Hedgerow Planting

Conservation Practice Standard 422, Practice Specifications

SCOPE

This specification serves as a guide for planning the selection and installation of a **Hedgerow Planting**, **Practice Code 422**. This document contains a list of considerations for the applicant and the NRCS requirements and constraints of this practice. This document will be given to all producers who apply for NRCS financial and technical assistance to install a **Hedgerow Planting**.

DEFINITION

A **Hedgerow Planting** is the establishment of dense vegetation in a linear design to achieve a natural resource conservation purpose.

NRCS Caribbean Area - Hedgerow Planting

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- To provide habitat, including food, cover, and corridors for terrestrial wildlife species.
- To enhance pollen, nectar, and nesting habitat for pollinators.
- To provide food, cover, and shade for aquatic organisms that live in adjacent streams or watercourses.
- To provide substrate for predaceous and beneficial invertebrates as a component of integrated pest management.

- To intercept airborne particulate matter.
- To reduce chemical drift and odor movement.
- To provide screens and barriers to noise and dust.
- To increase carbon storage in biomass and soils.
- To create living fences.
- To provide boundary delineation and contour guidelines.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies wherever it will accomplish at least one of the purposes stated above. Land uses where this practice can be implemented include croplands, forestlands, pasturelands, protected lands, farmsteads and associated agricultural lands.

GENERAL

This specification provides guidance for the installation of the practice **Hedgerow Planting** (NRCS Code 422). Guidance may include information not directly addressed in the standard. Site specifications for the installation, operation and maintenance of the practice shall be prepared for each field or treatment unit in accordance with the requirements in the Conservation Practice Standard and the guidance in this Specification.

A hedgerow is a linear planting of vegetation. For this conservation practice, plantings may consist of trees, shrubs and grasses. If grasses are not available due to lack of seed availability or nursery materials, natural regeneration below trees and shrubs will be allowed to implement this practice. Hedgerows can perform many biological and ecological functions and purposes on the farm and the landscape.

Use woody plants or perennial bunch grasses (see Tables 1 and 2 for species recommendations) producing erect stems attaining average heights of at least 3 feet at maturity. Plants listed noxious weed (https://plants.usda.gov/java/noxious) by the state or territory, shall not be established for this practice. In addition, species to be plated shall not host pests or diseases that could pose a risk to nearby crops.

SITE PREPARATION

Note to the conservation planner: *Tree/Shrub Site Preparation is a component included in* ***Hedgerow Planting*** *(422) conservation practice scenarios, differently as compared to Tree/Shrub Establishment, Multi-Story Cropping and Riparian Forest Buffer where Tree/Shrub Site Preparation is a separate component. For financial assistance, do not include conservation practice Tree/Shrub Site Preparation (490) for the implementation of Hedgerow Planting for the reason explained above. However, it is recommended to review the specifications from Tree/Shrub Site Preparation to prepare the site before planting as part of implementing the practice.*

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Tree/shrub site preparation is the treatment of areas to improve site conditions for establishing trees and/or shrubs. This component integrated with the Hedgerow Planting practice is used to encourage natural regeneration of desirable plants and to allow artificial establishment of vegetation. Methods of site preparation include hand site preparation using hand tools (e.g. trimmers, lawn mower, shovels, garden hoes, machetes, pickaxes), chemicals (herbicides) and biological control (sheep & goats).

PLANTING IN THE RIGHT PLACE

When planting a hedgerow, avoid overhead utility lines such as power and communication. Do not plant over or beside underground utilities such as sewer or potable water systems or pipelines. Do not plant under overhead lines (see Figure 1).

Figure 1.A Tree Planting Guide for Puerto Rico and other Caribbean Countries, USDA Forest Service.

The recommended distance for tree planting near overhead lines depends on the voltage of the electric line and the utility company's easement for the line(s). On average, for a 38 kV electric line the distance to plant a tree should be between 25ft to 50ft of the main conductor depending on mature tree height and crown width as shown in the table below:

Mature Tree Height (ft)	Recommended horizontal distance from power lines (ft)
15-30	25
30-50	50
>50	>50

Planting trees, shrubs, or any other vegetation inside and outside the power line right of way (ROW) should be avoided. Distances of crown width or tree height should never reach between 12-20 ft around the structures (post, towers, guy wires, circuits), depending on the circuits.

