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Unit Code: T/602/3921
UNIT GUIDE 2023-24

The Interaction of Soil Environments and Woody Plants

5. Understand soil pH and the ranges found in soil

5.1. Identify two implications for woody plants of a low and a high value of pH

Soil pH (also known as soil reaction) is a 14-unit scale (0-14) which measures the relative acidity or basicity (alkalinity) of a soil.
Soil pH is a key characteristic that can be used to make informative analysis both qualitative and quantitatively regarding soil characteristics.
pH stands for potential of hydrogen and the technical definition of pH is the negative log of hydrogen ion (H+) concentration in a water-based solution. pH is a measure of the availability of hydrogen ions (H+) in a solution.
The pH scale is **logarithmic**, meaning that each pH value represents an increase or decrease of not one, but ten times.
If you reduce the pH of your soil by 1 point, your soil becomes 10x more acidic.

If you reduce the pH of your soil by 2 points, your soil becomes 100x more acidic.

If you reduce the pH of your soil by 3 points, your soil becomes 1,000x more acidic.

If you reduce the pH of your soil by 4 points, your soil becomes 10,000x more acidic.

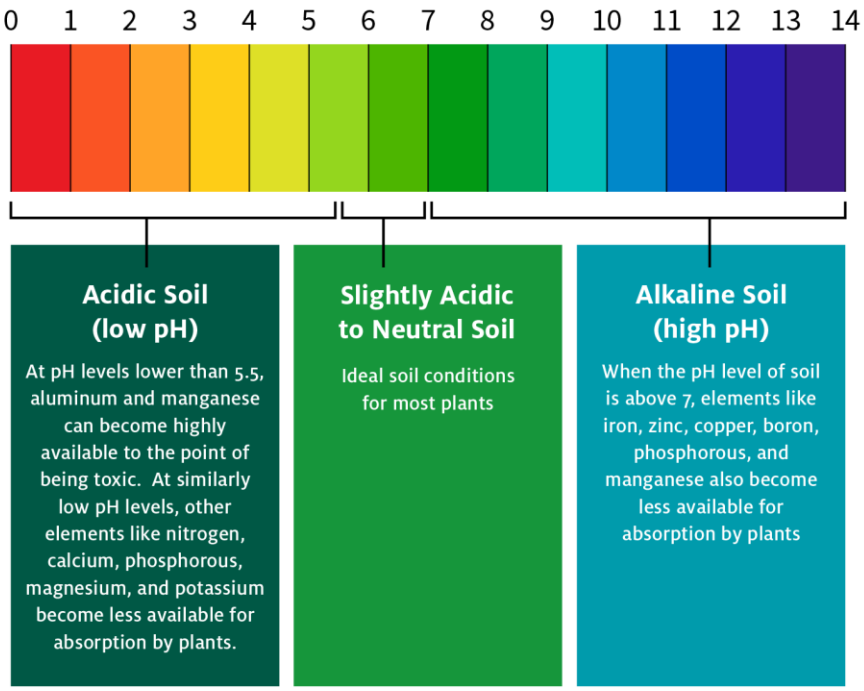
If you increase the pH of your soil by 1 point, your soil becomes 10x more alkaline.

If you increase the pH of your soil by 2 points, your soil becomes 100x more alkaline.

If you increase the pH of your soil by 3 points, your soil becomes 1,000x more alkaline.

If you increase the pH of your soil by 4 points, your soil becomes 10,000x more alkaline.

The soil pH is a number that describes how acid or alkaline your soil is. A pH of 7.0 is considered neutral. An acid soil has a pH value below 7.0 and above 7.0 the soil is alkaline.



https://www.fast-growing-trees.com/pages/soil-ph

While many plants prefer soil that is close to neutral or only slightly acidic (often in the pH range of 6-7), some plants do need more acidic soil.

To avoid the potato scab disease, Irish potatoes, for instance, grow best in soil with a pH level between 5 and 5.5.

Extreme pH values can have an impact on the amount of harmful minerals in the soil and the availability of nutrients for plants. Aluminium and manganese can become highly accessible to the point of becoming hazardous at pH values lower than 5.5. Other elements, including nitrogen, calcium, phosphorus, magnesium, and potassium, become less available for absorption by plants at equally low pH levels. Iron, zinc, copper, boron, phosphorus, and manganese become less available for absorption by plants when the pH level of soil rises above 7.

Simply adding fertiliser to the soil will not solve the issue of excessive pH levels in the soil. Instead, the pH must be adjusted to return to the desired range. This can be done by adding aluminium sulphate or elemental sulphur to raise the pH or crushed agricultural limestone to lower it. To find out how much must be given to the soil to bring the pH level back into range, conduct a soil test.

Soils are composed of a mixture of sand, silt, and clay.

Sand particles are the largest, so sandy soils tend to drain quickly and do not hold water well, but allow good aeration.

Clay particles are very small and tend to pack down, so clay soils tend to not drain or aerate well at all.

Silt particles are medium sized, so silty soils have properties in between those of sand and clay.

We have covered sandy, clay and silty soils, but what is loam?

A loamy soil is one that combines sand, silt, and clay particles in relatively equal amounts, so it can retain moisture while draining well, and allow sufficient air to penetrate to reach the roots, making it ideal for most garden plants.

Soils with a loam texture can contain different proportions of sand, silt, and clay, so there are sandy loams, silty loams, loamy sand, and clay loams.

