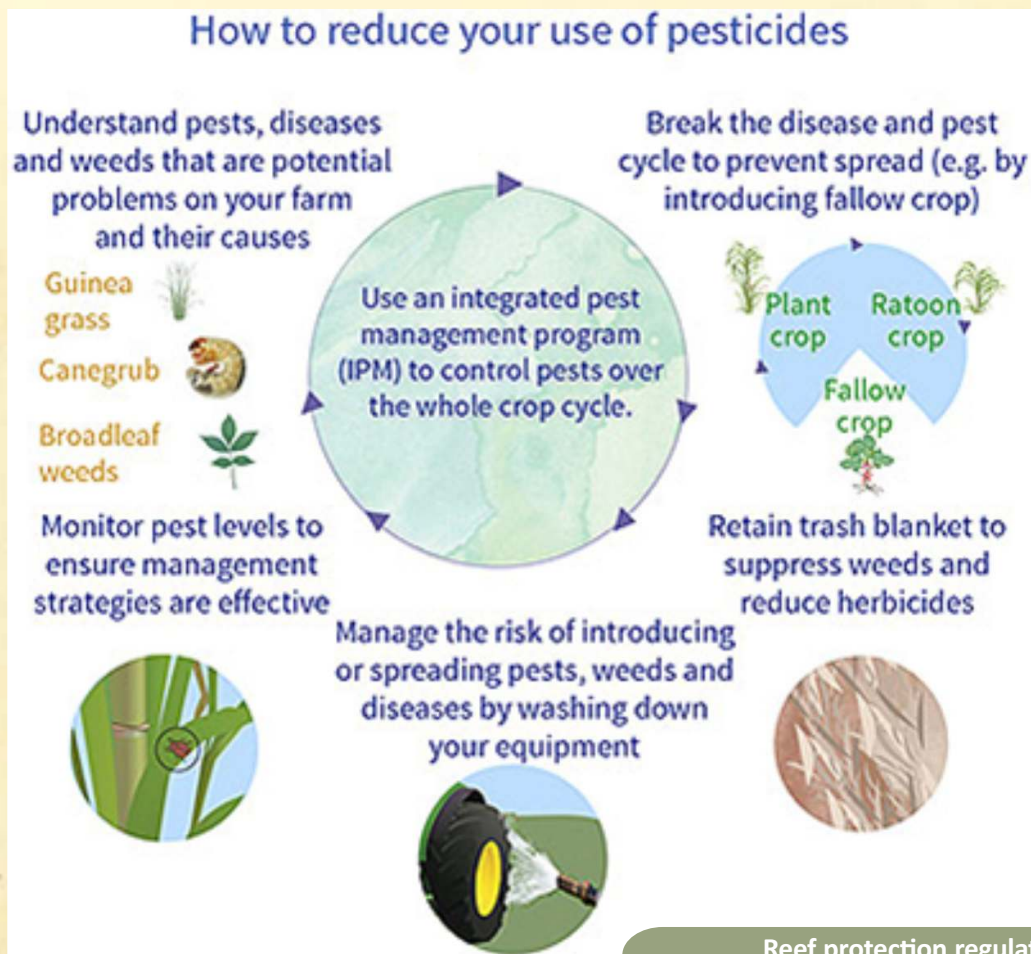
Introduced in the 1940s, synthetic pesticides have been evolving ever since. In the early 90s, new EU regulations led to the withdrawal of various compounds, some of

which were replaced by more effective products used at lower dosages, leading in some countries to a slight reduction in the volume of pesticide used. Across Europe, various incentives encourage low-pesticide farming: Sweden and Norway both introduced targeted tax schemes in the 1980s, followed by France and Denmark in the late 2000s, though with limited effectiveness. Belgium, Switzerland, the Netherlands and Germany have recently discussed similar measures. Organic farming is one of the ways to reduce pesticide use. 2014 organic farming accounted for 5.4 per cent of the total agricultural area, which is by 2.3 per cent more than in the previous year.



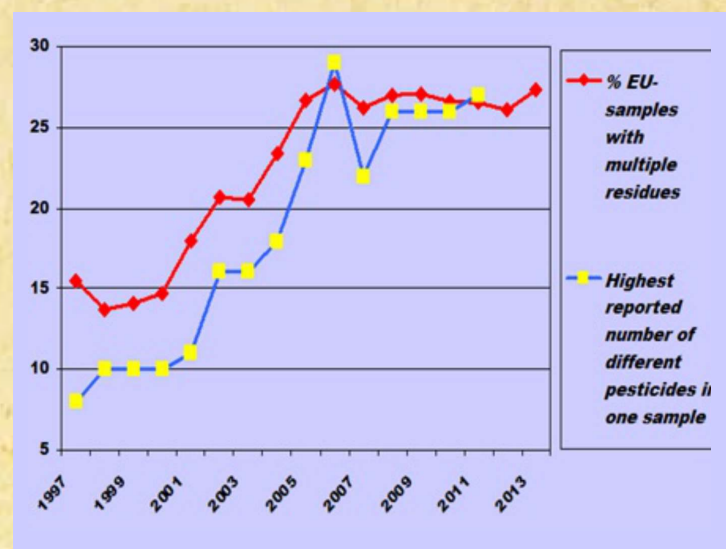
The pesticide champions in Europe, 2016  
(<http://www.technologist.eu/the-pesticide-champions/>)





Reef protection regulations, 2018  
(<https://www.qld.gov.au/environment/agriculture/sustainable-farming/canefarming-impacts#>)

The massive use of pesticides in fruit and vegetables and the cocktails applied are reflected in our food. Currently 27 per cent of all fruit and vegetables contain multiple residue (cocktails of pesticides); a bucket of strawberries or a bunch of grapes could easily contain 10 – 15 pesticides. Also the maximum number of pesticides found in one food item is at the almost unbelievable level of 28 as is shown in graph below. European consumers will be exposed to a daily dose of pesticide cocktails as a consequence. In 2013 the percentage of multiple residues in European vegetables and fruit increased again to the extreme high rate of 27,3 per cent. Unfortunately EFSA stopped publishing the data on the highest reported number of different pesticides in one sample.



Pesticide Use in Europe, 2013  
(<https://www.pan-europe.info/issues/pesticide-use-europe>)



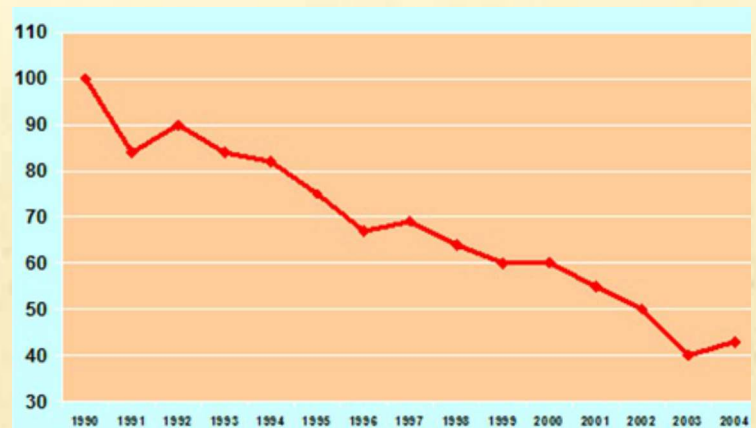
As a consequence of the industrial agriculture no place is left for natural life. Monocultures from maize, grass, potatoes, bulbs, massive use of pesticides and fertilizers make life for animals and herbs impossible. Food (insects, seeds) is not available anymore or poisoned, place to shelter (hedges, trees, buffer zones) gone and crop growing will take all place available. Birds, mammals, bees and all natural life has more or less disappeared in the agricultural areas, like the Skylark, for ages an abundant bird in the European fields and now threatened to extinction (see graph).

Not only birds, but also a large number of wildlife species is in danger for agricultural synthesis compounds spread, first of all honey bees.

The increasing of pesticide consumption during the last four decades and the side effects one of which is the toxicity to honey bees. According to a study in the UK, pesticides damage the ability of bees to gather food and are also killing them. Since bees are the most important pollinators of crops, the use of pesticides can considerably reduce the yield of cross pollinated crops. In addition to the above effects, contamination of bee products, and loss in production of honey are the other effects caused by pesticides on bees.

Unfortunately, many pesticides are harmful to bee population. There are some pesticides that kill the bees directly. This occurs when bees are on the flowers at the time of application of the insecticide and the bees die instantly. Some other types of pesticides allow the bees to return home and then they die. Such types are easy to identify than the first ones. There are certain pesticides that do not have any effect on the adult honey bees, but cause damage to young, immature bees.

According to research, two pesticides commonly used by farmers today could affect bees brains. The two pesticides



Number of skylarks in the Netherlands (1990 = 100%)  
Pesticide Use in Europe, 2013  
(<https://www.pan-europe.info/issues/pesticide-use-europe>)

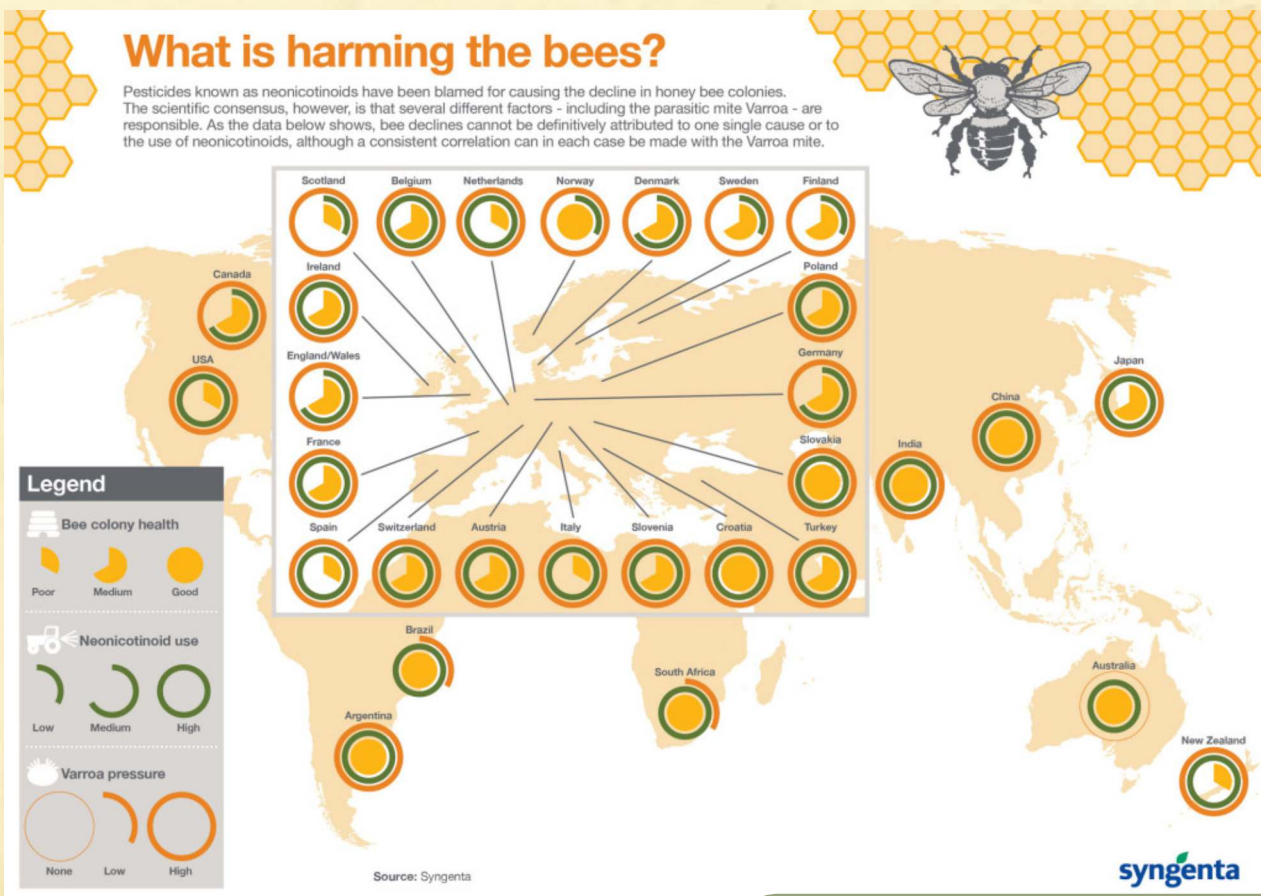
namely, neonicotinoids and coumaphos target bees brains, thus making it a slow learner and make the it forget floral scents. They also found that, the combination effect of these two pesticides were far greater than individual effect. Bees that were exposed to combined insecticides, were slow to learn or sometimes completely forgot important associations between their ability to nectar and floral scent.

The neonicotinoids are a relatively new class of pesticides that have an effect on the bee's central nervous system. It is the most widely used insecticide in US, which is used as a coating in agricultural seeds and in potted plants. It spreads to the whole plant including pollen and nectar that the bees eat. Scientific studies indicate that the bees that feed on neonicotinoid contaminated pollen and nectar forage less and produces fewer offspring. The other insecticide, coumaphos, is a compound that is used in honey bee hive to kill a parasite called the Varroa mite that commonly attacks honey bees.



coumaphos, is a compound that is used in honey bee hive to kill a parasite called the

Varroa mite that commonly attacks honey bees.



What is harming the bees? 2018  
(<https://www.syngenta.com/>)

A study of the honey bee's genome published in 2006 in the journal *Genome Research* says honey bees have 170 odorant receptors that can help them sniff out and distinguish different types of flowers — so it's important to understand how critical a bee's sense of smell is to its ability to find food.

The results of Penn State researchers' computer simulations showed that even a moderate level of air pollutant such 60 parts per billion of ozone can change a floral scent composition and make it harder for bees to find their next food source. This alteration could have a dramatic effect on bees' foraging habits and food supplies that could create "severe cascading and pernicious impacts on the fitness of foraging insects by reducing the time devoted to other

necessary tasks," the study's abstract suggests.

Jose D. Fuentes, a professor of meteorology and atmosphere science at Penn State and lead author on the study, says that floral scents need to be able to travel a great distance in order for bees to find them. He estimates that the nests of bees and other insects that pollinate flowers can be located up to 3,000 feet away from their nearest food source.

So a pollutant that degrades the quality of a floral scent and lessens its reach could have a dramatic effect on bees' pollination habits and patterns, Fuentes says.

"We found that when we confused the bees' environment by modifying the gases present in the atmosphere, they spent more time foraging and would bring back less food,



which would affect their colonies," Fuentes says. "It's similar to being asked to get a cup of coffee at the nearest cafeteria while you are blindfolded. It will be hard to locate the coffee shop without using visual cues. The same could happen to insect pollinators

while foraging for food in polluted air masses."

The absence of insect pollination would cut the production of crops that are partially dependent on insect pollination by around 25–32 % (Zulian et al., 2013).

## Pollution

It is estimated that every year over 400 000 citizens die prematurely in the EU as a result of poor air quality: this is more than ten-fold the number of deaths by road traffic accidents. Millions more suffer from respiratory and cardiovascular diseases caused by air pollution.

The Air Quality Atlas for Europe developed by the JRC provides information on the type and location of the main emission sources of particulate matter in the air of the 150 European cities with a population density above 1,500/km<sup>2</sup> and a population above 50,000.

Many of these cities are battling air pollution that exceeds the air quality levels recommended by the EU and the World Health Organisation.

Tibor Navracsics, the Commissioner responsible for the JRC, said: "Thanks to national and EU policies, the air we breathe today is much cleaner than in the past. Yet air pollution remains a problem in many regions and cities in Europe. We must better understand where urban pollution comes from in order to tackle it at the right level – local, national or European. The Air Quality Atlas produced by the JRC provides essential information on pollution sources for European cities struggling with air pollution. It will help cities design air quality plans which focus on their most polluting activities".

The cities with the highest particulate pollution in Europe are located in Southern Poland, the Italian Po Valley and Bulgaria.

The table below shows the data of particulate pollution of project partner countries.

Rank	City	Pollution Index	Exp Pollution Index
1	London, United Kingdom	59.56	106.34
2	Manchester, United Kingdom	54.07	92.93
3	Birmingham, United Kingdom	43.22	73.63
4	Glasgow, United Kingdom	30.67	53.33
5	Edinburgh, United Kingdom	20.23	40.21
Rank	City	Pollution Index	Exp Pollution Index
1	Brno, Czech Republic	44.15	72.97
2	Prague, Czech Republic	36.80	63.18
Rank	City	Pollution Index	Exp Pollution Index
1	Budapest, Hungary	54.57	97.33
Rank	City	Pollution Index	Exp Pollution Index
1	Naples, Italy	83.08	148.82
2	Turin, Italy	74.49	139.58
3	Rome, Italy	67.50	125.77
4	Milan, Italy	63.85	116.11
Rank	City	Pollution Index	Exp Pollution Index
1	Vienna, Austria	18.97	31.63
Rank	City	Pollution Index	Exp Pollution Index
1	Vilnius, Lithuania	28.34	46.40



whIn 2015, the annual average and annual maximum PM2.5 levels of Katowice, Krakow, Ostrava, Czestochowa, Plovdiv, Sofia, Lodz, Kielce, Poznan and Brescia were above the EU annual target value for PM2.5 (25 µg/m<sup>3</sup>).

Nearly all 150 cities have their PM2.5 levels above the WHO recommendation (10 µg/m<sup>3</sup>). According to data from 2015, only Stockholm, Glasgow, Tallinn, Helsinki, Goteborg, Genova, Clermont-Ferrand were below these levels.

Transport emissions represent an important contribution to the particulate matter (PM2.5) levels in some of the European cities such as Madrid, Spain (39 per cent), Luxembourg City, Luxembourg (30 per cent) and Paris, France (29 per cent) and are a key contributor in densely populated areas like Belgium and the Netherlands.

Although agricultural activities take place mostly outside cities, agricultural emissions contribute to fine particulate matter concentration in many European cities.

The highest levels were found in Dresden, Germany (40 per cent), Braunschweig-Salzgitter-Wolfsburg, Germany (39 per cent), Usti nad Labem, Czech Republic (38 per cent), Pilsen, Czech Republic (37 per cent) and Leipzig, Germany (36 per cent).