Do not plant trees at least 15-25 ft (more if the tree is a large species) from houses, buildings or structures. In urban areas select the tree with correct root-growth pattern in order to avoid the tree from causing problems like cracking and heaving curbs and sidewalks.

SPECIES SELECTION AND SPACING

Species Selection

Plants selected must be suited and adapted to soil and site conditions, climate, and conservation purpose. Plant species shall be selected based on: the proposed uses of hedgerows, preferences of land user, conditions of the soils, plant growth rate and shade tolerance. Examples of suitable species which may be used for hedgerow for each ecological life zone in Puerto Rico and the U.S. Virgin Islands are included in Tables 1 and 2. These tables are a guide and not intended to exclude

other species. Ecological Life Zones are listed for each plant to assist with the selection and design process for establishing hedgerows. Ecological life zones, described by Ewel & Whitmore, 1973, for Puerto Rico and the U.S. Virgin Islands, are major climatic divisions and define the conditions for ecosystem functioning. Figure 2 shows the life zones by municipality.

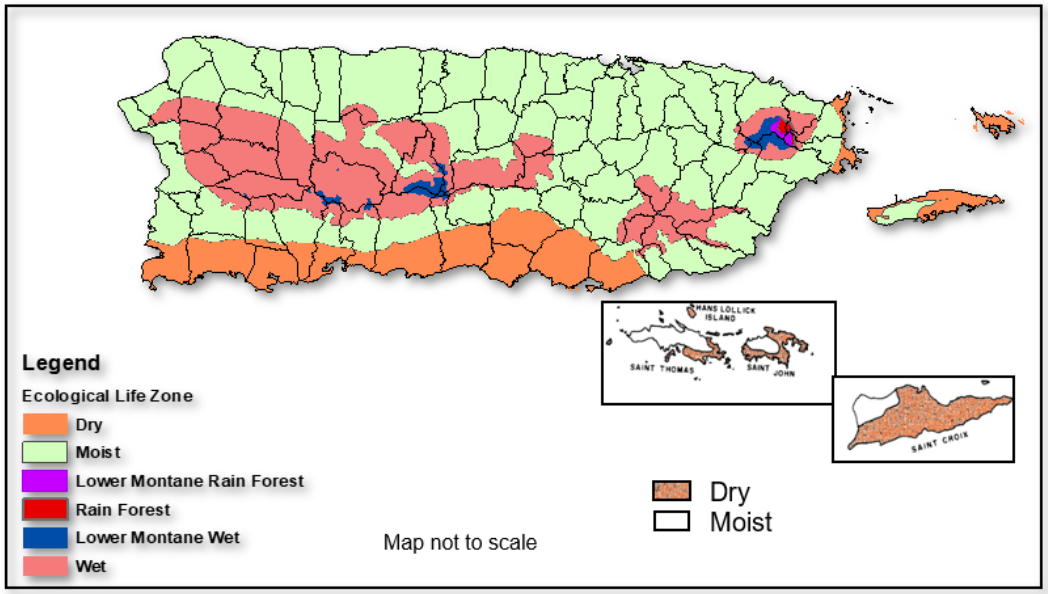

Figure 2. PR and USVI Ecological Life Zone. Source: Ecological Life Zones for Puerto Rico and the U.S. Virgin Islands, Ewel & Whitmore, 1973.

Species Spacing

No minimum width beyond a single row is required except where wildlife food and cover is an objective (which shall be 15 feet to provide food, cover and ecological corridors for wildlife). When wildlife food and cover is an objective, a triangle or diamond pattern should be used to reach the 15 ft minimum hedgerow width, at maturity (see Figure 3 below). Plantings consisting of two or more species, especially native plant species, shall be encouraged. Multiple species increase food and habitat diversity.

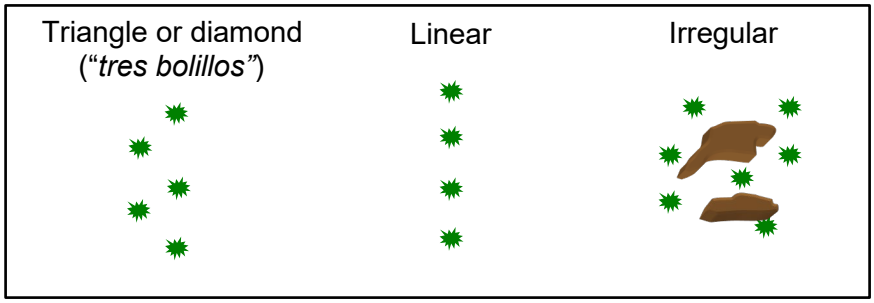

Figure 3. Planting pattern.