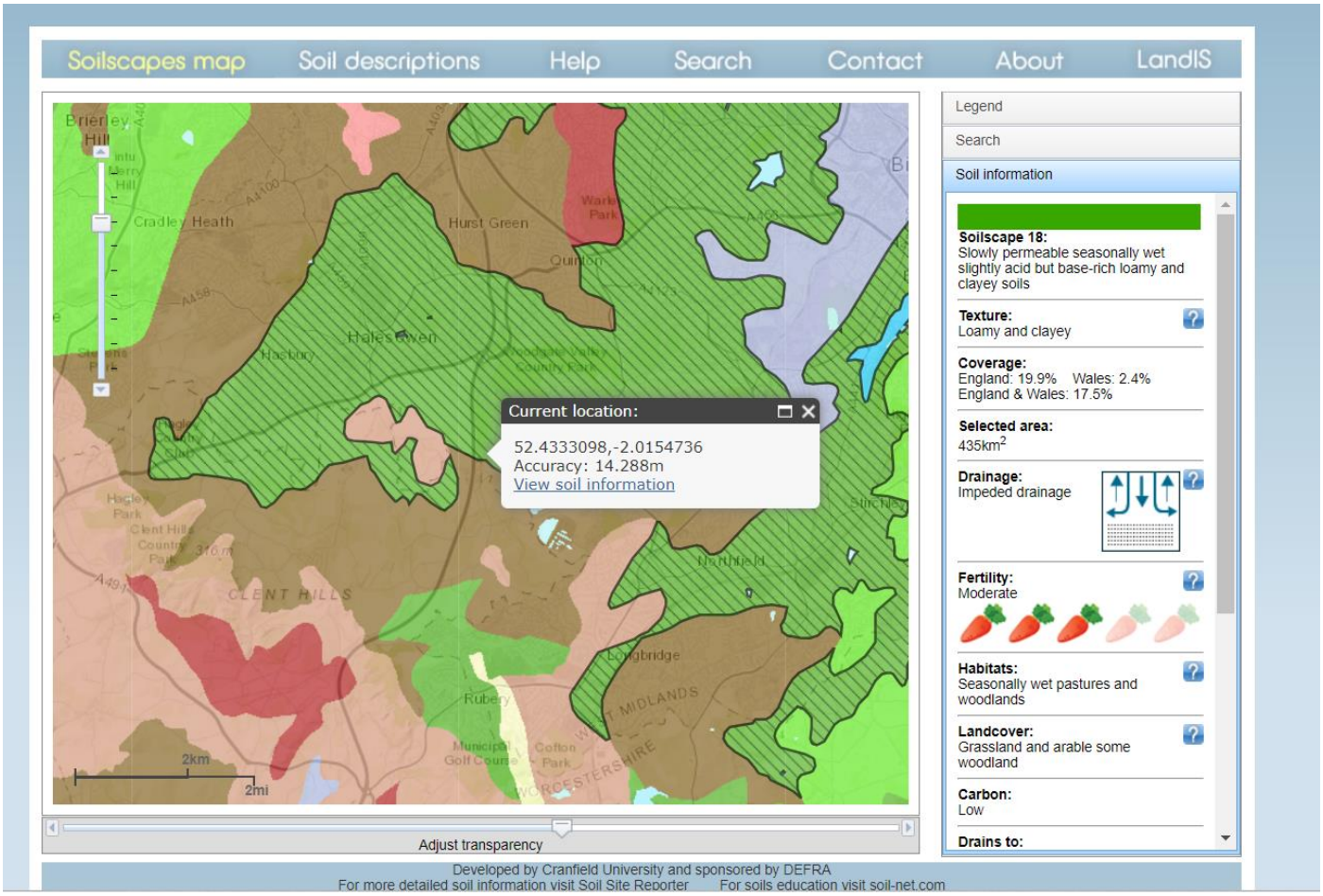
Due to their poor pH resistance and lower buffer capacity, sandy soils can acidify more quickly, but they can also be corrected or recovered the quickest for the same reason. When compared to clay soils, for instance, acidic sandy soils require less lime to raise the pH.
The biggest buffer capacity is found in clay soils, which also have a lot of organic matter and can withstand pH shifts more effectively.

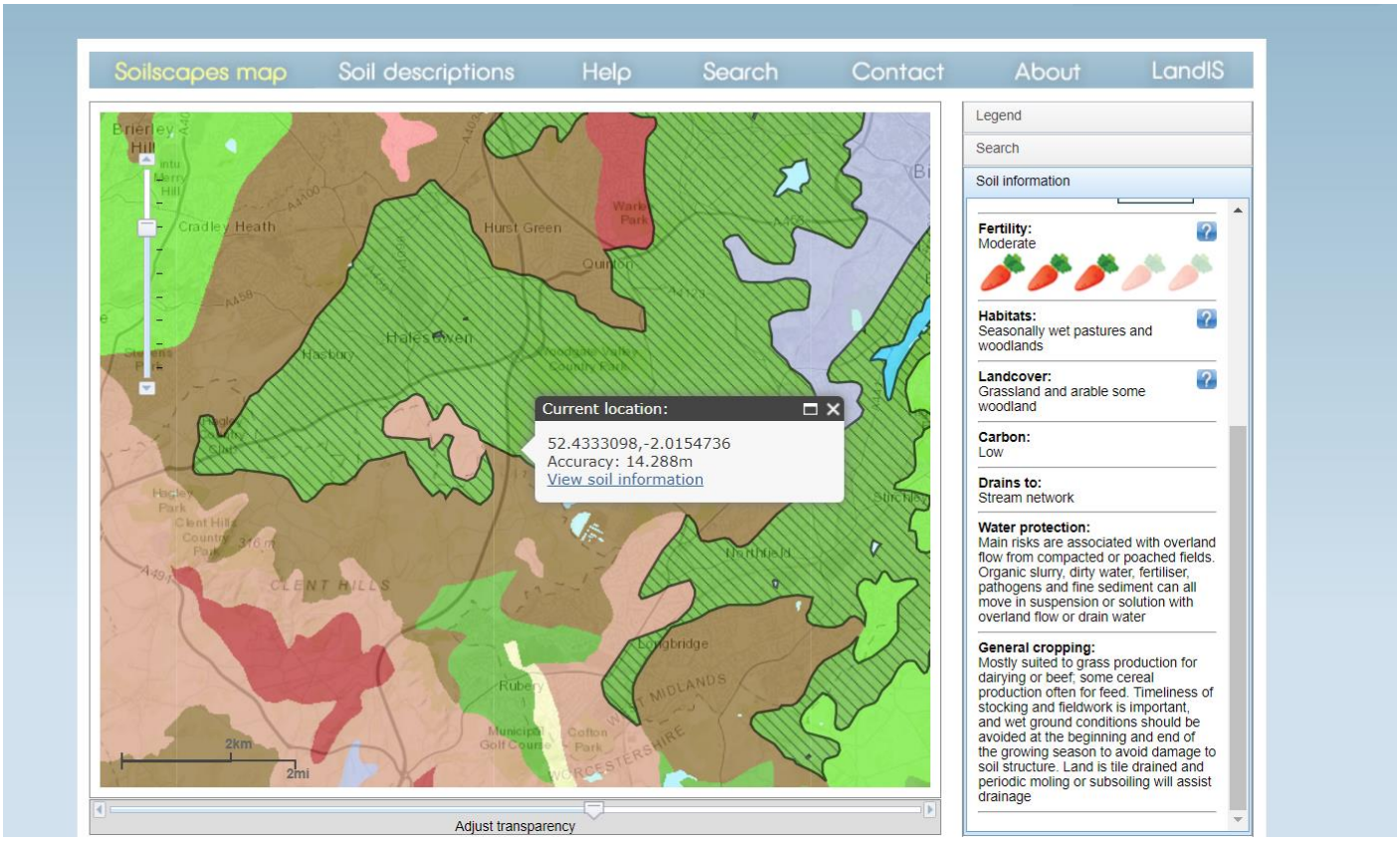
Soils high in clay or organic matter can resist a becoming acidic because they have a larger number of surface sites which are able to bind hydrogen (H+) ions, which are responsible for acidity. However, once they get acidified, they are also able to resist attempts to raise the pH to make them less acidic due to their high buffering capacity. The hydrogen (H+) ions in the soil solution can be neutralised by adding lime, but a properly buffered, acidified soil will release bound hydrogen (H+) ions from the soil surface to maintain equilibrium and withstand pH increases.

