succulent roofs

written by Andreas | 28 September, 2019



July 2018. The sedum roof in all its glory, 4 years after its installation.

Being a fan of botany and natural vegetation, I have always been fascinated by green (or vegetation) roofs, which are quite fashionable these days, at least in countries like Holland, Germany and Scandinavia. Green rooofs have quite some advantages: they protect the waterproof black EPDM sheet, they insulate the house against heat and cold and they work as a water buffer, regulating the water drainage with heavy rains. This may especially hold true in cities where climate change seems to provoke more irregular and heavy rainfall. Urban green roofs also offer welcome new opportunities for insects, birds and plant life. Another personal motivation for green roofs is that they can be very economical, especially if you do everything yourself with the method I propose. When you hire professional help or buy the ready made green carpets from the garden center, you will have to spent 5 to 10 times as much.



June 2018. Drone impression, with the two roofs of the house on the left and the toilet building in the upper right corner.
The greenhouse in the bottom right corner has a semi-transparent roof of fiberglass.

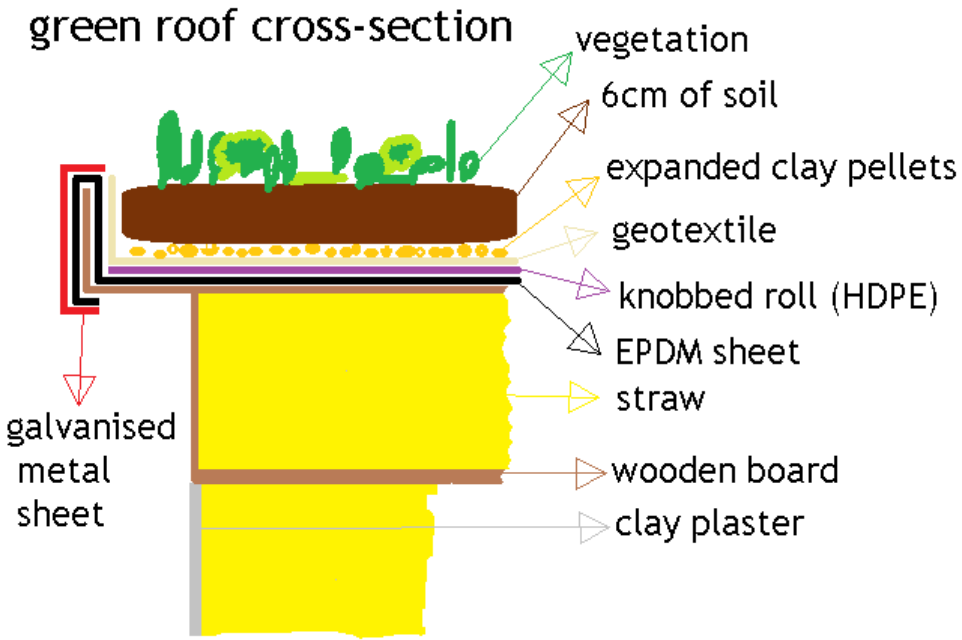
Over the years I installed three green roofs. Two for the house with its two modules (the first consisting of the kitchen and the second the studio-bed-living room) and a simpler one for the toilet building. All three of them are of the Sedum variant and are often called Sedum roofs, after the plants from the *Sedum* genus. *Sedum* species are well suited for the task, especially if the soil layer is only around 5 cm. For more insulation and water buffering you can choose a system with more soil (up to 20cm) but then you need to take care of the extra load in the construction of your house. This last variant features more grasses and needs more maintenance. My Sedum roofs are respectively 10, 5 and 10 years old, haven´t had practically any maintenance and are doing fine.



January 2009. The roof of the first straw bale module is ready and the first layer, the EPDM sheet, has been spread out.

For the two roofs of the house I used more or less the same method which will be described in the next paragraphs.

In the early spring of 2009 the roof of the first module of the house (a kind of garden house, serving as a first essay in straw bale building) was ready to receive the different layers that make up the green roof system, as I had studied and adopted from various sources of literature and internet. Schematically it looks something like this:





The knobbed roll (in two colours) is spread and ready to be covered with the geotextile. The black PE pipe, running along the edge of the roof, has many holes and collects the down running rain water. The chimney needs special auto adhesive EPDM to seal the hole off. The plastic bags contain the ´Arlita´ clay pellets.

The waterproof black EPDM sheet is of course the crucial and also most expensive element of the roof. It has a warranty of 50 years but is still quite vulnerable being only about 1mm thick. The knobbed HDPE roll is basically a cheap protection for the EPDM and can also hold some rainwater in its knobs. The geotextile is another protection layer and keeps the soil in place while keeping the HDPE knobs open for some water storage.