Mature height, canopy spread, root space, and planting patterns are all important factors to consider before deciding the planting distance. It is also vital to know what the tree will look like as it reaches maturity. The distance between rows and trees defines the Planting Patterns such as triangle or diamond ("*tres bolillos*"), linear, and irregular.

Triangle or diamond ("*tres bolillos"*) pattern: vegetation is planted in zigzags; all individuals are the same distance from each other except for grasses, which can be planted closer.

Linear: vegetation planted in a lineal design without any other outline; all individuals are the same distance from each other except for grasses, which can be planted closer.

Irregular: used when obstacles such as rocks are present or when the landform does not provide for regular arrangement.

If shrub or grass species are available, it is desirable to intercrop the trees with shrubs and grass species to maximize the bare soil area coverage and increase the probability of success of the conservation practice.

The maximum distance between trees shall be 6 to 8 ft and for shrubs 1.5 to 4ft for all purposes of this conservation practice. Minimum hedgerow width at maturity shall be 15 ft to provide food, cover and ecological corridors for wildlife. This can be achieved by planting one row of trees and/or shrubs in a diamond pattern using the recommended distance between individuals provided above. A wider hedgerow can be implemented if it meets the landowner's objectives. This conservation practice can be implemented to create a living fence.

The hedgerow will be oriented perpendicular to the prevailing wind direction as much as practicable, if practice is planned to intercept particles matter. Hedgerow density should be at least 50% at maturity on the upwind side; and at least 65% at maturity adjacent to the particulate source.

PROTECTION FROM LIVESTOCK

This practice shall be protected from livestock grazing and trampling to the extent necessary to ensure that it will perform the intended purpose(s). Use conservation practice Fence (382) to protect hedgerows. Generally, this occurs when this practice is planned on pasturelands or where livestock such as goats, sheep, horses, cattle, etc. are present or can access the hedgerow area. The fence must be installed at least 6 ft from the hedgerow to exclude grazing animals (see Figure 4).

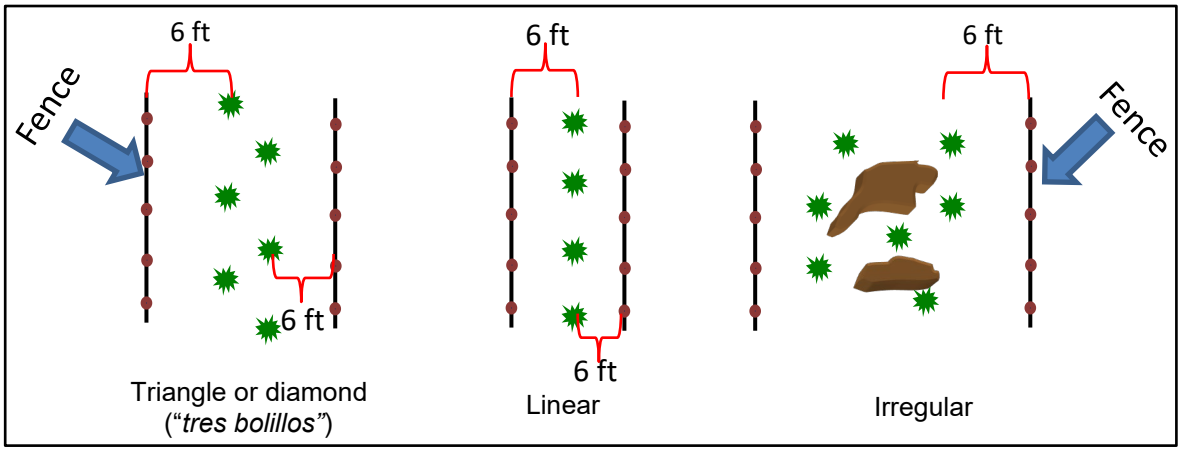

Figure 4. Distance recommended for the installation of a fence to protect vegetation form animals.

