



# SOILS

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## INTRODUCTION:

A healthy soil is vital for commercial growers because it holds and regulates water and nutrients, and provides support for plants and helps maintain healthy root systems. Whilst synthetic substrates and hydroponics are emerging as commercial growing methods both are relatively new, and soil-grown plants are predominant.

Natural soils are formed through the weathering of rocks and the accumulation of organic matter over time. Soil types differ and are formed depending on local factors. The parent rock material determines the mineral content and the particle size. Temperature affects the rate of weathering of the underlying rocks and rainfall leaches minerals through the soil from the rock. Organisms such as earthworms, plant roots and fungi chemically and physically alter the soil, providing nutrients such as nitrogen through fixation, and keeping the soil porous so that roots can breathe, have water and nutrients. Topography, the direction and slope of the surface, will modify the water run-off and the temperature and affect the organic matter accumulation. Soil formation happens over time so that the older the soil is, the more time it has had to be weathered.

Soil types also differ in particle size, organic matter content, pH, nutrient content, porosity to air and water or, conversely, their compaction. These factors affect the fertility of the soil and its ability to support healthy, vigorous plants. Soil Testing, correcting pH and nutrient deficiencies, are essential skills for commercial growers.

Beyond producing plants, healthy soils have a fundamental role in environmental quality preventing flooding through regulating water run-off, filtering pollutants, recycling nutrients and soil acts as a carbon sink which is crucial in reducing climate change.

Soils have suffered from many agricultural practices including, compaction by heavy machinery, the loss of organisms through pesticide use and artificial fertiliser, and erosion of soil depth through wind and water run-off. Concern over this has led to the encouragement of more soil-friendly practices such as no-till. As soils deteriorate they are less able to perform their environmental functions and the less food that they will be able to produce.

Use this section to find out about:

- identifying soil types
- the practices of maintaining and improving the soils that support your crops

## CONTENTS

1. Soil Health
2. Composts
3. Soil and Pesticide management
4. Soilless Growing and Controlled Environment



## 1. SOIL HEALTH

Soil health is defined by the USDA as the continued capacity of soil to function as a living ecosystem that sustains plants, animals and humans. A healthy soil is vital for commercial growers because it holds and regulates water and nutrients, and provides support for plants and helps maintain healthy root systems.

The following Tyfu Cymru resources are recommended:

Webinars

- [Soil Health for field vegetable growers](#)
- [Tyfu Cymru: Flower Network – soil health and how to unlock nutrients for flowers](#)
- [Soil Health for Commercial Growers](#)

## 2. COMPOSTS

Composts are a crucial method of applying nutrition, mulches and adding organic matter to soil. Growing consumer demand and government legislation for a low carbon economy is leading the industry towards peat free compost.

The following are external links to useful sources of further reading:

- A description of nutrient cycling and its role in plant nutrition: <https://www.eea.europa.eu/signals/signals-2019-content-list/infographics/agriculture/view>
- A useful factsheet from the USA is here that describes different types of compost and their application on an organic farm: <https://www.carolinafarmstewards.org/wp-content/uploads/2012/12/9-CEFS-Composting-on-Organic-Farms.pdf>
- PAS100 is a recognised specification for composting materials and a useful example of a composting standard is here: <https://www.qualitycompost.org.uk/standards/pas100>

Useful Webinars and resources provided by Tyfu Cymru can be found here:

Webinars:

- [Small Farm composting and no-till soil building](#)
- [Peat Free](#)
- [No dig methods and advantages for cropping \(Webinar / Part 1\)](#)
- [No dig methods and advantages for cropping \(Q&A / Part 2\)](#)

Factsheets:

- [Peat-free horticulture – how and why](#)
- [Considering Converting? The first steps towards organic production](#)



### 3. SOIL AND PESTICIDE MANAGEMENT

Pesticide residues, soil erosion and compaction are serious problems for sustainable plant production and maintaining a healthy soil.

Foods standards require pesticide residues to be within specified limits. Testing for pesticides is usually done commercially and a range service providers exist. Further information about these limits can be found on the FERA website: <https://www.fera.co.uk/>

Different pesticide residues in soil can interact with one another and this 'cocktail effect' can increase harmful impacts. Many pesticides degrade over time and that is why organic soil certifications schemes require periods of time without pesticide applications before organic status is conferred.

Certification scheme specifications can be found through their websites: e.g. Soil Association. <https://www.soilassociation.org/our-standards/what-are-organic-standards/>

A series of European projects have been summarised in a report giving the benefits of organic soil through lower pesticide levels. This is available at <https://cordis.europa.eu/article/id/430355-organic-soils-soundly-beat-conventional-soils-in-pesticide-residue-level-stakes>

Compaction is covered in the following Tyfu Cymru webinar:

- [Soil Health for Commercial Growers](#)

### 4. SOILLESS GROWING AND CONTROLLED ENVIRONMENT

Soilless growing, includes hydroponic growing, and is a method that delivers water and nutrients to plants in ways that can be controlled by growers to help them meet demand.

It often works alongside other technologies such as LED lighting, crop monitoring technology and carbon dioxide enrichment.

A high planting density is possible that can reduce labour costs and increase the efficacy of biological controls.

The following Tyfu Cymru resources introduce soilless growing for a range of crops with practical guidance on crop management:

#### Webinar

- [Horticulture Leaders' Forum – Expert Panel Debate 2](#) - with Adam Dixon of Phytoponics, Jeremy Joseph-Meade of Derwyn Garden Centre and Owen Rosser of Pembrokeshire Chilli Farm.

#### Factsheets

- [Controlled Environment Agriculture Article and Vertikit Case Study](#)
- [Soilless cultivation for ornamentals](#)
- [Soilless cultivation for herbs](#)
- [Soilless cultivation of table top strawberries](#)
- [Soilless cultivation for leafy salads](#)



**Notes:**

Every effort has been taken to ensure the information contained within this guide is accurate and current at the time of writing. We cannot take responsibility for links to external web-sites.

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