Industry plays a key role in city pollution in

some of the Eastern countries (Bulgaria, Romania and Greece) as well as in the western part of Germany. The largest contributions were found in Mannheim-Ludwigshafen, Germany (47 per cent), Bilbao, Spain (46 per cent), Linz, Austria (44 per cent), Marseille, France (41 per cent) and Brescia, Italy (37 per cent).

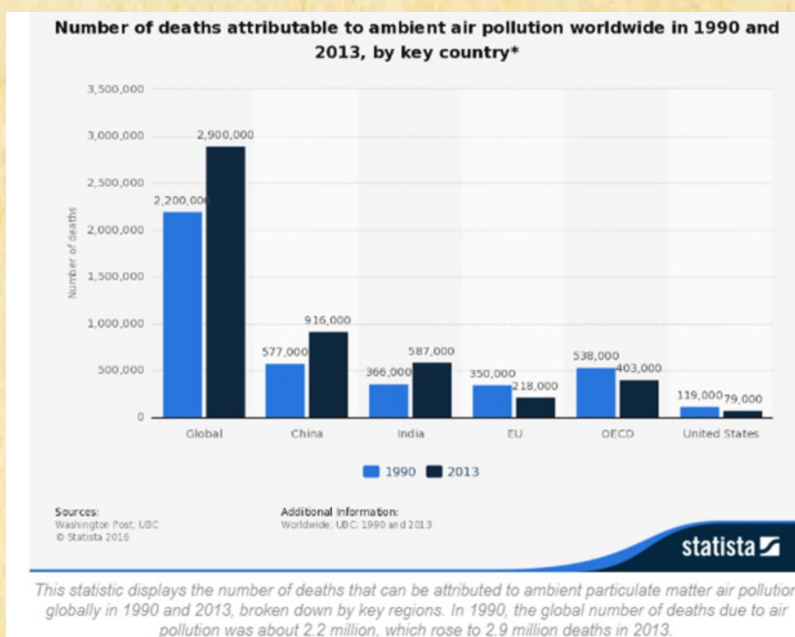
The impact of residential heating is more important in the eastern countries (Poland in particular) and in some cities in Italy.

The largest contributions were found in Warsaw, Poland (48 per cent), Krakow, Poland (40 per cent), Katowice, Poland (40 per cent), Lodz, Poland (33 per cent) and Poznan, Poland (33 per cent).

The Air Quality Atlas for Europe provides a detailed analysis of the sources of particulate matter for the 150 cities. It ranks the sectors that contribute most to air pollution and indicates the share of pollution emanating from local, national and European sources.

The Atlas also clarifies the role that cities, regions, Member States and the EU can have in the reduction of air pollution.

At the Clean Air Forum taking place today in Paris, the Commission also launched a new Air Quality Index with the EU Environment Agency, which allows citizens to monitor air quality in real-time.



1/ PM2.5 means the mass per cubic metre of air of particles with a size (diameter) generally less than 2.5 micrometres (µm).

UN environmental summit focuses on global air pollution, 2016  
(<https://america.cgtn.com/2016/05/24/un-environmental-summit-focuses-on-global-air-pollution>)



EU air quality policy has brought significant reductions in concentrations of harmful pollutants such as particulate matter, sulphur dioxide, lead – and yet, major problems remain. Fine particulate matter, nitrogen dioxide, and ozone, in particular, continue to present significant health risks, and recommended limits for health are regularly exceeded.

EU air quality standards are breached in many regions and cities, and public health suffers accordingly, with rising costs to health care and the economy.

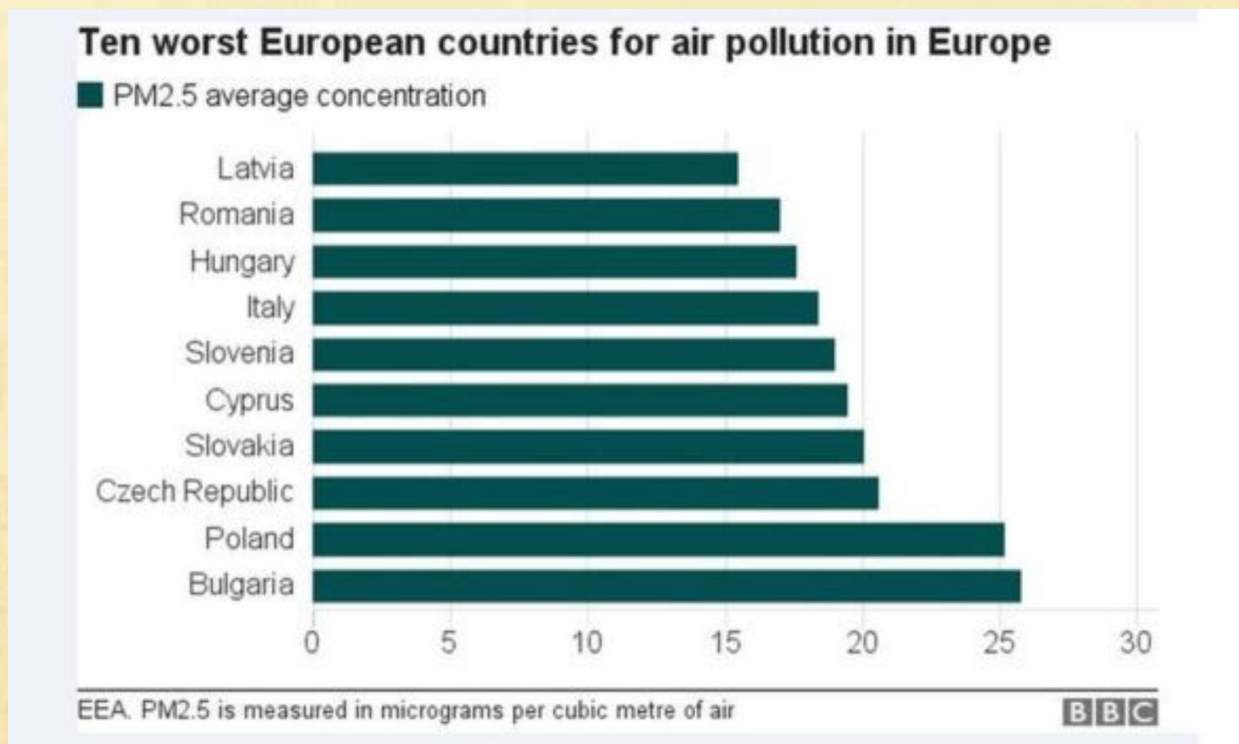
The term particulate matter refers to fine solid or liquid particles created by human activities. It includes dust, smoke, soot, pollen and soil particles.

PM2.5 is particulate matter with a diameter smaller than 2.5  $\mu\text{m}$ ; PM10 refers to particulate matter with diameter smaller than 10  $\mu\text{m}$ .

These pollutants can be emitted directly or be formed through series of complex chemical formation processes from other air pollutants.

Depending on meteorological conditions, PM2.5 can remain in the atmosphere from several days up to one week.

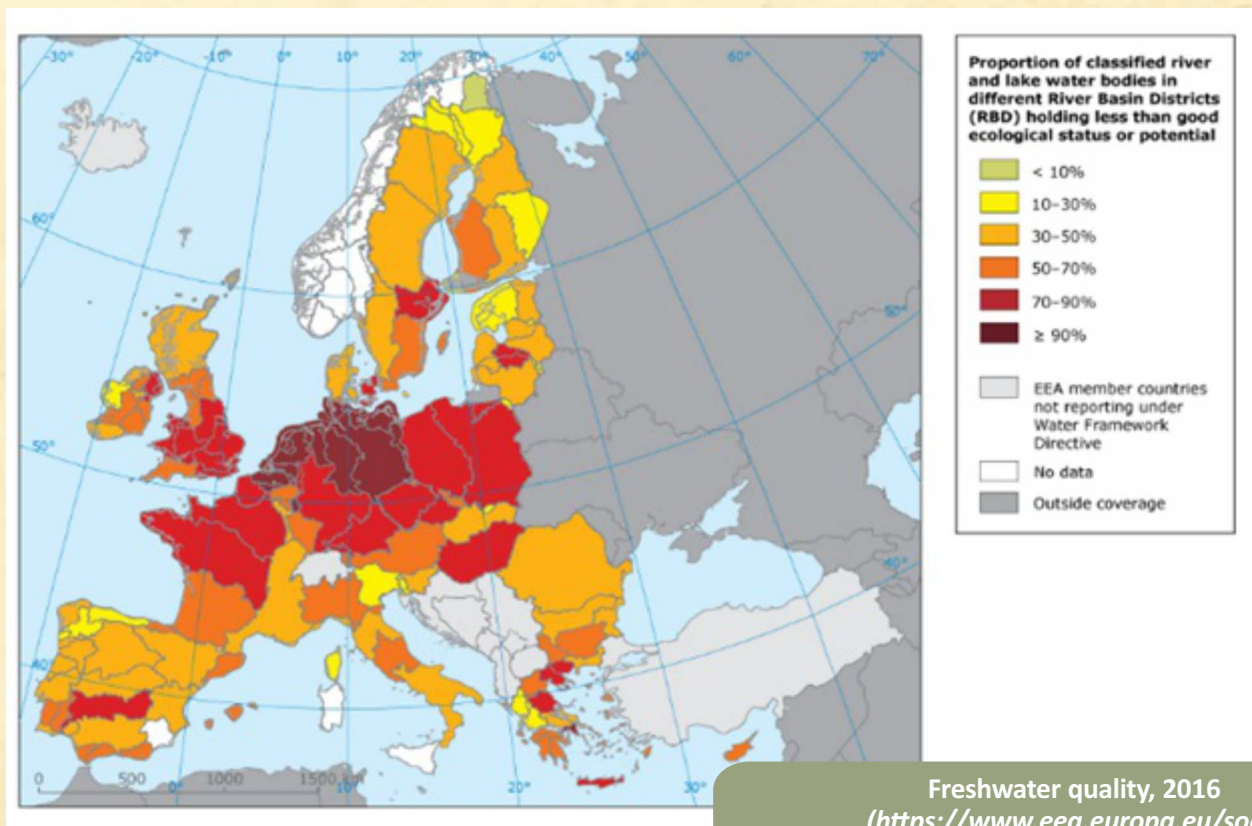
PM2.5 is responsible of adverse health effects and premature deaths and it has been estimated to reduce life expectancy in the EU by eight to 10 months in the most polluted regions.



How big is the air pollution problem? 2018  
(<https://www.pollutionairmask.com/air-pollution-causes-467000-premature-deaths-a-year-in-europe/>)



## Water Pollution



Freshwater quality, 2016  
<https://www.eea.europa.eu/soer-2015/europe/freshwater#tab-based-on-indicators>

Many years of investment in the sewage system, and better wastewater treatment under the Urban Waste Water Treatment Directive — together with national legislation — have led to some remarkable improvements. Europe's waters are much cleaner today than they were 25 years ago when large quantities of untreated or partially treated urban and industrial wastewater were discharged into water.

Around half of Europe's rivers and lakes are still polluted, a major environmental review has found, despite a 15-year-old target to restore all the continent's waters to good ecological health by 2015.

Among the worst offenders are Germany and the Netherlands, where more than 90% of fresh water has failed to reach good ecological status (see chart, below). Waters

with good status are defined as those that deviate only slightly from “undisturbed” reference conditions, which are based on measurements of chemical pollutants such as nitrates, biological indicators including the abundance of caddisflies and other invertebrates around rivers, and the physical condition of the water (whether a river is in a free-flowing, near-natural course, for example, or has been affected by structures such as hydroelectric power plants).

Pollution from agriculture and urbanization is mostly to blame. “Europe has not been very good at getting rid of manure from animal farming, nor lowering fertilizer use,” says Bruyninckx. Urbanization leads to changes in land use, as farmland pastures and forests are converted into mining and construction sites.

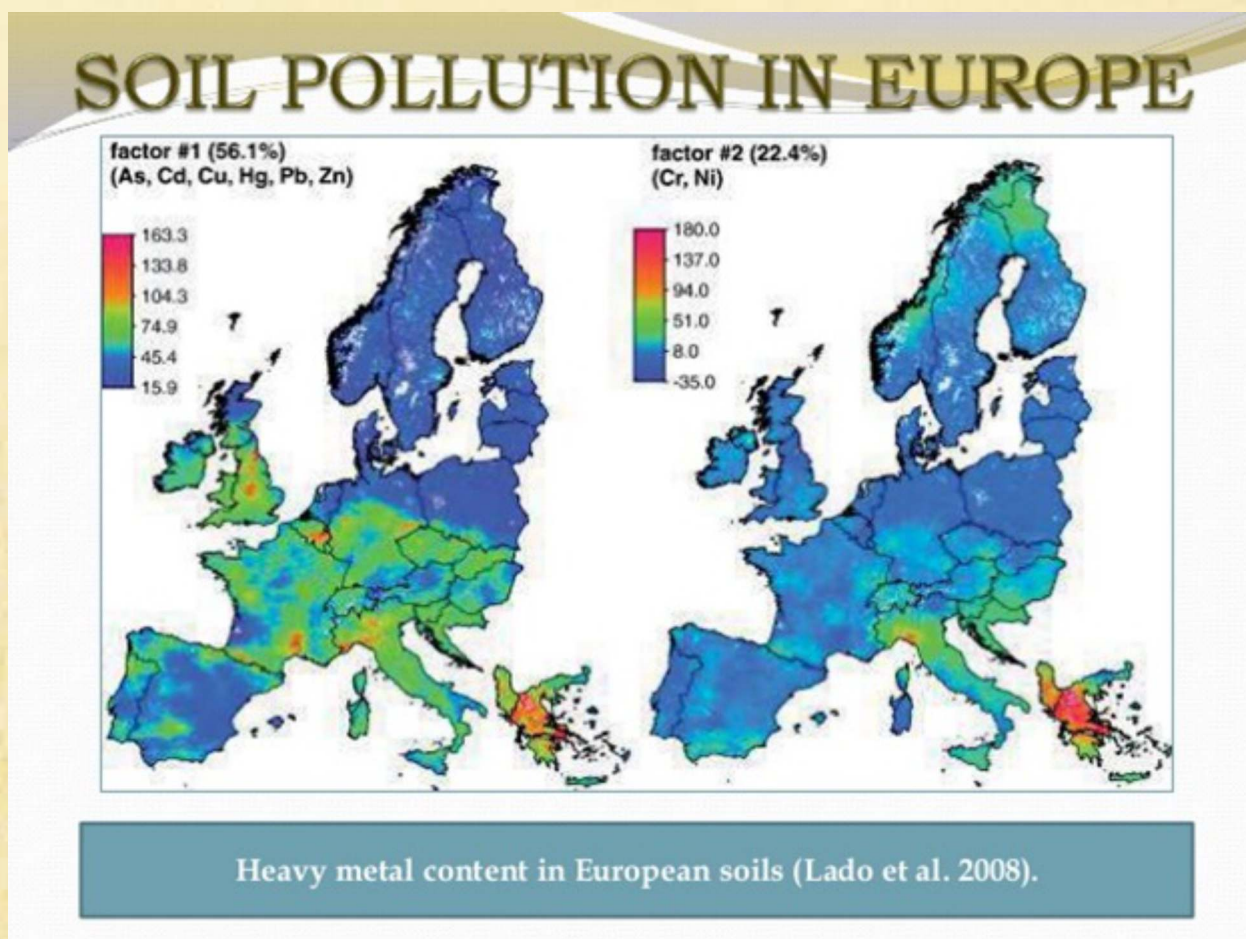


## Soil Pollution

Soil contamination in Europe can be divided into different topics according to the source of pollution (point or diffuse, from industry, urban or agriculture) and the types of the (emerging) pollutant (organics, inorganics, particulate pollutants).

In 2011-12, the European Soil Data Centre of the European Commission conducted a project to collect data on contaminated sites from national institutions in Europe using the European Environment Information and Observation Network for Soil (EIONET-SOIL). According to the received data, the total number of identified contaminated sites

caused by point pollution is 2.5 million, the estimated number of potentially contaminated sites is 11.7 million (Panagos et al., 2013). Municipal and industrial wastes contribute most to soil contamination (37%), followed by the industrial/commercial sector (33%). Mineral oil and heavy metals are the main contaminants contributing around 60% to soil contamination. In terms of budget, the management of contaminated sites is estimated to cost around 6 billion Euros (€) annually (Panagos et al., 2013).



(<https://www.slideshare.net/KakaliRoy2/soil-pollution-64065819>)



Lado et al. (2008) present the results of modelling the distribution of eight critical heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc) in topsoils using 1588 georeferenced samples from the Forum of European Geological Surveys Geochemical database (26 European countries). High values of Cr and/or Ni are mainly found in central Greece, northern Italy, the central Pyrenees, northern Scandinavia, Slovakia and Croatia and show a strong correlation between the contents of Ni and Cr and the magnitude of earthquakes. The seismic activity is indirectly correlated with heavy metal concentrations – such materials provide high quantities of Ni and Cr to the soils by weathering processes. Cadmium, Cu, Hg, Pb, Zn present a high concentration in Central Europe and are mainly related with agriculture and with quaternary limestone. The use of fertilizers, manure and agrochemicals are important sources of these elements. They are also inversely correlated with distance to roads (Lado et al., 2008).

Although there are 700 emerging pollutants described in the European environment (NORMAN, 2014), until now, they are only taken under consideration in the aquatic environment. Their presence and concentration in the terrestrial ecosystem is unknown as is the potential risk for the

environment. Aerial transport of pollutants from industrial and urban sources is even more difficult to monitor because their distribution and the fall out is not easily known.

