BIODIVERSITY & WELL-BEING TOOLKIT
MONTSERRAT
MANAGEMENT OPTIONS

'Preserving the Past,
Protecting the Present
& Enriching the Future'

linktr.ee/montserratbiodiversitytoolkit

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UK Centre for Ecology & Hydrology
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Introductions

The Biodiversity & Well-being Toolkit project provides information on how you can improve, maintain and monitor green spaces around your site or home for wildlife and to improve quality of life.

As part of the Darwin Plus (DPLUS192) project, the team undertook consultations with the community on the island to understand what aspects of life on Montserrat would be important to include in a toolkit.
Using the responses as a guide, a series of management options have been developed to support the community in developing the island's sustainably while protecting unique wildlife and culture. These options have been designed to cover a range of low cost, easy to implement options with known benefits to people and the planet. You can of course also add other options that you would like to include.

The options are grouped into the following themes:

- **Caring For Wildlife:** Supporting native and endemic plants, pollinators and other animals on Montserrat
- **Caring For Our Island**: Supporting sustainable living on Montserrat
- **Caring For Our Community**: Supporting wellbeing on Montserrat

Some management options will have benefits across main overarching category types. All of the management options contribute towards the United Nations Sustainable Development Goals (SDGs). The ways in which each management option contributes towards the SDGs is noted below as a way for you to understand the contribution you are making to these global targets and to Montserrat's sustainability.

02. Publications & Guides

Throughout the document, there are a series of publications and information notes that are referred to. These have been put together by the Montserrat National Trust with support from a wide number of local and international experts. Unless otherwise stated the information guides are available at: **linktr.ee/montserratbiodiversitytoolkit**

03. Measuring Biodiversity

To find out if the management options implemented have been successful, measuring the outcomes for biodiversity is important. There are several ways we can do this. Across the world members of communities who may have little training in identifying wildlife can help collect data and this can be extremely valuable to those responsible for conserving wildlife (Mandeville et al., 2023). The Montserrat National Trust, and other partners, have been developing the use of tools to do this, otherwise known as 'citizen science'. iNaturalist **https://www.inaturalist.org** is one such tool. It is a network of naturalists, citizen scientists and biologists. Records of any wildlife can be submitted with an image and an identification to whatever level the observer feels comfortable (for example, you can simply record a bird or a bee, alternatively you could have seen a Montserrat Oriole). These records are then identified by the online community after which they can become part of global data set. This allows anyone to learn more about the biodiversity they see. The iNaturalist app (and others) allow citizens and biologists alike to learn about biodiversity by helping identify records. As a minimum this method is recommended for monitoring the success of biodiversity management options in the toolkit, but it can be done in combination with other methods (see box 2; FIT Counts and Butterfly Counts).

There is a dedicated page to Montserrat on iNaturalist called "**Biodiversity of Montserrat**", which you can search for. All records uploaded for Montserrat will be linked to this page to help understand more about Montserrat's unique environment. A guide on how to add a record to iNaturalist is included in Annex 3.

This **QR code can be used to download the iNaturalist application** for your mobile device. If you do not have a mobile device, you can also login to the iNaturalist website and upload records from a camera.

The World Health Organization (WHO) describes well-being as:

'A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'.

There is growing evidence from around the world that suggests the encouragement of positive human/biodiversity interactions and time in nature provide multiple benefits for human physical and mental health as well as leading to greater appreciation for biodiversity and nature conservation. See box 1: *Two hours per week in nature*.

There are several methods for measuring human well-being which look at states of human emotions. Throughout the project ways to measure changes in well-being relating to time in nature and positive experiences are being explored.

Box 1: Two hours per week in nature

Studies have found that health can be improved from spending only two hours per week outdoors in nature (White, 2019). Early exposure to allergens (e.g. pollen) in childhood can also build up immunity to allergies in future (Kilpatrick, 2017).

"When I was sitting at the beach I felt the waves and listened to the crashes of the waves the snapping of the crab pinchers and the singing of birds, I felt at ease and calm as the salty air blew against my face."

(Montserratian Secondary School pupil)

Box 2: Invertebrate recording and monitoring methods

Flower-Insect Timed Count (FIT Count)

The FIT Count, developed by the UK Centre for Ecology & Hydrology (https://fitcount.ceh.ac.uk), uses a simple and widely tested method for collecting data on the number and type of flower-visiting insects and which plant species are most important to them. Counts take 10 minutes and involve observing how many insects visit the flowers of a plant species in a 50x50cm area. Insects are recorded to groups (such as bees, butterflies and moths, beetles, and other insects). Choosing a plant species that is attractive to pollinating insects is better as it maximises observations of insect visitations, but the counts themselves can be also used to determine how attractive different plant species are to insects. Possible focal plant species on Montserrat include: Tridax daisy (*Tridax procumbens)* Sage (*Croton flavens),* Wild pea/Butterfly pea (*Centrosema virginianum),* Lantana *(Lantana camara),* Sleepy Head *(Mimosa pudica var. pudica)*, Milkweed (*Asclepias curassavica),* Silk cotton (*Ceiba pentandra),* Spanish Needle *(Bidens pilosa)*, Black Manjack (*Cordia alliodora),* West Indian milk berry (*Chiococca alba),* and Liana (*Cissus verticillata subsp. verticillata)*. For images see **linktr.ee/montserratbiodiversitytoolkit**. For information on how to carry out a FIT count, see Annex 4.




Butterfly Count

The Butterfly Count app was developed through several projects in Europe (https://www.brc.ac.uk/app/butterflycount-app) and has been adapted for use around the world. It is used to standardised counts of butterflies using fifteen minute timed counts.

Timed counts take 15 minutes and can be conducted anywhere, at any time in the day when the weather is suitable for butterflies to be active. During the count the app uses GPS to track the route of the surveyor and calculate the area searched within the time of the count. The searched area can be a walking route or just a point of interest such as a garden. Along the route, surveyors add observations of the butterflies that they see. An identification guide for the butterflies of Montserrat is in development. The count can be paused at any time to allow closer inspection of species without interrupting the timed count, after which the count can be continued. The advantage of this method is that it involves a standardised survey of butterflies and you can repeat surveys in the same locations using the same methodology which allows you to monitor changes over time. The Butterfly Count App can be downloaded to your smart phone.
Some id guides on iNaturalist can be found here: **https://www.inaturalist.org/guides/17271**

