

Deep mulching, a nature friendly method for gardening and farming

By Iván Gyulai, Ecological Institute for Sustainable Development

The Australian professor John Crawford stated that here, in the developed Europe, soil degradation is 17 times faster than soil restoration due to human activity. Since we leave nothing on the surface of the soil, it has no cover and no protection from erosion, and there are no dead plants to turn to humus. Thus soil biology increasingly lacks adequate nutrition, and the amount of living organisms decreases. We substitute the gratis help we could get from nature (in the form of ecosystem services like soil formation and nutrient recycling) with artificial fertilizers, which we produce, transport and apply with the use of huge amounts of fossil energy. Together, this diminishes the nutritional values of our food, as well as degrades the soil. Even though these problems are well known in the scientific community, ordinary people, many of whom like gardening and are impacted by the problem, know almost nothing about it.

To cut at least a part of the problem I switched my conventional gardening method to deep mulching 15 years ago. Deep mulch imitates natural processes, as plants shed their leaves in autumn, and these cover the surface, which protects the soil from degradation, compaction, loss of moisture, and also provides an opportunity to build up topsoil, enhance soil life and improve its ability to regenerate, as well.

Deep mulch is a 50–60 cm thick cover made of organic waste ready for composting. Initially, this kind of thick cover is necessary, but year by year less cover is needed as the top soil layer becomes thicker. It means that after 10 years of continuous soil restoration we form a closed system and are able to use just the locally produced green remains for cover. In the first period we used large amounts of organic material input to the field, and over a decade we form a self-sustaining, closed cycle of organic green waste.

To start with the method it is recommended to remove perennial weeds, but not by ploughing and hoeing. The simplest way is to cover the surface vegetation with cardboard for three weeks. Thereafter, we have to uncover it for one week, then cover it again for three weeks, uncover for one week, cover for three weeks again, and after that the perennial weeds will disappear from the treated territory.

In the autumn (in October and November) we make deep mulch from organic waste to cover the soil surface. I personally use organic litter from the horse stable. First, you can use straw to cover the surface with a 20 cm thick layer. On top of that, add a 30 cm layer of stable litter (one day old), and then a 10cm straw cover on the top. The aim is to reach the right balance of nitrogen and carbon content that is optimal for composting. In this case the straw is the low-nitrogen component, and the high-nitrogen stable litter lays on top of it. When the rainwater leaches the ammonium nitrate from the dung, the straw below will absorb it, so the nitrite-nitrate compounds do not infiltrate straight into the soil, but will enrich the straw and the mixture will be ready for decomposing. Material decomposition will not start until spring, because the cold surroundings in winter abstract the heat. The thermophilic (heat producing) phase of composting lasts for cc. 2 months – therefore it is over before the summer begins – and provides the soil with enough warmth for the sprouts to shoot. As opposed to shallow mulch, which actually slows the vegetation period down by preventing the

sunlight from reaching and warming up the surface of the soil, the warmth generated by the composting process will promote sprouting. If we are done with the covering in autumn, we will have nothing to do until spring. By the end of May the soil will be ready for planting.

I started using deep mulch on degraded clay-based soil in 2002, and since then, the mulch helped establish a 25-30 cm deep topsoil layer. I use this humus for planting, and a closed cycle is applied now in which the green waste produced by the system is used for mulch.

The results prove that the method is capable of mitigating the negative impacts of environmental change; for example, the high water retention capacity of the deep mulch and later of the humus essentially eliminates the need for irrigation, as the soil maintains higher levels of moisture throughout the whole vegetation period.

Many kinds of organic waste can be used as mulch locally, one does not need to transport organic waste by using energy and creating emissions. The soil cover made of organic waste results in the re-creation of soil structure, increased soil biodiversity, simultaneously protecting the soil from degradation and compaction. Plant health is strengthened by the rehabilitation of topsoil and its biodiversity due to the presence of natural nutrients instead of artificial fertilizers.

The weed pressure is decreased to 20% of the area due to the permanent farming and soil succession, the remaining “weeds” are integrated into the self supporting system. Making use of the high diversity of the plant community and establishing diverse biotopes, a self-sufficient system is created. Due to the rich soil and self control, production is increased at minimum by 30%.

We are on the way to spread the technology to the public at large. A half-an-hour short film was created in 2014, and is broadcasted on [youtube](#). The video has been viewed by more than 190 000 people. The method was introduced on major television channels, as well as in several journals. Due to the publicity I was invited to different parts of the country to share the information and experience with farmers and gardening groups. Thanks to the attention and great feedback, the Ecological Institute for Sustainable Development started organising training courses to teach people how to apply the method. 1200 people were trained during the training courses and consultations. Around 100-150 people started to apply the deep mulch method and formed a corresponding consulting community.

The method is competitive with conventional gardening and small scale farming. We save significant costs, such as digging, ploughing, fertilizing, irrigating, using chemicals for plant protection, buying and maintaining tools and machines and using fossil fuels. In addition, time is saved for the farmers. Instead of traditional work, all we have to do is provide organic litter with the correct nutrient composition, which gives task late autumn. This part of the task may prove to be the most challenging if someone does not have organic litter at all; cooperation with others is then necessary. But the volume of organic litter need decreases year by year, as the soil develops.

There are two basic innovations in the method. The first is the way of mulching, which is different from current mainstream mulching. The problem with traditional (shallow) mulching is that the soil surface cools down in the winter, and the mulch prevents sun radiation from warming up the soil to the desired temperature for germination. Secondly, the mulch is often composed from litter that is not fit for composting because of either a too low or too high carbon proportion in comparison to the nitrogen. The third problem is that the mulch is not deep enough to catch and reserve rainfall for the entire vegetation period. We solved these problems by mixing a mulch from a different type of organic litter at the proper proportion of nitrogen and carbon (1:30-35). The deep mulch prevents the soil from freezing, and the mulch is ready for composting in spring time, creating heat and warming up the surface slightly earlier. Due to the proper conditions in the soil, life is active even during winter, and the movements in the soil help soften the soil until spring. The deep mulch collects and reserves all the rain water, releasing it to the soil very slowly.

Another innovation is the complete self regulation, which makes even biological treatment for plant protection unnecessary. We believe that there is no organic food without self protection. If we protect

the plant instead of stimulating self protection, the plant will not create the high nutritional values as it could.

There is also a social innovation aspect to the method of deep mulching. Instead of organic waste ending on waste deposits or in a central composting plant, local people cooperate to provide the appropriate composition of the deep mulch by delivering different types of organic waste locally to each other.

This is related to the most sensitive point of this method, which is collecting the necessary organic green waste. There are two basic problems here. First, most people do not know the nitrogen and carbon proportions of different types of organic waste. To understand this, we need practice, time and guidance. The second obstacle is finding organic waste in the demanded quantities. Naturally, organic litter is everywhere, but we need to find these sources and build cooperation among the different stakeholders, such as municipalities, farmers and private individuals. At the moment, this type of culture is absent, but this is an opportunity to make people cooperate and form communities based on mutual generosity.

Organic waste itself is a problem for waste management, and the EU aims to split organic waste from municipal solid waste. The best place to use organic waste is at the source, to save transport costs and use organic green waste to renew the soil, as it would happen in nature.