More than 3000 different types of pesticides have been used in the European agricultural environment in the past 50 years. It has been estimated that less than 0.1% of the pesticide applied to crops actually reaches the target pest; the rest enters the environment, contaminating soil, water and air, where it can poison. Heavy metal content in European soils (Lado et al. 2008). 95 otherwise adversely affect non-target organisms (Pimentel and Levitan, 1986). Furthermore, many pesticides can persist for long periods in an ecosystem – organochlorine insecticides, paraquat, deiquat for instance, were still detectable in surface waters 20 years after their use had been banned (Larson et al., 1997). Few studies have been carried out monitoring the mixtures of pesticides present in our soils. Oldal et al. (2006) and Ferencz and Balog (2010) found high concentrations of mixtures of organochlorines and lindane even 20 years after they were forbidden in Hungarian and Romanian soils. Whilst the EC has data available on the herbicide applications per country, no data exist on the actual pesticide concentration in European soils.





## Urbanization

In only 200 years, the world's urban population has grown from 2 percent to nearly 50 percent of all people. The most striking examples of the urbanization of the world are the megacities of 10 million or more people. In 1975 only four megacities existed; in 2000 there were 18. And by 2015 there were 22.

The growth in urban areas comes from both the increase in migration to the cities and the fertility of urban populations. Much of urban migration is driven by rural populations' desire for the advantages that urban areas offer. Urban advantages include greater opportunities to receive education, health care, and services such as entertainment. The urban poor have less opportunity for education than the urban nonpoor, but still they have more chance than rural populations.

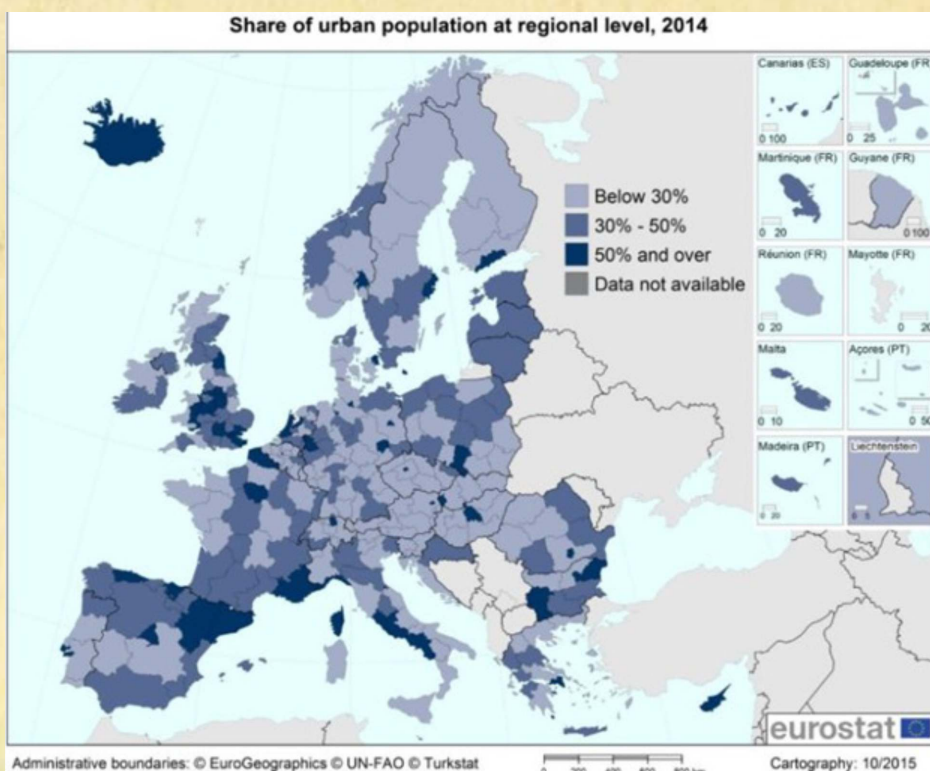
Urban fertility rates, though lower than rural fertility rates in every region of the world, contribute to the growth of urban areas. Within urban areas, women who migrated from rural areas have more children than those born in urban areas. Of course, the

rural migrants to urban areas are not a random selection of the rural population; they are more likely to have wanted fewer children even if they had stayed in the countryside. So the difference between the fertility of urban migrants and rural women probably exaggerates the impact of urban migration on fertility.

The urban environment is an important factor in determining the quality of life in urban areas and the impact of the urban area on the broader environment. Some urban environmental problems include inadequate water and sanitation, lack of rubbish disposal, and industrial pollution. Unfortunately, reducing the problems and ameliorating their effects on the urban population are expensive.

The health implications of these environmental problems include respiratory infections and other infectious and parasitic diseases. Capital costs for building improved environmental infrastructure – for example, investments in a cleaner public transportation system such as a subway – and for building more hospitals and clinics

are higher in cities, where wages exceed those paid in rural areas. And urban land prices are much higher because of the competition for space. But not all urban areas have the same kinds of environmental conditions or health problems. Some research suggests that indicators of health problems, such as rates of infant mortality, are higher in cities that are growing rapidly than in those where growth is slower.



Proceeding urbanization in the EU member states, 2015

(<http://ec.europa.eu/eurostat/documents/2995521/7020151/3-05102015-BP->



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Freshwater quality, 2016: <https://www.eea.europa.eu/soer-2015/europe/freshwater#tab-based-on-indicators>;

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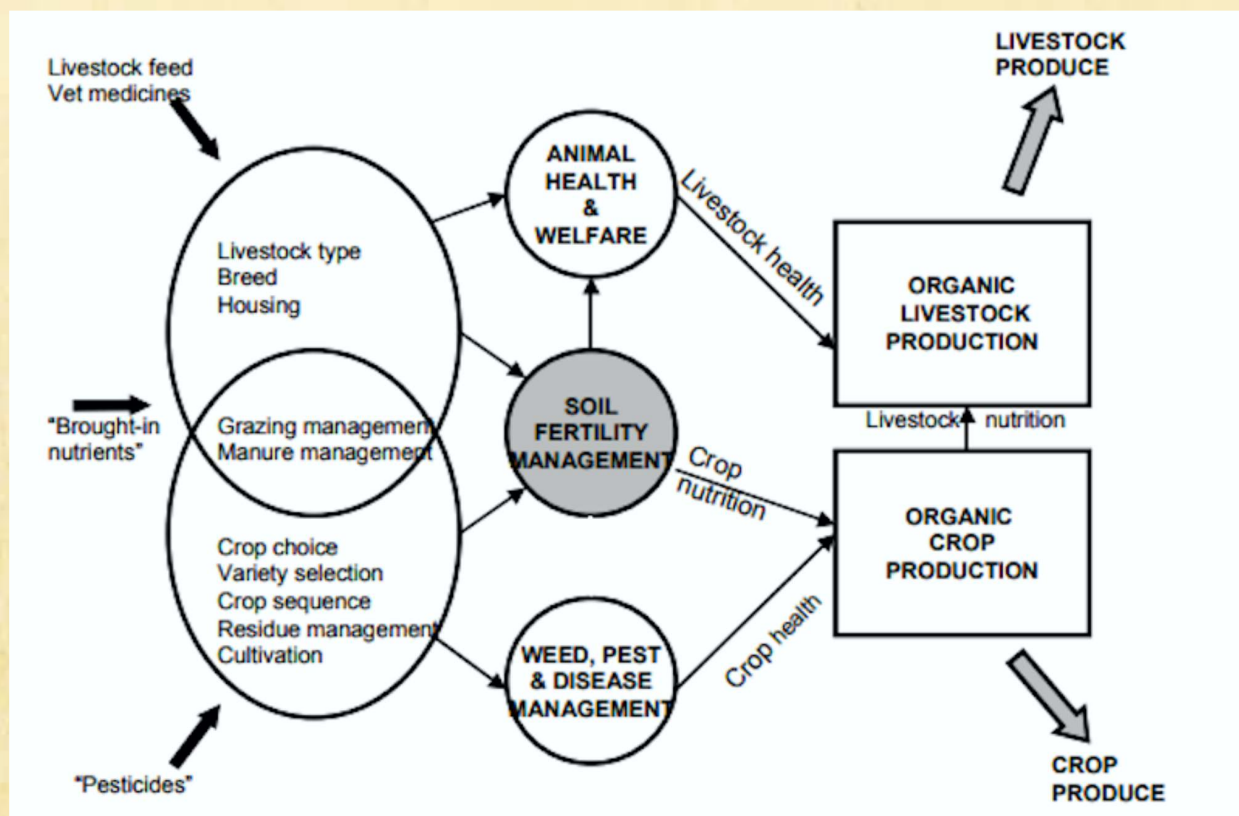
# SOIL & FERTILITY MANAGEMENT THREATS

Soil fertility is most commonly defined in terms of the ability of a soil to supply nutrients to crops. In our view soil fertility is an ecosystem concept integrating the diverse soil functions, including nutrient supply, which promote plant production. Soil fertility is fundamental in determining the productivity of all farming systems.

Organic farming systems, as the only sustainable farming systems legally defined, rely on the management of soil organic matter to enhance the chemical, biological,

and physical properties of the soil, in order to optimize crop production.

Soil management controls the supply of nutrients to crops, and subsequently to livestock and humans. Furthermore soil processes play a key role in suppressing weeds, pests and diseases. The following figure illustrates conceptually the complexity of the relationships between soil fertility and the different components within and outside the system that may influence it.



Source:

<https://pdfs.semanticscholar.org/74c6/785d6436b88d6d11fca9537da65087ba4097.pdf>

One of the fundamental differences between management of organic and conventional systems is the way in which problems are addressed. Conventional agriculture often relies on targeted short-term solutions e.g. application of a soluble

fertilizer or herbicide. Organic systems, in contrast, use a strategically different approach, which relies on longer-term solutions (preventative rather than reactive) at the systems level.



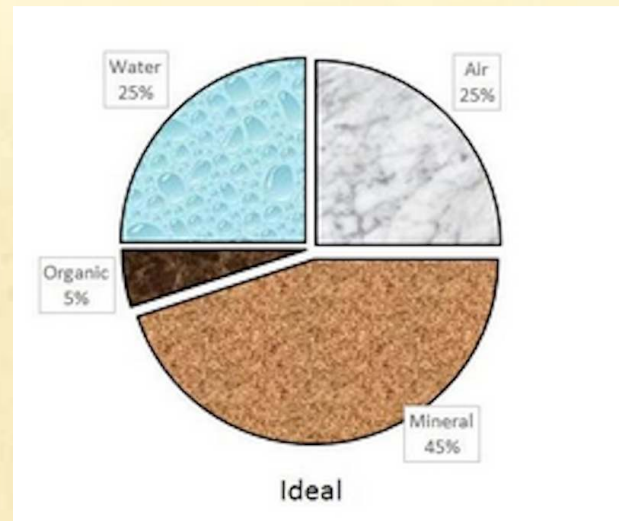
## Organic Approach

A healthy soil is primarily defined by its fertility, representing two essential components for farming. Soils are a living system of organisms reacting with organic and inorganic matter. Soil quality comprises a range of chemical, physical and biological factors which together affect the productive potential of the land.

A soil's physical properties determine how well a plant's roots grow and proliferate. Plant roots thrive in soil that has good aggregate stability (tilth), porosity, infiltration, drainage, water-holding capacity, bulk density, and resistance to crusting and compaction. An extensive root system that explores more soil volume naturally has access to more soil moisture and nutrients. The following figure illustrates the ideal physical properties distribution in an ideal soil.

Soil *chemical properties* control the availability of nutrients to plants. Nutrients must be present in sufficient quantities, or yields will be limited. As a consequence, the primary focus of fertility management on many conventional farms has been the application of chemical fertilizers. Less attention has been given to other soil management practices that also contribute to fertility. In contrast, most organic farmers take a much broader long-term approach to building soil fertility. For example, organic farmers strive to increase cation exchange capacity, thereby increasing nutrient storage.

Organic farmers are encouraged to work to enhance soil biological properties. Soil organisms control many important processes, such as nutrient cycling. In a process called **m i n e r a l i z a t i o n**



Source: <https://content.ces.ncsu.edu/extension-gardener-handbook/1-soils-and-plant-nutrients>

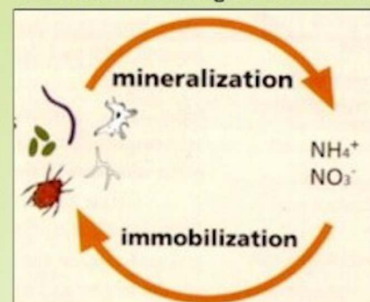
(immobilization is the opposite) microbes break down organic plant and animal residues to produce plant nutrients. Plant roots take up these inorganic nutrients and convert them into organic forms, such as leaf, stem, and root tissue.

When these plants die, the nutrients are recycled once again. Soil organisms also promote the development of soil structure by excreting chemicals that bind soil particles together into aggregates. An aggregated soil is said to have good soil tilth. Typically, soils with good tilth have good water infiltration and drainage, and are easy to work.

## Mineralization and Immobilization

Organisms consume other organisms and excrete inorganic wastes.

Organic nutrients are stored in soil organisms and organic matter.



Source: <http://slideplayer.com/slide/8767684/>



## Organic Farming Systems

### Mixed systems

Mixed systems are most commonly based on ley/arable rotations. Fertility is built during the ley phase, in which grazing and fodder production provides an economic return. The degree of integration of livestock and cropping will vary, depending on rotation, land type and livestock species. For example, sheep may graze turnips or vegetable residues over winter, while pigs are sometimes used instead of a plough to achieve the transition from ley to arable.

### Livestock systems

In situations where it is undesirable or impractical to operate a rotation due to soil/land type, climate constraints or conservation issues, the use of long-term or permanent grassland is acceptable within the organic regulations. Management emphasis is, however, still on the maintenance of soil

fertility through nutrient recycling, with minimal external inputs.

### Stockless systems

The area of organic land farmed using stockless organic systems is increasing while the greatest challenge is management of the nutrient supply. Forage legumes are of no direct economic benefit in stockless systems (other than for set aside payments), so there is greater emphasis on alternative fertility building strategies, such as the use of green manures, grain legumes and the import of manures, composts and other acceptable fertilizers.

### Horticultural systems

The term horticulture covers a wide range of systems from field vegetable production to fruit and protected cropping (glasshouse/polytunnels). Intensive organic horticultural production systems are often the most dependent on imported nutrients, while these systems frequently include several crops within one growing season.













# OPTIMUM ORGANIC ENVIRONMENT CREATION AND MAINTENANCE

The following meticulously designed guiding principles and tools depict Synergy's strategic plan for effective soil and fertility management on organic farms.

## Soil Testing and the Sufficiency Level Approach to Fertility

Whatever the approach a farmer takes to managing fertility, soil testing will help determine the proper application rates of lime to adjust soil pH and the current availability of nutrients in the root zone. Soil tests can help farmers avoid over-application of expensive nutrients. Over-application can cause pollution when nutrients leach from or run off farm fields into water supplies.

### Soil Test Index Values

Many soil testing labs subscribe to the sufficiency level concept of fertilization. They use a rating scale or index to indicate whether or not a soil's nutrient content is sufficient to meet yield expectations. A soil test report provides index values for most of the important crop nutrients. Although the sufficiency level approach can increase soil nutrient test values, its chief goal is not to build a nutrient bank account in the soil. The sufficiency system helps reduce leaching losses of mobile nutrients, such as potassium, in highly weathered soils with a low cation exchange capacity (CEC). The CEC measure on a soil test reflects a soil's ability to hold mineral nutrients, such as calcium and potassium, as well as many important micronutrients, such as zinc and copper.

### Important Crop Nutrients

N	= nitrogen
P	= phosphorous
K	= potassium (potash)
Ca	= calcium
Mg	= magnesium
Mn	= manganese
S	= sulfate
Zn	= zinc
Cu	= copper
Na	= sodium

Essential Crop Nutrients  
Source: Synergy European Consulting

### Soil Organic Matter Content

One of the most common objectives of organic farming—increased soil organic matter content—is difficult to measure. Soil samples from the same area of a farm may differ widely, based on the site-specific nature and properties of soils, the variability of the organic matter source (such as bark, leaves, or green manure) in the soil sample, and the state of decomposition of the organic matter. Soil organic matter content can be measured directly or indirectly by measuring soil humic matter content. Different labs in different states may choose to measure and report one or the other. Humic matter, the most reactive component of soil organic matter, is a key component of nutrient retention in soil.



Therefore, it is impossible to be 100 percent accurate in measuring the total soil organic matter content by determining the humic matter content. Humic matter values on soil tests are generally much lower than the actual soil organic matter content, particularly in soils high in organic matter. For example, some organic soils show less than 10 percent humic matter, although the soil organic matter content may be 50 percent or more.

Organic farmers who want a ballpark estimate of soil organic matter content can use the following equation to convert humic matter (HM) to organic matter (OM):

**Converting humic matter to organic matter:**

$$\text{OM}\% = [(\text{HM}\% - 0.16) \times 2.7]$$

**Calculation 1**

*Source: Synergy European Consulting*

Increases in the humic matter index in a soil test may provide organic farmers with indicators of improvements to soil quality. A farmer may want to include humic matter as an evaluative parameter when preparing the soil improvement program for a certification application.

## Nutrient Management on Organic Farms

Many organic farmers speak about the importance of a proper balance of nutrients in the soil for plant growth. They use the Basic Cation Saturation Ratio method for estimating crop nutrient requirements. This approach is based on an ideal ratio of exchangeable bases (in particular Ca++, Mg++, and K+) held at cation exchange sites. Farmers believe that an ideal ratio will optimize plant nutrient utilization and crop yield. These are the ideal ratios:

Ca:Mg 6.5:1

Ca:K 13:1

Mg:K 2:1.

If they were ideally balanced, 85 percent of the exchange sites would be occupied by Ca++, 10 percent by Mg++, and 5 percent by K+. If these ratios are not present, then a farmer assumes that a deficiency exists in one or more of these nutrients.

