



## HEAVY METALS IN GROWING MEDIA

Heavy metals occur naturally and through industrial pollution. Some heavy metals are required as trace elements for plant growth. Excessive levels can be harmful. With consumption crops also to human. For food safety and to prevent soil contamination in the environment, legislation limits the total heavy metal content in consumption crops and in raw materials and growing media for soil-based applications. But what about growing media for cultures in pots or containers?

### Heavy metals

Heavy metals occur naturally in the environment, but can also result from industrial pollution. In recent years, heavy metals have gained increasing attention due to growing environmental awareness. Although certain heavy metals are essential for plant growth, they are needed only in very small quantities as so-called trace elements. Examples include Copper (Cu), Nickel (Ni), and Zinc (Zn). However, when concentrations become too high, they can be toxic to plants and, in the case of consumption crops, pose health risks to humans.

### Heavy metals in substrates?

In controlled levels, certain heavy metals as trace elements are necessary in growing media for plant growth and health. For that purpose, nutrition like trace elements are added to growing media by the substrate producer and/or grower. But it is essential to avoid excessive amounts or the presence of toxic heavy metals.

In that respect, it is important to take into account that some substrate raw materials



can already contain heavy metals by itself, which could result in accumulating amounts of heavy metals in a substrate mixture. Heavy metals can be taken up by plant roots and pose plant toxic risks causing chlorosis, growth inhibition or even death crop.

Therefore, in many countries legislation exists to limit the total heavy metal content in consumption crops, such as vegetables or herbs. Also, many countries have legislation to prevent soil contamination and excessive concentrations in the environment, with which they regulate the total heavy metal content in substrate raw materials and growing media for soil-based applications, including in public green spaces.

In the Netherlands, for example, the 'Besluit bodemkwaliteit' (Bbk) and the associated 'Beoordelingsrichtlijnen' (BRLs) set requirements regarding heavy metals in end products like growing media. For organic raw materials such as compost the requirements are set up in the 'Uitvoeringsbesluit Meststoffenwet'.

For heavy metals in growing media for cultivation in pots and containers there hasn't been developed specific legislation. At a European level, there is the Fertilising Products Regulation (FPR) standards for end products (growing media), compost and digestate. For the quality marks RHP and RAG there are specific requirements regarding heavy metals in substrate raw materials and growing media.

### **What are the requirements of the RHP and RAG quality marks?**

For the quality marks RHP and RAG the requirements of permissible values of heavy metals apply to the substrate raw materials as well as end products. Periodic raw material analyses for heavy metals are part of the RHP quality mark. This indicates more quickly whether the content of heavy metals in end products (growing media) is exceeded. For the RAG quality mark, both raw materials and end products are analysed for heavy metals.

The requirements for the RAG quality mark concern soil-based applications, like tree substrates for public green spaces, and always comply with current environmental legislation on heavy metals, for example the mentioned Dutch Bbk and associated BRLs.

The requirements for the RHP quality mark concern substrates for cultivation in pots and containers and regard heavy metals in substrate raw materials. RHP-certified products meet the European Fertilising Products Regulation (FPR) and are in some cases even stricter.

Only RHP makes a distinction between permissible values of heavy metals in mineral products and in organic products. This is due to the fact that mineral products (including perlite, vermiculite, pumice and mineral wool) are often applied in a higher dosage in a mixture or even purely for growing crops. Organic products will digest with which the heavy metals remain left.

Various methods are used to determine the

heavy metal content, the analysis results of which are not directly comparable. For products intended for soil-based applications, laboratories use aggressive acids to dissolve all heavy metals, including those in solid form. Such a total analysis provides insight into the overall amount of heavy metals, including the fraction not available to plants, resulting in higher concentrations. For products used for cultivation, laboratories perform a water extraction analysis for trace elements. In this method, heavy metals are measured in their water-soluble form – the fraction actually available for plant uptake – which provides a more realistic assessment of plant safety.

### **Advice for the user**

To ensure safe heavy metal values in a substrate mixture, it is good to take into account that some renewable raw materials, including compost, can already contain elevated levels of certain heavy metals. If necessary to avoid excess in the culture, it can be wise to adapt fertilisation strategies.

- ✓ **Certain heavy metals are essential trace elements for plants**
- ✓ **Excess of heavy metal levels can damage plants**
- ✓ **Manage levels with careful raw material selection and adjusted fertilisation**
- ✓ **Legislation for food safety and environment exist, but not for growing media for cultures**
- ✓ **RHP and RAG quality marks do have heavy metal limits**