

This booklet contains up-to-date information on techniques and practices that help save water in your garden even if it has been established for years.

If you are starting a new garden from scratch, you will find a wealth of information to help you to plan and establish a garden that will not only cope with our climate, but also meet your needs without wasting water.



the WATERWISE garden BOOK

A green garden hose is coiled and placed over the letter 'O' in 'BOOK'. An orange flower is placed over the letter 'K' in 'BOOK'.

Introduction

The Mid North Coast usually experiences long, hot summers and wet autumns, with mild and dry winters, however, the wet autumns cannot always be relied upon. When drier weather conditions occur, there comes an urgent need to reduce the amount of water that is normally used, particularly in the garden. Despite the uncertainty of our weather conditions, we are still planting gardens that are based upon northern European garden designs; these designs focus on cool, wet climates and use delicate plants that would not normally survive in Australia's harsh dryer climate. As a result we have had to use a lot of water to maintain these gardens and plants.

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In the Hastings Shire area approximately 20% of annual water consumption goes on watering lawns and garden. In summer this figure rises to almost 50%.

This booklet contains up-to-date information on techniques and practices that help save water in your garden even if it has been established for years. If you are starting a new garden from scratch, you will find a wealth of information to help you to plan and establish a garden that will not only cope with our climate, but also meet your needs without wasting water.

Hastings Council Water Wise would like to thank the local Nursery & Garden Centres for their assistance in the development of this guide.

Garden design

A successful garden doesn't happen by accident. Many things need to be considered to ensure the garden is functional, waterwise and eye pleasing. The average garden is a combination of water-consuming areas such as lawn, flowerbeds, borders and shrubberies, and hard or dry surface areas such as paving, sheds and pathways. Following are some useful checklists to ensure that your new or remodelled garden is a success.

When planning a new garden, or remodelling an old one, consider your needs for:

- Utility spaces such as clothes lines, compost and storage areas
- Outdoor living spaces such as courtyards, barbecues and seating
- Special needs such as a vegetable garden, swimming pool, etc
- How much time you have for garden maintenance
- How much money you wish to spend developing and maintaining the garden

The general principles of saving water through garden design are to:

- Minimise the area of lawn. Since most summer water is used on lawns, turf areas should be kept to a minimum, consistent with functional and aesthetic requirements.
- Choose plants that are suitable for the environmental conditions and have a low water demand.
- Keep planted areas dense, consolidated and well mulched. Sparse, scattered plants are more difficult to water efficiently than those in defined areas.
- Prepare the ground before planting to ensure that plants can make the most of the water provided.
- Maximise the use of non-planting treatments such as paving and mulches, while at the same time considering the risk of creating hot spots due to large areas of unshaded paving.
- Install a watering system that is both efficient and flexible.
- Monitor and adjust the amount of water that is applied on a regular basis.
- Make use of windbreaks, pergolas, screen, lattice, shade cloth and vines to shelter the house, outdoor living areas and plants.

The proper definition of a waterwise garden is "quality landscaping that conserves water and protects the environment". Above all things, it must be a quality design that balances the lawn area, shrub and flower plantings and the hard surface areas. (Decks, patios, paths and swimming pools)



Before you plant

Soil improvement

Adding organic matter to the soil improves both its moisture and nutrient-holding capacity. This means that less water and fertiliser need to be applied. As well as saving on water and fertiliser, there is better plant growth with less stress between waterings. It is particularly important to improve the top 15-20cm of soil where a plant's feeder roots can be found. Compost and proprietary products are ideal soil improvers. Mix them in equal parts with the garden soil prior to planting using the following areas as a guide.

Note: Generally the bigger the area prepared, the better the long-term result.

PLANT TYPE	COVERAGE AREA
Shrubs, groundcovers, climbers	30cm in depth and up to half a metre across
Trees	40-60cm deep and 1 metre across
Bedding plants	25cm deep for the whole bed
Lawns	15-20cm deep for the whole area

Sandy soil is quite common in coastal areas. One of the problems with sandy soil is that over time it can dry out and develop non-wettable characteristics. Water applied to these soils simply pools on the surface before eventually making its way down through one or two spots. The bulk of the soil remains dry. Non-wettable soils are particularly noticeable in containers, but are also a significant problem in lawns, where they can cause brown, dry patches.