### Feed the Soil Approach

The purpose of this approach is twofold. When organic nutrients are added to the soil, microbial activity increases. In this sense, organic farmers are “feeding the microbes.” Increased microbial activity improves soil physical properties. For example, when microbial activity increases, soil tilth improves. In addition, microbial activity speeds nutrient cycling, increasing the availability of nutrients for plant uptake (when mineralization exceeds immobilization by microbes)

### Crop Use Efficiency.

Regardless of rooting conditions, crop roots will not find all of the applied nutrients. Some crops are much more efficient than others at finding and taking up nutrients. For example, a cucumber crop may take up as little as 20 to 25 percent of applied Nutrients fertilizer. The Nutrients use efficiency of cucumbers, therefore, is 25 percent. The Nutrients use efficiency of corn is only 50 percent. Corn may uptake only 50 pounds from a 100-pounds-per-acre application of fertilizer. Nutrient uptake is influenced by the density of plant roots, which in turn is influenced by the soil's physical, chemical, and biological properties. Even when soil quality is excellent, plant roots may explore less than 5 percent of the entire soil volume. Many other factors contribute to inefficient use of applied nutrients, such as fertilizer placement, rainfall and irrigation amounts, and soil temperature.



The feed-the-soil approach stops short when nutrient concentrations in soils are already very high. In these cases, feeding the soil can result in nutrient additions that increase the potential for environmental pollution or plant toxicity.



### **Avoiding Over-applications of Phosphorus and Potassium**

In some instances, basing fertilization rates on crop nutrient removal calculations is useful—for example, when farmers use manure to meet crop nutrient requirements. Where soil tests show that P and K values are very high and no additional P or K is recommended, a manure application rate calculation that is based on crop N needs will oversupply P and K. This is because manure contains significant amounts of these nutrients. In these cases, the most sustainable practice may be to apply manure based on the plant removal rates of P or K. Any resulting shortfall in the crop N requirement can be met with another N source that doesn't contain P or K.

Over-application of P is especially problematic when organic amendments are applied to soil surfaces, as when using no-till systems or perennial cover crops.

Although N may be lost by many means in a no-till system (leaching, runoff, and denitrification, for example), P is typically lost through erosion, runoff, and subsurface flow. Losses of soil P to streams and rivers through these processes can degrade water quality in lakes, reservoirs, and marine estuaries.

Additions of manures, composts, and other organic byproducts can and do result in a buildup of available P in organic farm fields over time. For this reason, it makes sense to calculate P application rates based on the P removal rates (where soil is sufficient in P). In any case, calculations of crop removal rates of P and K are useful in accounting for additions and removals of nutrients from farm fields over time.

### **Avoiding Over-applications of Nitrogen**

Nitrogen application rates for a particular crop grown on a particular soil in a particular field should be based on a realistic yield expectation (RYE) for that crop grown in that field. A number of soil-related factors can affect the realistic yield expectation,

including these:

- depth to subsoil, rock, or other limiting horizons
- organic matter content
- permeability, infiltration, and drainage
- landscape position
- climate

Fertility management strategies can overcome many of these site-specific properties, but farmers will have to spend more time and money in terms of irrigation, nutrients, labor, and skill to achieve high yields on poorer soils.

### **Determining a Realistic Yield Expectation.**

The best method of determining the realistic yield expectation is to use historic production records for each field. To obtain a truly representative value, farmers can average the three highest economic yields (yields that provide the highest net returns) in the last five years that the crop was grown.

Unfortunately, data is sometimes not available on a field-by-field basis, especially where a new crop is being grown.

### **Calculating a Nitrogen Application Rate.**

Once a realistic yield expectation for a field has been determined, an appropriate nitrogen rate can be calculated by multiplying the realistic yield expectation by a suggested Nutrient application rate which must be determined from personal experience, a reliable consultant, or local farmers.

### **Constructing a yield response curve.**

In the absence of yield response curves for organic operations, organic farmers must construct their own curves to determine N application rates that produce realistic yields of specific crops. Farmers can start with one year's data on N application rates and the



crop yields they produce. The data can be expanded over several years of production that represent a range of growing conditions. The data can be averaged to provide a better estimate of realistic yields and N rates that produce those yields.



All of this will require dedicated record-keeping

### Tissue Analysis

It's a good idea to have plant samples analyzed periodically to determine if crops are receiving adequate levels of nutrients. Public and private laboratories will analyze nutrient concentrations in plant leaf tissue. Results indicate the nutritional status of plants, identify deficiencies or toxicities, and provide a basis for determining whether additional applications are needed, such as a sidedressing or foliar application.

### Taking a Sample

The laboratory analysis requires less than 1 gram of tissue. However, a good sample contains enough leaves to represent the total area sampled. For example, 8 to 15 tomato leaves should be adequate. Take separate samples from separate fields or management zones, or from production areas where problems exist.

### Crop Rotations

Crop rotation is a system where different plants are grown in a recurring, defined sequence. Crop rotations constitute a substantial mechanism for nutrient supply within organic systems, considering that they modify the physical characteristics of the soil, including the size and activity of the soil microbial biomass. Moreover, rotations are the primary means of controlling weeds, pests and diseases in organic farming.

Organic rotations are divided into phases that increase the level of soil nitrogen and phases that deplete it. The nitrogen building and depleting phases must be in balance, or show a slight surplus, if long-term fertility is to be maintained. This type of rotation provides the basis for forward planning of

nitrogen supply, necessary in the absence of soluble nitrogen fertilizer.

Farmers must consider long-term cropping plans or rotations when designing a fertility management plan. If it is agronomically feasible, nutrient application and utilization can be considered for the entire cropping cycle rather than on a crop-by-crop basis. All soil management plans should include a description of the normal cropping sequence, the nutrient needs, and the nutrient removal rates of all crops in the system.

The implementation of a crop rotation plan should include, but not limited to, sod, cover crops, green manure crops and catch crops. These crops must provide the following functions (USDA, 2000):

- Maintain or improve soil organic matter content.
- Provide for pest management in annual and perennial crops.
- Manage deficient or excess plant nutrients.
- Provide erosion control

### Nutrient Placement

In the absence of chemical or biological inhibitors, roots grow and proliferate in soils with good tilth. However, where root growth is restricted, placement of fertilizer near the developing root is important. Generally a placement that is 2 cm below and 2 cm to the side of the seed or transplant will ensure that nutrients will be available to the crop.

Restricted root growth will occur in compacted soils with high bulk density values or with compacted soil horizons. In these cases, nutrient uptake efficiency may improve if fertilizer placement reduces the distance between fleshy or tap roots and fertilizer material, particularly when fertilizer nutrients are relatively immobile in soil. This is particularly critical where soil test levels are low; in seasons when root growth is slowed due to cold weather; or for plants with restricted root systems due to other physical, chemical, or biological factors, such as nematode damage.



# USING MANURES, COMPOSTS, AND LEGUMES

Nutrients in commercial fertilizers are highly soluble, so nutrient availability is quite predictable and nutrients are quickly available to plants. Organic fertilizers, however, vary widely in how and how quickly they make nutrients available for crops. Nutrient availability depends on the source, whether it be manure, compost, or a cover crop used as green manure. In general, these organic fertilizers mineralize and release nutrients, such as N and sulfur, at a very slow rate.

## Animal Manure

Animal manure is an excellent source of nutrients and organic matter. Many of the nutrients, especially nitrogen, are readily available from fresh livestock manure. Nutrient content varies by animal species, their diets and the form of their manure. About half of the nitrogen in fresh dairy manure and 75% of the nitrogen in poultry manure is in the form of ammonia. Ammonia is subject to loss through volatilization if not incorporated immediately after spreading. In the soil, ammonia is converted to nitrate and is available for plant use or is directly absorbed as ammonium. However, nitrate is subject to leaching and large applications (more than 40 tons per acre dry or 20,000 gallons per acre liquid) should generally be avoided. There are times when readily available nitrogen is needed, but many people prefer to compost manure before field application (see below). This stabilizes the nitrogen. Manure can be mixed with other materials for composting. Manure

carries pathogens that are of concern to human health. **Uncomposted manure should not be applied within 90 or 120 days of harvesting vegetable crops**, depending on whether or not the edible part of the crop has contact with the soil.

## Compost

### Adding Organic Matter to your Soil: Making your Own Compost

Buy or make a simple composting bin (four stakes and some chicken wire) to contain your compost. Try to choose a site on grass or soil so that earthworms can move in and out of the compost heap. Start off by adding a layer of coarse material e.g. (twigs and branches) and build up the heap by adding layers of garden and kitchen wastes.

Woody stems should be cut up into small pieces. Weeds that can re-root from small pieces must be left out to die for several days before adding to the heap. Grass cuttings should be mixed with coarser material to allow air circulation and to stop them from turning into a wet mass.

Vegetable waste from the kitchen is good to add too. But cooked food and meats should be avoided because they may attract vermin. Old woollen and cotton clothes, newspaper and cardboard cut into pieces will compost if soaked and mixed in. Wood ash from fires and even waste from the vacuum cleaner can all be composted in little quantities.



To help decomposition, moisten the heap. If you want to speed things up, intersperse with layers of manure from a local farm. Try not to let the compost heap dry out completely or it will not rot down. Keep heat in and rain out by putting on a lid of newspaper, plastic sheeting or carpet.

Chemicals to accelerate decomposition are not essential but they do add bacteria and enzymes that improve composting. It is the action of these micro-organisms that generates the heat which is so beneficial in the composting process, especially for killing weed seeds. When the heap begins to shrink in size and starts to cool, take out the contents, shake up any compressed matter and return them to continue the composting process. When the compost is brown and crumbly you can add it to your soil as needed.

Composting livestock manure and other organic matter stabilizes the nutrients by partially decomposing the materials. Nutrients from finished compost are more slowly released than from fresh livestock manure. **Compost is considered mature (i.e., finished)** when the energy and nutrient containing materials have been combined into a stable organic mass. At this time the pile returns to ambient temperature, and it does not reheat on mixing even though it is moist, not overly wet, and well aerated. The composting process results in a dark-brown

material in which the initial constituents are no longer recognizable and further degradation is not noticeable. The length of time needed to achieve finished compost will vary with many factors and can take anywhere from a couple of weeks to over a year.

It is very important to make sure compost is **finished, before adding it to the soil**. In practical terms, this means that compost is ready or finished when it looks, feels and smells like rich, dark earth rather than rotting vegetables. In other words, it should be dark brown, small particle size, crumbly and smell like earth.

Immature compost may contain plant pathogens or be a weed seed bank among other problems. Application of unfinished, carbonaceous compost could affect plant growth adversely because the compost may compete for nitrogen with plant roots as the breakdown to maturity continues in the soil. Applying compost at least one week before transplanting or seeding a crop will allow a margin of safety in case the compost is immature. Immature composts made from nitrogen-rich feedstock also are often high in ammonium, which can be toxic to plant growth. High ammonium concentrations are not typically a problem if the compost is field applied, but if compost will be used in a greenhouse mix, it is important that it is low in ammonium.



Manure Compost

Source: <http://www.agrinord.it/gallerydetails/usi-compost-5>



Vegetable growers can make compost on the farm although most don't have enough raw materials to satisfy their needs. Some bring in additional materials such as municipal yard wastes to compost on site. Others purchase compost from the increasing number of commercial composters. If organic materials are imported onto a farm, it is recommended to test the soil at least every two years and obtain a test of the compost being applied.

**Compost as a nutrient source.** Finished compost is a dilute fertilizer, but the analysis can vary greatly depending on the types of materials used to make the compost and how they were composted. Composts should be analyzed for their available N, total N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O content before application to agriculture fields.

**Carbon to Nitrogen Ratio.** Recommended C: N ratio for finished compost is 15-18:1. The C: N ratio plays a crucial role in the availability of nitrogen in any organic material added to the soil. If the C: N is much above 30:1 microorganisms will immobilize (i.e., consume and make unavailable for plant uptake) soil nitrogen. This soil nitrogen will remain unavailable until the carbonaceous material is consumed by the bacteria.

**Nitrogen.** The majority of the nitrogen in finished compost (usually over 90%) has been incorporated into organic compounds that are resistant to decomposition. Rough estimates are that only 10% to 30% of the nitrogen in these organic compounds will become available in the first season following application. Some of the remaining nitrogen will become available in subsequent years and at much slower rates than in the first year. Repeated annual applications of compost at high rates above 400 pounds of nitrogen per acre can result in excessive amounts of nitrate in the soil.


**Phosphorus.** Composts made primarily from manures supply phosphorus over the growing season at 70 to 100% of the availability of triple superphosphate fertilizer.

**Potassium.** Potassium in finished compost is much more available for plant uptake than nitrogen because potassium is not incorporated into organic matter. However, some of the potassium can be leached from the compost because it is water soluble. In one study, potassium levels were reduced by 25% when finished compost was left uncovered in the open over a winter.


**Soluble Salts.** In general, soluble salts are not a concern from additions of composts to field soil. However, soluble salts can be a serious problem when using compost in greenhouse mixes. Incorporation of 40 tons/acre of compost in the top 6" of field soil would be a ratio of 50 parts soil to one part of compost. Compost used in the preparation of greenhouse media will make up a much greater percentage of the whole mix and therefore will have a greater influence on all aspects of fertility, including soluble salts. It is important to have composts tested for salt levels. Electrical conductivity (EC) is a measure of salt level, and compost used in greenhouse mixes should have EC < 1 mmhos/cm.

**Compost and pH.** The pH of finished compost is usually slightly alkaline. In general, composts will not raise soil pH to undesirably alkaline levels because of the low total alkalinity of composts. However, caution should be taken if the compost has been "stabilized" with the addition of lime (thus increasing the total alkalinity) or with heavy applications to certain crops such as potatoes, for which the soil pH should be about 5.2. Heavy applications can cause increases in soil pH that might last for a growing season.





**Take Soil Test After Applying Compost.** An efficient way to evaluate the effect of compost on the fertility of a soil is to obtain a soil test after applying compost. It is advised to wait 6 to 8 weeks after application before testing the soil to allow the compost and soil to equilibrate. The soil test can measure available plant nutrients, soil pH, organic matter, and heavy metal content of the soil.



**Have Compost Analyzed.** No compost should be applied to field soil or used in greenhouse mixes without testing for nutrient content. If the compost will be used in greenhouse mixes, it should also be tested for maturity. Some soil test labs (see list of labs in the Soil Testing section) will test compost. Check to be sure the lab analyzes compost before submitting samples, and make sure to have it tested as a compost sample, not as field soil.

## Using Legumes as Nitrogen Sources

Increasingly, organic growers are using legume cover crops as green manures in rotations to meet the N needs of cash crops. Legume cover crops fix significant amounts of N for use by subsequent crops. Through a symbiotic association with the legumes, rhizobia bacteria convert atmospheric N<sub>2</sub> into an organic form that the legume uses for growth. The accumulation of N via cover crops depends on the length of the growing season, climate, and soil conditions. Sometimes a legume that is grown as a green manure crop can supply enough biomass N to meet the entire N requirement of the next crop. This depends on the climate, species of legume, soil conditions, and the length of time the legume is allowed to grow before it is killed.

Sown shortly after harvest of a cash crop, winter and summer legume covers serve as trap crops for leftover nutrients that might otherwise be lost from the cropping system. These trap crops prevent excess N and inorganic phosphorous from leaching into ground and surface water. Legume residues contain phosphorous, potassium, and other nutrients that are recycled in relatively available forms for subsequent crop use. Where soil P and K sufficiency index values are high and soil pH is appropriate, legume cover crops can provide nitrogen for subsequent crops without contributing to problematic increases in soil P, K, and trace metal concentrations. Removing legume or other trap crop biomass from the field provides a means of reducing soil concentrations of these and other nutrients.





# ENVIRONMENTAL AND REGULATORY CONSIDERATIONS

Applications of manure, compost, and other organic amendments should be limited on fields where significant environmental hazards or concerns are present, for example on highly erodible land (HEL). Uniform application of organic materials on highly erodible land is often physically difficult. Surface-applied materials on HEL are subject to runoff. Nutrient rates should be based on realistic yield expectations (RYE) for the crop and on plant-available nitrogen or phosphorous, as described previously in this publication. For amendments with significant nitrogen content, applications

should not be made to HEL fields more than 30 days before planting. Complying with this last recommendation can complicate manure management for certified organic growers. Manure cannot be applied within 120 days of harvesting a crop that will come into contact with soil or soil particles. If a leaf lettuce crop (fertilized with manure) requires 45 days from planting to harvest, manure would have to be applied at least 75 days before planting. This is in obvious conflict with the recommendation not to apply manure more than 30 days before planting.





# MANAGEMENT GUIDELINES

In addition to the rules and decision supporting tools for proper soil and fertility Management mentioned previously, we recommend the use of the following management practices in organic operations so as to **use plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil or water by plant nutrients pathogenic organisms, heavy metals or residues of prohibited substances.**

**I.**Animal waste should not reach surface waters by runoff, drift, manmade conveyances, direct application, or direct discharge during land application. Proper application rates and methods should be used to ensure that animal waste does not impact surface waters.

**II.**Animal waste should be applied to meet, but not exceed, the nitrogen needs for realistic crop yields based on soil type, available moisture, historical data, climatic conditions and level of management, unless there are regulations that restrict the rate of application for other nutrients.

**III.**Liquid waste should be applied at rates not to exceed the soil infiltration rate. In order to control conditions conducive to odor or flies, no ponding should occur.

**IV.**Manure should not be applied to saturated soils, during rainfall, or when the surface is frozen. When manure is to be applied on acres subject to flooding, it should be incorporated to the soil on conventionally tilled cropland. When applied to conservation-tilled crops or grassland, the waste may be broadcast, provided the application does not occur during a season prone to flooding

**V.**Manure should not be applied closer than 100 feet to wells or within 200 feet of dwellings other than those owned by the landowner. Manure should be applied in a manner not to reach other property and public rights-of-way.

**VI.**Manure should not be applied on grassed waterways that discharge directly into watercourses. If used in this situation, manure should be applied at agronomic rates and in a manner that causes no runoff or drift from the site.

**VII.**Records of waste application should be maintained to establish actual application rates. The records should include date of application, amount of waste applied per acre by tract number and field number, most recent waste analysis and soil test report, and the realistic yield expectation (RYE) nitrogen rate.

**VIII.**Proper calibration of application equipment is important to ensure uniformity and accuracy of spreading rates.

**IX.**Maintaining good crop growing conditions will reduce both runoff losses and leaching losses of plant nutrients. Preventing pest damage to the crop, adjusting soil pH for optimum growth, providing good soil tilth for root development, planting suitable crop varieties, and improving water management practices will increase crop efficiency in nutrient uptake.