04. Caring for wildlife: Supporting native plants, pollinators and other animals on Montserrat

Sustainable Development Goals

1. Encouraging plants that support pollinators

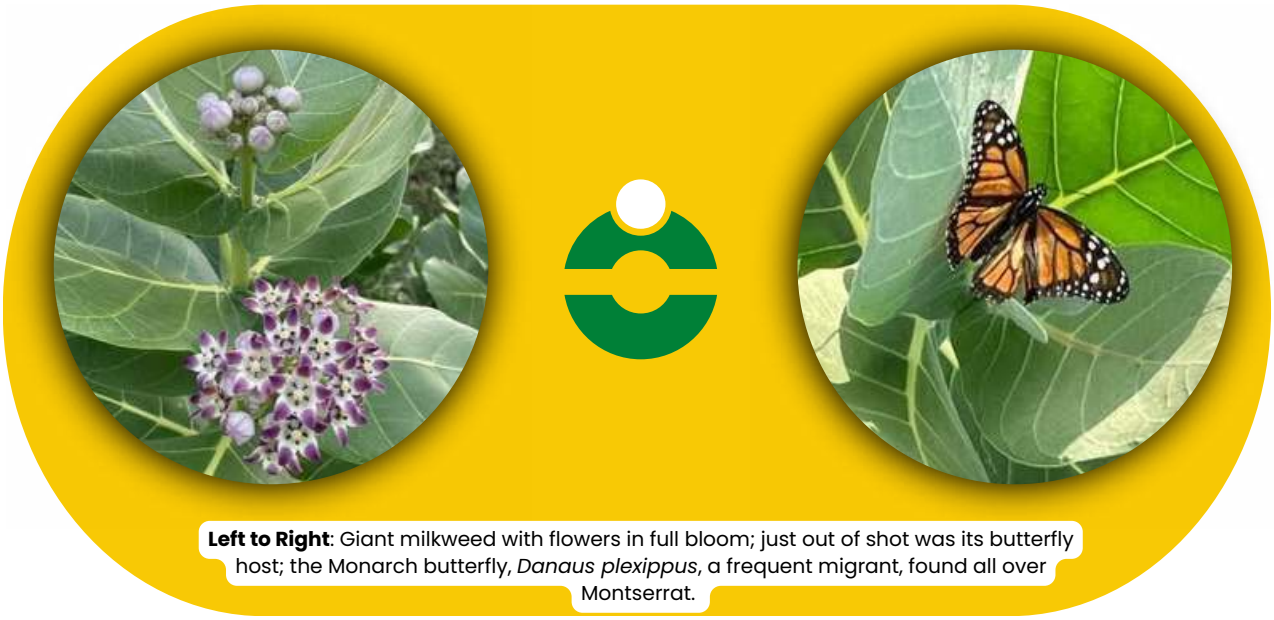
Plants native to Montserrat are adapted to local conditions, as a result they often require little maintenance or watering. Plants provide humans with many services (called ecosystem services) including slowing water to reduce erosion, shade, shelter and medicines. While some plants are pollinated by the wind, many plants need animals like insects, birds and bats to pollinate them. Some pollinators are very specialised and have a unique relationship with the plant they pollinate, meaning only they can collect its pollen and nectar. Montserrat is home to both plants and pollinators that are unique to Montserrat and a few other nearby islands and nowhere else on earth (known as 'endemics'), for example the amazing bottle bee *Melipona variegatipes*.

If you are interested to know more about the amazing range of plants and animals and fungi in Montserrat, or, if you would like to help record species you can visit this free online portal: www.inaturalist.org and go to the project "Biodiversity of Montserrat". Some free photo guides have been made for certain species on iNaturalist e.g beetles, butterflies and spiders. See Annex 3.

Information on plants you can grow and the insect pollinators that they support are included in the following information sheets:

- Host Plant & Insect Pollinator Information sheet (butterflies, bees and moths) **linktr.ee/montserratbiodiversitytoolkit**

- Host Plant & Vertebrate Pollinators (hummingbirds and bats) **linktr.ee/montserratbiodiversitytoolkit**



Left to Right: Giant milkweed with flowers in full bloom; just out of shot was its butterfly host; the Monarch butterfly, *Danaus plexippus*, a frequent migrant, found all over Montserrat.

Suitability	Any area where the planting of flowering plants is possible. Suitable pollinator plants include shrubs, trees etc, see information sheets for suitable plants
Supplier information	Pollinator plants can be sourced from variety of places on Montserrat. The Montserrat National Trust will be able to advise you on where to source plants.

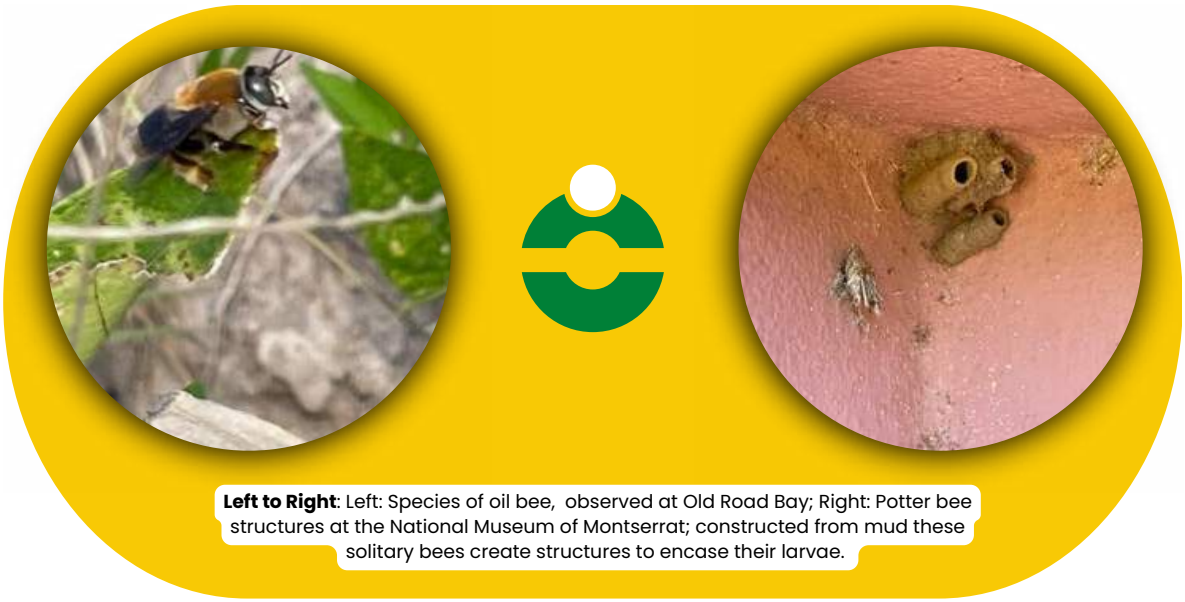
Community engagement opportunity	Yes – the planting of the pollinator plants is a good community engagement opportunity. Also, community members can get involved in the counting and monitoring of the butterflies once the plants are established, to demonstrate the biodiversity benefits of the planting.
Benefits	Increasing nectar and food plant numbers will support population of pollinators such as butterflies, moths, bees, hummingbirds, bats
Costs/ Disbenefit	Low. Ensure you have a source of appropriate native plants
Biosecurity Issues	Please make sure, where possible, you plant native species. Introducing plants from outside of Montserrat can risk bringing in pests and diseases. Please see here for more information from the Ministry of Agriculture, Lands, Housing and the Environment (MAHLE) Department of Environment and on Montserrat biosecurity **https://www.nonnativespecies.org/assets/Biosecurity-on-Montserrat_Impacts-risks-and-priorities-for-biosecurity.pdf**
Level of ongoing maintenance	Watering of plants to ensure establishment. Managing fast growing species that can crowd out native plants while they establish.
How Achieved	Please also consult the plant-area matrix (Annex 2) to see what native plants might work well for you, together with information sheets. Please source plants from local suppliers where possible. The Montserrat National Trust may be able to provide information on this: +1 664-491-3086.