To ensure your soil doesn't develop non-wettable characteristics, it is important to apply soil-wetting agents during spring. Soil-wetting agents should be watered in immediately. If the first application does not work, apply a second. Soils that are particularly prone to the problem may need a second treatment in summer.

Soils for Containers (including hanging baskets)

When purchasing potting mix for your containers, choose the best quality you can afford, preferably one approved by the Australian Standards Association. The water and nutrient-holding capacity of potting mixes can be further enhanced by the use of water-absorbent polymers (Water Saving Crystals). Some potting mixes may already contain them. Most plants are now grown in soil-less mixes, which can quickly become non-wettable. A quick and easy way to treat containers is to dip the whole pot into a larger container of a prepared wetting agent.

Tip:

To ensure your soil doesn't develop non-wettable characteristics, it is important to apply soil-wetting agents during spring.

What to plant

Lawns

When developing an area of lawn, good design, thorough preparation, careful consideration of the type of grass to be planted and good management will result in significant reductions in water use.

Choice of Variety

The table below details the needs and characteristics of some of the grasses available.

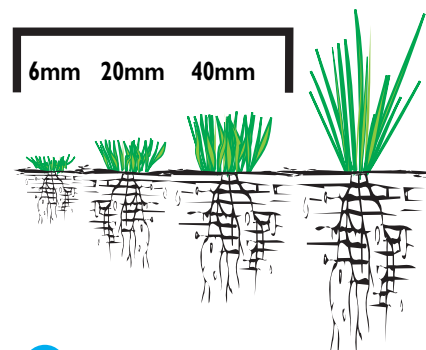
Warm-season grasses (mostly grown from runners or rolls)

Variety	Water Use	Drought Tolerance	Maintenance	Mowing Heights mm	Shade Tolerance	Wear Resistance
CT2 Couch	Medium	Medium	Med/High	10 - 20	Low	Very Poor
Couch Greenlees Park	Medium	Medium	Med/High	10 - 20	Low	Very Good
Couch Wintergreen	Medium	Medium	Med/High	10 - 20	Low	Very Good
Couch Windsor Green	Medium	Medium	Medium	10 - 20	Poor	Very Good
ST - 85	Low	Medium	Low	25 - 40	Good	Good
ST - 91	High	Medium	Low	30 - 40	Low	Low
Buffalo (Syd.)	Medium	Very High	Medium	20 - 30	Very good	Very Good
Kikuyu	High	Medium	High	20	Very low	Very Good
Shade Master	Low	Medium	Low	20 - 40	Good	Good
Sir Walter Buffalo	Low	Very High	Low	20 - 40	Very good	Very Good

Tip:

Higher mowing of turf grass promotes a good root system

CLIPPED NON-CLIPPED



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Tip:

Contact your local turf grass supplier to find out the most suitable grass species for your situation.

Methods of Planting

There are three ways to establish a lawn, turfing, runners and seeding.

Turf rolls provide the most water-efficient means of establishment. If laid out on prepared soil in late winter and early spring the grass should be able to cope with the stress of summer. (Subject to soil depth and porosity)

Runners can be planted all year round, although it is best to plant them in the cooler months of spring.

Seed should only be sown in autumn and spring. Seed must be watered constantly and foot traffic banned for several weeks until growth occurs.

Tip:

Turf rolls provide the most water-efficient means of establishing a lawn.

Tip:

Mowers should be set so that only one-third of the leaf area is removed at any one time. This should leave a grass blade length of some 10 to 15mm.

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Other Garden Plants

Average suburban gardens generally contain a variety of plants, which have their origins in many different parts of the world. Some come from tropical rainforests where light is limited, rain may be heavy and frequent, and the atmosphere is protected and humid. These plants have not developed any mechanisms to make them water-efficient or protect them from drying winds. Other plants may come from northern temperate regions where it is cooler and slightly less humid and they don't have to cope with high temperatures and high humidity. Others may have originated in harsh desert conditions where their very survival depended on harvesting every single drop of water and storing it for later use. A large number of our garden plants have their origins in Australia. Those of local origin are perfectly adapted to our climate, having evolved over millions of years.