**X.**Crop sequences, cover crops, and surface crop residues are useful tools for reducing runoff and leaching losses of soluble nutrients. Winter cover crops can capture residual nutrients after harvest of the summer crop. Nutrients from green manures and cover crops must be credited to determine the appropriate nutrient additions.



**XI.**Where possible, develop field borders that can serve as a nutrient trap if field runoff occurs.

**XII.**The growing of two or more crops together (intercropping) has the potential to improve resource use. This results from differences in competitive ability for

resources between above and below ground crop components in space and time.

**XIII.**The influence of livestock on soil fertility and the influence of soil fertility on livestock nutrition and health are vital management considerations.



The starting point for improved soil fertility management is always the farmer.

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# WATER MANAGEMENT

Water is essentially significant for life and landscape. It is the basic building block of life and all organisms, from the most primitive to the very advanced animals. Water determines the quality of the landscape. Along with the temperature, the availability of water is an abiotic factor affecting organisms and vegetation. Important processes take place in water and it serves as a solution agent.

Water is also essential for the formation of the land relief, it affects atmosphere and forms habitats. In general, the landscape with fewer water areas heats up more quickly. Their absence thus may lead to the extreme climatic changes. The ability to retain water is also one of the very important landscape-forming factors.

Water is an essential prerequisite of life. The human body contains approximately 70% of water. Plants contain up to 90% of water. The water cycle begins with the rainfall with

more than 50% evaporating again, 10 – 20% draining to rivers, seas and oceans and less than 10% soaking in groundwater.

The loss of water in the landscape is linked with the reduction of fertility of agricultural land. Agricultural lands cease to exist due to desertification, urbanization, mining, erosion or other activities.

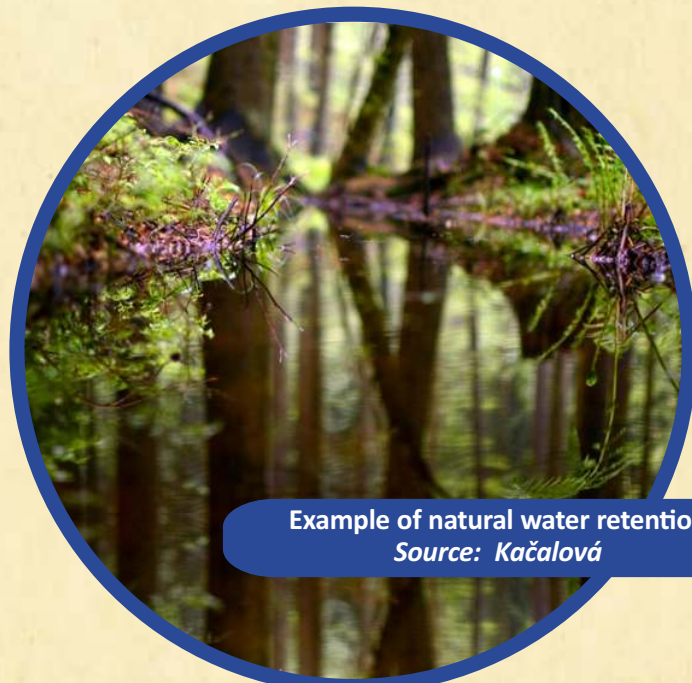
Human activities do not always have to mean only the contamination of water sources, but also interventions in the water regime in the landscape may present a number of negative impacts. In past years, drainage of wetlands has started, and straightening of river flows, backfilling of blind stream branches or land reclamation meant the land's loss of ability to retain and absorb water into the soil. There was a rapid run-off of the water from the landscape and reduced self-cleaning ability, there were storm rainfalls causing floods.





# NATURAL SOURCES OF WATER

Natural water habitats are places where water retains. These places can convert to dry habitats throughout the year and due to climatic conditions. Although some water sources can be of short term, they have irreplaceable importance for the landscape. They provide moisture and water reservoir for the surrounding, implicating the long-term behavior of the landscape and preservation of many fauna and flora species.

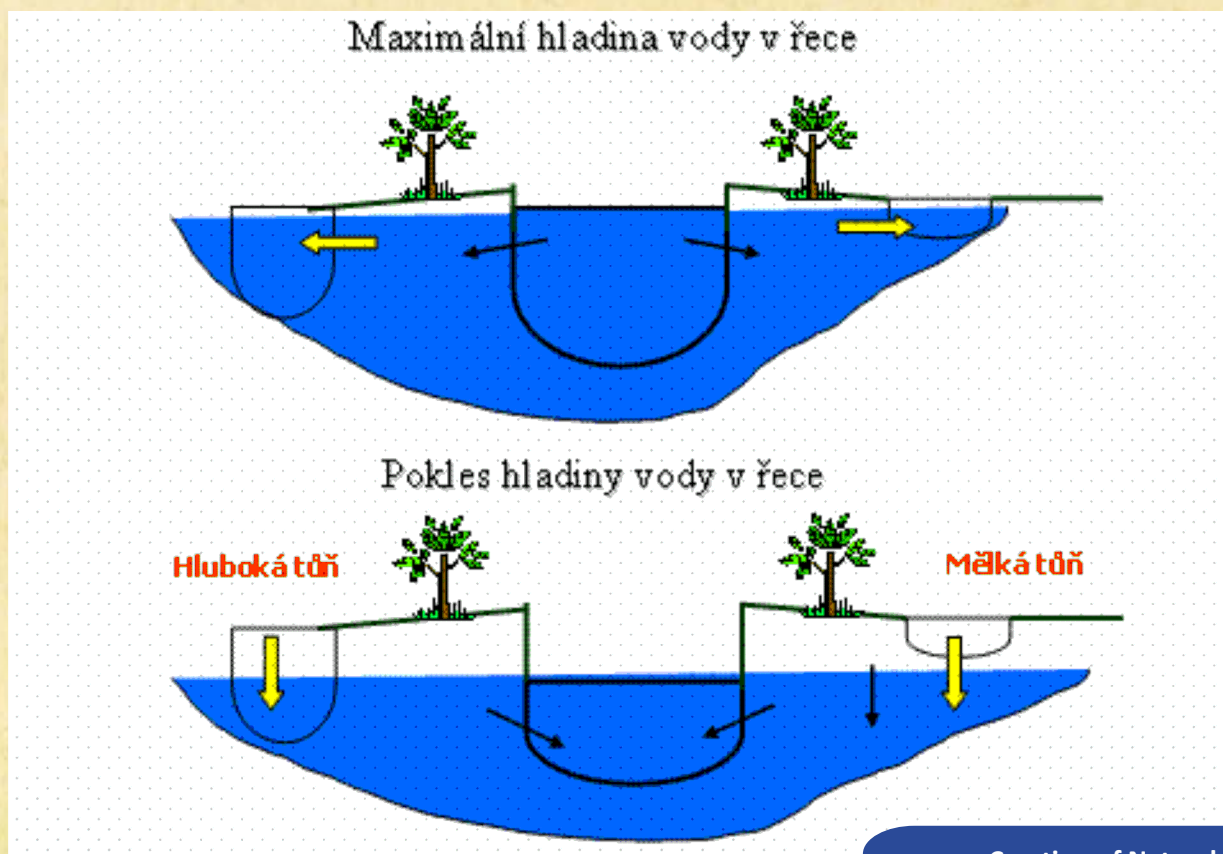


Example of natural water retention  
Source: Kačalová

## Pools

Pools can be of different sizes, shapes and depths. They are generated by a depression in the terrain that is filled throughout the year with water from various sources (water flow, groundwater or rainfall). Pools can be

artificial or natural created by animal activity...(animal activity, water overflowing, tree uproots, etc.)



Creation of Natural Pools



## Periodic Water – Puddles

Some human activities, such as agriculture, tourism and building industry, devastate the landscape. On the other hand, for example the timber harvesting often leaves depressions, thus giving a chance for new water areas to create.

The formation of periodic water is heavily dependent on the total of rainfalls and their re-evaporation. They form mainly during the wet season, with minimum weather conditions. Another factor for the formation of such water is the shape of the place where the rain falls.

Empty reservoirs, cracks in the rocks and depressions can often serve for formation of periodic water. Phytotelmata formed in in axils and leaf rosettes are dependent on vegetation age. It will also depend on the shape of the leaf, its thickness and the distance from the axil. The season affects the formation of periodic water, which is most often formed in the spring after the thaw, or in the summer and autumn during more frequent rainfalls. Latitude or altitude then plays its role mainly with regard to the amount of rainfall and melt of snow and glaciers. The surrounding and local vegetation is also involved in the ability to take and retain the water.

The advantage of puddles (small water areas) is the possibility to be formed easily. Almost anybody is capable of digging out a small shallow puddle using a spade in quite short time. In addition, the puddle can be created almost everywhere in the landscape, since it almost never harms any habitat due to its size.

## Wetlands

*“The wetlands are the territory of swamps, fens, moorlands and areas covered with water, natural and artificial, permanent or temporary, with standing or flowing water, fresh, brackish or salt, including the areas with sea water with the depth during*



Example of periodic waters - puddles  
Source: Kačalová

*the low tide not exceeding six meters.”*

[https://www.mzp.cz/cz/ramsarska\\_umluva\\_o\\_mokradech](https://www.mzp.cz/cz/ramsarska_umluva_o_mokradech)

The wetlands belong to the most significant reservoirs of water. Currently, however, they belong to the most endangered ecosystems. They retain water in the landscape, have a positive effect on the climate, are able to absorb carbon dioxide from the air and are a habitat for endangered species of flora and fauna.

What is a wetland? It is the territory of moorlands, swamps or fens covered with water that does not exceeds six meters in depth during the low tide. The cause of endangering of wetlands is the conversion of wetlands on agricultural land, wide area draining, and flow regulation, construction of water dams, peat digging and urbanization.



Example of wetlands



# IRRIGATION

## Practical Advice how to Retain Water in the in the Garden

### 1. Planting the proper plants

Plant only xerophil vegetation on dry places, and hygrophil plants on wet areas

### 2. Mulching

Retain current moisture in the soil. The most effective way is mulching. Mulch is a thick layer of any organic material at the soil surface that allows water to soak, but prevents evaporation, makes shade for roots and provides excellent climate for the soil microflora necessary for improvement of the physiological properties of your soil.

### 3. Collection of rain water

We can collect the rain water in barrels, tanks or other collection containers using pipes or gutter. We can also let the water to soak and remain in the soil. We can create terraces on slopes that enable longer soaking of water and prevent its drainage.

### 4. Use of humus

Quality soil, rich in humus, can hold more moisture even during the drought than the soil without any organic matter.

trees, vegetable) in the way they fully shade the surface of the soil when grown – or even earlier. (You can facilitate this by creating tiers.) The shade will prevent the sun to evaporate the moisture. Shaded soil is cold and evaporation reduces up by 60%.

We facilitate the retention of water with higher lawn or pasture grass, shade the soil and prevent excessive evaporation.



Example of burying rotting wood beneath the plants

**Reportedly, 3 liters of quality dry soil can soak one liter of water, which means that 30 cm layer of soil rich in organic matter spread in the garden holds for example as much water as the 7.5 cm deep lake of the same area.**



**FACT**

It is therefore more economical to retain water in soil than built basins or buy it from the water supply utility line.

### 5. Dense planting.

Plant your vegetation (perennials, shrubs,

You can either bury needless wood or logs directly deep beneath the plants you want to keep in good condition thanks to greater moisture without watering, or you can leave the wood on surface and use it to create various supporting mounds filled with dirt, separate beds, embed it partially etc. Let your imagination run wild in utilizing the whole disassemble old barn, if you like.



## WARNING



Of course, wood for these purposes cannot be chemically treated, impregnated with waste oil or varnished. Never use old railway ties preserved with very harmful chemicals.

Another option is to use branches for providing more moisture to plants. Rotting wood on which no sunlight comes has a great ability to absorb water. We can thus add pieces of wood when planting. Wood must not be chemically treated.

## Bioclimatic or Rain Garden

Rain garden includes depression in the terrain, to which the water from the surrounding areas runs off and remains there. The depression is planted with selected plants and their root system acts as a filter and retains the water. Roots serving as the filter are able to absorb contaminants up to 30 – 40% more than common lawn. This system prevents soaking of pollutants in groundwater or their possible disposal to sewage systems. Rain garden not only enables better retention of water, but also provides shelter and food to animals.

Esthetically and environmentally interesting alternative how to deal with rain water are green roofs, roofs with surface consisting of live foliage.

- **How can individuals, for example gardeners, help?**

Landscape tending begins with the fact that gardeners make compost. By composting they obtain organic fertilizer which they insert back in soil. Thus enriched soil soaks water better and lets the nutrients out worse. It is important to catch the water directly in the landscape where it fell down, rather than in a pond or a basin. Catching of water must be done on the entire area. Formerly, farmers used irrigation trenches and pits, which was actually the last furrow of the field which was deeper than the rest of them. Another thing turns out. By forming barks or agricultural terraces, water slowly stores in these areas and at the same time prevents the soil erosion.

- **And how can people in the cities contribute? Can we save even more water?**

More extensive saving of water is not necessary. We are on a reasonable minimum. In countries like Guatemala, the daily water consumption is 50 liters per person. This volume is considered a recommended humanitarian daily dose. In poor countries this water should be free of charge. The Czech consumes about 90 liters of water per day. The current development leads to collecting rain water or so called “grey” water, which is waste water not containing feces or urine that drains from washbasins, bathtubs, showers or sinks. It has several positive impacts. You decrease flood wave because you catch rainstorms and save drinking water that you would otherwise use for flushing toilets or irrigating



Example of rain garden

Source:

<http://www.dumazahrada.cz/zahrada/p/estovani/22949-desova-zahrada-je-lek-pro-zemi/>



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# REGIONAL PLANTS I

*“A wise man ought to realise that health is his most valuable possession.”*

Source: ([http://www.art-quotes.com/auth\\_search.php?authid=2178#.WtoINi5uaK4](http://www.art-quotes.com/auth_search.php?authid=2178#.WtoINi5uaK4))

## It Is Said That We Are Born in One Way, But Die in Thousand Different Ways.

Herbal medicine is one of the most ancient healing arts. It has always been and will have been the medicine of the people. As far back as the primitive-communal society human suffered from various diseases that shortened his life. But because he fed on products of the surrounding nature, he gradually started to recognize quality of herbs to heal his diseases and those harmful to destroy his enemies or to bag game more easily. No matter which political power, no matter what globalization pressures putting away real-world problems, no matter what is deemed legal versus illegal, not even FDA in all of its regulatory glory can prevent someone from going his way and using nature's free medicine.

Humans have always lived in symbiosis with plants and plants have been here longer than the humans (than we have). They have learned their lessons and adapted to their environment, and they have produced a beautiful language to communicate those lessons with other plants, animals, and fungi. The chemical compounds that plants produce, their biochemical language, is so complicated that we haven't even scratched the surface in the thousand or so plants around the world that are used as medicine. As we move toward a more sustainable world with clean energy production, locally grown

organic foods, and nature conservation, we must look at our current model of medicine through the same filter of sustainability. A world that remains totally dependent on high-cost chemical medicines, controlled by multinational pharmaceutical companies whose main purpose is profit, is dependent upon the very institutions that created the environmental problems that are poisoning this world.

The goal of this chapter is to encourage you to use herbs to help yourself, your family and others.





# The Benefits of Herb Usage

Medicinal plants grow everywhere and are easily available for harvest.

One day the mankind is going to seek not only how the plants work, but also why they work as natural healing substances. Medicinal plant, or better say drug, is an important raw material necessary for the production of medicines. Medicinal plant is a plant that is capable, due its content, of removing pathological changes in living organisms. These substances are included throughout the plant or in some parts of the plant.

Everyone working with medicinal plants, i.e. including picker or grower, must be at least broadly familiarized with their effects to avoid harm due to ignorance or improper handling.

Every meal presents an opportunity to nourish yourself and powerfully support your health. Adding more herbs and spices into your diet comes with many benefits. They provide essential nutrients, support natural energy, promote healthy aging, prevent diseases, aid in the repair of vital processes, and strengthen healthy bodily functions. And what's more, when knowing how to use them correctly, it is an extraordinary reward that these "ingrediences" in your kitchen cabinet can have such a dramatic effect in so many areas of health.

## General Benefits of Herbs

### 1. Herbs strengthening digestion

A principle of herbalism is that most chronic disease begins with poor digestion. If an organism can't transform food into the

nutrients the body needs, then the organism can't be of a good health. Many culinary herbs have been in use for thousands of years not only because of they taste good, but mainly because they help with digestion.



Fragaria vesca - digestion herb  
Source: Karpecki

All too often, which is very sad, people have had poor digestion for so long that they assume it is a natural part of their life. If they work with herbs and spices to strengthen their digestion, they often find that many of their complaints disappear.

The following symptoms need to be considered as they are clues to poor digestion:

- Bloating
- Indigestion
- Gas
- Constipation
- Heartburn
- Nausea
- Poor appetite
- Ulcers
- Recurring diarrhoea



## 2. Herbs are high in antioxidants

Herbs and spices are high in antioxidants. They are an important key to limiting the damage done to the body by oxidative stress such as liver problems, heart disease, arthritis, eye damage and premature skin aging. Oxidative stress occurs when the body is overloaded with free radicals. The formation of free radicals is a natural part of living, eating and breathing. However, it can be awfully increased by stress, eating processed foods, consuming oils that have been overheated, breathing air pollutants or cigarette smoke, eating charred meats being or sleep deprived. It is important to limit these negative influences and regularly include high antioxidant foods, such as herbs and spices in your meals in order to minimize oxidative stress.

## 3. Herbs support nervous system

Busyness becomes a standard way of our life,

we may say that we live in a perpetually stressed culture. It becomes quite normal due to excessive stress to run on too little sleep, be rushed, overworked and overcommitted.;

However, our bodies are increasingly showing the effects of constant exposure to chronic stress. Based on the data of CDC and psychologists, chronic stress is linked to six leading causes of death: cancer, coronary heart disease, accidental injuries, respiratory disorders, cirrhosis of the liver, and suicide.

