

Perennials (cont.)

Mirabilis jalapa—Four O’Clock
Oenothera caespitosa—Tufted Evening
Primrose
Psilostrophe bakerii—Paperflower
Sphaeralcea coccinea—Scarlet
Globemallow
Stanely pinnata—Prince’s Plume
Yucca elata — Soaptree Yucca
Yucca glauca—Small Soapweed

Vines

Lonicera japonica—Japanese Hall’s
Honeysuckle
Lonicera tataricum ‘Zabelii’ - Zabel’s
Honeysuckle
Parthenocissus quinquefolia—Virginia
Creeper

Fruit, Nut and Vegetable

Allium cepa—Onion
Apium graveolens—Celery
Beta vulgaris—Beets
Beta vulgaris var. cicla—Swiss Chard
Brassica napobrassica—Rutabaga
Brassica oleracea—Broccoli
Brassica oleracea Acephala—Kale
Capsicum spp—Bell Pepper
Cucumis Sativus—Cucumber
Daucus carota subsp sativus—Carrot
Ficus carica—Fig
Juglans regia—English Walnut
Pistacia vera—Pistacio
Rhem rhabarbarum—Rhubarb
Prunus dulcis—Almond
Punica sp—Pomegranate
Solanum tuberosum—Potato
Solanum lycopersicon—Tomato
Spinacia oleracea—Spinach
Zea mays—Corn

Brackish Water Study

This study observed ornamental plants irrigated with untreated Virgin River water that can have a total dissolved solids (TDS) count on the average 0 to 2,000 ppm.

Water from the Virgin River was applied to a variety of shrubs, trees, grasses and vegetables using various irrigation methods. Observations indicate that the suggestions in this brochure should be followed when using untreated Virgin River water on landscape.

This study is being performed by Dr. Frank Williams.

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Water quality concerns have not been taken into considering because good quality water supplies have been plentiful and readily available. This situation is now changing in many areas including the St. George area. Proper water management involves reserving our high quality water supply for indoor use and developing the lower quality water for outdoor use. With the low quality water, new irrigation methods need to be put in place. It is important that we adapt and learn how to use lesser quality water on our landscapes. The following suggestions are designed to help you manage your landscapes with the low quality water high in salts.



Suggested plant material

Trees

Albizia julibrissin—Silk tree Mimosa
Cupressus arizonica—Arizona Cypress
Elaeagnus commutata—Silverberry
Fraxinus velutina—Modesto Ash
Gymnocladus dioica—Kentucky Coffee
Jacaranda mimosifolia—Jacaranda
Liquidambar styraciflua—Sweet Gum
Lagerstroemia indica—Crape Myrtle
Magnolia grandiflora—So. Magnolia
Melia azedarach—Texas Umbrella
Platanus racemosa—California Sycamore
Quercus rubra—Red Oak
Quercus virginiana—Live Oak
Quercus emorui—Emery Oak
Tilia cordata—Littleleaf Linden
Ulmus parvifolia—Chinese Elm

Shrubs

Abelia grandiflora—Glossy Abelia
Buxus microphylla—Japanese Boxwood
Callistemon citrinus—Bottlebrush
Carissa grandiflora—Natal Plum
Cercocarpus—Mountain Mahogany
Cotoneaster glaucophyllus—Grayleaf Cotoneaster
Cowania Mexicana stansfuriana—Cliffrose
Elaeagnus pungens—Silverthorn
Euonymus japonicus—Japanese Euonymus
Fallugia paradoxa—Apache Plume
Feijoa sellowiana—Pineapple Guava
Hesperaloe parviflora—Red Yucca
Hibiscus syriacus—Rose of Sharon
Ilex cornuta—Chinese Holly
Juniperus chinensis—Chinese Juniper
Lantana camara—Lantana
Lavandula angustifolia—Lavender
Leucophyllum frutescens—Texas Ranger