To allow for efficient watering, this diverse range of garden plants is categorised into three groups according to water needs:

- One-Drop Plants - the most efficient water-users, which only need occasional watering over summer, perhaps once every two weeks or longer.
- Two-Drop Plants - less efficient but still reasonably tough, which need to be watered every 3 to 7 days in summer.
- Three-Drop Plants - which use a lot of water and need to be watered every 1 to 2 days.

Some examples are given below. Your local nursery and garden centre is a valuable source of information.

Examples of One-Drop Plants

CLIMBERS

- N Guinea Flower (*Hibbertia scandens*)
- N Native Grape (*Cissus opaca*)
- N Apple Berry (*Billardiera scandens*)
- X Star Jasmine (*Trachelospermum jasminoides*)
- X Golden Trumpet Vine (*Allamanda cathartica*)
- X Bouganvillea (*Bouganvillea* var)

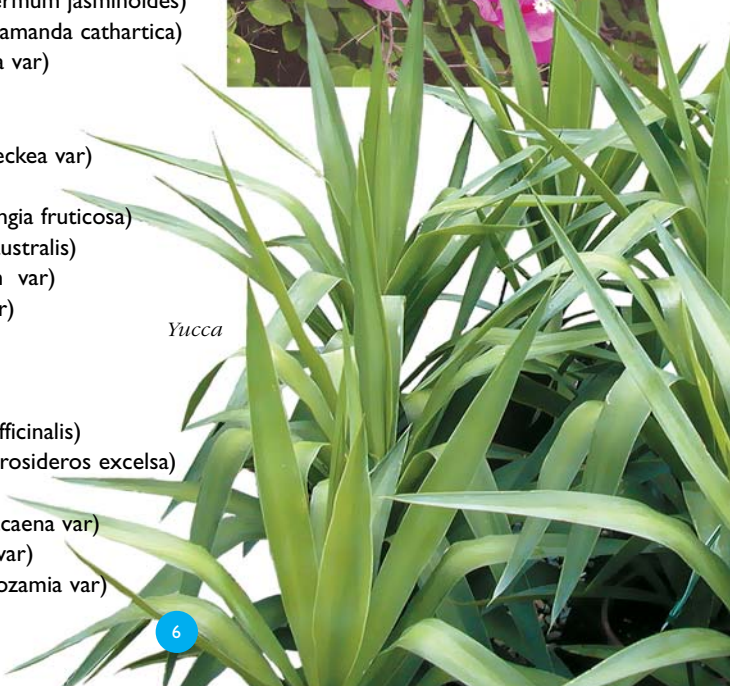
Bouganvillea



SHRUBS

- N Twiggly Heath Myrtle (*Baeckea* var)
- N Grevilleas (*Grevillea* var)
- N Coast Rosemary (*Westringia fruticosa*)
- N Grass Tree (*Xanthorrea australis*)
- N Tea trees (*Leptospermum* var)
- N Paperbarks (*Melaleuca* var)
- N Wattles (*Acacia* var)
- N Banksias (*Banksia* var)
- N Hakeas (*Hakea* var)
- X Rosemary (*Rosmarinus officinalis*)
- X NZ Christmas Bush (*Metrosideros excelsa*)
- X Yucca (*Yucca* var)
- X Dragon/Happy Plant (*Dracaena* var)
- X Red Hot Poker (*Knifofia* var)
- N/X Cycads (*Cycas* var, *Macrozamia* var)

Yucca



PERENNIALS

- N Mat Rush (*Lomandra* var)
- N Kangaroo Paw (*Anigozanthos* var)
- N Flax Lily (*Dianella* var)
- X Pony Tail Plant (*Beaucarnea recurvata*)
- X Bird of Paradise (*Sterlitzia reginae*)
- X Agapanthus (*Agapanthus praecox*)
- X Coral Plant (*Russellia equisetiformis*)
- N/X Succulents (*Crassula* *Agave*, *Portulaca* var)
- N/X Ornamental Grasses



Pony Tail Plant

GROUNDCOVERS

- N Native Daisies (*Brachycome* var, *Helichrysum* var)
- N Prostate Grevilleas (*Grevillea* var)
- N Myoporum (*Myoporum parvifolium*)
- X Moses in the Cradle (*Rhoeo discolor*)
- X Mondo Grass (*Ophiopogon japonica*)
- X Gazania (*Gazania* var)