Timing of activity	In theory, all year around, but please see individual plant suggestions for advice on planting time
Long-term management	Depending on the plants, regular pruning might be necessary. The Montserrat National Trust Botanical Gardens is a source of information and the team can help you to learn more about managing the plants in your garden
Monitoring success	Flower-Insect Timed Counts: **https://ukpoms.org.uk/fit-counts** Butterfly Count App **https://butterfly-monitoring.net/**

2. Create 'microhabitats' for invertebrates

Some animals, particularly invertebrates (bees, butterflies, beetles etc), require areas that have a series of unique conditions on a smaller scale to allow them to complete their life cycle. These are sometimes called 'microhabitats'. See **https://education.nationalgeographic.org/resource/resource-library-habitats-and-microhabitats/** Some bees on Montserrat require different microhabitats as they might get nutrients from different plants for food, but they also require the habitat for protection and reproduction. Additionally, some beetles, which are great for controlling aphids under control, need wood piles or dense leaves to lay their eggs in and to shelter from storms.

Information on how to create microhabitats on Montserrat can be found in the information sheet here: **linktr.ee/montserratbiodiversitytoolkit**



Left to Right: Left: Species of oil bee, observed at Old Road Bay; Right: Potter bee structures at the National Museum of Montserrat; constructed from mud these solitary bees create structures to encase their larvae.

Suitability	Areas with space for additional wildlife homes, for example piles of logs and twigs, or areas with large stones, or wooden boxes filled with dried grass, twigs, bamboo canes/pithy plant stems/wood blocks with holes and other natural materials, would create shelter for beetles such as ladybirds, but also beetles that live in deadwood and convert it back to soil, as well as important pollinators like leaf-cutter bees and many other invertebrates.
Supplier information	Can easily be created using existing material and garden waste. To make more of a feature, a wood box for shelter material and wood pieces to be drilled with nesting holes could be sourced locally.
Community engagement opportunity	Yes; a good community activity is collecting natural materials and using them to make a 'bug home'
Benefits	These types of areas can provide shelter for a range of different invertebrates including many types of beetles (that also manage garden pests), as well as spiders etc. Also a very low cost activity.
Costs/Disbenefit	Keep flammable material like twigs and logs in damper areas, to avoid making a fire hazard. A damp area will particularly help beetles which need dead wood.
Biosecurity issues?	Please use untreated, local deadwood. Please contact the Montserrat National Trust if you want to know more.
Level of ongoing maintenance	Replenish materials in wood piles and in bug boxes, as over time material will rot or be lost and will need replacing

How Achieved	An easy job and can be made part of regular site and garden maintenance.
Timing of activity	Ongoing as does not need to occur at a specific time of year
Long-term management	Aim to keep a number of bug homes present on each site
Monitoring success:	At a simple level the number and size of bug homes could be recorded. The Montserrat Bug count method, used in the Adopt a Home for Wildlife Project (https://www.ukotcf.org.uk/key-projects/adoptahomeforwildlife-main/), could be used to monitor the different taxon groups using the bug homes over time.

3. Help conserve endemic plant species

The Critically Endangered flowering shrub *Rondeletia buxifolia*, or 'pribby', is only found on Montserrat. It is a member of the coffee family and grows in mountain zones. When it grows in full sunlight it is a sturdy, compact bush, but when grown in the shade it becomes long and spindly. It makes a great hedge because some feral animals e.g. goats, will not eat it. At the same time it will attract birds, bees and butterflies to its small pinkish flowers.

Pribby has been successfully propagated in the native plant nursery at the Montserrat National Trust's botanic garden. More information is available from the Montserrat National Trust.

Pribby, *Rondeletia buifolia*, a shrub with pink/yellow flowers

Suitability	Grows across the island but it may look different depending on the conditions grown in. For example, where this grows in wet forest, the leaves can be much bigger and the plants grow taller than in drier areas.
Supplier information	Please contact Montserrat National Trust. They grow this at the Botanic Garden using best practice for biosecurity to ensure that pest species are not spread around the island.
Community engagement opportunity	Opportunities for community engagement, such as tree-planting events for young people.
Benefits	Implementing this option helps conserve Montserrat's unique species and when planted as a hedge it keeps feral goats away from crops and other vegetation. This species also has pretty flowers for ornamental planting. Expanding range of an endemic species.
Costs/ Disbenefit	Removal and management of existing species, soil for growing.
Biosecurity issues?	Ensure plants are sourced from pest free environment, such as the Montserrat National Trust
Level of ongoing maintenance	Depending on personal preference, hedge trimming might be necessary to maintain a neat hedge.
How achieved	Purchase young plants from the Montserrat National Trust.

Timing of activity	All year round with good irrigation; wetter months recommended for establishment.
Long-term management	Once established, maintenance costs and effort are low.
Monitoring success	Number of plants planted and survival rate of plants. Flower-Insect Timed Counts: **https://ukpoms.org.uk/fit-counts** Butterfly Counts: **https://butterfly-monitoring.net/**

4. Leave patches (small areas) of land to "run wild"

There are many campaigns around the world to consider reduced mowing and leaving small patches of wild areas in gardens and back-yards. The reason for this is to add to the diversity of smaller flowers. For example, Tridax daisies can grow providing food and cover for pollinating insects.

At certain times of the year vegetation grows very fast and there may be some restrictions in place in certain areas on Montserrat.

There are creative ways to enjoy these areas including mowing a path through lawns and areas to enable people to get closer to the flowering plants and look at what is growing.

Other benefits are that you may find saplings of native trees such as cedar or lignum vitae growing from areas of non-mowing which you can re-plant elsewhere or share with neighbours and the community.

More resources are available here:

linktr.ee/montserratbiodiversitytoolkit

Tridax daisy flowers, *Tridax procumbens*, found all around Montserrat. It is a native species and is an source of pollen for many invertebrates including butterflies such as the Tropical Buckeye, *Junonia evarete;* a fairly common and widespread species on Montserrat.