Ligustrum japonicum—Japanese Privet
Mahonia Fremontii—Fremont's Barberry
Mahonia aquifolium—Oregon Grape
Nerium oleander—Oleander
Photinia xfraseri—Fraser Photinia
Pittosporum tobira—Mock Orange
Platyclusus orientalis—Chinese Arborvitae
Podocarpus macrophyllus—Podocarpus
Raphiolepis indica—Hawthorn
Rosa woodsii—Woods Rose
Rosmarinus officinalis—Rosemary
Shepherdia argentea—Silver Buffaloberry
Syringa x chinesis—Chinese Lilac
Syringa reticulata—Japanese Lilac
Syzygium paniculatum—Brush Cherry
Viburnum tinus—Spring Bouquet
Xylosma congestum—Shiny Xylosma

Grasses and Ground Covers

Agrostis palustris—Creeping Bentgrass
Agrostis tenuis Bentgrass
Cynodon dactylon—Bermuda
Festuca arundinacea—Tall Fescue
Lolium perenne—Perennial Rye
Lotus corniculatus—Bird's foot Trefoil
Puccinellia distans—Weeping Alkaligrass
Zoysia japonica—Zoysia

Perennials

Aquilegia micrantha—Cliff Columbine
Baileya multiradiata—Desert Marigold
Gardenia hybrids—Gardenia
Lantana—Lantana
Lavandula angustifolia—Lavendar
Linum—Blue Flax

- E. **Finale Grade**—After the fertilizer has been added and incorporated 4 to 6 inches, the soil should be firmed by rolling with a roller. The soil should be firm enough that when walked on it will leave 1/2 inch imprint.
- F. **Watering**—The should be moist down to at least a 16 to 18 inch depth. This will allow the establishment turf without the continued wetting of the surface. Watering after the grass is planted on a soil that has no appreciable moisture for several years creates problems in the landscape. The single-most important factor in the successful rooting of newly installed turfgrass sod is adequate moisture in the soil before planting.
- G. **Sodding**—The land preparation should be same as it is for seeding. Sod should be installed as soon after harvest as possible, within 24 to 48 hours for greatest success. Don't let it dry out. Even though it can still grow if dried out, the edges dry and weeds will grow where the edges have been stressed. Lay the sod squares/rectangles/rolls staggering the joints like you would laying bricks. Butt the edges of each piece together tightly. Do not overlap or leave a gap between them.
- H. **Sod and Seed Rolling**—Once in place, tamp or roll to ensure good contact between the sod or seed and the underlying soil.

These subsections are based on the preliminary results observed at the Washington Fields research plot. Untreated water from the Virgin River has been used on a variety of low growing shrubs, trees, grasses and vegetables. Several methods of irrigation are being evaluated for use with the untreated irrigation water. Over the last year, small shrubs that have had water on the foliage from the sprinklers have shown very little growth or have been lost. Observations indicate that the following suggestions be followed when using untreated Virgin River water on landscape.