March 2009. The EPDM sheet was in one piece and extremely heavy and was lifted, like the soil, with this tractor onto the roof.

The soil consists of the 10cm top layer of the soil from the very same spot of the house, which was excavated in order to lay the foundations. The expanded clay pellets (´Arlita´) were partly used as substratum and partly mixed into the soil. They mainly reduce the weight of the soil layer while still working as a substratum for the rooting of the vegetation.

Once the soil was in place, many ´books´ of straw (=more or less intact pieces of straw bale) were spread out over the surface. Cuttings of a couple of *Sedum* species were then planted or ´sown´ into the spaces between the books. The straw maintains humidity and helps the seedlings establish. I used mostly the readily available *Sedum* species from the local region: *Sedum acre, S.sediforme, S.album, S.reflexum, S.anglicum and S.telephium*. The last one was bought and was the only *Sedum* species not to survive after 5 years, and it was the same for *Sempervivum tectorum*. All the other ones quickly settled and thrived.



March 2009. The ´strawbooks´are spread out onto the soil and Sedum cuttings are planted between them.



June 2009. The Sedum cuttings grow and even flower well, together with other

spontaneous plants that usually don´t survive the dry hot summer.



October 2009. Sedum species have established themselves while most other spontaneous species disappeared, with the notable exception of Iris germanica in the lower left corner.

It was astonishing to see the vigorous growth and flowering the next spring. For aesthetic reasons and fire risks (with the chimney so near) most of the straw books had been taken away.



April 2010. An astonishing explosion of plant growth just one year after planting. Completely spontaneous is the presence of Iris germanica with its long, somewhat succulent leaves, whose roots were hidden in the soil and later on cut and dispersed. The non-succulent tiny annual with yellow flower heads is Alyssum alyssoides which has irregularly reappeared in following

years.



June 2010. Sedum acre has just stopped flowering , S.album and S.anglicum are flowering now (white) and will be followed by S.reflexum (just starting to flower in yellow) and later on S.sediforme (white).
At the back the greenhouse.



April 2019. On both roofs the Iris germanica shows off their beautiful and fragrant flowers.

Remarkable is the appearance and persistence of *Iris germanica.* Its presence was not planned and in the beginning I was somewhat skeptical and reluctant thinking it was too bulky for the vegetation tapestry and that it wouldn’t survive the long dry summers anyway. But it stayed, and moreover: it massively flowers every spring, much more abundantly than its fellow plants on the ground. And then I really started to appreciate them, even during the rest of the year when their leaves turn partly brown and blend nicely with the rest of the withering vegetation. It is amazing that such a big flowering plant can thrive and spread in a layer of just 6 cm soil, which completely dries out in summer when there is sometimes no rain for 2 or more months. Part of its success will have to do with its 3 to 5 cm thick rhizomes. It is very important not to cut its withering leaves after flowering because the plant seems to reuse all the nutrients inside them. I think that the use of this plant on green roofs is very promising and recommendable. It combines the advantages of grass roofs with their denser and higher vegetation with the low maintenance and low weight advantages of Sedum roofs.



July 2018. I admit it is an acquired taste, but now I really appreciate the green-brown mosaic of the dying Iris germanica leaves in the Sedum tapestry.



March 2017. A record breaking freaky and sticky snow storm just at the beginning of spring. Had I not taken away some, the snow would perhaps have formed a layer of 30 or 40 cm.

The last two images above were taken on the second green roof, which was installed on the new wing of the house in 2013, following the same procedure as for the first roof. The first roof has an angle of 5 degrees and this 2nd roof about 1.5 degrees, quite favorable for the establishment of vegetation on green roofs. Higher angles involve risks with heavy rain that might wash away the soil and plants. But on the other hand, the almost horizontal roofs take the risk of dangerous weight with heavy snowfall. Heavy snowfall is very rare in this region, with snowfalls that haven´t gone passed 20 or 30 cm for the last decade(s). But in March 2017 I climbed up the roof with a shovel to take away some snow when there was already a layer of 20 cm and it continued snowing heavily. But I haven´t noticed any cracks or bending whatsoever in the structure of the house.



July 2018. The Sedum roof of the compost toilet building.

In 2009 I installed a green roof on the compost toilet following a simpler design with only EDPM sheet, knobbed HDPE roll and a shallow soil layer of a few centimeters. I didn´t want to charge the un-plastered straw bale walls with too much weight. Especially *Sedum album* is doing well there, and also, to a lesser degree, *S.anglicum* and *S.acre*.

The next images give an impression of the green roofs in different seasons and weather types and show how it makes the house blend nicely in its surroundings.



April 2018. Spontaneous appearance of the bulbous Muscari botryoides with blue flowers.



July 2018



January 2019.



September 2019.



June 2018. Sedum acre creating a yellow tapestry.