SELECTION AND CARE OF PLANTING MATERIAL

Care in handling and planting of the seed or seedlings will ensure that planted materials have an acceptable rate of survival.

Only viable, high-quality and adapted planting stock or seed will be used. Do not plant trees that have scrapes on the bark or girdling roots in the pot without proper pruning.

We recommend to plant trees and shrubs that have a height between 2-4 ft and avoid planting material taller than the desirable size because it will decrease the survival rate.

Always keep planting stock roots moist before planting. Cuttings of shrubs may be rooted in pots or beds and then transplanted. Unrooted cuttings may be planted directly depending on the species, available moisture and other conditions. Consider using a rooting hormone to enhance rooting percentage. If the roots are tangled or compacted, cut a portion with sharp scissors or a sharp knife before planting.

PLANTING

Considerations to choose the right planting sites:

- Soil type (drainage, fertility and texture),
- Periodic flooding,
- Amount of available sunlight,
- Existing plant competition, and
- Exposure/aspect/orientation of the terrain.

Select planting technique and timing that is appropriate for the site and soil conditions. Planting should be done as early in the wet season as possible. Avoid planting on hot, windy days.

If individual planting holes are dug through sod or untilled soil, make them as large as practicable and apply herbicide or clear a 3 ft diameter circle outside of the hole at the time of planting. Follow the instructions on the label when using chemicals.

Dig a planting hole that provides plenty of room for the roots. The hole's diameter should be 2 times the pot diameter and have the same depth (see Figure 4).

Remove the tree, shrub or grasses from the container and always pick up the plant by the root ball, never by the trunk.

Place the tree/shrub or grass in the hole at the same depth it grew in the nursery (see Figure 5). Make sure the trunk is straight. Completely bury all material. Exposed material will act as a wick drawing water out of the planting hole.

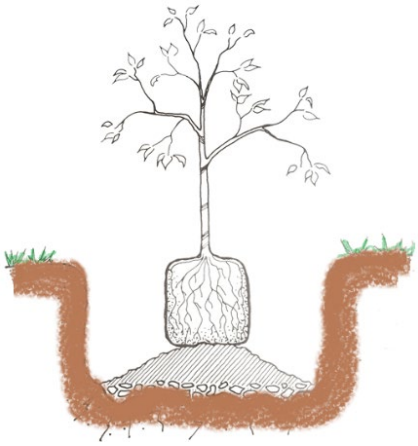

Figure 5. Image adapted from: "Árboles para uso urbano en Puerto Rico e Islas Vírgenes", USDA Forest Service. General Technical Report SO-57. December 1985. (Correct position or way to plant a tree/shrub.)

Refill the hole with the same soil previously removed from the hole. Settle the soil by watering as you fill up the hole to eliminate air pockets. Do not place soil on top of the root ball and stamp earth firmly above the root zone.

Place a 3-inch layer of mulch around each plant to prevent water loss and promote humidity. Consider applying the practice Mulching (484), if appropriate.

Stake newly planted trees **only if needed**. Trees usually do better if they become established without staking, but in many cases, trees need staking to protect the trunk from equipment, anchor the root system from the wind or support a limber trunk in an upright position.

OPERATION AND MAINTENANCE

The continuous maintenance of the young tree, shrub or grass is key for vegetation survival and health. The plant will be maintained in different ways, depending on type, until maturity. Monitor vegetation establishment for at least 6 consecutive months to ensure survival.

Competing vegetation shall be controlled until the hedgerow becomes established. If necessary, control shall continue beyond the establishment period.

Supplemental planting may be required when survival is too low to produce a continuous hedgerow.

Watering

Watering is the key for plant survival. Learn your vegetation's water requirements to determine the frequency of watering. Water each tree thoroughly at planting and every two days during dry periods. Once the tree, shrub or grass is established, watering the vegetation every week will be sufficient. Remember, water thoroughly and more frequently during warm days and drought season. Water deeply to promote healthy root development. Keep watering during the next 6 months after planting, if necessary.

Fertilizing and treatment of pests and diseases

Fertilizing is the answer to nutrient deficiencies. Fertilizer application is based on a soil test and the practice Nutrient Management (Code 590). If you notice that your tree's leaves are yellow, its development is slow, or a pest or disease is affecting the tree, consult a Department of Natural and Environmental Resources, USVI Department of Planning and Natural Resources, Extension Service Specialist, PR Department of Agriculture, USVI Department of Agriculture or NRCS field office.