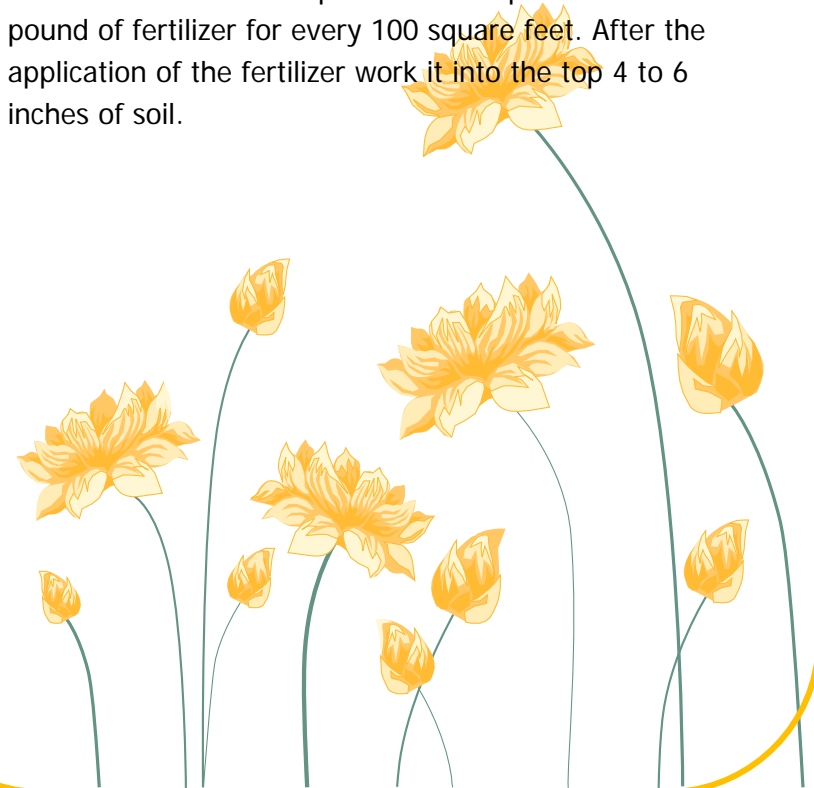
Soils and Soil Quality

Soil is the store house for all nutrients that plants require for growth. Therefore, the physical and chemical composition of the soil is of great importance if our horticulture endeavors are to be successful. Physical conditions can be changed by drainage and tillage and incorporation of organic matter. If plants are to achieve excellent growth, it is essential that the soil be in good physical condition. Soil must have a good texture and be well prepared. Addition of a good organic matter is very important. Adding good organic matter is a must. Excellent soil consists of 5-10 percent of compost worked into a depth of 6 to 8 inches.

Southern Utah has another factor to consider in soil quality. The chemical make-up of local soils is very high in salt. Boron (B), sodium (Na), sodium bicarbonate (NaHCO_3) and gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) must be evaluated in the content of the soil to minimize the impact of the salt factor. In fact, in many areas the amount of gypsum, which normally would have little effect, is so high that the growth of plants is greatly reduced or non-existent. It has been observed that many grasses will show reduced growth and reduced seed germination. If you feel you are in an area where this is a problem, consult your county agent at 435-634-5706.

A well prepared soil will account for 90 percent of your success in the future. A healthy plant is the best defense against attack or invasion of various pests.

- C. **Replacing the Topsoil**—If topsoil is to be added over the subsoil, you must allow for 6-8 inches of depth after the soil has settled. This means that you are going to have to add about 8 to 10 inches of topsoil over the subsurface to stop interface problems from developing later on. Mixing a portion of the topsoil into the upper 2 to 3 inches of the subsoil avoids a distinct layering effect between the top soil and subsoil. Topsoil should not be distributed when the soil to be covered is very dry, wet or frozen. No soil modification should be carried out that will develop any layers.
- D. **Fertilization**—Next step is add a complete fertilizer. A pound of fertilizer for every 100 square feet. After the application of the fertilizer work it into the top 4 to 6 inches of soil.



Steps in Turfgrass Establishment

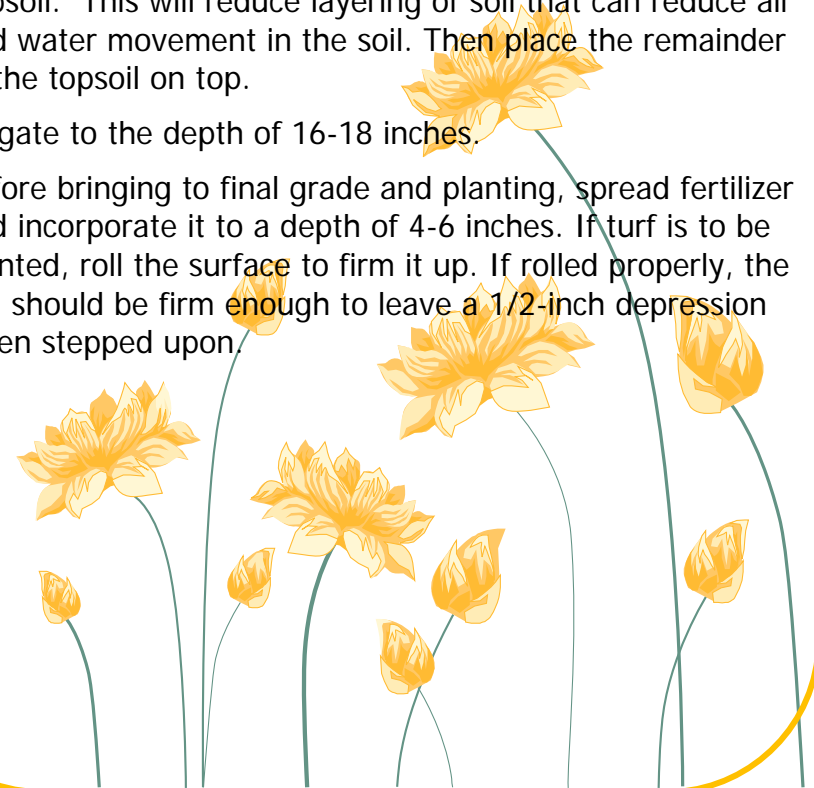
The importance of the proper establishment of the landscape cannot be over stressed. The proper establishment of the turf and trees will mean the savings of money and a landscape that will be one to be proud of for a long time.