Suitability	Suitable across the island.
Supplier information	N/A
Community engagement opportunity	Surveys could be undertaken of areas using citizen science application such as iNaturalist.
Benefits	Increased biodiversity, reduced workload throughout the year. Potential for saplings of native trees grown from non-mowing which can be re-planted around the yard/garden.
Costs/ Disbenefit	Potential for pest species to thrive, e.g. fire ants. Fast growing vegetation throughout the year may become unwieldy.

Biosecurity issues?	Potential for providing habitats for fire ants. Please contact the Department of Environment for support managing fire ants.
Level of ongoing maintenance	Low but see disbenefits above.
How achieved	Allow 4-5 inches before cut but this needs to be adaptive based on time of year and amount of rainfall. If there is heavy rain, it might need to be mowed once a week. It would be beneficial not to cut on the lowest mower level. Between June – September mowing can be reduced as the grass will not grow as high because it is dry. Reduced mowing gives a chance for flowers to grow and pollinators to visit. Mowing a path through the lawn is recommended to enable people to get closer to the flowering plants and look at what is growing.
Timing of activity	Can be done throughout the year, however, wetter periods may lead to faster growth of vegetation and you may want to carefully manage these areas.
Long-term management	Reduced mowing cycle depending on conditions.
Monitoring success	Butterfly Counts: **https://butterfly-monitoring.net/** Flower-Insect Timed Counts: **https://ukpoms.org.uk/fit-counts**

05. Caring for our Island: Supporting sustainable living on Montserrat

Sustainable Development Goals

5. Grow your own food and medicinal plants

Food produced on Montserrat has not traveled far (and so less emissions have been given off to produce it) and so is better for the planet already. Food produced at home can have other benefits such as: an enormous sense of satisfaction, giving you appreciation for what goes into the process to get it to your dinner table (which may mean less is wasted) and knowledge of what resources have gone into producing them (e.g. fertilizers). Montserrat has a Farmers Association which aims to support locally grown food. Typical foods that grow well on Montserrat include: citrus, avocado, plantain, pawpaw, passion fruit, cherryann, banana, vegetable garden sweet potato, eggplant, carrot, green leafy vegetables, pumpkin and a variety of tea bushes. You can even grow apples, pears and grapes!

Companion planting is when you pair up plants that grow well together. Some food crops grow really well with others. The benefits of doing this include reducing pest species, increasing pollination, and increased nutrients in the soil. Examples of companion planting include marigolds, cucumbers and beans.

Some issues may include drought and pests. Irrigation and supplementary nutrients via a timed drip feeder can help food crops in the drier months. Simple things like soapy water in a bottle can trap tricky pests you want to keep off your crops.

Planting smaller dwarf varieties of fruits such as dwarf bananas and crops low to the ground like pumpkins often escape the worst of the heavier storms.

Information on how a space can be transformed into a productive and vibrant space can be seen in the plan for a Montserrat garden. This is based on a real garden on Montserrat, which is productive all year round and full of wildlife.

More resources at linktr.ee/montserratbiodiversitytoolkit

Pumpkin and aubergine grown sucessfully on Montserrat using minimal pest control and timed irrigation.

Suitability	Perfect for either your own yards or in communal areas and gardens.
Supplier information	Seeds are available on the island. Gardening equipment can be purchased from various stores around the island.
Community engagement opportunity	Yes, community gardens provide a great opportunity to bring people together. Contact Farmers Association if interested in supporting other growers or growing yourself.

Benefits	Increased sense of satisfaction growing own food, reduced costs of purchasing food, less pesticides and herbicides.
Costs/ Disbenefit	Regular weeding and pest clearance needed
Biosecurity issues?	Do not bring in soils or compost from outside of Montserrat to keep it safe from pests. Please contact the Department of Agriculture for specific advice.
Level of ongoing maintenance	Medium. Regular weeding and harvesting is needed but this can be shared.
How achieved	Need to prepare land/growing medium. Please see Annex 1&2 to see what crops might grow best in your area. Please contact the Department of Agriculture if your area is not listed.
Timing of activity	Sowing and harvesting of various food can be undertaken all year round.
Long-term management	Once established, production of fruit and vegetables can be regular.
Monitoring success	This can be tracked with monitoring the amount of money that is spent on food, the amount of produce grown, and satisfaction surveys to track the users enjoyment of the experience of time in nature.

6. Reuse house-hold items

There are lots of household items that can be reused in the garden or outdoor areas. This is a cost-effective way to source and re-use materials that would otherwise end up in the land-fill or the ocean. Examples include plastic bottles, glass, packaging, wooden sticks, old CDs or shiny materials such as foil etc.

Some uses of these items include: plastic bottles for catching pest species, ice-cream or yogurt pots and tubs for growing plants, plastic bags or foil to stop birds eating fruit on trees.

You could also re-use waste from the house such as dish-water for watering, old shredded paper as mulch for the soil and food scraps for compost.

Left and Middle: Examples of herbs grown in pots such as basil, rosemary and oregano to prevent overcrowding. Right: pest control using pheromones

Suitability	Everywhere on island
Supplier information	Items reused from around your house
Community engagement opportunity	Community engagement around reduce and reuse

Benefits	Reduces waste on the island and materials are free to use so save money on purchases.
Costs/ Disbenefit	Some people might not like how it looks
Biosecurity issues?	Make sure soil is not transported around the island
Level of ongoing maintenance	Low
How Achieved	Re-using household items that can be used in the garden. Old bottles used soapy water pest control, old yogurt pots for seedlings. Using shiny materials, such as foil and clear plastic bags to scare away birds.
Timing of activity	All year round
Long-term management	Plastic materials may crack and become damaged over time
Monitoring success	Assessment of items going to landfill. This will be reduced.

7. Build your resilience and be climate-smart

Water on Montserrat comes from the natural springs. To reduce pressures on the supply of water to homes, a water butt can be installed. They can store water captured from rainfall which can then be used for watering plants. On Montserrat, blue drums are often used as water butts. They can be connected to roofs with downpipes in order to capture rainfall and then store it for use later on.

The sun is a renewable source of energy and can help us reduce our greenhouse gas emissions and mitigate climate change. Montserrat is working towards harnessing geothermal energy, which will also reduce emissions. Installing solar panels and harnessing the sun's energy will help to maintain good air quality and reduce demands on our natural resources including water, which is also needed in energy production.

Suitability	Everywhere on island
Supplier information	Water butts can be purchased on Montserrat for capturing rainwater. The Department of Agriculture (DoA) can supply these and advise on irrigation, sprinklers and fittings needed. Fittings can be purchased from hardware stores such as MS Osbornes, Nigel's and Emerald Plumbing. DoA advises farmers for free but may also offer advice for private individuals.
Community engagement opportunity	Appreciating water as an ecosystem service on International days like World Water Day
Benefits	Reduced cost of water usage for watering and reduces pressure on local island resources. Helps increase awareness of water conservation and thus increases resilience to climate change and makes people aware of how to live more sustainably.