All soils with a high buffer capacity will acidify more slowly, but require more lime to raise the pH when they do acidify. Clays are generally better buffered than loams, which in turn are better buffered than sands.

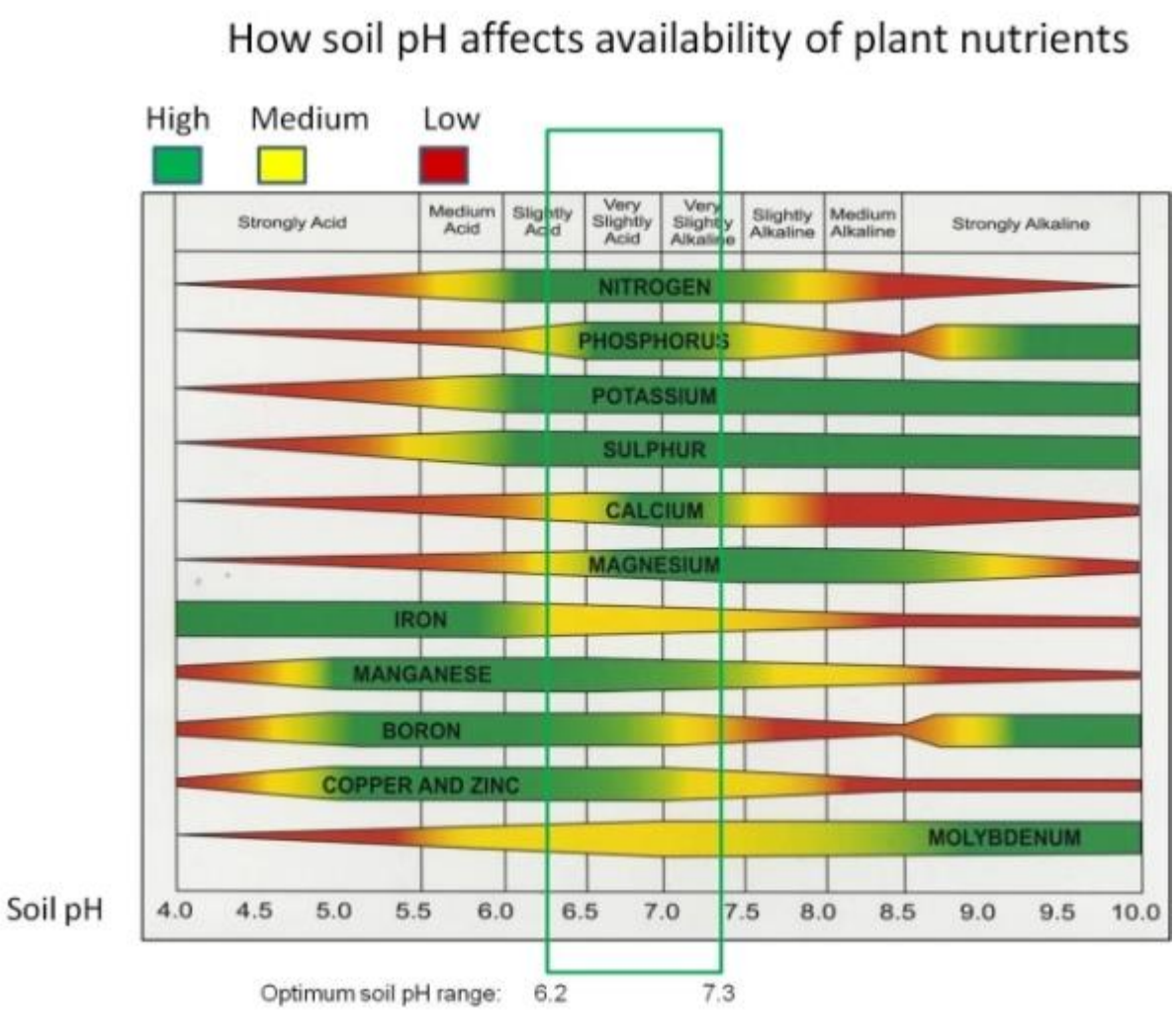
In the **UK**, acid soils are more widespread than alkaline soils, and can be found making up large areas of heathland and coniferous woodland, such as Dartmoor National Park, York Moors, Yorkshire Dales, Brecon Beacons, and the Cairngorms.

Through this below website, I was able to get my location and more soil information.