N = native, X = exotic,
var = various species or cultivars

Gazania

Mondo Grass



Examples of Two-Drop Plants



CLIMBERS

- N Bower vine (*Pandorea jasminoides*)
- N Native Wax Flower (*Hoya australis*)
- N Native Sarsparilla (*Hardenbergia violacea*)
- X Jasmine (*Jasminum* var)
- X Dipladenia (*Mandevilla* var)



Dipladenia

GROUNDCOVERS

- N Midyim (*Austromyrtus dulcis*)
- N Fan Flower (*Scaevola* sp)
- X Bromeliad (*Bromeliad* var)
- X Seaside daisy (*Erigeron karvinskianus*)
- X Blue eyes (*Evolvulus* var)
- X Gardenia (*Gardenia radicans*)
- X Star Jasmine (*Trachelospermum 'tricolour'*)

Bromeliad



PERENNIALS/SHRUBS

- N Bottle Brush (*Callistemon* var)
- N Lily Pilly (*Syzygium*, var)
- X Abelia (*Abelia* var)
- X Croton (*Croton* var)
- X Gardenia (*Gardenia* var)
- X Hibiscus (*Hibiscus* var)
- X Liriope (*Liriope* var)
- X Port Wine Magnolia (*Michelia figo*)
- X Sacred Bamboo (*Nandina domestica*)
- X Philodendron (*Philodendron* var)
- X Blue Plumbago (*Plumbago auriculata*)
- N/X Palm Lily / Cabbage Tree (*Cordyline* var)

N = native, X = exotic,
var = various species or cultivars

Hibiscus



Examples of Three-Drop Plants



Bird's Nest Fern

CLIMBERS

- X Glory Bower (*Clerodendron splendens*)
- X Red Jasmine (*Quisqualis indica*)
- X Wax Flower (*Stephanotis floribunda*)

GROUNDCOVERS

- N Bird's Nest Fern (*Asplenium* var)
- N Native Violet (*Viola hederacea*)
- X Bugle Flower (*Ajuga reptans*)
- X Annuals
- N/X Ferns -various

Wax Flower



PERENNIALS/SHRUBS

- X Fijian Fire Plant (*Acalypha wilkesiana*)
- X Shrubby Allamanda (*Allamanda nerifolia*)
- X Tibouchina (*Tibouchina* var)
- X Azalea sp (*Azalea* var)
- X Salvias (*Salvia* var)
- N/X Gingers (*Alpinia* var)
- X Heliconias (*Heliconia* var)

N = native, X = exotic,
var = various species or cultivars



Shrubby Allamanda

Watering Zones

A typical garden bed may contain a mix of two or three different drop-rated plants. They may look nice together, but such a diverse mix can lead to a lot of water wastage. Knowing the water needs of each plant allows you to group the plants together. A water-efficient garden will be planted into areas, or Watering Zones, each of which contains only plants with the same drop rating. Only when the plants are grouped in this way can they be watered efficiently.

Tip:

No matter how drought hardy a plant is, it will require special care until it is well established. It will be necessary to deep water all plantings regularly and even if they appear established continue to do this twice a month during dry periods until the following season.

How to water

Whether you are watering your garden from the mains water supply, by private bore or from a private rainwater tank, it is important to apply the water as efficiently as possible through a well-designed and maintained irrigation system.

Most members of the Irrigation Association of Australia can offer a free, no obligation design service.

Sprinklers

Overhead sprinklers should only be used on broad areas that are densely planted. Choose sprinklers that produce coarse sprays of large droplets that are less prone to wind drift. Use good-quality sprinklers, which have matched precipitation rates, i.e. they all put out the same amount. Cheap sprinklers often vary enormously in their output. Uneven distribution will cause some areas to be over watered while others are under watered.



Micro-irrigation

Micro-irrigation is suitable for most areas of the garden, especially general garden beds, shrubberies, pot plants and hanging baskets. These systems are flexible, low cost, easy to install and allow for precise delivery and placement of water to the root zones of individual plants. Various types of nozzles are available, including a full range of micro-sprays, mini sprinklers and fixed and variable drippers. All micro systems should begin with a pressure or flow control device. If this is not installed the nozzles will not work efficiently and the joints may burst under excess pressure. These vital components are often not on display at hardware stores. Be sure to ask for one. For consistent performance it is best to use recognised brand-name products.

Choice of Equipment

Use a good-quality controller that has the ability to run separate programmes for different garden areas or Watering Zones.

