OCCIDENTALIS' LEAVES IN DRY SUBSTANCE AND MINERAL SUBSTANCES

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Abstract

By determining the content of Thuja occidentalis leaves in dry substance and mineral substances, it was intended to monitor the mineral nutrition control.

The harvesting of plant material samples and laboratory analyzes were performed at times that coincided with the maximum consumption needs of the plants.

Laboratory analyzes determined the contents of N, P, K, Ca and Mg, expressed as a percentage of the total dry matter contents of the analyzed plant material. The global nutrition was obtained from the data summation of N, P and K, and the nutritional balance was obtained from the percentage expression of each of them towards their sum. It is considered nutritional deficiency when nitrogen values are lower than 3.2%; phosphorus values are less than 0.2 %, and when those for potassium are lower than 2.5%.

Key words:dry matter, mineral elements, fertilization.

INTRODUCTION

In crops, the soil substrate is formed from several components according to the requirements from each species.

A proper soil is the one which contains 30-35% solid phase 35-40% liquid phase and 30-35% gaseous phase.

Since, an inappropriate soil substrate leads to ruined crops, in countries with a tradition in flower farming; the specialists propose standard soil substrates for the purpose of cultivating as many floral plants in the same kind of soil.

Therefore, soil substrates can be for sowing, for multiplication, for the different plant species grown in pots, orchids, calcifuges, acidophilus plants, etc., with recipes for the addition of complex fertilizers. The basic components of these substrates are: fallow land, leaf soil, peat and sand.

In countries such as the Netherlands, Switzerland, Germany, France, substrates are obtained from granular clay, 50-70% peat 20-25% and sand 5-10%. In order to ensure the plant nutrition, fertilizations with complex fertilizers are made periodically.

Mixtures made from two or more components are chemically or thermally disinfected before they are used to set up crops.

Steam disinfection is done on concrete platforms where the mixture is laid in layers of 25 cm thick, covered with tarpaulins under which the

steam is introduced until the base of the layers (25 cm deep) reaches 90 ° C for an hour.

Depending on the species, the mixtures are neutralized and fertilized with the following doses, calculated per m^3 of substrate:

- Simple superphosphate 1-2 kg
- Ammonium nitrate 0,5-0,6 kg
- Magnesium sulphate 0.8-1.0 kg
- Potassium sulphate 0.5-1.0 kg
- Borax 10-15 g
- Copper sulphate 15-25 g
- Iron sulphate 15-30 g
- Manganese sulphate 10-20 g
- Zinc sulphate 10-15 g
- Ammonium molybdate 3-5 g
- Calcium carbonate 2-3 kg

The basic fertilizers are mixed in the powdery state with the soil substrate and the ones with microelements are dissolved in water and administered uniformly.

According to the laboratory analyzes the amount of fertilizer to be administered in the soil substrates is determined by calculating the need of each species and is not approximated.

The phasial fertilization is done with slightly soluble mineral fertilizers that either dissolve in water in a concentration of 0.1-0.4% or are administered by being spread in the amount of 20-40 grams / m2. Phasial fertilization can also be done with 1: 5-10 diluted manure juice or diluted birds manure 1: 15-20.

The fertilization should not be done when the soil is very dry or when there is too much moisture.

Usually, in a vegetation periodare carried out 3-5 phasial fertilizations. The first one is done 15-20 days after planting.The fresh manure is diluted with water in proportion of 1:10 and birds manure in proportion 1:20. Chemical fertilizers are applied in the solution form; each 100 l of water is combined with100 grams of ammonium nitrate, 100 grams superphosphate, and 100 grams potassium salt. 3 l of solution are administered toeach m^2.The second fertilization is applied at the beginning of the flowering period.In this case the fresh dung is diluted 1:6, and the amount of solution per m^2 will be 3.5 l.For the rest of the period, 1-3 fertilizations are applied with diluted manure in proportion of 1:6, poultry manure in proportion of 1:15, or mineral solution (100 liters of water, 100 grams of ammonium nitrate, and 200 grams of superphosphate and 100 grams of potassium salt) , all in the amount of 4.5 l per m2.

When the fertilizers are applied, the soil must be free of weeds and loose, in order for the floral plants to benefit from the full amount of the administrated fertilizer.

MATERIAL AND METHOD

The experiments were carried out between 2017 and 2018 at Sântandrei (Oradea) using plant material samples (leaves) from four cultivars of Thuja.

Experiments included 12 variants.

RESULTS ANDDISSCUSSIONS

To determine the content of leaves of Thuja occidentalis in dry matter and mineral elements, we used:

- The Nelson-Boodley method, which involves the use of leaves.

The content of leaves in dry matter varies according to the intensity of the light radiation received (table 1).

The leaves' nitrogen content can be correlated with the average temperature except for the rapid growth period when a "dilution" of the assimilated substances is produced in relation with the whole plant's volume which is growing rapidly and it occurs an intense translocation of the same substances to other organs.