https://www.landis.org.uk/soilscapes/

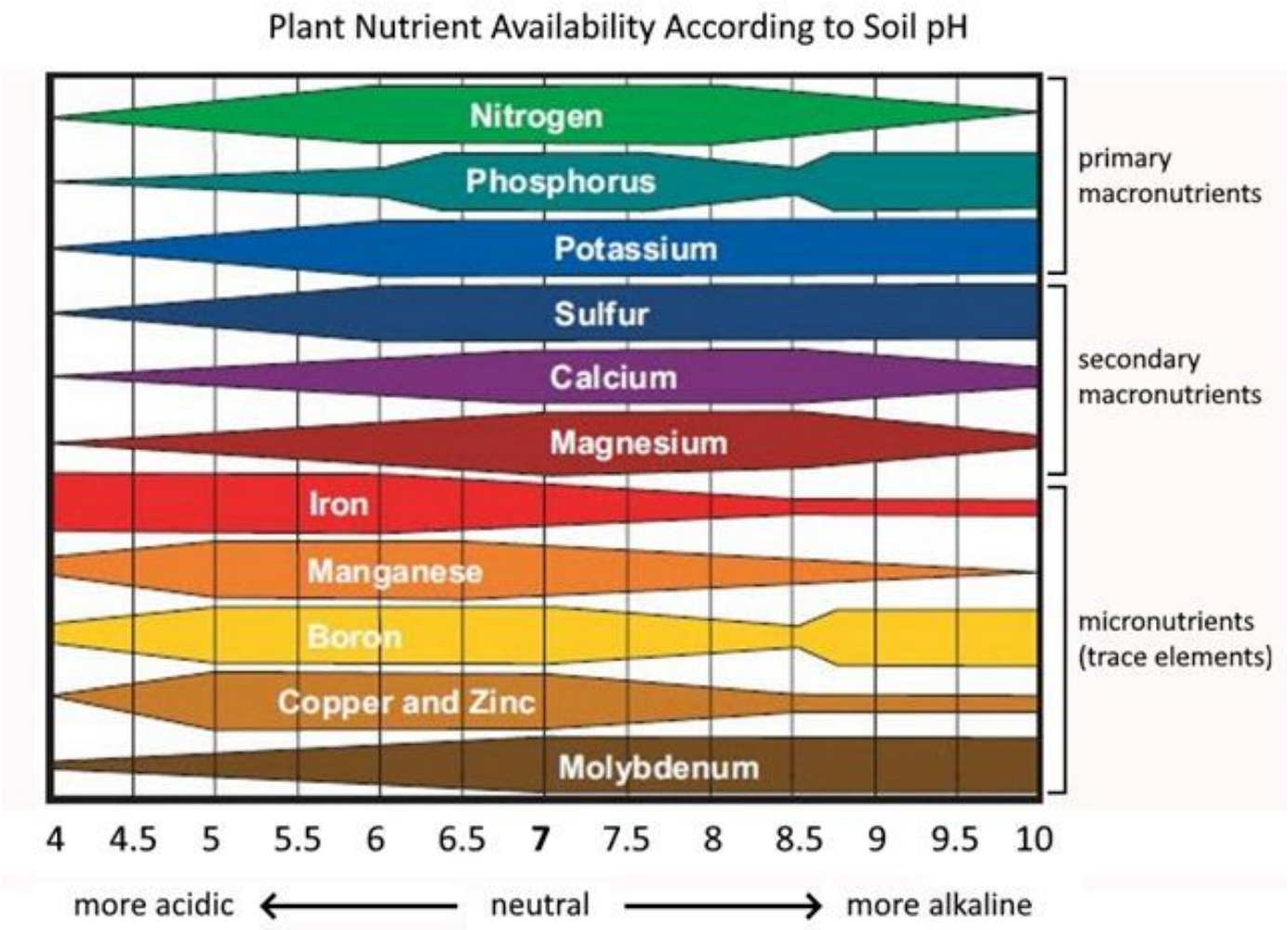


https://planetpermaculture.wordpress.com/2013/07/25/ph-chart-showing-nutrient-availability/

In the diagram below, we can see how the **primary and secondary macronutrients**, which plants require in the greatest quantities, and the micronutrients or trace elements, which are required in smaller quantities, are most available to plants when the soil pH is between 6.5 to 7.0**.**

The macronutrients are most available to plants when the soil pH is between 6.5 to 7.5, a slightly wider range than the micronutrients,

At either extreme, when soils become extremely acidic or alkaline, many nutrients become locked up and less available to plants, which leads to nutrient deficiencies and negative impacts plant growth and productivity.



At a low pH, when the soil becomes more acidic, we can observe from the left side of the diagram that:

- All the primary and secondary macronutrients become less accessible.
- The availability of trace elements, such as molybdenum (Mo), decreases for plants.
- The availability of aluminium (Al) increases significantly when the soil pH falls below 5.5. Al may accumulate in hazardous amounts for plants and can restrict phosphorus uptake by lowering phosphorus solubility.
- Other elements like manganese (Mn), which is poisonous to plants, and iron (Fe) become more readily available.

Please take note that aluminium (Al), which is not a plant nutrient and is not represented in the picture, is present in soils and can be hazardous to plant roots because of a severely low soil pH (high acidity).

At a higher pH, where the soil becomes more alkaline, as shown on the diagram's right side,

Calcium can bind phosphorus at pH levels higher than 7.5, reducing its availability to plants.
Less iron, a trace element, is accessible.

Zinc and other trace elements like cobalt become less accessible, resulting in nutrient shortages that can cause stunted plants, poor development, and decreased crop yields.

A **low pH** creates an acidic environment, and while many plants thrive in slightly acidic environments, you should not let the pH of the solution or soil become too low, as this could lead to detrimental effects on your plants.

Some nutrients may be available in low pH environments, while others become unavailable, causing nutrient deficiencies for your plant.

If your plants are experiencing a low pH environment, they may display one or more of the following signs:

Stunted growth

Brown spots on the leaves (calcium deficiency)

Dying leaves

Green leaves with red or purple edges

Burnt tips (nutrient overload)

Looking withered

Twisted leaves

If your plant has fruits, you may see blossom end rot

Yellow leaves, known as leaf chlorosis

As previously said, nutrients are essential for the growth, development, reproduction, and defence against pests and diseases of your plants. The following macronutrients become depleted and deficient when the pH is too low:

Nitrogen is an essential component of the proteins in your plant. When the pH is low, the bottoms of the plants turn yellow, and growth is also impeded. Since nitrogen is required for the creation of chlorophyll, which is essential for your plant to photosynthesize, low pH also has an impact on the metabolism of your plant and the activities of its enzymes.

Low pH levels in your soil and plant exposure to severely cold temperatures are both associated with phosphorus deficiency.

Your plant's elder leaves, which normally have a dark green colour with purple or crimson margins, will be the first to be affected by a phosphorus shortage. Your plant will grow slowly and eventually develop black areas and necrosis on its leaves if ignored.

The two best phosphorus additions are superphosphate and phosphate rock. Nutrient solutions and fertilisers should be avoided because they might provide your plants with too much nutrition.

The intake of water and photosynthesis are both aided by potassium. If your plant displays chlorosis and has leaves that appear burned or brown, its low pH may be causing it to lack potassium.
Lack of potassium can cause leaf necrosis and, in extreme situations, purple areas under the leaves if left untreated. Seaweed, kelp, or tomato feed are examples of potassium-rich soil additives that can be used to solve the issue.

Calcium is the macronutrient that is most important for the growth and development of plant cells. Low pH can cause plants to lose calcium, which causes wilted and plainly gloomy-looking leaves. Your plant will eventually stop blooming as a result. If your plant has fruit, the fruit will either begin to develop slowly or stop entirely.
To remedy calcium deficiency in hydroponics, only use a water-soluble calcium supplement to prevent overdose. Any kind of lime is beneficial for soil.