- The controller should be placed under cover in an easily accessible site.
- Gutter-mounted rain sensors can be used to disable watering after summer rain.
- Solenoid valves should be covered by a valve box, not buried beneath the soil.

Pressure

Irrigation components are designed to operate within a set pressure range. Too much pressure causes misting and high evaporative loss. Too little pressure causes uneven application. If in doubt consult an irrigation specialist who can conduct pressure and flow testing.

How Much Water to Apply

The feeder roots of plants grow in the top 15 to 20cm of soil. That's why soil improvement is confined to that depth and it also determines how much water needs to be applied. In improved sandy soils a depth of 10mm of water, applied to the surface, is sufficient to wet down to 15 to 20cm. The remainder of the volume is taken up by soil particles. This 10mm application is referred to as the Standard Drink. Applying more than 10mm results in water seeping down past the feeder root zone and being wasted. Applying less than 10mm will prevent full development of the feeder root system. The Standard Drink does vary according to location and soil type. For more information regarding a Standard Drink for your soil type and garden, contact a member of the Australian Irrigation Association.

Every irrigation system or hose has a different output, so the only way to determine how long to water is to measure how long it takes to deliver 10mm. This can be done reasonably accurately using containers such as ice cream cartons.

Making the Most of Watering Zones

By grouping plants together on the basis of similar water needs into areas called Watering Zones, you can ensure that each plant in the zone gets as much water as it needs and that no plant is over watered. The result is good, healthy growth using less water. Each zone must be capable of being watered independently from other zones with different values.

This means separate lines controlled either manually by separate taps or automatically by separate stations operated from a controller.

Each plant, whether in a 1, 2 or 3 Drop Zone, gets the same amount of water each time the system is turned on (a Standard Drink), but what varies is the interval between watering. The following guide to watering in the heat of summer can be used as a starting point. Try extending the duration between watering as far as possible.

One-Drop Zone A Standard Drink every 7 to 14 days or longer

Two-Drop Zone A Standard Drink every 3 to 7 days

Three-Drop Zone A Standard Drink every 1 to 2 days

Watering Lawns

Warm-season grasses have been proven to be both water-efficient and drought-tolerant. They fit into the 'Two-Drop Zone' of the garden. The unique aspect of watering turf is the need to ensure an even application over the whole area. To achieve this, sprinklers should be placed so that the spray from one sprinkler touches the next sprinkler and rows of sprinklers should be staggered. Use a good quality part-circle sprinkler on the edges to prevent water being thrown on to hard surfaces such as driveways or paving.

Always water early in the morning or in the evening (depending on Water Restrictions). Never water during the heat of the day. Check your system regularly and replace worn nozzles or broken seals as necessary.

Tip:

Applying more than a Standard Drink will result in water seeping down past the feeder root zone and being wasted

Tip:

Whenever any plant is watered it should be given the Standard Drink, whether it is a bedding plant, fruit tree or lawn.

Tip:

Always water early in the morning or in the evening (depending on water restrictions).

Tip:

Always check with Council to ensure you are complying with current water restrictions.

Operation of Watering Systems

Set your controller to deliver a Standard Drink of 10mm per application. Then follow the guidelines below, changing your schedule as indicated.

MONTH	FREQUENCY
January	Once or twice a week
February	Once or twice a week
March	Once or twice a week
April	Once or twice a week
June	Once per fortnight
July	Once per fortnight
August	Once per fortnight
September	Once per fortnight
October	Once or twice a week
November	Once or twice a week
December	Once or twice a week

Please note these watering frequencies are for ideal conditions when there is sufficient water available. Even when there are water restrictions there is no advantage in delivering more than the 'Standard Drink'.



Problems Associated With Watering Lawns

Regularly shaped brown patches in a lawn may indicate either uneven water distribution or areas of non-wettable soil. Vigorous lawn varieties can build up a layer of brown material near the soil surface. This is known as thatch. It frequently contributes to the development of non-wettable soils and should be reduced by a hard mowing in spring or the use of a de-thatching machine. Non-wettable soils should be treated by the regular use of soil-wetting agents each spring. Over-watering of lawns, particularly if the water is applied in the evening, can lead to the development of fungal problems. Moss growing in a lawn may indicate excess water application, poor drainage or insufficient sunlight.