Without a doubt herbs and spices are not going to give you superhuman powers, but can help you modulate the negative effects of stress. They can help us get restful sleep at night and reduce levels of anxiety during the day. Along with fresh local food, they offer us high amounts of the vitamins and minerals needed to support our nervous system.

### I. Progress in the Leading Causes of Death

Since 2005, the rate of death has declined for all leading causes of death, except suicide.

**Trends in Age-Adjusted Death Rates (per 100,000 persons), 2005-2012**

Cause of Death	Baseline 2005	Status 2012	Progress
1. Heart disease	216.8	170.5	●
2. Cancers	185.1	166.5	●
3. Chronic lower respiratory diseases	43.9	41.5	▲
4. Stroke	48.0	36.9	●
5. Unintentional injuries	39.5	39.1	▲
6. Alzheimer's disease	24.0	23.8	▲
7. Diabetes	24.9	21.2	●
8. Pneumonia and influenza	21.0	14.4	●
9. Kidney disease	14.7	13.1	●
10. Suicide	10.9	12.6	■

■ Trend in wrong direction

▲ Insufficient Progress

● Progress

Rate of Cause of Death

Source:

<https://www.cdc.gov/healthreport/publications/compendium.pdf>



#### 4. Herbs are antimicrobial

Some herbs and spices offer a powerful defence against pathogenic bacteria. In an age of pharmaceutical antibiotics, however, humanity is facing a major problem with antibiotic resistance. Bacteria have adapted during their evolution to the pharmaceutical antibiotics people use. After decades of rampant overuse of antibiotics, more and more bacteria do not respond to treatments using antibiotics.

#### FACT

In the USA only, more than 23.000 people die each year from antibiotic-resistant infections.

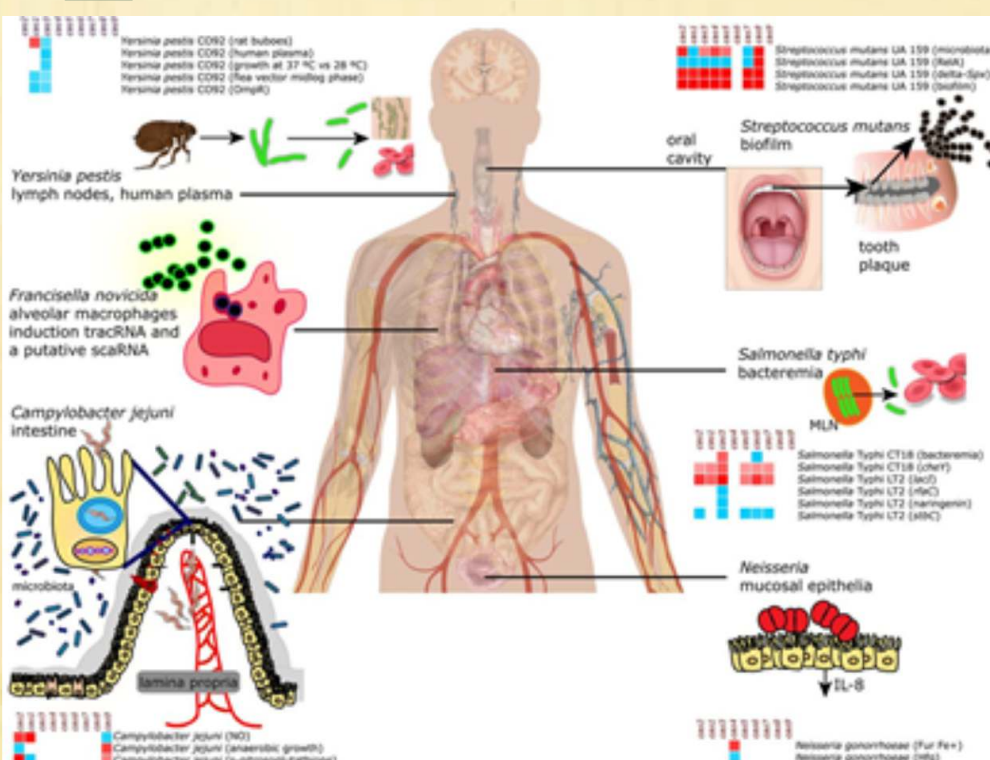
The importance of having a healthy and diverse gut flora, which is a beneficial bacteria in our digestive tract, might be wiped out by pharmaceutical antibiotics. After all, the term antibiotic, means “anti-life.”

Plants can be chosen for the specific type of infection and can also be effective against viruses and fungal infections. Some herbs have a stronger effect on one type of bacteria than other one.

In other words, herbs can simply kill a pathogen and also support the ecosystem of the body. They help restore integrity to mucous membranes and maintain healthy gut flora.

#### 5. Herbs support the immune system

Herbs can reinforce our health during times of infection by strengthening or modulating our body’s own immune system, which is arguably our best defense against pathogens that lead to illness. Immune system dysfunction can increase our risk of infection and is also implicated in cancer, autoimmune disorders and seasonal allergies. Herbs can help to strengthen and boost our immune system so that it can do its complex job well.



#### The Role of CRISPR-Cas Systems in Virulence of Pathogenic Bacteria

Source:

(<http://mmb.asm.org/content/78/1/74/F6.expansion.html>)

As plants have been evolving for millennia, they are of a very complex system that may make it harder for pathogens to adapt to them.

Most commonly used herbs are safe to use. However, like all medicines, herbal remedies must be treated with respect as some plants can produce side-effects. It is crucial to take certain plants only under the guidance of a well-trained practitioner in order to avoid adverse consequences. When a herbal medicine is taken correctly, then the chance to develop a serious side-effect is low.



## Plants as Foods & Medicines

In general, human body is much better adapted to treatment with herbal remedies than with isolated chemical medicines. Humans evolved side-by-side with plants over hundreds of thousands of years and as a result our digestive system and physiology as a whole are driven to digesting and utilizing plant-based foods that often have a medicinal value as well as providing sustenance.

Herbal medicine comes into its own when the distinctions between foods and medicines are removed. For example, lemon improves resistance to infection, oats support convalescence, onion relieves bronchial infections. It means that lemons,

oats and onions are food and also medicine. Though to have eaten a bowl of porridge it increases our stamina, helps the nervous system to function well, provide a good supply of B vitamins and maintain regular bowel function.

## Herbs & Body Systems

Most medicinal plants have a specific action on particular body systems and are known to be suitable for treating certain types of illnesses, see examples below.

Medicinal plants are classified according to the identification of their actions, for example, whether they are sedative, antiseptic or diuretic and the degree to which they affect different body systems.





## Herb Impact on Body Systems

Herbs benefits	Identification of herb action	Example of herb/plant
<b>Immune system</b>	<i>Immune modulators</i> encourage the immune system to ward off infection.	<b>Echinacea</b>
<b>Respiratory system</b>	<i>Antiseptics and antibiotics</i> help the lungs resist infection	<b>Garlic (Allium sativum)</b>
	<i>Expectorants</i> stimulate coughing up of mucus	<b>Sléz (Malva)</b>
	<i>Demulcents</i> soothe irritated membranes	<b>Coltsfoot (Tussilago farfara)</b>
	<i>Spasmolytics</i> relax bronchial muscles	<b>Chamomile (Matricaria chamomilla)</b>
<b>Endocrine glands</b>	<i>Adaptogens</i> help the body to external pressures and stress	<b>Ginseng (Panax ginseng)</b>
	<i>Hormonally</i> used for menstrual problems, infertility or reduces sex desire	<b>Chaste tree (Vitex agnus-castus)</b>
<b>Urinary system</b>	<i>Astringents</i> tightens and protects the urinary tubules	<b>Horsetail</b>
<b>Musculo-skeletal system</b>	<i>Anti-inflammatories</i> reduce swelling and pain in joints	<b>White willow (Salix alba)</b>
<b>Nervous system</b>	<i>Nervines</i> supports and strengthens nervous system	<b>Rosemary (Rosmarinus officinalis)</b>
	<i>Relaxants</i> relax nervous system	<b>Lemon balm (Melissa officinalis)</b>
	<i>Tonics</i> improve nerve function and tone help to restore the nervous system as a whole	<b>Oats (Avena sativa)</b>
	<i>Sedatives</i> reduce nervous activity	<b>Mistletoe (Viscum album)</b>
<b>Circulation &amp; heart</b>	<i>Circulatory stimulants</i> improve blood circulation to extremities	<b>Chilli (Capsicum frutescens)</b>
	<i>Spasmolytics</i> relax the muscles and help to lower blood pressure	<b>Cramp bark (Viburnum opulus)</b>
<b>Digestive organs</b>	<i>Antiseptics</i> protect against infection	<b>Ginger (Zingiber officinale)</b>
	<i>Bitters</i> stimulate secretion of digestive juices by stomach and intestines	<b>Wormwood (Polygonum bistorta)</b>
	<i>Carminatives</i> relieve wind and gripping pain	<b>Sweet Flag (Acorus calamus)</b>
	<i>Choleretics</i> stimulate secretion of bile by the liver	<b>Artichoke (Cynara scolymus)</b>
<b>Skin</b>	<b>Healing and vulnerary</b> aid the healing of cuts, wounds and abrasions	<b>Comfrey (Symphytum officinale) Marigold (Calendula officinalis)</b>



# Natural Prevention and Pest Control

**Biological control** is a method to control pests such as insects, weeds, mites and plant diseases using other organisms. It relies on the natural mechanisms such as predation, herbivory, parasitism and others. However, the method also involves an active human management role. It can be an important component of integrated pest management programs (IPM).

There are three basic strategies for biological pest control:

- 1. classical (importation): natural enemy of a pest is introduced to achieve control
- 2. inductive (augmentation): in which a large population of natural enemies are administered for quick pest control
- 3. inoculative (conservation): specific measures are taken to maintain natural enemies through regular reestablishment.

Biological control agents, i.e. natural enemies of insect pests, include predators, parasitoids, pathogens and competitors.

Biological control agents of plant diseases are often referred to as antagonists. Biological control agents of weeds include seed predators, plant pathogens and herbivores.

Nevertheless, biological control might have side-effects on biodiversity when any of the same mechanisms attack on non-target species, particularly when a species is introduced without thorough understanding of the possible consequences.

- *Examples of predators:* lady beetles, larvae of hover fly species, some species of entomopathogenic nematodes, but for example cats or barn owls as well.
- *Examples of parasitoids:* wasps, flies or birds
- *Examples of pathogens:* bacteria, fungi, viruses
- *Examples of competitors:* legumes, some species of dung beetle





## Natural Pest Control Methods

Organic gardening basically means using the least harmful method of controlling pests and diseases. It also means that the plant is not looked on as an isolated thing but part of bigger ecological system and doing what's best for the system as a whole instead of what's best for just the plant. Organic pest control doesn't have to mean fruits and veggies riddled with worms. Your vegetable or fruit garden can thrive without the addition of poisons.

Spraying chemicals on the plant is the answer for many gardeners, either preventatively, or for treatment, but this method of pest control has major disadvantages.

First, it creates more work in the garden, with the need to keep spraying whenever there's a problem and that will be often. Secondly, pesticides won't kill just the pests, but also

the predators of the pests you are trying to kill and all-important bees and soil life as well.

Finally, there is increasing evidence that pesticides are harmful to human health, and many are persistent in the environment.

Simply said, spraying poison on your food might not be the best idea. The good news is, there are very effective organic, all-natural ways you can control pests in the garden that are not only better for the environment and your health, but also much less work once set up.

It takes more time and more thought to grow food organically but it's better for the ecosystem and your family. Over time you will figure out what works best for you and your garden. Just remember to keep notes while you're learning.

Pruning Trees - Natural Way to Control Pests





## Keep Your Plants Healthy

Plants that have their needs met (nutrients, water, a healthy ecosystem, etc.) are better at repelling pests. When the plants have what they need, they begin to produce their own organic pesticides. These are compounds that either prevent easy digestion, they are fully toxic, make them taste bad, or act as deterrents to pests. Here are some key ways to keep plants healthy:

### 1. Build Healthy soil

Growing splendid plants always starts with soil. If you have dead soil because you killed every living thing but your plant, the plant will not thrive. Each year you will have to add more and more fertilizer to get the same results. Building your soil takes time but if you stop tilling and start adding compost your soil becomes healthy over time.

***Healthy soil = healthy plants.***

Mulch helps protect and build soil, and so do compost and compost tea, actively aerated or not. These add nutrients and micro-organisms to the soil. Micro-organisms are important because they make nutrients “bio-available” to plants, breaking indigestible compounds down into nutrients the plants can use, while helping to build a healthy soil structure that keeps nutrients from washing away in the rain.

***Building soil helps to create  
a pest free garden***

**Add beneficial nematodes to the soil**

### 2. Increase Soil Organic Matter

Mulch, compost, and the resultant micro-organisms will help to build the soil organic matter, which becomes a teeming-with-life underground ecosystem that feeds the

plants and keeps them healthy while also dramatically increasing the soil's water holding capacity. Other ways to increase organic matter are to plant mulch crops and periodically cut them and toss them onto the soil (e.g. comfrey, alder trees), and to plant “green manure” crops (e.g. alfalfa, rye, buckwheat), prior to planting, and then cutting them and working them into the soil a little (mixing the top layers of soil as little as possible with the lower layers).

- Do not compost the effected plant debris
- Dispose of infested plants.

### 3. Rotate the crops

Don't make it easy for the pests to find your plants by planting the same plants in the same spots year after year. Here is a simple order for rotating crops – legumes, leaf, fruit, roots. No one is perfect, do not keep it totally, just try to not plant the same thing in the same spot year after year.

### 4. Use Mulch

Mulch, which should be at least 4-6 inches thick, not only provides a habitat for allies like ground beetles, it also slows down water evaporation, breaks down into nutrients and protects the micro-organisms in the soil from the harsh sun, wind, and rain, while preventing soil erosion. You can mulch with leaves (but not from black walnuts), straw (seedless!), or wood chips (ideally not acidic ones like cedar), for example.



**FACT**



**FACT**





## Encourage Predators of Pests

Predators, or allies, tend to have longer life cycles than vegetable or other plant pests, which means it takes longer for their numbers to build up. If you wage war on pests, not only do you risk killing their predators, but these natural pest controllers will never have the food they need to establish themselves. The first thing to do, then, is to identify the pests that are causing you problems. Then, do some research to find out what preys on them in your area.

## Give Allies Food

Some predators, like parasitic wasps, need other sources of food besides the pests they eat. The wasps require nectar that only certain umbel flowers can provide. The best way to make sure predators have the food they need is to plant a large diversity of plants, especially native perennial plants and flowers. (not acidic ones like cedar), for example.

## Create a Pond

Life needs water, and your garden allies are no exception. Too many slugs? You don't have a slug problem, you have a frog deficiency, and frogs won't come around without a pond.

## Create Other Habitats

Adding things like mulch, logs, rocks, and lots of perennial plants to your garden will create diverse habitats for different allies. Again, find out what your pest predator needs, and give it to them.

## Plant in Natural Patterns

Most people tend to plant a particular

species into the same area of the garden. While this may save some time harvesting, it will cause more problems by giving pests an easy-to-find buffet of their favourite foods. Consider spacing smaller plantings out into different areas of the garden. This will keep the pests of a given species.

## Release predatory beetles into the garden

Not all bugs or insects are harmful. In fact many are beneficial. Ladybugs and hoverflies eat aphids. Parasitic braconid wasps kill tomato hornworms. Paper wasps, spiders, and many other bugs and insects are very good for your garden. If you use a commercial all inclusive pest control powder, you'll kill all the beneficial bugs and insects in your garden and you don't want to do that. Be sure to plant flowers that attract these bugs and insects. Dill, tansy, coriander, Queen Anne's lace, yarrow, buckwheat, sunflowers, sweet alyssum, lemon balm, and marigolds are wonderful choices.



Ladybird - Very Beneficial Predator  
Source: [familyfoodgarden.com](http://familyfoodgarden.com)



## Diversify Your Plants

If you only have a few types of plants, you are more likely to attract the pests that love those plants. Having more types of plants not only ensures more food and habitats for insects (and most insects are not plant pests), it also creates a healthier environment for your plants in other ways beyond the scope of this article. There is no need to keep perennials and annuals separate in the garden either. In fact, planting them together creates less root competition for nutrients and water, since perennials almost always have much deeper roots than annuals.

### Use Trap Plants

Once you know your pests, you can also use their favourite food against them. This works best if the pests are already there (otherwise you may attract them). Use a plant the pests particularly enjoy (e.g. flea beetles love bok choy more than anything), and plant a small clump of that food near the problem plants. Once the pests flock to their favourite food, you can vacuum them off with a shop vacuum, or spot spray them with an organic pesticide like Neem oil or diluted soap.

### Plant some companions

***Companion planting of vegetables with herbs and flowers is a great way to have a healthy garden!***

Marigolds, nasturtiums, geraniums, dahlias, chrysanthemums or aromatic plants such as lavender, savory or garlic make great companion plants with your vegetable seeds and can also offer various benefits for your garden not only deterring the pests and thus having splendid vegetable, but getting your garden decorated with pretty flowers too.

There are some plants that pests just don't like. Radishes will deter cucumber beetles, borage will deter tomato hornworms and cabbage moths, onions and garlic have a

strong smell and can be planted throughout the garden. Some plants can be planted as a trap for pests. Sunflowers will keep aphids occupied and off other plants, hyacinth beans will do the same for leaf footed bugs. Some plants will attract beneficial bugs to your garden. Chamomile and buckwheat both attract bees and ladybugs. And guess what ladybugs like to eat....aphids. So mix up your beds, you don't need to have nice neat row crops to have a successful garden.

Encouraging ladybugs in the garden helps to control aphids.

Experienced vegetable gardeners often use flowers shown above, and herbs such as sage, rosemary, basil, and horseradish to act as natural insect repellants in the garden.

Borage and lemon balm can be used to help attract bees to the garden to help with plant pollination.

***Learn which plants grow well together, and which plant combinations to avoid for best gardening results.***

Follow traditional vegetable gardening methods by companion planting your garden.

- Dust the plants with diatomaceous earth.
- Solarize infected garden beds, by covering with black plastic which will heat the soil.