If turf is established properly the amount of water required during the lifetime of the lawn will be reduced greatly. It is recommended to sod lawns when using brackish water.

- A. **Clean and Rough Grade**—Remove all debris from the location to be planted. Any rock larger than a chicken egg should be removed.
- B. **Deep Tillage**—Due to the movement of heavy equipment during construction and the rough grading of the area it is important to loosen the compacted soil that has developed.

Soil Conditioning Best Management Practices

- * Clean and rough grade the area to be planted and remove any debris from the location to be planted. Remove rocks that are larger than a chicken egg.
- * Tilling the soil to a depth of 8-10 inches will reduce soil compaction and allow air and water movement in the soil.
- * If you plan to replace the top soil, it is important that you replace it with at least 8-10 inches of top soil. If top soil is to be added, you should lay down 2-3 inches of new top soil and rototill it to mix the top soil with some of the subsoil. This will reduce layering of soil that can reduce air and water movement in the soil. Then place the remainder of the topsoil on top.
- * Irrigate to the depth of 16-18 inches.
- * Before bringing to final grade and planting, spread fertilizer and incorporate it to a depth of 4-6 inches. If turf is to be planted, roll the surface to firm it up. If rolled properly, the soil should be firm enough to leave a 1/2-inch depression when stepped upon.



Irrigation

Proper irrigation is essential for successful growth of plants in the St. George area. Quality of the water is also important, so one needs to understand the importance of the quality of water that is going to be used. Poor quality irrigation water and over watering are two of the main reasons landscapes fail. When we irrigate, all of the air is forced out of the soil. When this occurs, the roots no longer have the air they need to remain healthy and grow. So the longer the period between irrigation, the better the environment for root growth and health. Therefore, watering less frequently and for longer periods will enable the roots to grow to a greater depth which will result in healthy plants.



Importance of a good established root system. After the establishment of the plants it is important that when irrigation occurs that the moisture reach a depth of 6 to 8 inches for turf. Once a month, shrubs and trees should be irrigated for an extended period of time. It is also important that the last irrigation in the fall should be an extended period of time to allow for the soil to become moist to greater depth.



- * **If cycling irrigation time, plants should only be allowed to dry only the once for that irrigation period when the irrigation is turned off. This means that the rotation of the sprinklers must be fast enough that the surface of the plants remains moist during the entire sprinkling cycle.**
- * Make sure that your sprinklers don't mist, but have the correct pressure to water correctly.
- * If the winter months have been dry, the first irrigation in the spring should exceed the normal cycle to allow the salts to leach out of the root zone.
- * When watering trees, water deeply. If the tree is planted in the lawn, give it an extended watering of 4-6 hours, if possible, once a month.

Irrigation

Best Management Practices

- * The best method of irrigation is a drip or trickle system that would not put water on the foliage.
- * If sprinklers must be used, a low profile head should be utilized in order to keep as much water off the foliage as possible.
- * Water as infrequently as possible.
- * When possible, water during the coolest and calmest period of the 24-hour day. The best time to water is during early morning before sunrise if there is no air movement or just slight air movement.