When the **pH is too high**, the environment becomes alkaline. Some plants will tolerate alkaline conditions, but others will not, leading to potential issues such as:

Brown spots on leaves

Leaf chlorosis

Tip death

Stunted and/or wilted leaves

Green leaves with red or purple edges

Although some crops prefer acidic or alkaline soils, many crops thrive on soils with a pH that is close to neutral (pH 6 to 7.5). While phosphorus, boron, molybdenum, calcium, and magnesium are low in acidic soils, aluminium and manganese are abundant, sometimes in amounts that are deadly to some plants. In extremely alkaline soils, phosphorus, iron, copper, zinc, and boron deficiencies are common. Low pH levels cause bacterial populations and activity to decrease, whereas fungi can adapt to a wide pH range (acidic and alkaline). Most microorganisms have a pH range where they can survive and thrive. (See table 2).

Table 2: Maximum, minimum, and optimum pH values for microbial groups. (Adapted from Smith and Doran 1996)

Microorganisms	Range	Optimum
Bacteria	5 - 9	7
Actinomycetes	6.5 - 9.5	8
Fungi	2 - 7	5
Blue green bacteria	6 - 9	> 7
Protozoa	5 - 8	> 7

http://soilquality.org/indicators/soil_ph.html

At severely acidic or alkaline pH values, organic matter mineralization is hampered or blocked due to insufficient microbial activity attributed to bacteria. Nitrification and nitrogen fixation are also prevented by low pH. Both the mobility and degradation of insecticides and herbicides, as well as the solubility of heavy metals, are pH-dependent processes. The effects of soil pH on cation availability influence aggregate stability because multivalent cations, such as calcium ions, act as a link between organic colloids and clays. Numerous illnesses flourish in alkaline or acidic soil.

Woody plants rely on microorganisms to break down organic materials and produce usable nutrients. Woody plant growth is hampered since there are fewer nutrients available in the soil due to fewer microbes working there.

5.2. Identify 5 trees and 5 shrubs suitable for each situation given below

• a soil with a pH of 5.5

• a soil with a pH of above 7.5

5 trees, a soil with a pH of 5.5

These woody plants are calcifuge or ericaceous, meaning that they do not like a chalky soil.

1

Common Name	Latin Name	Description
Alder	**Alnus glutinosa**	At 10 to 25 m tall (and exceptionally 35-40 m), black alder is a relatively small tree species. It is also short-lived for a tree, with individuals normally reaching 60 years, but can reach 160 years in some areas. Its dark green leaves are 4 to 10 cm

		long, and have a characteristic inward notch at the end.

Alders can grow on a wide range of soil types as well as on soils with varying nutrient status. They can also be found on soils ranging in values between 4.2 and 7.5 pH. Alders are tolerant of sites prone to periodic flooding as well as having the ability to adapt and live in habitats with high water tables. The characteristics of black alder wood make it very suitable for many different uses. Apart from alder making very good firewood its fibre is ideal for paper making and good quality alder is an excellent timber for joinery as a solid wood or veneer.

2

Common Name	**Latin Name**	**Description**
Downy Birch	**Betula pubescens**	Mature trees can reach 30m in height, forming a light canopy with elegant, drooping branches. Downy birch is more upright than silver birch and the bark is browner in colour with more obvious horizontal grooves and lacking the papery quality of the silver birch. Look out for: bark which is grey-white, and triangular-shaped leaves. Identified in winter by: bark which is white all year round and twigs that are softly hairy to the touch. Birch wood is tough and heavy, making it suitable for furniture, handles and toys. It was used to make bobbins, spools, and reels for the Lancashire cotton industry; and herbal medicines were made from different parts of the tree. In spring, the rising sap can be used to make refreshing drinks, wines, ales, and liqueurs; while the bark is used for tanning leather.

Because birch is shallow-rooted, they prefer a location where the soil remains cool and moist while exposing the canopy to ample sunlight (about 6 hours daily). The ideal spot is the north or east side of a building, where the tree will receive full sun in the morning and some shade during the afternoon.

Soil:

Birches may grow well in a variety of soil types, apart from severely wet or dry situations. Some birches can even thrive in moist soil, provided it is not flooded. Although somewhat acidic soils (with a pH between 5.0 and 6.5) are desirable, species have different preferences, with yellow birch being tolerant of alkaline conditions whereas river birch prefers a pH below 6.5.

3

Common Name	**Latin Name**	**Description**
Common Ash, European Ash	**Fraxinus excelsior**	Fraxinus excelsior is a deciduous Tree growing to 30 m (98ft) by 20 m (65ft) at a fast rate. It is hardy to UK zone 4 and is not frost tender. It is in leaf from May to October, in flower from April to May, and the seeds ripen from September to January. The species is dioecious (individual flowers are either male or female, but only one sex is to be found on any one plant so both male and female plants must be grown if seed is required). and is pollinated by Wind. The plant is not self-fertile. It is noted for attracting wildlife. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils. Suitable pH: mildly acid, neutral, and basic (mildly alkaline) soils and can grow in very acid soils. It cannot grow in the shade. It prefers moist or wet soil. The plant can tolerate maritime exposure. It can tolerate atmospheric pollution.

This plant has been used in vegetative covers on heavy metal polluted sites, helping to avoid dispersion of contaminants through wind erosion and by reducing the volume of water percolating through the soil. This species is considered a heavy metals excluder, useful in phytostabilisation of polluted soil or sediments; ash trees may have a mechanism to avoid metal uptake by stabilizing it in the rhizosphere or exclude it from their above-ground tissues by keeping in their roots (Rosselli et al., 2003). In this way Fraxinus reduces the risk of metal dispersal and is therefore suitable species for phytostabilisation (Mertens et al., 2004). Additionally, F. excelsior is pioneer plant known to be able to adapt and survive in harsh environments and, thus, is interesting in rehabilitating contaminated soils that

have also extreme chemical and physical characteristics (Rosselli et al., 2003). A study showed that the sharp decrease in trichloroethylene (TCE) concentration of contaminated groundwater plume under a common ash planted area, was related to trees evapotranspiration activity leading to evaporation of a significant amount of TCE and its metabolites through the leaves to the atmosphere (Weyens et al., 2009).

https://www.iret.cnr.it/phytoremediation/fraxinus_excelsior_cd_pb_zn_cu_organics.pdf

People have worked with ash timber for years. It is one of the toughest hardwoods and absorbs shocks without splintering. It is the wood of choice for making tools and sport handles, including hammers, axes, spades, hockey sticks and oars. An attractive wood, it is also prized for furniture.
The young, green, immature seeds of ash are edible and have also been used in herbal medicine.

