

Role and practice of fertilization in the cultivation of horticultural crops

Definition of fertilization

- The process of providing materials (fertilizers) to the soil, to the leaves or to the air for supplying plant nutrients or amending soil fertility.

Comparison of fertilization of horticultural crops to that of field crops

- More intensive:
 - more frequent application
 - bigger amount of fertilizers are used
 - more attention is paid to microelement application
- Many horticultural crops are salt sensitive.
- Application of fertilizers during the vegetation period (topdressing) has a bigger importance.
- The bigger production value enables the growers to employ more expensive fertilization methods too. (fertigation, slow release fertilizers, soilless cultivation, CO₂ application)

Comparison of fertilization strategies of chemicalized and ecological cultivation methods

Chemicalized → Integrated ← Ecological

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|---|---|
| • Plant is fertilized | • Soil is fertilized |
| • Slight over fertilization | • Slight under fertilization |
| • Soil improvement is a goal | • Soil improvement is a goal |
| • Based on chemical fertilizers | • Based on organic and mined inorganic fertilizers |
| • Few types of fertilizers and methods are used | • Many types of fertilizers and methods are used |
| • Concentrates on macroelements | • Bigger attention is paid to micro- and trace elements |

Basic elements of a fertilization technology

1. type of the fertilizer(s)
2. amount of the fertilizer(s)
3. method of fertilizer application
4. time of fertilizer application

1. Types of fertilizers, their grouping

□ Based on origin

- Organic fertilizers – manure, compost, etc.
- Inorganic fertilizers
 - Mined inorganic fertilizers – limestone, sulphur, etc.
 - Chemical fertilizers

□ Based on state

- Solid
- Liquid – liquid manure, fluids, suspensions
- Gas – CO₂

- **Based on composition**
 - **Straight fertilizers** – one compound
 - **Compound fertilizers** – more compounds
 - **Complex fertilizers** – all essential elements
- **Based on water solubility**
 - **Completely water soluble fertilizers**
 - **Water soluble with some amounts of sediment**
 - **Hardly water soluble, hardly dissolving**
- **Based on release duration, availability**
 - **Readily available fertilizers**
 - **Slow-acting fertilizers**
 - (Organic and natural inorganic fertilizers)
 - Stabilized fertilizers
 - Slow release fertilizers
 - Controlled release fertilizers

2. Amount of fertilizer

- **The used amount of fertilizer depends on the**
 - species
 - projected yield and green mass production
 - (previous crop grown on the field)
 - organic matter and nutrient content of the soil
 - soil type
 - nutrient use efficiency
 - weather conditions
 - type of fertilizer used
 - application method
 - cultivation method, level of cultivation

Inputs for fertilizer calculation and fertilization

- Cropping history of the field
- Soil type
- Soil test – method of extraction ↔ method of cultivation (intensive or extensive?)
- Target yield
- Relative nutrient need (kg/t) of the crop
- Fertilizer analysis (composition)
- Visual diagnosis (observation)
- Foliar analysis

3. Method of fertilizer application

- **Directly to the soil:**
 - broadcast application, banding, sidedressing, drill hole; injection
 - depth of incorporation
- **Through irrigation water onto the soil:**
 - irrigation method – drip, micro sprinkler
 - Fertigation (chemigation)
- **Onto the leaves – foliar application**
 - for supplementary application or in case of deficiency problems
- **Into the air - CO₂**

Advantages of fertigation

- Nutrient concentration can be maintained around the optimum level
- The following parameters can be constantly adjusted to the actual needs of the plants, to the growth phases:
 - amount of nutrients
 - concentration of nutrients
 - ratio of nutrients

4. Time of fertilization application

- **Outside of the vegetation period – basal fertilization**
 - **Goal:** making a reserve of nutrients
 - farm yard manure, P, K, (N ? – usually not), (Ca)
- **Just before the vegetation period – starter fertilization (preplant fertilization)**
 - **Goal:** helping early development
 - N, P, K, Ca, Mg
- **During the vegetation period - topdressing**
 - **Goal:** permanent supply of nutrients based on the needs of the plant
 - mainly N and K, but every other nutrient can be given