Costs/ Disbenefit	Standing water can attract mosquito larvae, so various control techniques in rainwater containers needed.
Biosecurity issues?	Keep water barrels covered and overturn anything that collect water as mosquitoes can breed in these areas.
Level of ongoing maintenance	Low
How achieved	Placing storage tank under downpipes from roofs of buildings.
Timing of activity	All year
Long-term management	Regular cleaning of water butt
Monitoring success	Reduced spending on irrigation

Source: Pan American Health Organisation www.paho.org

06. Caring for our Community: Supporting wellbeing on Montserrat

Sustainable Development Goals

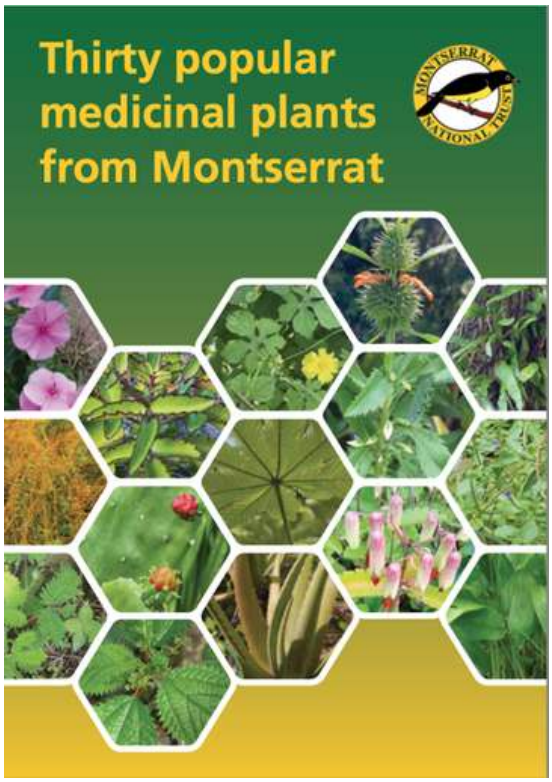
8. Grow a tea bush garden

Certain herbs or bush have played an important role in the healing and other cultural practices in Montserrat for generations. Reliable sources of information about this aspect of the island's cultural heritage are disappearing and so the Montserrat National Trust has been working on a series of booklets to preserve this knowledge. As part of this toolkit project, a second edition of a booklet outlining medicinal plants found on Montserrat was produced see Annex 5. It was informed by the local community and is available for purchase.

Growing your own tea bush garden from planting, pruning to picking could be rewarding in lots of ways including: encouraging you to spend more time outdoors, giving a boost to your immune system, and fresh air.

For more information on types of medicinal plants and their traditional uses:

- 30 Popular Medicinal Plants on Montserrat (summarised in Annex 5; sample page on page 24)
- TRAMIL is also a great source of information https://www.tramil.net/en
- A medicinal plant collection from Montserrat, West Indies: Brussell (2004) see references section.



Above Left and Right: Front Cover and sample page from the publication *Thirty popular medicinal plants from Montserra*t which can be purchased from the Montserrat National Trust

Suitability	Montserrat has rich soils and with some care a tea bush garden could thrive. They could provide you with pleasant colours, tastes and smells in your outdoor space all year round.
Supplier information	Many tea bushes can tolerate some pruning or cuttings being taken. It is recommended that you start small, try out some easy-to-care for tea bushes and seek advice from grandparents, parents and friends who may have some surplus amounts you could try.
Community engagement opportunity	Many residents of Montserrat have knowledge of traditional plants which have medicinal uses. This knowledge has been passed down through generations and has been documented. Conversations within the community and passing information on encourages strengthening of community ties and connection to nature. Tea bush is regularly consumed around Montserrat. The annual Montserrat National Trust Flower Show often includes medicinal plants.

Benefits	Time spent outdoors and engagement with nature can improve well-being.
Costs/ Disbenefit	Some species may be invasive or could inhibit growth of other plants. A way to counter this is to put them in containers. Some are also toxic (e.g. periwinkle) so we would advise caution.
Biosecurity issues?	Inspect your tea bushes regularly or pests or disease. If you see anything unusual you can always record it on iNaturalist.org (see Annex 3) as this would be useful information for Pest Control Officers.
Level of ongoing maintenance	Low-medium
How achieved	Some tea bushes grow rapidly and spread widely. It is strongly encouraged to grow these in pots and containers so that they do not encroach on other areas of the garden.
Timing of activity	All year
Long-term management	Some plants will require irrigation in dry periods.
Monitoring success	Number of hours spent outside, mood and general health improvements e.g. increase in number of steps per day.

9. Plant to create shade and shelter space breeze and shade

The shade, shelter and breeze that plants and trees provide is linked to human well-being. Green space which incorporates native trees benefits to other biodiversity as well. When palms and shade giving trees are interspaced with ferns and other plants that like to be under the shade with you, an oasis for wildlife can be created too.

Suitability	Carefully map out where your shade-giving trees will go. They will take longer than shrubs and ground layer species to grow and need the space and light to develop. Palms are ideal for the conditions on Montserrat as well as species such as lignum vitae and Gumb bark. See Annex 2 for a simple guide to suitability of plans in areas around Montserrat.
Supplier information	Saplings are available from a variety of suppliers on the island. The Montserrat National Trust can advise you (Tel: 491 3086)
Community engagement opportunity	Tree Planting days, tree sales, open garden days, village competitions.
Benefits	Shade from sun, heat and wind
Costs/ Disbenefit	New microclimate created when trees are planted so it will impact what grows underneath
Biosecurity issues?	Consideration of species used

Level of ongoing maintenance	Initial planting and growth may be slow, but once established will require less care.
How achieved	Think carefully about removing mature trees that already are established and provide shade. They can take some time to grow to maturity where they provide the most benefits to people and nature in general.
Timing of activity	It is possible to create shade, but it will take some careful planning and patience. Saplings will need light and nutrients while they build up their root systems. Plants which do not crowd them out, but offer some cover and build nutrients into the soil can give them a helping hand.
Long-term management	Some native trees, given the right conditions can provide shade relatively rapidly. Some examples are included in Annex 2
Monitoring success	Number of hours spent outside, mood and general health improvements e.g. increase in number of steps per day.

MNT grows a variety of palms and tree saplings for sale in its native plant nursery. Visit the Botanic Gardens in Salem to learn more.

07. Annex 1 Montserrat Garden Design

MONTSERRAT GARDEN DESIGN

This design is modelled on a real back-yard garden on Montserrat. It is possible to created everything you need to live a happy and healthy life.

