

How to survive in the wild – plant adaptations around the world

KS4 RHS Wisley lesson plan

Topics: Plant cells. Photosynthesis, adaptations of plants to tropical, and desert conditions, sexual and asexual reproduction in plants, making cuttings

Every Child Matters: main areas covered: *Stay Safe* 2.3; 2.4 *Enjoy & achieve* 3:6 *Make a positive contribution* 4.2; 4.3; 4.4



<i>Learning Objectives</i>	<i>Structure</i>	<i>Plenary</i>
<p>Objectives:</p> <p>Cells</p> <p>Students should :</p> <ul style="list-style-type: none"> recall the structure of plant cells – nucleus, cytoplasm, cell membrane, mitochondria, ribosomes, cell wall, chloroplasts, permanent vacuole. recall the functions of the above structures. <p>Photosynthesis</p> <ul style="list-style-type: none"> know the word equation of photosynthesis. discuss factors limiting the rate of photosynthesis – low temperature, shortage of carbon dioxide, shortage of light. know that glucose produced during photosynthesis is stored as starch. 	<p>Introduction</p> <p>Introduction to plant adaptations using PowerPoint . Recap cell structure – linking chloroplast to photosynthesis. Establish by means of questions relating to the PowerPoint, environmental factors needed for photosynthesis and food production. Link photosynthesis and respiration. Discuss limiting factors. Role of leaves (water loss from leaves). Role of roots and minerals. Link to the bog and carnivorous plants. Using a few demonstration plants, discuss environmental factors in tropical and desert habitats. Discussion to be brief with just the main facts not to give away too much as students need to think adaptations through for themselves.</p> <p>Activities</p> <p>Students divided into groups of 3. Each group with a worksheet ‘Plant Adaptations’ In the glasshouse, clipboard, pencil and help sheet with photographs of plants to be found. Groups to explore the glasshouse find the plants and write down the adaptations the plants have to the tropical and desert habitats.</p> <p>Groups visit the ‘Root Zone’ Report back with a medical, culinary, and three other new facts about roots that you did not previously know</p>	<p>Link the environmental factors studied today to photosynthesis. Which environmental factor do you think was rate limiting in each of the habitats studied?</p> <p>Give your reasons why that factor would be rate limiting.</p> <p>Describe with reasons how a plant was adapted to the one of the habitats studied.</p>

<ul style="list-style-type: none"> • make the link between glucose produced during photosynthesis and used during respiration. • recall the structure of plant roots. • know that plants use nitrates for producing amino acids and magnesium is needed for chlorophyll production. • see the symptoms of nitrate and magnesium deficiencies on plant growth. • know that plants are producers in food chains. <p>Habitats</p> <ul style="list-style-type: none"> • make the link between physical conditions in different habitats (tropical and arid) and limiting factors for photosynthesis. • be able to recall some adaptations of plants to tropical and arid climates. <p>Cuttings</p> <ul style="list-style-type: none"> • know that asexual reproduction produces genetically identical 	<p>Discussion of findings. Using plants from demonstration, establish the general adaptations to tropical and desert habitats. Establish what the special adaptations of the carnivorous plants are and why the adaptations are needed. Have two mystery plants for the students to guess the habitats the plants may have come from using ideas gained from the activity.</p> <p>Growing lab</p> <p>Discuss the production of seeds making a link with variation of offspring. Discuss asexual reproduction, clones and offspring being genetically identical.</p> <p>Students take cuttings of succulent plants.</p> <p>Students guess which habitat the succulents may thrive in. Students to point out adaptations. Discuss conditions needed for healthy growth. Discuss the care of their succulents.</p> <div data-bbox="775 783 1572 1268" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 60%;"> <p>Key vocabulary:</p> <p>Chloroplasts, photosynthesis, mitochondria, respiration, vacuole</p> <p>Energy conversion, limiting factors,</p> <p>Nitrate, amino acids, proteins, magnesium, (chlorosis),</p> <p>Producers,</p> <p>Tropical and arid climates, shade leaves, climbers, epiphytes, succulents, insectivorous</p> <p>asexual reproduction, clone, genetically identical, sexual reproduction, gametes, variation</p> </div>	<p>Resources:</p> <p>Projector for PowerPoint</p> <p>Worksheet 'Plant Adaptations in the glasshouse' - quiz</p> <p>Picture cards of plants in quiz/help sheet</p> <p>Clip boards, pencils</p> <p>Growing Lab – Model flower compost, plastic pots, labels etc, succulent plants for cuttings</p> <p>Demonstration plants: Venus fly trap, sundews, pitcher plants, cacti,</p>
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<p>offspring called clones</p> <ul style="list-style-type: none"> • understand that cuttings produce clones • know that seed production is the result of sexual reproduction and produces variation in the offspring. <p>Assessment questions</p> <ul style="list-style-type: none"> • Describe the physical features of each habitat and identify major environmental factors, e.g. <i>light intensity, carbon dioxide availability, temperature range, water availability, humidity.</i> • Describe adaptations to life in a variety of habitats. Pick out appropriate adaptations and explain clearly their significance. • In a waterlogged habitat, what could be a limiting factor for plant growth? • How have insectivorous plants become adapted to their waterlogged habitat? 	<div data-bbox="672 204 1700 1193" style="border: 1px solid black; padding: 10px;"> <p>Differentiation: All students can state which factors are needed for photosynthesis. State which may be the most important physical factor in the, tropical and arid environments which would slow the rate of photosynthesis. Be able to give some adaptations of plants to a particular habitat studied. Know that cuttings produce clones that will look exactly the same as the parent plant (if grown under the same conditions).</p> <p>Most students can write a word equation for photosynthesis. Give the key factor in the habitats studied which could reduce the rate of photosynthesis. Link adaptations of plants in the habitats studied to some of the physical factors present. Be able to explain the difference between the way a seed is formed and a cutting is made. Know the difference between sexual and asexual reproduction in plants. Suggest advantages to the farmer or gardener of producing clones.</p> <p>Some students can understand the concept of limiting factors for photosynthesis and state the key limiting factor in the environments studied. Pick out appropriate adaptations and explain their significance. Be able to clearly explain using scientific terminology (e.g. gametes) the difference between sexual and asexual reproduction in plants. Explain the significance in terms of genetic inheritance of sexual and asexual reproduction. Suggest advantages and disadvantages of producing plants by cloning.</p> </div>	
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