

An investigation into
the variables affecting
the distribution of
plants in a woo...



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I will be carrying out my investigation in Whomerley wood. Whomerley wood is an ancient wood, created in the 16th century, 400 years ago. Initially Whomerley wood seems to be largely made up of bramble and the trees consist mainly of Hornbeam, with a number of Oaks, Ash and Silver Birch trees, consequently the woodland looks to be a fairly sheltered and shaded place in the patches where the trees were growing. On the woodland floor though, there were numerous patches of Bluebells, Dog's mercury, Wood millet and Wood melleck.

Make note how to identify the different plants. The woodland is coppiced on a rotation system, where one acre of trees per 15- 25 years are cut, giving them a small trunk remaining. This produces a smaller diameter wood, therefore giving other plants light and space to grow. This can be seen in the wood, and over time, on the trunks a shrub (explain what layers are) layer will start to grow. The idea of coppicing affects some of the areas factors of distribution of plants because it provides more light and space for smaller plants, i.

e. dog's mercury, so they will not be competitively excluded. This also affects when they grow, because bluebells have adapted to their environment in Whomerley wood, and they start to develop in the early spring, where most of the trees surrounding them are bare. This means that the bluebells have light (through the bare tree branches) and less competition for the nutrients in the soil.

Variables/Factors The factors that will affect the distribution of plants in a wood are: (information found in " Biology G. C. S. E. edition" and the internet)* Temperature.

Principally speaking, in more extreme temperatures, whether hot or cold, animals and plants find it more difficult to survive. This is because water is very easily lost through evaporation, and is not easily replaced. Only few plants adapt to extreme conditions, which is why places like a desert or the Antarctic is sparsely populated. Plants and animals can adapt to their surroundings, cacti have a small surface area on the plant so water is not evaporated off and polar bears produce a thick layer of fat and a thick coat to insulate them in the freezing cold temperature.

* Food availability. Animals and plants will populate where there is food availability, especially if there are no other competitors in the vicinity of their chosen area. This results in the plants and animals being able to increase in their population and grow into healthy organisms. This is why on areas such as fields, plants like daffodils can grow as there are no trees to take up their nutrients in the soil.* Shelter.

Plants and animals will usually stay in a habitat where there is shelter, but not so much so that they do not have enough light. Plants and animals can adapt to shelter, plants can become shade tolerant, which means either, like the Blue bell they flower early or they reduce the need for light.* Trampling. Plants will mostly be nonexistent on places with high trampling numbers like a path because the intensity of the forces exerted on to the plant will be very likely to be too much so the plant would die.

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* Light. This is an important factor, as it is needed for photosynthesis. If plants become shade tolerant, i. e.

Dog's mercury, it is able to grow in shaded areas without the competition for light with other plants. If, however a plant does not become shade tolerant, i. e. poppies, the plant will have to grow in open areas with plenty of light, like fields.* pH of soil.

Only few types of plants live in acidic soil because few bacteria live in acidic conditions so there are few nitrates in the soil, which is a requirement for the growth of plants.* Space/ competition. Plants need space to grow and so to decrease the competition for nutrients, light and so on. With their own space, plants are free to reproduce and grow into healthy organisms.

* Rainfall/ water. Water is essential for the growth of plants, but too much or too little dangerous to the plant. With too much water, soil becomes wet and bacteria are unable to live there, as they cannot get enough air from the soil. This makes the bacteria unable to decay dead organisms, so the dead organism start to release acid into the soil, which destroys any nitrates in the soil. This makes it very difficult for plants to have their environment there.

If there is not enough water, soils become gritty and lack nutrients and its water retentive properties, making it difficult for a plant to have its habitat there.* Predators. A predator is an animal, which kill another living organism, called prey, for food. If a plant is a prey for an animal in its environment, the plant must adapt to protect itself from being eaten.

This may make it very difficult for a plant to produce in that area, so it is likely that plants will produce more in environments with a low number of predators.* Oxygen. Oxygen is a necessity for plants to live with. Oxygen is available in the air, but aquatic plants can obtain it from the oxygen dissolved in the water. Aquatic plants will usually live along the edges of a river or pond, as oxygen is not easily dissolved so it does not diffuse very quickly, this means that there is a larger oxygen supply in the shallower parts of the water.* CO₂.

Carbon dioxide and water are combined using energy from sunlight to give sugars and oxygen to the plant in photosynthesis. The plant then uses the sugars. One of the things that the sugar is used for is growth (it's used in respiration to give the plant energy, and to make cellulose- needed for plant cell walls, it's also converted to other substances needed by the plant to grow). If you increase the concentration of carbon dioxide then photosynthesis will work faster, and more sugars will be produced. The growth rate will also increase so the plants will grow more quickly.* Nitrates Nitrogen is usually very important to plants, so soils low in dissolved nitrates will not support growth well.

Again, some plants deal better with low levels or absence of some nutrients better than others. E. g. Legumes (Peas, beans, clover) have symbiotic nitrogen-fixing bacteria growing in nodules in their roots, enabling them to flourish in soils poor in nitrogen.* Pathogens. If pathogens are present in the plants environment the plants habitat can be destroyed if not damaged.

This can affect the reproduction and growth of the plants, as pathogens are organisms that cause disease. These factors can be divided into two groups: biotic and abiotic. Biotic means living and abiotic (sometimes referred as edaphic) means not living. So, Food availability, shelter, space/ competition, Trampling, predators and pathogens (diseases) all come into the biotic side.

Temperature, light, rainfall/ water, pH of soil, wind, oxygen, CO₂ and Nitrates all come into the abiotic side. However, food availability, shelter and pathogens also come into the abiotic side as well, so these factors are exceptions.