Pruning

Pruning is recommended during the first few years after planting, especially when plants reach 4 feet in height, to strengthen the effectiveness of the hedge at the base. Refer to Tree/Shrub Pruning Code 660 - Standard Specifications.

FREQUENTLY ASKED QUESTIONS

1. Which species are recommended to plant in a Hedgerow?

Table 1 and 2 list the recommended species to plant in a Hedgerow.

2. Can Hedgerow Planting be implemented in cropland or in pasturelands?

Hedgerow Planting can be implemented in the following land uses: croplands, forestlands, pasturelands, protected lands, farmsteads and associated agricultural lands.

3. Can Hedgerow Planting be planned on a boundary of a property?

Yes, *Boundary delineation and contour guidelines* is one of the purposes of this practice.

4. Do I need to protect my Hedgerow from livestock and wildlife? How I can protect it?

Yes, a fence must be installed to protect a Hedgerow from livestock.

5. Can I plant shrubs in a Hedgerow?

Yes, shrubs should be planted in conjunction with trees and grasses, if available.

6. What is the minimum width for a Hedgerow?

Minimum width for hedgerow is 15 feet. This can be achieved by planting a single line of trees with fences installed on both sides at a 6-foot distance from the trees, shrubs and grasses. The preferred planting pattern is "Tres bolillos," but depends on the landowner's objectives.

7. Does this practice require pruning?

Yes, pruning is part of the suggested operation and maintenance of this practice.

8. Why is 6 ft to 8 ft the planting distance allowed to implement this practice?

The intention of this practice is to create a "living wall" (a hedgerow, living sedge or "seto vivo") by manipulating the plants to accomplish the purposes for this conservation practice and benefit wildlife. A specific density is required in the hedgerow, for example: at least 50% at maturity on the upwind side; and at least 65% at maturity adjacent to the particulate source (See practice Standard).

If trees are planted at a further distance (more than 8ft) the "hedgerow effect" or the "living wall effect" will not be accomplished. If landowner want to plant trees at a further distance, please consider implementing Tree/Shrubs Establishment (Code 612) practice instead.

9. What other practices are recommended to plan with Hedgerow Planting?

Associated Practices

Some conservation practices may be applied alone and others in combination with other supporting Caribbean Area conservation practices.

The following practice is required where livestock are present:

- Fence (382)

The following practices are recommended:

- Tree/Shrub Pruning (660)
- Upland Wildlife Habitat Management (645)
- Pest Management Conservation System (595)

Note: There is tremendous overlap between this practice and conservation practice 380 Windbreak/Shelterbelt Establishment. The main difference is that conservation practice 380 is exclusively woody plants where practice 422 provides for the use of herbaceous materials.

REFERENCES

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APPENDIX

Table 1. Recommended tree species for Hedgerows for each Ecological Life Zone in the Caribbean Area

			Subtropical Lower Montane Wet Forest	Subtropical Wet Forest		Subtropical Moist Forest				Subtropical Dry Forest	
Scientific	**Español**	**English**	**Volcanic**	**Moist Serpentine**	**Volcanic**	**Sedimentary Moist Volcanic**	**Limestone**	**Moist Alluvial**	**Ultramaphic**	**Dry Alluvial**	**Volcanic limestone**
Annona montana	Guanábana cimarrona	Wild soursop		x			x	x	x	x	x
Bourreria succulenta	Palo de Vaca	Pigeon-berry		x			x	x	x	x	x
Terminalia buceras	Úcar	Black-olive / Gre Gre		x		x	x	x	x	x	x
Busera simaruba	Almácigo	Turpentine-tree		x		x	x	x	x	x	x
Byrsonima spicata	Maricao	Hogberry	x	x	x	x	x		x		
Calophyllum antillanum	María	Santa-maria / Galba		x	x	x	x	x			
**Casearia arborea*	*Rabo de Raton	*Casearia		x		x	x	x			
Casearia guianensis	Cafeíllo, Palo blanco	Wild Coffee									
Chrysobalanus icaco	Icaco	Icaco / Coco Plum					x	x	x	x	x
Chrysophyllum cainito	Caimito	Star-apple	x	x	x	x	x	x	x	x	x
Citharexylum spinosum	Péndula	Pasture fiddlewood					x	x	x	x	x
Coccoloba swartzii	Ortegón, Uvilla										
**Coccoloba pubescens*	*Moralón	Leather-coat tree									
Conocarpus erectus	Mangle Botón	Buttonwood									
Cordia alliodora	Capá prieto										
Eugenia biflora	Hoja menuda	Stopper		x		x	x	x			
Exostema caribaeum	Albarillo										

