Physical and Chemical Properties of Local Volcanic Rock and Date Palm Waste Substrates as compared with Rockwool and Perlite

Background

The effect of soilless substrates on plant growth and yield varied with physical and chemical properties of the used substrate materials. Volcanic rock and date palm waste are locally available/low-cost materials, and their physical and chemical properties is expected to be varied as compared with the commercial substrates such as rockwool and perlite.

Volcanic Rock   Perlite   Rockwool   Date Palm Waste

Objectives

To determine the physical and chemical properties of locally available volcanic rock and date palm waste as compared with commercial soilless substrates, rockwool and perlite.

Treatments

Samples of different soilless substrates (date palm waste, volcanic rock, rockwool and perlite) were collected pre-planting pepper cultivation at Estidamah research center to determine the physical and chemical properties, at KSU labs.

Results

- Rockwool has the highest water holding capacity while volcanic rock has the lowest
- Volcanic rock has the highest bulk density and rockwool has the lowest
- Date palm waste has the highest salinity and cation exchange capacity levels
- Macro and micronutrient levels varied in the tested material

Physical Properties				
Items	Date Palm Waste	Volcanic Rock	Rockwool	Perlite
Water Holding Capacity (%)	70	60	98	80
Bulk Density (g/cm3)	0.25	1.06	0.04	0.21
Organic Matter (%)	22.2	0	0	0
EC (ds/m)	4.6	0.013	0.015	0.12
CEC (Coml/kg)	37.5	9.5	0	0
pH	6.7	7.5	7.6	7.2
Weight of (16 L) slab in kg	3	12.3	0.7	3.4
Chemical Properties				
N (%)	21.9	13.2	9.1	8.5
P (%)	18.9	101.9	80.8	131
K (Cmol/kg)	16.4	0.8	3.7	0.8
Mg (Cmol/kg)	12.9	2	4.4	7
Ca (Cmol/kg)	26.1	4	5	3
Na (Cmol/kg)	3.53	8.4	3.1	5
Fe (mg/L)	2.9	72.7	14.1	440.9
Mn (mg/L)	0.25	5.58	0.25	48.57
Zn (mg/L)	0.88	0.89	0.33	4.28
Cu (mg/L)	0.22	0.07	0.1	3.44

Conclusion

❖ In soilless culture, substrate properties should be taken into concertation to determine the pest practices for each one.