Watering Shrubs and Perennials

Shrubs and perennials should be planted in Watering Zones. Micro-irrigation is ideal for these plants. If you have improved soil that is well mulched even the thirstiest of plants (Three Drop) can be maintained on a watering schedule of every second day in the heat of summer. This can be extended to every third or fourth day as the weather cools down. Very tough, water-efficient plants may only need a drink every month or so during their first summer, after which the micro-irrigation system can be disconnected and recycled elsewhere in the garden. Only the soil around the plant root zone needs to be watered, not the area between plants. This minimises nitrogen drawdown problems and weed germination. Adjustable nozzles can be used to deliver variable quantities of water to the right locations. Nozzles should be exposed to allow for inspection.

Even when the water is being delivered precisely to the plants at ground level, it is still desirable to water early in the morning to minimise evaporation losses. Your irrigation supplier can give you more details on designing a micro-irrigation system for shrubs and other parts of your garden.

Watering Fruit Trees

If the soil has been improved and a good mulch is present, all fruit trees in the home garden, even tropical species like mangoes, avocados and custard apples, can be kept growing healthily and productively by watering only on alternate days during the heat of summer. Where applicable, once the crop has been harvested, the water may be cut back even further. Flat-throw, low-pressure micro-irrigation sprinklers are the most efficient means of watering fruit trees. They can be set close to the ground and easily adjusted to wet the entire drip-zone area without being affected by wind. A simple technique to ensure the most efficient use of water is to shape the mulch like a saucer, with the highest part immediately below or just outside the drip line. Place the sprinkler in the middle and adjust the height until it just throws out to the rim of the saucer. The water is then caught and directed down to the roots. Drippers are generally not satisfactory for fruit trees in sandy soils. They only wet a limited surface area and lead to wastage, as most of the water is lost to the deeper soil. Drippers are slightly better in heavier soil where they have a flatter wetting pattern, but even then they are not as efficient as micro-sprinklers. Overhead watering of fruit trees is extremely wasteful due to high evaporation losses. It is not recommended in the home garden.

Watering Pot Plants

Micro-irrigation systems can be installed to deliver water to individual pots around the verandah or patio. Adjustable drippers allow for different pot and plant sizes. Terracotta is a porous material, which allows moisture to escape through the sides comparatively quickly. Before planting you should waterproof the material by either using a liquid sealant painted on to the inside of the pot or lining the inside of the pot with polythene. Make sure that a hole is cut in the polythene to coincide with the drainage hole of the pot. Self-watering pots come in many styles. These pots are very water-efficient as long as they are maintained correctly. Hydroponic systems are also water-efficient. Although they may use a large liquid mass, the fluid is retained and recycled in the hydroponic process with very little waste. Slow-release fertilisers release their nutrients gradually over the growing season and are the ideal way to feed pot plants.

Tip:

Slow release fertilisers release their nutrients gradually over the growing season and are the ideal way to feed pot plants and hanging baskets

Watering Hanging Baskets

Micro-irrigation systems can be adapted to deliver water to individual hanging baskets. Adjustable multi-outlet nozzles ensure a large area of the surface is moistened. Protect hanging baskets from the drying winds. Porous basket lines such as coconut fibre or wool should be lined internally with polythene to reduce excess moisture loss. Make sure that a hole is cut in the polythene to allow for drainage. Slow-release fertilisers release their nutrients gradually over the growing season and are the best way to feed hanging baskets.

Watering Bedding Plants

Plan your flowerbeds to be mass displays. Do not place a few plants here or there in odd spots all over the garden, but rather group your flowers together in a suitable area that can be watered independently. Many bedding plants have a high water demand and may need hand watering on occasions.

Tip:

Plan your flowerbeds to be mass displays to ensure efficient use of water.

Watering Vegetables

These are generally high water-demand plants that need a sunny position. Because of their short life cycle and varying size they are best watered with overhead sprinklers. Slowing down hot, dry winds is very important. Creating a windbreak on the exposed side will save a lot of water and prevent damage to delicate plants.

Tip:

Make sure the controller of your irrigation system is easily accessible and that the instruction book is always kept nearby so adjustments can be made on a monthly basis.