* means good for pollinators

WOODY PLANTS

A variety of shrubs and small trees can create shade, foods and medicines and lessen storm damage

1. Lemon
2. Bayleaf*
3. Pomegranate*
4. Gumbark
5. Papaya
6. Rainfall bush
7. Dwarf banana
8. Banana
9. Barbados cherry
10. Sugar cane
11. Mulberry
12. Plantain

MEDICINAL PLANTS

Plant paracetemol bush in pots as this spreads. Allow thyme to flower for the bees

13. Paracetemol bush
14. Thyme*
15. Marjoram*
16. Broadleaf mint
17. Mint
18. Rosemary*
19. Basil

VEGETABLE PLOT

Mulch the soil below each plant and don't plant families together as they have the same pests

20. Tomato
21. Pepper
22. Lettuce
23. Tridax daisy*
24. Sweet potato
25. Melon
26. Squash

MOON AREA

Plants with night scent and perfume that open at night

27. Ylang ylang*
28. Avocado*
29. Dragon fruit*
30. Noni*

COMPANION PLANTS

This enables different plants to benefit from being planted with another e.g. maximising space, managing pests and improving success

31. Marigold*
32. Pumpkin
33. Spring onion

OPEN AREA

Leave space for seasonal growth, like sorrel for Christmas

34. Coriander
35. Sorrel
36. Ginger
37. Parsley

GARDEN CARE

The garden can thrive with some simple measures e.g. goats will be deterred by certain plants or a prickly hedge, such as sweet lime

38. Pribby hedge*
39. Compost heap
40. Mounds of soil
41. Water butt
42. Irrigation

Created for the DPLUS192 Biodiversity and Well-being Toolkit project (2024 v1); Design by MNT, UKOTCF & MAHLE; Illustrations by Lizzie Harper; Layout by Field Studies Council.

08. Annex 2 Habitat Types & Areas

List of area names and the main habitat types of Montserrat where there are settlements. Habitat definitions (from the Centre Hills Report: Young, 2008). This is a guide only.

Dry Forest Types	Description	Areas
Littoral/Beach	Coastal vegetation influenced by wind and salt spray. Typical plants: *Cordia sebestena, Argusia gnaphaloides, Ipomoea pes-caprae, Coccoloba uvifera, Ernodea littoralis, Strumpfia maritima, Suriana maritima.*	Little Bay
Dry Scrub	Shrubby vegetation 0.5-2.5m tall in lower elevations with low rainfall. Typical species/taxa: *Comocladia dodonaea, Agavaceae, Croton spp., Acacia spp., Malphigia linearis, Stigmaphyllon spp., Tetramicra canaliculata, Melochia spp., Jacquinia armillaris, Corchorus aestuans.*	Cheap End, Davy Hill, Maniack, Shinlands, Yellow Hill.
Dry Scrub (cacti dominated)	Shrubby vegetation 0.5-2.5m tall in lower elevations with low rainfall that is dominated by cacti and succulent plants. Typical species/taxa: *Cactaceae, Oncidium urophyllum.*	
Dry Thicket	Large shrub/small tree dominated vegetation 2.5-5m tall in lower elevations with low rainfall. Typical species or taxa: *Cordia spp., Bourreria succulenta, Oplonia* , Microphylla, *Cassine xylocarpa, Piscidia carthagenensis, Pithecellobium unguis-cati, Pisonia spp., Coccoloba spp., Verbenaceae.*	Brades, Carr's Bay, Dick Hill, Drummonds, Friths, Garibaldi Hill, Old Towne, Olveston, Sweeney's

08. Annex 2 Habitat Types & Areas

List of area names and the main habitat types of Montserrat where there are settlements. This is a guide only.

Dry Forest Types	Description	Areas
Dry Forest	Medium/Large tree dominated vegetation >5m tall in lower elevations with low rainfall. Typical species or taxa: *Capparis spp., Bursera simaruba, Tabebuia spp., Chiococca alba, Guaiacum officinale, Cedrela odorata.*	Baker Hill, Banks, Blakes, Cavalla Hill, Cujoe Head, Flemings, Fogarty, Gerald's, Hope, Judy Piece, LookOut, Mongo Hill, Nixons, Peaceful Cottage, Salem, St John's, St Peters, Woodlands
Dry/Mesic Transition	Medium/Large tree dominated vegetation >5m tall in low to mid elevations with low to medium rainfall. Typical taxa are a mix of Dry and Mesic Forest species.	

Mesic Forest Types	Description	Areas
Mesic Forest	Medium/Large tree dominated vegetation >5m tall in mid elevations with medium rainfall. Typical taxa: Begonia obliqua, Araceae, Lauraceae, Inga laurina, Eugenia spp., Piper spp.	Barzey's, Hope, Jack Boy Hill,
Mesic Forest (Disturbed)	Medium/Large tree dominated vegetation >5m tall in mid elevations with medium rainfall that has been disturbed through human activity. Typical taxa: *Mangifera indica, Thunbergia spp., Sida spp., Solanum spp., Stachytarpheta spp.*	

08. Annex 2 - Continued

List of area names and the main habitat types of Montserrat where there are settlements. This is a guide only.

Wet Forest Types	Description	Areas
Wet Forest	Medium/Large tree dominated vegetation >5m tall in high elevations with high rainfall. Typical vegetation: *Elaeocarpaceae, Phyllanthus spp., Podocarpus coriaceus, Asplundia spp., Orchidaceae, Marcgravia umbellate, Arecaceae.*	Katy Hill, Lawyers Mountain
Wet Forest (lower)	Large tree vegetation with greater abundance of the following taxa: *Sloanea spp., Phyllanthus mimosoides, Asplundia insignis.*	
Wet Forest (upper)	Medium tree vegetation with greater abundance of the following taxa: *Marcgravia umbellata, Podocarpus coriaceus, Asplundia rigida, Orchidaceae.*	
Elfin Woodland	Shrubby vegetation 0.5-2.5m tall in high elevations with high rainfall and greater abundance of the following taxa: *Wercklea tulipiflora.*	

09. Annex 3 List of Plants & Habitat Types

List of plants that grow in the main different habitat types. This is a guide only.

