AGES 8–11 · TEACHER PAGE

Growing without soil?

By comparing a hydroponic crop with a soil-grown one, pupils discover where a plant's mass comes from.



2 sessions of 45 min, follow-up over 4 weeks | MAVA : HYDRO SLIM OLLA

KEY QUESTION **Does a plant need soil to grow?**

OBJECTIVES

1. Observe plants growing without soil.
2. Identify what soil provides: support, water, minerals.
3. Argue that a plant's mass comes mainly from air and water.

MATERIALS

- A plant from the MAVA HYDRO or SLIM, and the same species in soil (MAVA OLLA or a pot)
- Kitchen scales
- A new rockwool cube
- The pupil sheet

CURRICULUM LINKS

NGSS	**5-LS1-1**: Support an argument that plants get the materials they need for growth chiefly from air and water.
NATIONAL CURRICULUM	**Year 3 · Plants**: explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow).
IB PYP	**How the world works**

LESSON STEPS

1 **Ask** 10 min	Show the roots of a MAVA HYDRO plant: not a speck of soil! 'So what is soil for?'
2 **Compare** 20 min	Compare with the same plant grown in soil. Fill in the table: what soil provides, and how the MAVA replaces it.
3 **Reason** 20 min	Weigh a harvested lettuce, then a new rockwool cube. Read about Van Helmont's experiment: the willow gained 74 kg, the soil lost only 57 g.
4 **Argue** 25 min	A plant builds its body mainly from carbon dioxide in the air and water, using light. Minerals are essential, but only in small amounts. Each pupil writes an argument.

ASSESS

The argument rests on at least two pieces of evidence: measurements, the table, Van Helmont.

VOCABULARY

hydroponics, growing medium, minerals, nutrients, carbon dioxide, mass

EXTENSION

Debate: 'Do we need soil to grow food?'

⚠ **Safety :** Only an adult handles the nutrient solutions.

AGES 8–11 · PUPIL SHEET

Growing without soil?

NAME _____ CLASS _____ DATE _____

1 Compare: what soil provides, and how the MAVA replaces it.

What soil provides	How the MAVA HYDRO replaces it
Support to stand upright	
Water	
Minerals (nutrients)	
Air for the roots	

2 Weigh and record.

MASS OF HARVESTED LETTUCE (G) _____

MASS OF A NEW ROCKWOOL CUBE (G) _____

3 Read about Van Helmont's experiment, then answer.

In the 17th century, Jan Baptist van Helmont planted a 2.3 kg willow in 91 kg of dried soil. For 5 years he gave it only rainwater. The willow then weighed 77 kg; the soil, dried and weighed again, had lost only about 57 g.

MASS GAINED BY THE WILLOW (KG) _____

MASS LOST BY THE SOIL (G) _____

WHERE DID IT COME FROM? _____

4 My argument: does a plant need soil to grow?

CLAIM _____

EVIDENCE _____

REASONING _____