### ***Pick varieties that naturally discourage pests***

If you have trouble with vine borers pick a variety of squash that has a thinner or harder stem; butternut squash, green striped cushaw, Dickenson pumpkin and summer crookneck are somewhat resistant to vine borers. To discourage earworms in corn choose tightly husked varieties such as 'Country Gentlemen' and 'Victory Golden'. We're not talking about GMO seeds, just varieties that naturally make it hard for pests to attack.



## Get Physical

Sometimes you just have to get physical with pests.

- Nets or row covers over cabbage will keep the moths from laying eggs on them.
- Crushed eggs shells can be put around the base of plants to keep slugs away.
- Metals cans (with both ends cut off) can be put over tender seedlings and pushed into the soil a bit to keep cutworms at bay.

Many of the above tips for organic, all-natural pest control are related to creating a healthy garden ecosystem, which is really the key to keeping things in balance in the garden. The more we can learn about ecology and ecosystem dynamics related to gardening, the better we will intuitively know how to keep our garden healthy with less work and inputs.



FACT

To help with a pill bug infestation, put a teaspoon of yeast, a teaspoon of sugar and 1/2 cup of water into an 8 ounce jar and bury the jar up to the lip. The pill bugs are drawn to the smell and will drown. Change out the jar every couple of days. Also, looking for insect eggs on the underside of leaves and squishing them is an effective way to reduce pests in the garden.

However, the best thing we can do is to get out into the garden, observe carefully, and have fun!





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# REGIONAL PLANTS II

## WILD HERBS

Wild herbs are wild plants that are not bred and are not cultivated plants. They grow in the human environment and are often identified as weeds. Unfortunately, this designation is unjustly negative. Thus, the naming as wild herbs is better to judge. Today the wild herbs experience a

renaissance again. Many people are more concerned with the wild herbs and keep the cultural heritage high. Especially in the kitchen and as proven home remedies the wild herbs again find more use.



Source: [pixabay.com](https://pixabay.com/) / [silviarita](#)



## Wild Garlic

**Allium ursinum – Bärlauch – Česnek medvědí -Laukinis česnakas  
Medvehagyma – Aglio orsino**

**Family:** Daffodil Family (Amaryllidaceae)

**Common names:** Witch onion, witch-boots, forest garlic,

**Short description:** Height 20 - 50 cm stems without leaves

**Flowers:** 2 cm wide, spread out in a star shape

**Leaves:** usually two stalked leaves with a strong smell of leek/garlic

**Roots:** onion root

**Habitat:** humid deciduous forests with herbaceous undergrowth, alluvial forests, on humus-rich soils, in mostly shady locations, often forms extensive stands

**Collection time:** As soon as the leaves emerge (March - April) you can collect and process the leaves. Later you can pick the buds and process them into spreads. Of course, you can still process the leaves later, but the important ingredients are no longer so abundant.

**Danger of confusion exists with the autumn crocus - Colchicum autumnale!!!**

The leaves of this plant are darker, firmer, larger and usually grow together in a threes turned from a base and encase the basal capsule

.Furthermore, there is a likelihood of confusion with the lily of the valley! The leaves of the lily of the valley grow on a stem and embrace it.

Both plants are very poisonous!

Who is afraid of confusion, should only collect the buds of wild garlic.



WILD GARLIC



**Uses:**

The wild garlic is well suited for a spring cure. Wild garlic contains a lot of vitamin C, B1 and B2 as well as iron, manganese and magnesium. It stimulates the metabolism and the intestine. Bear's garlic vinegar cleanses the blood. To do this, hand a handful of cut leaves or onion into a quart of cider vinegar and leave to soak for 3 weeks. For a blood cleansing treatment, add one tablespoon of wild garlic vinegar to half a cup of warm water for 6 weeks in the morning and swallow in about 20 minutes before breakfast. The wild garlic is similar to garlic for loss of appetite, high blood pressure and arteriosclerosis, cut leaves suitable for quark and pesto.

**• Wild garlic pesto****Ingredients:**

500 g wild garlic  
80 g Parmesan, grated  
80 g Pine nuts, roasted, grated  
250 ml olive oil  
Salt  
Pepper

**Preparation:**

Wash wild garlic and spin dry. Finely chop with the remaining ingredients in the food processor and season to taste with salt and pepper. Fill in clean and very hot-rinsed screw-cap jars and store in the refrigerator. If the pesto is well chilled it can be stored in the fridge for a year as the wild garlic is antiseptic. Variations: You can use cashews or macadamia nuts instead of pine nuts for roasting and salting. Then the amount of salt to taste must be reduced. Use the pesto for pasta, sauces, salads and grilled food.

**WILD GARLIC**

Source: [pixabay.com](http://pixabay.com) / Wildfaces





## Comfrey

**Symphytum officinale - Gewöhnlicher Beinwell - Kostival lékařský -  
Vaistinė taukė - Fekete nadálytő - Consolida maggiore**

**Family:** borage family (Boraginaceae)

**Common names:** comfrey, soldier root, bone-kit

**Short description:** Height 30 - 100 cm

**Flowers:** flowers yellowish white, purple or reddish-violet, flowers nodding 1- 2 cm long

**Leaves:** sticky, shaggy leaves descend on the stalk

**Roots:** rootstock

**Habitat:** Shore, roadsides, wet meadows, ditches, alluvial forests, on humid to wet soils rich in nutrients and bases. Especially distributed in the lower elevations

**Collection time:** The root of the comfrey is best collected from February to March. The leaves can be collected the whole time but the later the less shabby they become

**Use:** From the roots can be made a good tincture. For this you clean parts of the roots and cut them into small pieces and put them in a screw jar. Then pour the roots over with at least 40% alcohol and let it stand for four to six weeks. Now you can filter this tincture and can make envelopes or make creams. The leaves may also be collected and used for cooking for "wild" recipes.

However, you should not take the leaves internal too often. Comfrey contains pyrrolizidine alkaloids, which can damage the liver. In external applications there is no danger of damaging the liver. Nevertheless, tinctures and comfrey creams should not be used for more than six weeks.



The comfrey root has many positive features on the musculoskeletal system and is helpful in accidental injuries. For bruising, bruising, sprains and even bone fractures, the active ingredient has been proven to prevent the tissues from becoming inflamed.

Ingredients of the comfrey include allantoin, rosmarinic acid and mucilage.

COMFREY



## Ribwort Plantain

**Plantago lanceolata - Spitzwegerich - Jitrocel kopinatý - Gysločiai - Lándzsás útifű - Piantaggine**

**Family:** Plantain Family (Plantaginaceae)

**Common names:** medicinal plantain, medicinal flower, hay feeder, dog ribs, laminae, lung leaf, ribwort, horse ribs, sheep tongue, snake tongue, seven ribs

**Short description:** Height 5 - 50 cm, common in fatty meadows

**Flowers:** 2 - 4 mm long with brownish edges

**Leaves:** basal rosette, lanceolate or linear-lanceolate, 10 - 20 cm long, 0.7 - 2 cm wide

**Root:** The richly branched root can reach up to 60 cm in depth.

**Habitats:** Greasy meadows, pastures, park turfs, oil fields, paths, fields

**Collection time:** from April to October leaves could be collected

**Use:** The plant contains many tannins, flavonoids, silica acid and has an antibacterial effect. It can be processed into tea, juice or syrup. Above all, the syrup is widely considered a good home remedy for cough. Fresh leaves help against insect bites when they are put on as porridge on the sting site. Fresh leaves of ribwort plantain can be finely cut in any salad and are also very delicious on bread and butter.

### Cough syrup

Ingredients:

Take fresh ribwort leaves (only collect intact, unbroken leaves, do not pick at the edge of the road or at "dog leashes"), in pieces ripen crumbled candies in about the same amount

Preparation:

Lay the ribwort leaves with the candy alternately into the screw jars until they are

completely full. Finish with a layer of candy. Now the glasses are closed and labeled with content and date of manufacture. Now you have to leave the whole thing for about three months, until the candy has completely liquefied. When the time comes, the syrup is drained through a sieve or pantyhose, the leaves are squeezed out. The finished syrup is then filled into suitable screw bottles and labeled. This syrup should be stable for about a year.



RIBWORT PLANTAIN



## Dandelion

**Taraxacum officinale - Wiesen-Löwenzahn - Smetánka lékařská  
Kiaulpienė - Gyermekláncfű (Pitypang) – Dente di leone**

**Family:** Basket bloom family (Asteraceae)

**Common Names:** Bed Pisser, Buttercup, True Dandelion, Common Cowslip, Common Dandelion, Meadow Dandelion

**Short description:** Height up to 30 cm

**Flower:** single petals, 2.5 - 5 cm wide cups with golden yellow florets, inflorescence spherical up to about 5 cm in size

**Leaves:** The leaves in a basic rosette are lobed to roughly sawn and bare.

**Root:** It is a tap root that reaches deep into the earth- nearly one meter

**Habitat:** Meadows, pastures, herds of weed on paths, in fields, park lawns, on fresh, nutrient-rich, mostly deep soils

**Collecting time:** roots in March and again from September to October, leaves from May to September, flowers from April to May

**Use:** Dandelion contains many bitter substances, vitamins A, B, C, D, E and minerals like potassium, calcium, iron, zinc and magnesium. This plant can be used extremely varied. You can put the leaves in any spring salad or make them as tea. A tincture helps against bad digestion and stimulates the liver and bile. In addition, the kidneys are stimulated and blood formation promoted.

### Dandelion water against inflamed eyes

Against inflamed eyes dandelion or dandelion root was placed in lukewarm water for 36 hours (maceration). Then the dandelion water was filtered, with the filtered lukewarm dandelion water wash your eyes several times a day.

Dandelion honey

### Ingredients:

600g dandelion flowers (only the yellow flowers)

3 liters of water

3 lemons

3 kg of sugar (organic)

### Preparation:

Pick dandelion heads fresh and best on a sunny, dry day and away from busy roads or sprayed fields. Now free the flower heads from all green. Wash the yellow petals and bring to boil in 3 liters of water. Add juice of 3 lemons. Cook for about 30 minutes and then strain. Add the sugar to the broth and cook for another 45 minutes. Stir again and skim off the foam. Then cook for about 1 hour on a low flame and then cook gently for another hour or leave to stand on a small plate. The more you reduce it, the more viscous the dandelion honey becomes. Fill the still hot dandelion honey in carefully cleaned screw jars. The consistency still solidifies in the cooled state.





## Shepherd's Purse

**Capsella bursa-pastoris - Gewöhnliches Hirtentäschel - Kokoška pastuší tobolka - Trikerté žvaginé - Pásztortáska - Borsa pastore**

**Family:** Brassica family (Brassicaceae)

**Common names:** bag cutter, heart, heart herb, wooden spoon

**Short description:** up to half a meter high

**Flower:** The flowers are arranged in a loose grape. The petals are white and 2 - 3 mm long. The fruit is shaped like a shepherd's bag.

**Leaves:** Leaves are in basal leaf rosette, bay-toothed. The stem is simple or branched with simple and single star hairs. The stem leaves are lanceolate, entire and the upper leaves cover the stems.

**Habitat:** weeds in fields, gardens, paths, rubbish sites, wastelands, burial mounds, nutrient-rich soils in bright locations, nitrogen pointers

**Collecting time:** from May to July

**Use:** The plant contains many important substances especially tyramine, histamine and flavone glycosides as well as tannins. These have hemostatic and vasoconstrictive. For example, if the menstrual bleeding is too frequent and too long, you can drink a cup of tea from this plant up to four times a day. For nosebleeds, you can also dip a little cotton into a concentrated tea and then introduce it into the affected nostril. Even with tooth extractions, the affected area can be rinsed with this tea for hemostasis.

**In addition,** the plant can also be used culinary. Fresh leaves can be processed with curd cheese. The taste is a bit like horseradish.

**Attention:** In stronger doses the plant is poisonous.



**SHEPHERD'S PURSE**

Source: <http://eurodenik.cz/zdravi/7-lecivych-bylinek-ktere-rostou-v-lete>



## Nettle

**Urtica dioica – Brennessel – Kopřiva dvoudomá**  
**Dilgelé – Nagy csalán – Ortica**

**Family:** Nettle family (Urticaceae)

**Short description:** up to 50 cm high

**Flower:** The flowers are green and numerous in panicles. The male inflorescences are hanging and the female are spangling. The plant is dioecious, that is why male and female flowers sitting on different plants.

**Leaves:** The leaves are oblong, roughly sawn, with burning hair and bristle hair and heart-shaped at the end. The leaves are oppositely.

**Habitat:** on nitrogen-rich soils, mostly in damp locations, roadsides, settlements, cultural companions

Collecting time: from May to October

**Use:** The nettle contains many vitamins and provides mineral salts. Their ingredients have a detoxifying effect. This plant helps with inflammation of the bladder, kidney and urinary tract. However, it should be emphasized that the stinging nettle is a great help against rheumatism. Because the nettle tastes slightly sweet, it can be used well in the kitchen for many dishes. Because it - like many other herbs - contains no bitter substances, it is also eaten by children.

The stinging nettle can be incorporated into the pasta dough or dressed to pesto.

Although the nettle is so healthy, it should not be consumed in excess. To drink the tea should be limited to a maximum of 6 weeks, otherwise the kidneys could be too irritated.

But the stinging nettle can also be used in agriculture - as a fertilizer and as a pesticide against harmful insects.

### *Nettle liquid manure*

#### **Ingredients:**

Nettle, water

#### **Preparation:**

Fill a bucket with nettle and pour over water until covered. Then leave this bucket in the sun and stir the mixture every day. Important active ingredients are released into the water. Finally, the mixture begins to ferment and can be sieved. Now you can use this manure in a diluted form to pour the plants, the vegetables and herbs.



NETTLE





## Horse Chestnut

**Aesculus hippocastanum - Rosskastanie - Kaštan koňský - Paprastasis kaštonas - Közönséges vadgesztenye - Ippocastano**

**Family:** Soapberry Family (Sapindaceae)

**Common names:** sour cream cheese

**Short description:** The pollinating flowers of horse chestnut have yellow, older or pollinated orange and red spots

**Flowers:** up to 2 cm tall, white

**Leaves:** fingered, with 5 -7 leaflets, often the leaves turn brown already in the summer

**Location:** in parks and on streets, hardly wild

**Collecting time:** seed from September to Oktober

**Use:** The seeds are always collected. This happens when the horse-chestnuts are ripe and fall to the ground. For further processing, the horse chestnuts are crushed and dried. Above all, the saponin contained are of great importance. So the horse chestnut can be used for washing clothes or a horse chestnut bath for the relief of dandruff and alleviation of skin problems.

In medicine, the horse chestnut is mainly used in venous disease.

A second possibility is to fill the horse chestnut pieces in a fabric bag and tie up well and to put the laundry in the washing drum. This washing powder is well suited for colourful laundry, but not for white laundry!

### *Horse Chestnut Facial Cleansing*

#### **Ingredients:**

50 grams of fresh horse-chestnuts

100 ml of water

100 ml of coconut milk

1 tsp apple pectin

#### **Preparation:**

The horse chestnuts are pulverized in a blender and placed in a screw jar. Now add the remaining ingredients and shake well. The whole is allowed to stand for 1 to 4 hours and then the liquid can be filtered and used as a facial cleanser or shower gel.

### *How to prepare an organic washing powder?*

#### **Ingredients:**

horse chestnut

#### **Preparation:**

Collect the horse-chestnuts and mince them (Moulinex). Then place them on a board or sheet to dry. If they are dry, they can be stored in a sealable container. For the washing process, take a screw-cap and add three to four tablespoons of dried chestnuts and fill with water. Now let the glass stand a little bit (4 - 8 hours). Now the water has turned cloudy and foams when shaken. You can now put the water in the washing machine and start washing.



**HORSE CHESTNUT**

Source: pixabay.com / \_Alicja\_



## Hedge Bedstraw

(*Galium mollugo*) - Wiesenlabkraut - Svízel povázka - Lipikas -  
Közönséges galaj - Caglio

**Family:** Reds (Latin Rubiaceae)

**Common Names:** White Forest Straw, Grass Star

**Short description:** Height 25 - 100 cm, stalks down to upright, branched, bare, 4-sided

**Flower:** lush, narrow pyramid-shaped inflorescence, crown with 4 flat, awn-like tipped edges

**Leaves:** oblong-lanceolate, coarse to leathery, spiky

**Roots:** The roots of meadowweed were formerly used to make red paint for textiles, much like the roots of the daffodil. The plant contains the enzyme Lab, which also occurs in calf stomach and is used in cheese production.

**Habitat:** meadows, forest and shrublands, nutrient-rich soils

**Collecting time:** from May to September

**Use:** The roots of hedge bedstraw formerly

used to produce red color for textiles, similar to the roots of the daffodil. The plant contains the enzyme Lab, which also occurs in calf stomach and is used in cheese production. The plant is edible. The young shoot tips and flowers can be used for salads, wild vegetables, jellies, drinks and desserts.

### *1-minute-hedge bedstraw-curd cheese spread*

#### **Ingredients:**

250 grams of curd cheese  
100 grams of meadowweed  
2 tablespoons sour cream  
Garlic, salt

#### **Preparation:**

Crush all ingredients in a Moulinex and stir.



HEDGE BEDSTRAW

Source: pixabay.com / WikimediaImages



## Common Yarrow

**Achillea millefolium - Schafgarbe - Řebříček obecný - Paprastoji kraujažolė - Közönséges cickafark - Achillea**

**Family:** Basket bloom plants (Asteraceae)

**Common names:** Eyebrow Venus (Supercilium Veneris), God's hand, Cats herb, Margaret's herb, Cat's tail, sheep's ribs, sheep tongue

**Short description:** The yarrow is a perennial, perennial plant, i. some of the leaves remain above the earth's surface even in winter

**Flower:** dense shingle with numerous, 4 - 10 mm large flower baskets, baskets with 4 - 6 ray florets, inside yellowish white tubular flowers

**Leaves:** alternate, lanceolate in outline, 2 to 3fold cleft

**Roots:** In spring, the rhizome sprouts a rosette of feathered leaves

**Habitat:** Meadows, pastures, semi-arid grasslands, fields, on nutrient-rich soils,

widespread in mountains

**Collecting time:** from June to November

**Use:** The yarrow is an old medicinal plant. The herb and the flowers contain many essential oils as well as tannins, bitter substances and other substances. Above all, the herb and the flowers are used. These are dried and usually prepared to tea. Internally, this plant is used for stomach problems, diarrhea and flatulence, as well as for painful menstruations against bleeding. In addition, this plant is used in purulent wounds and rashes. For baths against chapped skin and as a gargle.