Benefits: Native & good for pollinators

Name	Scientific Name	Growth form	Beach	Dry	Dry Scrub	Dry Thicket	Mesic& Wet Forest
Heliconia	*Heliconia caribaea*	Shrub					
Lantana	*Lantana camara*	Shrub					
Pribby	*Rondeletia buxifolia*	Shrub					
12 o-clock broom	*Sida acuta*	Shrub					
Sage	*Wedelia calycina*	Shrub					
Gumbark	*Bursera simaruba*	Tree					
Red cedar	*Cedrela odorata*	Tree					
Silk Cotton	*Ceiba pentrandra*	Tree					

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Native & good for pollinators

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic& Wet Forest
Yellow fiddlewood	*Citharexylum spinosum*	Tree					
Spanish Oak	*Inga laurina*	Tree					
Black Birch	*Myrcia splendens*	Tree					
West Indian jasmine	*Plumeria alba*	Tree					
Mahogany	*Swietenia mahagoni*	Tree					

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Weed & Bush have many medicianl properties

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic & Wet Forest
Aloe	*Aloe vera*	Succulent	■	■	■		
Soursop	*Annona muricato*	Tree	■	■	■	■	■
Davis Root	*Chiococca alba*	Shrub	■				
Ramgoat Bush	*Eryngium foetidum*	Herb/Shrub	■	■	■		
Rainfall bush	*Gliricidia sepium*	Tree	■	■	■		
Arrow root	*Maranta arundinacea*	Shrub	■				
Mosquito Basil	*Ocimum campechianum*	Herb	■	■	■		
Prickly Pear	*Opuntia cochenillifera*	Cactus	■	■	■		
Bay leaf	*Pimenta racemosa*	Shrub/ Tree	■				■
Cattle Tongue	*Pluchea carolinensis*	Shrub	■	■	■		

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic & Wet Forest
Aniseed	*Pimpinella anisum*	Herb					
Apples	*Malus domestica*	Tree					
Aubergine	*Solanum melongena*	Herb					
Avocado	*Persea americana*	Tree					
Banana	*Musa spp.*	Herb					
Breadfruit	*Artocarpus altilis*	Tree					
Bread nut	*Artocarpus camansi*	Tree					
Broad leaf thyme	*Thymus vulgaris*	Shrub					
Cabbage	*Brassica oleracea*	Herb					
Carrot	*Daucus carota*	Root vegetable					

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic & Wet Forest
Cashew	*Anacardium occidentale*	Tree					
Cassava	*Manihot esculenta*	Shrub					
Cherry	*Prunus avium*	Tree					
Cinamon basil	*Ocimum basilicum*	Herb					
Coconut	*Cocos nucifera*	Tree					
Corn	*Zea mays*	Grass					
Dasheen	*Colocasia esculenta*	Herb					
Dill	*Anethum graveolens*	Herb					
Dragon fruit	*Hylocereus spp.*	Cacti					
Egg fruit	*Pouteria campechiana*	Tree					

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic& Wet Forest
Fennel	*Foeniculum vulgare*	Herb					
Fine Leaf Thyme	*Thymus vulgaris*	Shrub					
Five-Finger	*Averrhoa carambola*	Tree					
Golden Apple	*Spondias mombin*	Tree					
Governor plum	*Spondias mombin*	Tree					
Grapefruit	*Citrus × paradisi*	Tree					
Grapes	*Vitis vinifera*	Vine					
Guava	*Psidium guajava*	Tree					
Hog Plum	*Spondias mombin*	Tree					
Honey suckle	*Lonicera spp.*	Vine					

09. Annex 3- Continued

List of plants that grow in the main different habitat types.

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic & Wet Forest
Jack fruit	*Artocarpus heterophyllus*	Tree					
Japanese plum	*Prunus salicina*	Tree					
Lime	*Citrus aurantiifolia*	Tree					
Lemon grass	*Cymbopogon citratus*	Grass					
Lemon Basil	*Ocimum × africanum*	Herb					
Lettuce	*Lactuca sativa*	Lactuca sativa					
Local soursop	*Annona muricata*	Tree					
Lonquat	*Eriobotrya japonica*	Tree					
Manciport	*Carya illinoinensis*	Tree					
Melon	*Cucumis melo*	Vine					

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic/ Wet Forest
Mint	*Mentha spp.*	Herb					
Onion	*Allium cepa*	Herb					
Orange	*Citrus sinensis*	Tree					
Passion Fruit	*Passiflora edulis*	Vine					
Peaches	*Prunus persica*	Tree					
Pears	*Pyrus spp.*	Tree					
Pepper-mint	*Mentha × piperita*	Herb					
Pigeon pea	*Cajanus cajan*	Shrub					
Pineapple	*Ananas comosus*	Herb					
Plantain	*Musa spp.*	Herb					

09. Annex 3 - Continued

List of plants that grow in the main different habitat types.

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic & Wet Forest
Pome-granate	*Punica granatum*	Tree					
Pumpkin	*Cucurbita pepo*	Vine					
Rough Lemon	*Citrus jambhiri*	Tree					
Seagrape	*Coccoloba uvifera*	Tree					
Season peppers	*Capsicum spp.*	Herb					
Shaddock	*Citrus maxima*	Tree					
Spare mint	*Mentha spicata*	Herb					
Sorrel	*Rumex acetosa*	Herb					
Squash	*Cucurbita spp.*	Vine					

09. Annex 3 - Continued

Benefits: Food Production

Name	Scientific Name	Growth form	Beach	Dry Forest	Dry Scrub	Dry Thicket	Mesic & Wet Forest
Sugar apple	*Annona squamosa*	Tree					
Sugar cane	*Saccharum officinarum*	Grass					
Smooth lemon	*Citrus limon*	Tree					
Surinam cherry	*Eugenia uniflora*	Tree					
Sweet potato	*Ipomoea batatas*	Herb					
Tangerine	*Citrus reticulata*	Tree					
Thyme	*Thymus vulgaris*	Shrub					
Tomato	*Solanum lycopersicum*	Herb					
Water-melon	*Citrullus lanatus*	Vine					
West Indian Cherry	*Malpighia emarginata*	Tree					
Yam	*Dioscorea spp.*	Herb					

10. Annex 4: Using iNaturalist

iNaturalist is one of the most widely used platforms for recording species www.inaturalist.org. It is free to use and anyone can use it.

1. Register for an iNaturalist account at www.inaturalist.org. It is more user-friendly to register first on a laptop/PC and use mobile and app after, which is much easier when outdoors.
2. Open the iNaturalist app on your smart phone
3. Touch the camera icon.
4. Take a photo (or select a photo from your photo library, or decide to just make a text observation).
5. Fill in whatever details you want to add about where you observed the species, any additional notes; to be added to the project “Biodiversity of Montserrat” select the location as Montserrat. You can be as accurate with the location as you want to be by using the map function. If you take a photo of a plant you planted in your garden, select the "Cultivated - YES option.
6. Touch the Save button.
7. Touch Upload.

As this is an online app, a version called Seek by iNaturalist that is suitable for all ages see https://www.inaturalist.org/pages/seek_app

11. Annex 5: Flower Insect Timed Count (FIT Count)

POMS
UK Pollinator Monitoring Scheme

FIT Count (Flower-Insect Timed Count) is a simple 10-minute survey where you watch a small patch of flowers and count the different insects that visit. It's designed for anyone to do and helps scientists learn more about how pollinators like bees, butterflies, and flies are doing. This information is important because pollinators play a key role in growing our food and supporting nature. By taking part, you're helping track changes in insect numbers over time and supporting efforts to protect these vital creatures.