***Species not native to the USVI. Species with (*) are not recommended to be planted in USVI.**

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Genipa americana	Jagua										
Guapira fragrans	Corcho	Black mampoo		x			x	x		x	x
Guarea guidonia	Guaraguao	American muskwood		x		x	x	x			
Guazuma ulmifolia	Guácima	West Indian elm / Bastardcedar		x	x	x	x	x	x	x	x
Inga laurina	Guamá	Sweetpea	x	x	x	x	x	x		x	
**Inga vera*	*Guaba	*White sweetpea	x	x	x	x	x	x			
Laguncularia racemosa	Mangle Blanco	White Mangrove									
**Lonchocarpus heptaphyllus*	*Retama	*Lancewood		x	x	x	x	x		x	
**Thespesia grandiflora*	*Maga	Purple haiti-haiti		x		x	x	x			
Ocotea leucoxylon	Laurel Geo										
**Ouratea littoralis*	*Abey amarillo										
Petitia domingensis	Capá blanco										
Pictetia aculeata	Tachuelo	Fustic									
Spondias mombin	Jobo, Jobillo	Hog Plum									
Tabebuia heterophylla	Roble blanco, Roble nativo	Pink Cedar									
**Thouinia portoricensis*	*Ceboruquillo, Quebracho										
Turpinia occidentalis	Sauco cimarrón										
Zanthoxylum flavum	Aceitillo	Satinwood									
Zanthoxylum martinicense	Espino rubial	White-prickle Ash	x	x	x	x	x	x			

***Species* not native to the USVI. Species with (*) are not recommended to plant in USVI.**

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Miconia impetiolaris	Camasey Colorado		x	x	x	x	x	x		x	x
Miconia laevigata	Camasey de Paloma	Smooth johnnyberry	x	x	x	x	x	x			
Trema lamarckianum	Cabrilla	West Indies trema	x	x				x		x	

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Table 2. Recommended grass species for Hedgerow Planting in the Caribbean Area.

Scientific name	Nombre en Español	Name in English	Comments
Andropogon bicornis	Barbas de Indio / Matojo de Trechar	Indian Beard	Native grass. Most common on moist mountains.
**Panicum acuaticum*	*Yerba Acuática	Aquatic Grass	Native grass that can grow on wetlands.
Uniola virgata	Yerba de alambre	Wire grass	Native grass. Can grow on dry forest or areas.
Eriochloa polystachya	Malojilla / Yerba Caribe	Carib Grass	Native grass. Most common on moist mountains and valleys

Please see important information and notes in the following page.

Additional information related to recommended species provided above:

Species availability for Caribbean Area will be subject to commercial and private nurseries stock inventory. Please check with nurseries before making a recommendation for a specific species.

The availability of commercial seeds for native grass is very limited. Natural regeneration in the hedgerow area after trees/shrubs establishment is allowed and encouraged. Part of the information provided in the table above were taken from "*Guía Ilustrada de Yerbas Comunes en Puerto Rico"*.

The recommended trees, shrubs and grasses provided in the lists above are not exclusive. Other native trees, shrubs and grasses could be considered. Consult with NRCS for further guidance.

Sixteen species from the table called: "*Recommended tree species for Hedgerows for each Ecological Life Zone in the Caribbean Area*" do not show the Ecological Life Zone due to the lack of information at the moment of developing this document. Consult with NRCS for further guidance if needed.

The number of native shrubs species recommended in this document is low because the Agency and partners are working on a comprehensive list of native shrubs to be recommended by conservation practices. An updated version of the table provided above will be available when the comprehensive list of native shrubs is finished.

Important note for US Virgin Islands*:*

Genipa americana is only found on St. Thomas and St. John and is not very common. Do not use this species on St. Croix.

***Species* not native to the USVI. Species with (*) are not recommended to be planted in USVI.**