In the 19th century ash was commonly used to construct carriages, and Britain's Morgan Motor Company still grows ash to make the frames for its cars.

Ash trees can live to a grand old age of 400 years – even longer if coppiced, the stems traditionally providing wood for firewood and charcoal.

https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/british-trees/a-z-of-british-trees/ash/

4

Common Name	**Latin Name**	**Description**
Scots Pine	**Pinus sylvestris**	Scots pine is an evergreen conifer native to northern Europe. Mature trees grow to 35m and can live for up to 700 years. The bark is a scaly orange-brown, which develops plates and fissures with age. Twigs are green-brown and hairless. Look out for: mature trees which have reddish bark towards the crown of the tree and brown bark towards the base. The needles are twisted and when broken, they have a fine white fringe of hairs. Identified in winter by: its evergreen needle-like leaves which are present all year-round.

Scots pine timber is one of the strongest softwoods available and is widely used in the construction industry and in joinery. It is used in the manufacture of telegraph poles, pit props, gate posts and fencing. The tree can also be tapped for resin to make turpentine. Other uses include rope made from the inner bark, tar from the roots and a dye from the cones. Dry cones can be used as kindling for fires.

5

Common Name	**Latin Name**	**Description**
English Oak	**Quercus robur**	A large, deciduous tree growing up to 20–40m tall. Also known as common oak, this species grows and matures to form a broad and spreading crown with sturdy branches beneath. Look out for: its distinctive round-lobed leaves with short leaf stalks (petioles). Identified in winter by: rounded buds in clusters. Each bud has more than three scales. pH: Neutral, acid, alkaline Oak trees are one of the longest-lived trees in the UK, with a potential lifespan of over 1,000 years. They reach maturity at around 40 years old, by which time many will be producing acorns. When trees reach 150-300 years old, they are usually classed as veteran trees. From 400 years old, they are known as ancient oaks. Even when an oak tree dies, the deadwood continues to provide habitats for wildlife including beetles, birds, and many species of fungi.

Oaks produce one of the hardest and most durable timbers on the planet. However, it takes up to 150 years before an oak is ready to use in construction. It has been a prized hardwood timber for thousands of years and is still used for flooring, wine barrels and firewood.

Leaves, bark, and acorns were believed to heal many medical ailments, including diarrhoea, inflammation, and kidney stones.

Acorns have also been used to make flour for bread making.

Tannin found in the bark has been used to tan leather since at least Roman times.

5 shrubs, a soil with a pH of 5.5

1

Common Name	**Latin Name**	**Description**
Bean's broom	**Cytisus × beanii**	A semi-prostrate shrub, to 35cm high, with simple, linear green leaves and rich yellow flowers along the green branches in late spring or early summer Family Fabaceae Native to the UK No Foliage Deciduous Habit Bushy Potentially harmful Harmful if eaten. Wear gloves and other protective equipment when handling Genus Cytisus can be deciduous or evergreen shrubs, ranging from prostrate to erect and almost tree-like, with small, simple, or 3-parted

		leaves and pea-like flowers spring or summer Moisture Well–drained pH Acid, Alkaline, Neutral

2

	Latin Name	**Description**
Californian lilac 'Puget Blue'	**Ceanothus 'Puget Blue'**	'Puget Blue' is a medium-sized evergreen shrub of upright habit, with small, dark green, narrow leaves. Flowers deep rich blue in conical or oblong panicles, in late spring and early summer. Growing conditions Sand Clay Moisture Well–drained pH Acid

3

Common Name	Latin Name	Description
Dogwood	**Cornus sanguinea - L.**	Cornus sanguinea is a deciduous shrub growing to 3 m (9ft 10in). It is hardy to UK zone 5 and is not frost tender. It is in flower from June to July, and the seeds ripen in September. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil. Suitable pH: mildly acid, neutral, and basic (mildly alkaline) soils and can grow in very alkaline soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

The seed contains 45% of a non-drying oil [74], it is used in soap making and lighting [7, 13, 100, 115, 177]. A non-drying oil is also obtained from the pericarp, it is used for lighting [74]. The pericarp contains 19 - 35% oil [74]. A greenish-blue dye is obtained from the fruit [13, 74]. The young stems are very flexible and are used in basketry [7, 13, 74, 100]. Wood - tough, hard. Used for small items such as tool handles, turnery etc [11, 61, 115]. A good quality charcoal is obtained from the wood [115], the wood also makes an excellent fuel [115].

https://pfaf.org/User/plant.aspx?latinname=Cornus+sanguinea#:~:text=Suitable%20pH%3A%20mildly%20acid%2C%20neutral,It%20prefers%20moist%20soil.

The bark of all Cornus species is rich in tannins and have been used in traditional medicine as a substitute for quinine - a drug that is used to treat malaria and babesiosis. A drink similar to tea can be made from the bark to treat pain and fevers, while the leaves can be made into a poultice to cover wounds. Dogwood is a popular garden plant and many horticultural varieties have been bred.

https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/british-trees/a-z-of-british-trees/dogwood/

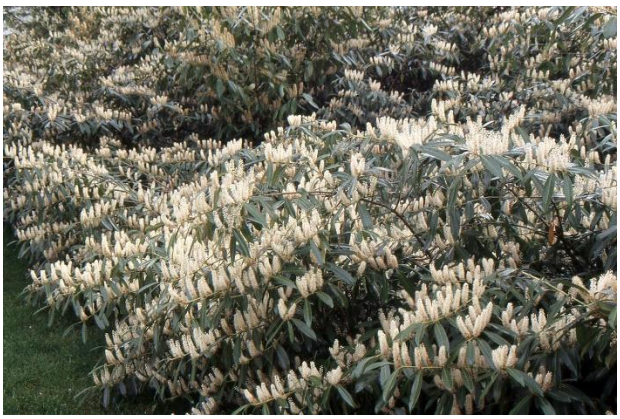
4

Common Name	**Latin Name**	**Description**
Pieris japonica 'Scarlett O'Hara	**Pieris japonica subsp. Japonica**	A slow-growing evergreen shrub, to around 2m high, with an upright habit and elliptic, slightly toothed, glossy green leaves that are reddish-bronze when young. Early flowering, producing dense clusters of small, scented, urn-shaped white flowers at the tips of the stems in spring Growing conditions Sand Clay Moisture Moist but well–drained pH Acid

5

Common Name	**Latin Name**	Description
Zabel's Cherry Laurel	**Prunus laurocerasus 'Zabeliana'**	Botanical details Family Rosaceae Native to the UK No Foliage

