

**Regulation of Growth By Hormones**

**Objective**

At the end of the activity the student should be able to explain how hormones act in the regulation and control process such as growth.

<p><b>Materials</b> Not Available from Region 20 Living Science Materials Center</p>	<p><b>Enrichment Activity</b></p>
<p>Oat seeds Seed flats Planting pots or paper cups Ruler (subdivided in millimeter units) IndoleAcetic Acid (IAA) Large tin cans or milk cartons that have been painted black Hydrous lanolin Ethyl alcohol</p>	<p><b>Procedure</b> <u>In advance:</u></p> <ol style="list-style-type: none"> <li>1. Plant oat seeds in three shallow planters or paper cups. Plant enough seeds to allow for six seedlings in each planter.</li> <li>2. Water well each day.</li> <li>3. Between the fifth and the eighth day, the seedlings should be 2 cm to 5 cm long.</li> <li>4. The seedlings are now ready for experimentation. The sheath around the first leaf is called coleoptile.</li> </ol> <p><u>In the lab:</u></p> <p>Treatment preparation: 0.1 gr IAA with 1ml of 70% ethyl alcohol: add 50gr of hydrous lanolin.</p> <ol style="list-style-type: none"> <li>5. Treat three seedlings from each container with lanolin and IAA, while the other three plants should not be treated. Mark the side that was treated.</li> <li>6. The first planter should be left uncovered.</li> <li>7. The second planter is placed under a can in which a hole has been cut. Before covering, mark the side of the paper cup nearest the hole.</li> <li>8. Place a strong light near the opening of the punched hole.</li> <li>9. The third planter should now be placed under a can without a hole.</li> <li>10. The next day measure how much curvature and growth have occurred in the coleoptile. The best way to measure the curvature is to cut the coleoptile and place it on a piece of graph paper, then cut how many squares it has deviated from the verticle.</li> </ol>

**Extensions**

Plant oat seeds in a shallow planter. Keep in a dark place and water well each day. When the coleoptiles are several centimeters long, cut off the tip 3mm from the end.

Cut a segment exactly 10 mm in length from the remainder of each plant. Place two of these segments in each of three petri dishes. Fill one dish with 2% sucrose solution; in a second dish put a 2% sucrose solution which also contains indoleacetic acid, 2 mg per liter; in the third dish put a 2% sucrose solution in which six coleoptile tips have been mashed using a glass rod. Place the petri dishes in the dark. A desk drawer or one large can inverted over them will serve. Leave the dishes overnight; then, with a millimeter ruler, measure the length of the coleoptile segments in each dish. Record these lengths and calculate the percentage increase in each solution.

Indoleacetic acid is a naturally occurring plant growth hormone. From your experiment, which part of the plant would most likely be the place the growth hormone is made?