However, it should be noted that this plant is not overdosed and taken over a long period of time.



COMMON YARROW



## Tormentil

**Potentilla erecta, Potentilla tormentilla - Blutwurz - Mochna nátržník - Miškinė sidabražolė - Vérontó pimpó - Cinquefolgia tormentilla**

**Family:** Rose Family (Rosaceae)

**Common names:** seven finger

**Short description:** Height 10 - 30 cm, stems ascending or lying down

**Flowers:** with 4 slightly indented petals, about 1 cm in size,

**Leaves:** leaves fingered, sitting, leaflets 1 - 2 cm long, roughly serrated

**Roots:** Rhizomes tuberous to whorled, black-brown, truncated rhizome turns red

**Habitat:** Mild grasslands, heaths, fens, sunny slopes, embankments, light forests, forest roads, on nutrient-poor, often acidic soils

**Collecting time:** roots from March to October, Flowers from June to September

**Use:** The rhizome works by tannins against diarrhea and inflammation in the mouth and throat. A tincture of the Tormentil calms the

stomach.

**Tormentil tincture**

**Ingredients:**

Root parts of the Tormentil

(These are highest as thick and as long as a thumb)

at least 40% alcohol

**Preparation:**

Clean the root parts and place them in screwed glass (about 2/3 root parts). Then douse them with alcohol until the glass is full and put it in a warm place. After about 6 - 8 weeks, filter the mixture.

For gastric problems, take one teaspoon of it.



TORMENTIL



## Common Valerian

**Valeriana officinalis - Echter Arznei-Baldrian - Kozlík lékařský  
Vaistinis valerijonas - Orvosi macskagyökér - Valeriana**

**Family:** Honeysuckle Family (Caprifoliaceae)

**Common Names:** Real Valerian, Common Valerian

**Short description:** up to 2 meters high

**Flowers:** forked, hemispherical to umbrella-shaped, dense inflorescences, flowers 3 - 8 mm long, very many pale pink, rarely more white flowers

**Leaves:** pinnate with 3 - 14 pairs of leaflets and terminal leaflets or feathered

**Roots:** The roots with their numerous fibers are brown on the outside and whitish on the inside

**Habitat:** wet meadows, riverside, moist forests on alkaline soils

**Collecting time:** root from September to October

**Use:** The ingredients of valerian are mainly essential oil, valeric acids and valepotriate. For application one uses above all the roots

and prepares an extract or a tincture. You can also make a tea from it. This tea has a relaxing effect, relieves cramps and even eliminates fears.

### *Common Valerian wine*

#### **Ingredients:**

Roots of the plant

one organic orange

one bottle of good white wine

#### **Preparation:**

Clean and mince the roots. Then fill in a well-sealable 1-liter glass. Add some grated orange peel (or lemon) and the white wine. Now you can leave this for 2 weeks. Then you sift the wine off.

A liqueur glass before sleeping can work wonders!



COMMON VALERIAN



## Common Self-Heal

**Prunella vulgaris - Kleine Braunelle - Černohlávek obecný**  
**Paprastoji juodgalvė - Közönséges gyíkfű - Prunella comune**

**Family:** Labiate Family (Lamiaceae)

**Common names:** Little Prunelle

**Flowers:** inflorescence from capitate heaped flower whorls, sitting on the uppermost pair of leaves, beater with 4 - 6 blue or purple violet love flowers, corolla tube straight, upper lip helmet-shaped, lower lip 3-piece

**Leaves:** opposite

**Roots:** Plant with creeping, above-ground, root-forming foothills

**Habitat:** Meadows, pastures, parks, lawns, banks, forest roads, on fresh or moist soils in bright locations, indicates nutrient richness

**Collecting time:** from May till October

**Use:** Early diphtheria

Earlier, the small brown cell was an important remedy for diphtheria, which was then often and very feared. The diphtheria is also called "neck tan," which probably gave Prunella her name. But the brown is still a medicinal plant that can be used against throat infections.

The ingredients of the plant are essential oils, flavonoids, bitter substances, tannins and triterpene saponins.

In China, it is still highly valued today and so this tea is offered for sale on every street corner. In addition, this plant is used in soups and salads to strengthen the body's defenses.



COMMON SELF-HEAL



## Purple Dead-Nettle

**Lamium Purpureum - Purpurrote Taubnessel - Hluchavka nachová  
Raudonžiedė notrelė - Árvacsalán - Falsa Ortica**

**Family:** Labiate Family (Lamiaceae)

**Common name:** bee sucking, flower nettle

**Flowers:** Flowering purple, 1 - 1.5 cm tall, upper-lip helm-shaped, flowers to 6 -16 lively in the axils of the upper leaves

**Leaves:** Crossed opposite to ground heart-shaped, sawn

**Habitat:** spotty weed stocks on fields, in gardens, vineyards, paths, rubbish dumps, wastelands, on fresh, nutrient-rich soils, nitrogen pointers

**Collecting time:** from March until October

**Use:** This plant grows very fast and can produce up to four generations per year. Sometimes it even blooms in the winter. For the treatment of ear noises Insomnia, dysentery, chest discomfort and lung complaints, metabolic diseases, scrofula, rash, numbness, white-flow, anemia, cystitis, hemorrhoids, irregular and painful period, earwax indurations and wounds helps this plant.



PURPLE DEAD-NETTLE



## St. John's Wort

**Hypericum perforatum - Echtes Johaniskraut - Třezalka tečkovaná  
Jonažolė - Közönséges orbáncfű - Erba die san giovanni**

**Family:** St. John's Wort (Hypericaceae)

**Common names:** weed, manpower, Spotted St. John's wort, our women bed straw

**Short description:** 30 - 60 cm high

**Flowers:** graded flowers stain red, multi-flowered panicles, flowers 2 - 2.5 cm tall, golden yellow, dotted black at the edge, 50 to 100 stamens

**Leaves:** opposite, sitting 1 - 2 cm long, black glands on leaf margin

**Location:** Lean pastures, lawns, heaths, fallow land, bushes and forest edges, railway ballast, rubbish dumps, oil fields

**Collecting time:** flower from June to August

**Use:** This plant contains essential oil, which is found mainly in the flowers and leaves. It is

best if you harvest them, if they had a lot of sun. Then you can make a tea from these parts of the plant or add oil. Internally, the tea has an antidepressant effect, relieves headache and strengthens weakness. Externally, the oil heals wounds and scars and helps with herpes and other viruses.

### Attention:

This plant is sensitive to sunlight and should be avoided especially in the summer months.



ST. JOHN'S WORT



## Ground Ivy

**Glechoma hederacea - Gundermann - Popenec obecny**  
**Šliaužiančioji tramažolė - Kerek repkény (Földi borostyán)**  
**Ellera terrestre commune**

**Family:** Labiate Family (Lamiaceae)

**Short description:** creeping plant, height 10 - 40 cm

**Flowers:** with flat upper lip and 3-part lower lip

**Leaves:** opposite, wintergreen

**Habitat:** meadows, pastures, lawns, forest edges, alluvial forests, embankments

**Collecting time:** the whole year

**Use:** Ground ivy contains a lot of vitamin C, essential oil, tannins, bitter substances and a lot of potassium but also saponin. This plant is good for all mucous membranes and works against inflammation. It even helps to dissipate heavy metals. Ground ivy is used mainly in the kitchen nowadays because it is a good spice herb.

In folk medicine for diarrhea and cough, as a bitter agent in beer brewing, in salads and quark, as spinach - like vegetables.



GROUND IVY



## Common Sorrel

**Rumex acetosa - Wiesen-Sauerampfer - Šťovík kyselý  
Valgomoji rūgštyinė - Lórom (Mezei sóska) - Romice**

**Family:** Knotweed Family (Polygonaceae)

**Common names:** sorrel

**Short description:** Height 30 - 100 cm

**Flower:** red-green in loose panicles

**Leaves:** basal stems, leaves 2-6 times as long as broad, arrow-shaped, with pointed, downward-pointing corners, slightly fleshy, sour-tasting

**Location:** meadows, pastures, roadsides, nitrogen indicator

**Collecting time:** from May to June

**Use:** Common Sorrel can be used as a spinach, for soups and salads, but enjoy in moderation if you have kidney weakness or bladder stones. The oxalic acid in the plants then harms them. The plant is a versatile wild vegetable and contains many minerals and contains a lot of vitamin C. Since the plant cleanses the intestine and the blood, it is well suited for a purifying treatment. For this you can mash smoothies - green smoothies - with meadow sorrel.



COMMON SORREL



## Gold Nettle

**Galeobdolon luteum – Goldnessel – Pitulník/hluchavka žlutá  
Geltonžiedis šalmutis – Erdei sárgeárvacsalán – Ortica mora**

**Family:** Labiate Family (Lamiaceae)

**Short description:** Height 15 - 80 cm, stalks lying in ascending order

**Flowers:** 1.2 - 2.5 cm long, light to golden yellow flowers, each 6 to 16 lively in the axils of the upper leaves

**Leaves:** serrated, long-stalked

**Habitat:** forests, bushes, on fresh, nutrient-

rich, loose soils

**Collecting time:** young leaves and shoots before flowering in March until May, the flowering herb until August.

**Use:** The leaves of the golden nettle, like other types of deadnettle, have a rather spicy taste. The flowers taste sweet, the nectar can be sucked out over the flower soil.



**GOLD NETTLE**

Source: [pixabay.com](https://pixabay.com/) / Hans Braxmeier



## Moneywort

**Lysimachia nummularia – Pfennigkraut – Vrbina penízková  
Šliaužiančioji šilingė – Pénzlevelű lizinka – Mazza d'oro minore**

**Family:** Primrose family (Primulaceae)

**Short description:** stems low, height 10 - 50 cm

**Flowers:** 1-2 on long stems, sepals heart-shaped, crown golden yellow, often dotted red

**Leaves:** wintergreen, up to 3 cm tall,

**Roots:** rooting stems in the lower part

**Location:** Greasy meadows, wet meadows,

pastures, alluvial forests

**Collecting time:** from June to July

**Use:** against eczema, wounds and cough, in salads and spreads the tea of fresh or dried leaves and flowers tastes very digestible. This is especially good for the lungs and the skin. The plant contains a lot of silicic acid, saponins and tannins.



**MONEYWORT**

Source: [www.wetland-plants.co.uk](http://www.wetland-plants.co.uk)



## Elder Flower

**Sambucus nigra – Holunder – Bez černý**  
**Juoduogis šeivamedis – Bodza – Sambuco**

**Family:** Honeysuckle (*Sambucus nigra*)

**Short description:** Height 200 - 700 cm

**Flowers:** Flowers cream-colored, up to 5 mm in size, in flat up to 20 cm large umbrella panicles, stamens are yellow

**Leaves:** The leaves are opposite, impeccable and lanceolate, asymmetrical.

**Location:** bushes, hedges, forests, forest edges

**Collecting time:** flowers from May to June,

fruits from August to September

**Use:** Elderflower tea in order to combat fever, cold and soothes the nerves. You can make jam, juice, liqueur and much more from the berries.

Elderberries should never be eaten raw. This leads to nausea!



ELDER FLOWER



## Large Thyme

**Thymus pulegioides – Gemeiner Thymian - Mateřídouška vejčitá  
Keturbriaunis čiobrelis – Kakukkfű – Timo**

**Family:** Labiatae (Thymus pulegioides)

**Short description:** Height 5 - 25 cm

**Flowers:** Inflorescences oblong, heady at the stem end, flowers pink violet, 3 - 6 mm long

**Leaves:** small egg-shaped leaves

**Roots:** deep roots

**Location:** dry grasslands, stony soils, sunny slopes

**Collecting time:** from June to October

**Use:** The Large thyme contains many essential oils (carvacrol and thymol), flavonoids and tannins. The Large Thyme helps with bronchial congestion and promotes good digestion.



LARGE THYME



## Soapwort

**Saponaria officinalis – Seifenkraut – Mydlice lékařská – Putoklis  
Orvosi szappanfű – Saponaria commune**

**Family:** carnation plant (*Saponaria officinalis*)

**Short description:** Height 30 - 80 cm

**Flowers:** The flowers have pink or white petals. They are 10 - 15 mm long, rounded or slightly emery. The flowers are in stalked doldigen inflorescences at the end of the stem. The goblet is tubular.

**Leaves:** The leaves are opposite, broadly lanceolate, pointed and three-annoying.

**Location:** roadsides, riverbanks, gravel fields, rubbish dumps

**Collecting time:** roots from October to

November and in March the herb from June to July

**Use:** The plant contains the flavonoid saponarin, sugar and other substances. This plant is made into drops and syrups, which are urinary and sudorific. Due to the saponins, the soapwort is also used in toothpastes, soaps and detergents.

**A high doses of soapwort the saponins decompose the red blood cells.**



SOAPWORT



## Dog Rose

**Rosa canina – Hundstrose - Růže šípková - Paprastasis erškėtis  
Vadrózsa (Csipkerózsa) – Rosa canina**

**Family:** Rose Family (Rosa canina)

**Short description:** Height up to 3 meters

**Flowers:** The flowers are light pink, 5 - 6 cm and on bald stalks in sepals with few narrow fiddles. These are repulsed after flowering and fall off before fruit ripeness.

**Leaves:** Leaves are 5- to 7-fold pinnate.

**Location:** forest edges, hedges, bushes

**Collecting time:** flowers from June – July, fruits from October to December

**Use:** The rosehips contain more vitamin C than citrus fruits and vitamins A, B1, B2, E

and K as well as minerals and fruit acids.

### *Rosehip cores to deacidify the body*

You have to dry the kernels and then mortar. Now take a spoon of shredded rosehip seeds and cook them in a quarter of a liter of water for 20 minutes and drink them swallowed. This tea increases the kidney activity and cleanses the intestines. Rosehip also acts deacidifying.



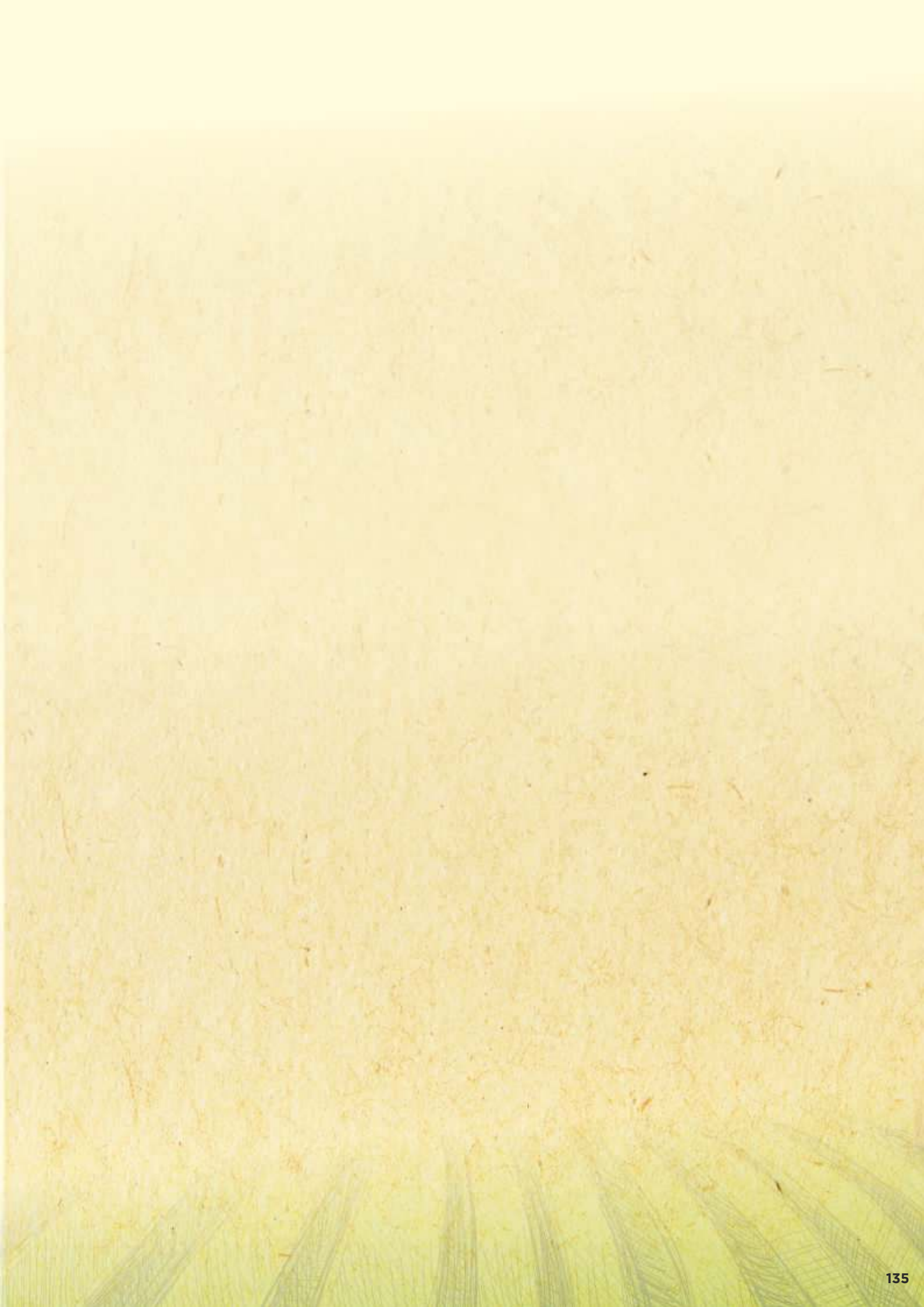
DOG ROSE



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