		Evergreen Potentially harmful Leaves and fruits may be harmful if ingested. Wear gloves and other protective equipment when handling Genus Prunus can be deciduous or evergreen trees or shrubs with showy flowers in spring, and often good autumn foliage colour. Some have edible fruit in autumn, and a few species have ornamental bark Growing conditions Loam Chalk Sand Clay **Moisture** Moist but well–drained, Well–drained **pH** Acid



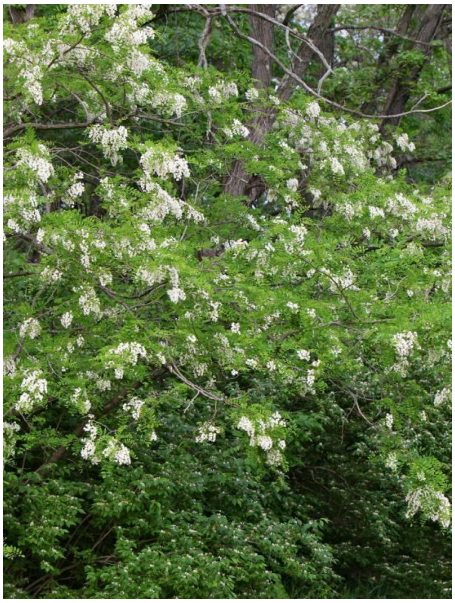
5 trees, a soil with a of above 7.5

Alkaline or “sweet” soils are those with a pH of more than 7. This is commonly caused by a high content of limestone or chalk, which may also result in the soil being free draining and lower in nutrients than neutral, loamy soils.

1

Common Name	**Latin Name**	**Description**
Black Locust Tree	**Roboniapseudoacacia**	Fast growing and vigorous, locust tree will tolerate alkaline soil to about 8.0 on the pH scale. Often multi-trunked, it offers you fine, bright green foliage with delicately pinnate leaves, and lovely drooping panicles of fragrant white flowers, which are even edible!

		Followed by brown pods, they will grace your garden in spring. Perfect for the back of a garden and privacy, a small coppice of this deciduous tree will also greatly improve your soil condition. Hardiness: USDA zones 4 to 9. Light exposure: full Sun. Blooming season: spring. Size:30 to 50 feet tall (9.0 to 15 meters) and 20 to 33 feet in spread (6.0 to 10 meters). Soil requirements: well drained, dry to medium humid loam, clay, chalk, or sand-based soil with pH from mildly acidic to mildly alkaline.

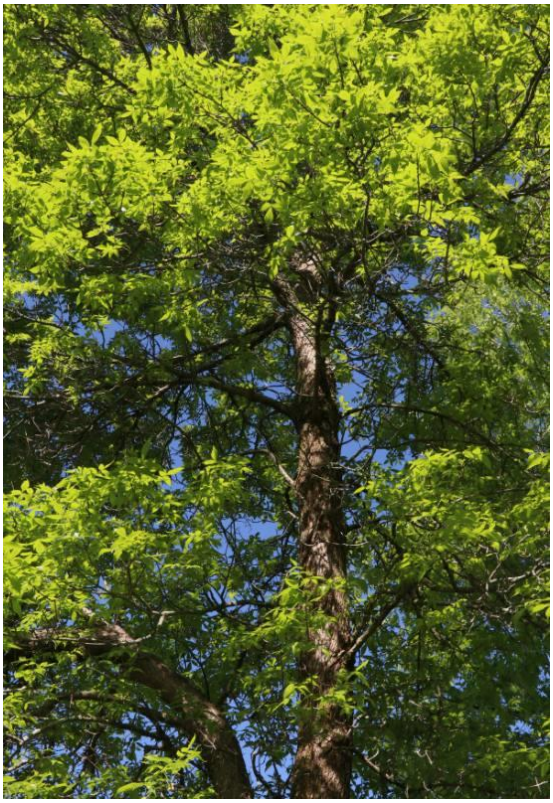


https://www.gardeningchores.com/plants-for-alkaline-soil/

2

Common Name	**Latin Name**	**Description**
Green Ash	**Fraxinus Pennsylvanica**	Green ash likes mildly alkaline soil! This upright tree has green pinnate leaves that turn yellow and orange in fall, before dropping to feed your land. But they will also entertain your family and guests with its seeds, called samara, which have wings like dragon flies to be carried by the wind. Very common in urban décor, it is also an excellent choice for a bright and cheerful garden design. However, remember that it can grow quite tall. Hardiness: USDA zones 3 to 9.

		Light exposure: full Sun. Blooming season: spring. Size: 50 to 70 feet tall (15 to 21 meters) exceptionally up to 148 feet (45 meters) and 33 to 50 feet in spread (10 to 15 meters). Soil requirements: fertile, well drained, and humid loam or sand-based soil with pH from mildly alkaline to neutral. It tolerates wet soil.



https://www.gardeningchores.com/plants-for-alkaline-soil/

3

Common Name	**Latin Name**	**Description**
Tamarisk	**Tamarixramosissima**	Tamarisk is a rare exception: it can tolerate even very alkaline soil! With an open habit and reddish branches, it fills with delicate pink blooms late in the season, while you will enjoy its fine, breezy bright green foliage from the spring. Its feathery look makes it ideal as an elegant garden tree (or shrub, according to how you train it), and it can withstand very harsh conditions indeed! Despite its delicate look, it is in fact very tough! Hardiness: USDA zones 2 to 8.

		Light exposure: full Sun. Blooming season: late summer and early fall. Size: 10 to 15 feet tall (3.0 to 4.5 meters) and 8 to 13 feet in spread (2.4 to 4.0 meters). Soil requirements: poor to average fertile, well drained, dry to medium humid loam, clay, chalk, or sand-based soil with pH from mildly acidic to alkaline. It is drought and salt tolerant.

https://www.gardeningchores.com/plants-for-alkaline-soil/

4

Common Name	**Latin Name**	**Description**
Burning Bush	**Euonymousalatus 'Compactus'**	For a super decorative small tree that will grow well in most soil pH levels (5.0 to 8.0) including alkaline and sweet, look at burning bush! With elliptic leaves that turn from rich green to flaming scarlet red in the fall, it is a real show stopper. The small greenish flowers may not be a spectacle, but the purple red berries that follow them are quite shiny and attractive! Ideal for a small, even urban garden, it has even won the famous