Irrigation - the last words

There is more to saving water in the garden than installing an efficient system to water a well designed and carefully planted garden. As seasons change, so too does the water demand of the plants. It is necessary to adjust the watering programs each month to reflect these changes. That's why it is important to make sure the controller is easily accessible and that the instruction book is nearby. If you don't have an instruction book you can contact your local member of the Australian Irrigation Association for assistance.

Lawn Maintenance

Fertiliser use is closely linked to water use. Cutting down on the amount of water used also means you can cut down on the amount of fertiliser. The recommendations on the bags should be regarded as maximum levels. Fertilisers that have some animal manure content help to maintain the organic-matter level of the soil. All fertilisers should be applied immediately before a watering. Mowers should be set so that only one-third of the leaf area is removed at any one time. This should leave a grass blade length of some 10 to 15mm. This amount of leaf shadows the soil surface and thus reduces evaporation loss. Since the growth rate of warm-season grasses slows down in cold weather the mower blades should be raised another 5mm or so during winter. Only top dress to even out bumps and hollows and then only use special top dressing mixes that contain organic matter.

Mulching Gardens

Mulching can reduce evaporation loss from the soil surface by as much as 70%. Mulch should be spread over the entire planted area. Minimum thickness of the mulch will depend on the type of mulch used. As a general rule, mulch thickness should be between 100mm-200mm, except for mulches such as woodchip and bark, which should be about 75mm thick. In addition to saving water, mulching is beneficial in many other ways. Organic mulches are preferred because they:

- Break down over time and feed the plants
- Improve the soil's organic-matter content as they break down
- Reduce evaporation loss from the surface

Tip:

When mulching trees, keep the mulch away from the trunk. Its dampness may cause collar rot.

Did you know?

Mulching can prevent up to 70 percent of water loss by evaporation on hot days. It prevents excessive runoff, restricts weed growth, keeps soil from becoming too hot and, as it rots down, adds valuable nutrients to the soil.

After you plant

- Encourage earthworms and soil microbial activity
- Restricts weed growth and any weeds that do germinate are easy to remove
- Prevent wind and water erosion
- Protect the roots from daily temperature fluctuations, and
- Improve the appearance of the garden area.

Mulching Material

The ideal mulching material is one that consists of large, but irregularly shaped particles that do not hold any water, but rather allow it all to run through to the soil below. Raw materials like woodchips, chipped tree waste or similar, whether bought-in or homemade, are the best mulching materials, followed by crushed brick, stone or gravel. Lucerne hay, pea straw, seaweed and compost should only be used as mulch in areas such as the veggie patch or underneath fruit trees as they break down quickly.

Lawn clippings and sheep manure do not make good mulch, because of heat and weed generation problems, they are best composted. Old newspapers can be used under mulch for weed control. However, thick overlapping layers of newspapers may also prevent water penetration.

Applying Mulches

- For general garden use mulches should be spread at 75mm-200mm thick depending on the type of mulch. For more detail see your local nursery.
- Always leave a breathing space of 50mm around stems and trunks of plants.
- Organic mulches enriched with animal manures are enormously beneficial when applied thickly (to 30cm) around the drip zone of fruit trees. They should be topped up as necessary during spring, summer and autumn to maintain a minimum thickness (after settling) of 15cm.
- Vegetable gardens should be mulched with 'softer' mulches such as compost, pea, hay or lucerne straw or seaweed.
- In garden areas mulches should be topped up as necessary; perhaps twice a year in both autumn and spring.
- Mulches should never be raked up, turned over, dug in or disturbed in any way. To do so will damage the fine feeder roots that plants develop in the zone between the mulch and the soil.

Did you know? Adding organic material like lawn clippings, compost and chopped straw to the soil aids absorbency, helping to prevent water from reaching the water table. The better your soil, the less water you use.

Changing an Established Garden

If your garden has grown over the years with plants scattered all over the place, you can change it around. Most high water use plants have shallow root systems and so can be easily transplanted in winter or spring into their respective groups in a new site. Hardy, low water and drought-tolerant species cannot normally be moved because of their very deep root systems. The type, area and location of lawn in the garden can be reconsidered. Excess areas of grass can be converted to lower water use areas by either:-

- Using a herbicide containing the active ingredient glyphosate. Apply the chemical according to instructions using a garden hose as a marker guide to ensure you get a complete coverage the first time. Feed and water the lawn to get it growing vigorously before applying the chemical.
- Or, blocking out the light by laying a thick sheet of black polythene over it held securely in place by bricks. After 3 to 6 weeks all the grass will be dead. Dead material can be left in place as mulch while the new plants are established.