At the level of leaf samples, a decrease of the phosphorus concentration was recorded during the rapid growth period of the plants (March - June).

The results of the foliar analysis indicate the content's evolution in the potassium concentration according to that of the light radiation, with the exception of the spring period when there is a decrease in the potassium concentration.

The variation in leaf's calcium content was similar to the average temperature variation, with the exception of the spring season, when under the conditions of rapid plant growth there was recorded an apparent reduction of the tissues' concentration analyzed in this element.

The leaf's magnesium content decreased in September-October without any relation to light intensity or average temperatures.

Table 1

Dry matter content and mineral substances in leaves of Thuja occidentalis in variants (Oradea 2017-2018)

Variants	Cultivar	Dry Substance %	Mineral substances % fromD.M.				
			N	P	K	Ca	Mg
V1 – Culture in the nursery' soil, unfertilized with organic fertilizers	Thuja occidentalis Fastigiata	22,99	4,97	0,91	3,81	2,83	0,51
V2 – Culture in the nursery' soil, unfertilized with organic fertilizers	Thuja occidentalis Compacta	22,92	4,92	0,93	3,85	2,89	0,52
V3 – Culture in the nursery' soil, unfertilized with organic fertilizers	Thuja occidentalis Robusta	22,98	4,95	0,92	3,84	2,84	0,50
V4 – Culture in the nursery' soil, unfertilized with organic fertilizers	Thuja occidentalis elegantissima	22,98	4,96	0,94	3,82	2,82	0,49
V5 – Culture in the nursery' soil, fertilized with organic fertilizers	Thuja occidentalis Fastigiata	23,01	5,04	0,98	3,89	2,89	0,52
V6 – Culture in the nursery' soil, fertilized with organic fertilizers	Thuja occidentalis Compacta	23,16	5,09	0,99	3,91	2,91	0,54
V7 – Culture in the nursery' soil, fertilized with organic fertilizers	Thuja occidentalis Robusta	23,16	5,11	0,97	3,90	2,92	0,55
V8 – Culture in the nursery' soil, fertilized with organic fertilizers	Thuja occidentalis elegantissima	23,13	5,12	0,95	3,92	2,90	0,53
V9 – Cultivation in containers in leaf soil 50%, peat 30% and fallow land 20%	Thuja occidentalis Fastigiata	23,81	5,15	1,01	3,97	2,95	0,55
V10 – Cultivation in containers in leaf soil 50%, peat 30% and fallow land 20%	Thuja occidentalis Compacta	23,29	5,17	1,03	3,98	2,97	0,56
V11 – Cultivation in containers in leaf soil 50 %, peat 30%, fallow land 20%	Thuja occidentalis Robusta	23,21	5,18	1,04	3,96	2,98	0,58
V12 – Cultivation in containers in leaf soil 50 %, peat 30%, fallow land 20%	Thuja occidentalis elegantissima	23,18	5,21	1,02	3,99	2,99	0,57

By analyzing data from the experiments performed on the leaves' dry matter content and the leaves' mineral substances content of Thuja occidentalis, Smaragd and Rheingold, we found that there are no essential differences between the variants.

A more detailed analysis revealed that the higher dry matter content is in the plants cultivated in containers with compost-based on urban waste, followed by those grown in containers with a mixture-based on of 60% fallow land, 20% aged manure, and 20% peat.

Regarding the plants' content of mineral elements (N, P, K, Ca, and Mg), this is higher in the variants cultivated in containers than in those cultivated in the nursery soil fertilized or unfertilized with organic fertilizers (table 1).

A proper knowledge of the mineral elements contained by the plant' leafs and the relationship between the varieties allows the cultivator to provide fertilizers at the right time.

CONCLUSIONS

1. Controlling the mineral nutrition of Thuja occidentalis plants can also be done by analyzing the leaves' mineral substances content.

2. The plant material's sampling is done monthly or in the moments that coincide with the maximum consumption needs of the plants.

3. It is considered a nutritional deficiency when nitrogen values are lower than 3.2%, the phosphorus values are lower than 0.2% and the potassium valuesare lower than 2.5%.

4. The results of the laboratory analyze allowed fertilization to be applied on time and in the suitable quantities without the risk of wasting them or of administering smaller quantities the required.

5. The leaves' nitrogen content can be correlated with the average temperature (except for the fast growth period), the leaves' potassium content can be correlated with the variation of the light radiation and the leaves' phosphorus content decreases during the fast growth period.

6. The variation in leaf's calcium content was similar to the average temperature variation; with the exception of the spring season when under the conditions of fast plant growth there was an apparent reduction in the concentration of tissue analyzed in this element.

7.The leaf's magnesium content decreased during the mounts of September-October without any relation to the intensity of light radiation or the average temperatures.

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