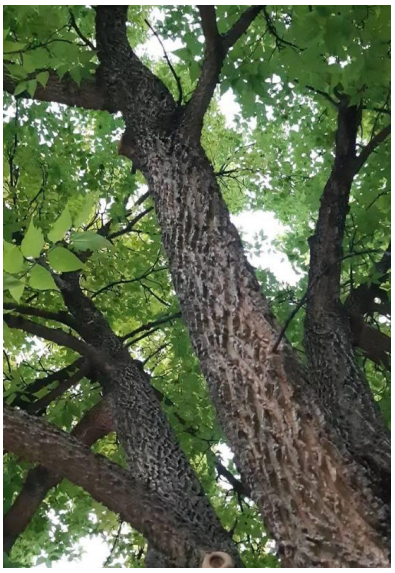
		Award of Garden Merit by the Royal Horticultural Society! Hardiness: USDA zones 4 to 9. Light exposure: full Sun or partial shade. Blooming season: late spring. Size: 9 to 10 feet tall and in spread (2.7 to 3.0 meters). Soil requirements: average fertile, well drained, medium humid loam, clay, chalk, or sand-based soil with pH from acidic to mildly alkaline.

https://www.gardeningchores.com/plants-for-alkaline-soil/

5

Common Name	**Latin Name**	**Description**
Hackberry	**Celtis Occidentalis**	Native of central and northeastern America, hackberry is an alkaline soil tolerant tree with many aces up its sleeve… lush foliage that starts off mid green to become golden yellow as the season progresses is one… Pollinators that come to its greenish flowers in spring is another. The berries that ripen to dark purple, almost black in abundance on the branches yet another. And, yes, they are delicious and they attract lots and lots of birds and small fauna to your garden! Hardiness: USDA zones 2 to 9. Light exposure: full Sun or partial shade. Blooming season: spring. Size: 40 to 60 feet tall and in spread (12 to 18 meters).

		Soil requirements: organically rich, well drained, humid loam, clay, or sand-based soil with pH from moderately acidic to mildly alkaline.



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5 shrubs, a soil with a pH above 7.5

Shrubs are essential for soil health, especially if it is alkaline. They provide lots of organic matter with leaves and small branches dropping, as well as shelter and corridors for small fauna.

1

Common Name	**Latin Name**	**Description**
Rock Rose	**Cistus Spp.**	If your soil is alkaline up to 8.5, you can grow a beautiful shrub like rock rose! As the name suggests, the blooms look like single roses, and they come in a range of colours from white to magenta, via pink and cerise. Some varieties also have dark purple dashes at the base of each petal, which contrast beautifully with the golden centres. The fuzzy herbaceous foliage of elliptical leaves is dense and healthy, perfect as compost when it falls to the ground, even if they are evergreen. You can also pick different sizes to suit the space you have in your garden, with many varieties you could use as ground cover, yet another way to keep your land healthy even in coastal regions. Hardiness: USDA zones 8 to 10. Light exposure: full Sun.

		Blooming season: late spring to late summer. Size: 2 to 6.6 feet tall (60 cm to 2.0 meters) and 3 to 8 feet in spread (90 cm to 2.4 meters). Soil requirements: well drained, dry to medium humid loam, clay, chalk, or sand with pH from mildly acidic to moderately alkaline. It is drought and salt tolerant.

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2

Common Name	**Latin Name**	**Description**
Lavender	**Lavandula Spp.**	Lavender is a tough shrub which likes free draining, even dry soil, like chalky and alkaline ground up to 8.0 on the pH scale. It will thrive with very little care, and it will attract lots of pollinators, thanks to its massive and aromatic blooms in colours from white to violet, thus also improving the fertility of the other plants on your land. Hardiness: USDA zones 5 to 9. Light exposure: full Sun. Blooming season: spring and summer. Size: 1 to 3 feet tall and in spread (30 to 90 cm). Soil requirements: well drained, dry to lightly humid loam, chalk, or

		sand-based soil with pH from mildly acidic to moderately alkaline. It is drought tolerant.

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3

Common Name	**Latin Name**	**Description**
Bearberry Cotoneaster	**Cotoneaster Dammeri**	A low but spreading shrub for mildly alkaline soil types is bearberry cotoneaster, and what a beauty it is! On the dark trailing branches, you will see many, dense glossy evergreen leaves, deep green in colour and oval. But the foliage turns bronze to reddish in winter! But you will also find lovely little flowers, white with a pink blush. And then, lots of shiny, round red berries will add an extra touch of colour to this easily grown favourite of birds and butterflies, who really love its little fruits. It is excellent as ground cover and in rock gardens. Hardiness: USDA zones 5 to 8. Light exposure: full Sun or partial shade. Blooming season: late spring or early summer. Size: 9 to 12 inches tall (22 to 30 cm) and 4 to 6 feet in spread (1.2 to 1.8 meters).

		Soil requirements: well drained, dry to medium humid loam, chalk, clay, or sand-based soil with pH from mildly acidic to mildly alkaline.

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4

Common Name	**Latin Name**	**Description**
Common Thyme 'Silver Poise'	**Thymus 'Silver Poise'**	All thyme varieties will tolerate alkaline soil up to a pH of about 8.0, but 'Silver Poise' is one of the most decorative. With purple branches, variegated leaves with grey green and white margins and pink tips, this small perennial shrub fills with white to purple flowers once a year. Aromatic, do not be put off by its decorative value: it is also great for cooking! And remember that there are many other varieties, like creeping thyme, for different effects, even to use as ground cover. Hardiness: USDA zones 6 to 9. Light exposure: full Sun. Blooming season: late spring and early summer. Size: 8 to 12 inches tall (20 to 30 cm) and 1 to 2 feet in spread (30 to 60 cm). Soil requirements: average fertile, well drained, dry to medium humid loam, chalk, or

		sand-based soil with pH from moderately alkaline to neutral.

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5

Common Name	**Latin Name**	**Description**
California Lilac	**Ceanothus Azureus**	For a strong and vigorous shrub with many varieties on the blue range, California lilac, or Ceanothus, is ideal for alkaline soil, up to pH level 8.0. Its massive blooms of many clusters that appear at the tips of the branches in late spring make it look like a piece of heaven on earth. The tiny little flowers form like clouds, and they are so many that they cover the whole shrub for two months! Coming in all the ranges of this colour, from azure to deep and some with a violet shade, when they are spent, they leave you with glossy, bright green leaves for privacy all year round! Hardiness: USDA zones 7 to 10. Light exposure: full Sun or partial shade.

		Blooming season: late spring and early summer. Size: 4 to 8 feet tall (1.2 to 2.4 meters) and 6 to 12 feet in spread (1.8 to 3.6 meters). Soil requirements: average fertile, well drained, dry to medium humid loam, clay, chalk, or sand-based soil with pH from mildly alkaline to neutral. It is drought and salt tolerant.

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