Step-by-Step Guide to Using the FIT Count App

1. Download the FIT Count App (App Store/Google Play).
2. Set Up Your Account
   - Open the app and register by providing your name and email address.
   - Choose your location to help with data mapping.
3. Prepare for the Survey
   - Weather Conditions: Ensure it's dry and preferably early morning or later evening when not too hot.
   - Location: Select a 50×50 cm patch of flowers, preferably from the target list.
   - Target Flower: Choose a flower from the FIT Count target list or select "Other" if your chosen flower isn't listed.
4. Conduct the 10-Minute Count
   - Start the timer within the app.
   - Observe and record all insects visiting the target flowers.
   - Identify insects into broad groups
   - Avoid counting insects on non-target flowers.
5. Record Environmental Conditions
   - Note the sky conditions (e.g. clear, partly cloudy).
   - Assess the wind strength (e.g. calm, breezy).
   - Record the type of habitat (e.g. garden, park, meadow).
6. Save and Submit Your Data
   - After completing the count, save your observations within the app.
   - You can submit data immediately if you have an internet connection or save it to upload later.

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Image*
Sensitive plant	*Mimosa pudica*	Tea is said to cure nervousness, high blood pressure, colds, and diabetes. It is used for relief from sore throats.	Children love playing with this plant to see the reaction of the leaves folding when touched.	
Love vine	*Cassytha filiformis*	Said to be cleanser of the blood and when mashed with salt and lime juice relief from colds.	Found thoughout the island and can spread quickly so utilise cuttings already growing	
Bay Leaf	*Pimenta racemosa*	Said to be an analgesic, relief from arthritic pains. Also said that chewing leaves relieves toothache	A pollinator favourite; oil as aftershave, and used room freshener or as a mosquito repellent.	
Inflammation Bush	*Peperomia pellucida*	Entire plant can be boiled to make a hot drink to alleviate symptoms of colds, coughs, and flu.	Can overcrowd so ideally should be grown in pots.	

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Image*
Arrowroot	*Maranta arundinacea*	Said to be very nutritious and is easily digested and eases indigestion.	Was grown commercially and exported to the UK, the USA, and other Caribbean regions.	
Mosquito Basil	*Ocimum campechianum*	The leaves, stems, and seeds are boiled to make tea to treat colds and flu.	Also combined with lemongrass to make bush rum	
Soursop	*Annona muricata*	Said to alleviate bladder, gall bladder and kidney problems	Also made into drinks or ice cream	
Tisane	*Capraria biflora*	Said to treat colds and digestive problems	Grows at lower elevations	
Body Cutter	*Jatropha gossypiifolia*	Said to reduce incidences of high blood pressure, diabetes and belly ache	It is said that if the tree is cut around midday on Good Friday it produces a red sap.	

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Image*
Guava	*Psidium guajava*	3-5 leaves of steeped in boiling water with some salt said to cure diarrhea & vomiting.	Can crowd out other species	
Resurrection Fern	*Microgramma lycopodioides*	Said to relieve back pain and symptoms of cold and respiratory ailments	Creeping, epiphytic fern, found winding around large trees in moist areas of Montserrat	
Lemon Grass	*Cymbopogon citratus*	Thought to relieve symptoms of cold and fever	Can be used as an insect repellent	
Broad Leaf Plantain	*Plantago major*	When boiled in tea said to treat respiratory infections	Wide-spread. Grow in pots as can overcrowd .	
Devil's Horsewhip	*Achyranthes aspera*	Said to treat colds, fever and colic	Seeds attach to clothes or the coats of animals.	

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Images*
Bitter Ash	*Picrasma excelsa*	Thought to be used to control diabetes, hypertension, indigestion, and cooling of the blood.	Native to South America and the Caribbean it can grow to 10 ft tall.	
Milk Thistle	*Silybum marianum*	Applied to skin rashes such as eczema and ringworm	Flowers are attractive to a variety of pollinators	
Aloe	*Aloe vera*	Said to reduce high blood pressure, as well as to treat diabetes and stomach issues	Had spiritual and decorative practices over the centuries	
Trumpet Bush	*Cecropia schreberiana*	Thought to reduce body temperature and treat wounds	Used as a natural barometer	
Periwinkle	*Catharanthus roseus*	Said to bring relief from cancer, high blood pressure, diabetes, asthma, and bronchial problem urinary retention and prostate issues.	Popular in house yards. Toxic so we do not recommend to consume it.	

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Images*
Blue Vervain	*Stachytarpheta jamaicensis*	Given to lactating mothers to increase milk production. This tea is also used to alleviate symptoms of menstrual cramps, kidney stones, jaundice, and gout.	Produces delicate flowers. Found all over Montserrat and so not necessary to grow at home.	
Davis Root	*Chiococca alba*	Said to alleviate "stoppage of water" (urinary retention).	Traditionally mixed with rum and peanuts	
Pung Coolie	*Momordica charantia*	Said to help treat high blood pressure, diabetes, and influenza.	It is not recommend ed to plant this species out as it can become overgrown. It is widespread across the island	
Prickly Pear Cactus	*Opuntia cochenillifer*	Reduces inflammation and treats wounds.	Fruit rich in vitamins and produces a red dye that can be added to cakes and jams.	

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Images*
Leaf of Life	*Kalanchoe pinnata*	Said to reduce infection and inflammation.	Can be found widely across Montserrat	
Rainfall Bush	*Gliricidia sepium*	Said to relieve colds and coughs and to lower blood sugar levels.	Grows tall. Good for planting at borders of land	
Ramgoat Bush	*Eryngium foetidum*	Said to help with stomach worms, indigestion, and vomiting.	Can be found widely across Montserrat	
Stinging Nettle	*Laportea aestuans*	Said to reduce high blood pressure and diabetes	Considered a nuisance by gardeners and farmers; widespread across the island	
Lord Lavington	*Leonotis nepetifolia*	Relieve colds and flu symptoms	Also known as Christmas Candle or Chandelier Bush for its striking appearance	

12. Annex 6: Medicinal Plants and Uses

Local Name	Latin Name	Medicinal use examples	Notes	Images*
Gumbark Tree	*Bursera simaruba*	Relief from colds and influenza and menstrual pain	Native to Montserrat; its thick brown bark that contains a gummy paste.	
Cattle Tongue	*Pluchea carolinensis*	Used for treating colds and flu and wounds	Found across Montserrat	

*All images: Lizze Harper www.lizzieharper.co.uk

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For more information on phytosanitary considerations and gardening pointers see: linktr.ee/montserratbiodiversitytoolkit

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