Replacing a lawn area by planting it with a range of low native groundcovers will ensure an ever-changing scene that is attractive to birds and gardeners alike, with far less maintenance than a lawn. Your local nursery and garden centre can help you with plant selection.

When to water a plant

- Look at your garden mid to late afternoon, you are looking for the 1st stage of wilting leaves. They will take on a somewhat dull appearance, curl in on themselves or start to droop a little.
- Water then if that plant and others like it need to grow rapidly or produce rapidly i.e. vegetables and trees with fruit maturing.
- Hold off watering for one or more days if it doesn't matter if the growth of the plant is slowed down. The longer you wait, the greater the saving in water, but the greater the reduction in growth of wilting plants.
- Alternatively water only the areas around plants showing obvious wilting and hold off on other areas.
- When you do water, concentrate or direct water so that soil is deeply soaked.
- You can be more precise, measure the amount of water delivered by your sprinkler in 1/2 hour. Leave them on long enough to deliver at least 20-30ml of water to sandy soil and 40-70 ml to loam and clay soils. These amounts will bring the top 300mm of soil - the main root zone - to field capacity.

Field capacity is after the main drainage of water into the soil has finished and the soil is fully wet.

The soil is able to hold approximately this amount of water for long periods if evaporation from its surface and transpiration by plants is prevented.

Depth of soaking to specified areas around plant root zones can be efficiently aided by the use of soil wetting agents.

These agents greatly improve soil water holding capacity maximising the amount of water that can be held in the soil. They reduce runoff and wastage. Some soils benefit from several applications to enable deeper penetration of their effect and once applied will last up to 8 months.

When water is limited, it is possible to establish new plants by using products available from garden centres that maximise our precious water application.

Water saving crystals are small granules that soak up and store enormous quantities of water i.e. 400 times their own weight which means they greatly increase the water holding capacity of the soil. As the roots of the plants grow they actually penetrate the individual crystals and absorb the water that has been held there in storage. The next time the plants are watered the water crystals absorb and store water ready for the plant to use when needed. This process continues time after time, whenever you water.

Tip in using - it is better to hydrate crystals before adding to soil using a solution of seaweed tonic, this adds root growth and it is easier to calculate how much to put around the plant.

The crystals eventually break down after a few months when the new plant is established and its roots are developed deep into the soil.

Soil wetting agents enhance the use of crystals, rewetting them effectively at watering.

Further protection from wilting can be helped by spraying of leaves with anti-transpiration spray that reduces evaporation by up to 50%. Commercial brands - Anti Stress 2000, Stress Guard, Envy, the spray forms a protective coating over the plant protecting against water loss and drying winds. It is bio-degradable.

It is recommended to divide the garden into watering sections that 1/2 hour watering time will cover. Concentrate water on this section checking that water is soaking to 20-30ml into the soil. This can be helped by the use of water wetting agents, mulching etc.

Plants don't need as much water as we think - far better to give a good soak once every 2 to 3 weeks than a bit all over every 2nd day.

Look at your plants, they will tell you if they are thirsty. If they look ok, leave them another couple of days. They might not grow as much but they will cope with the dry and flourish when rain comes.

Greywater Recycling for Garden Watering

Design Principles

- The benefits of greywater recycling include: reduced water bills, conserving water resources, reducing the amount of pollution going into waterways and helping to save money on new infrastructure for water provision and water treatment.
- Greywater recycling systems must be carefully installed to industry standards to ensure the protection of surface water, ground water, vegetation, soil and public amenity. The siting, design, construction, operation and maintenance of the system are critical in this regard.
- Greywater must be treated and disinfected before storage and general re-use. This is because it can contain significant numbers of pathogens which spread disease and it cannot be stored for longer than a few hours untreated as it begins to turn septic and smell.
- There are many different types of greywater treatment systems available. The main steps involved in the process of greywater recycling include filtering the water to remove large waste particles, feeding it through a treatment system (e.g. aerated waste treatment system, reed bed or sand filter for secondary treatment, disinfection and then pumping the water to a storage tank for re-use.

Performance Criteria

- Bucketing of greywater during declared water restriction periods directly from washing machines is permitted and does not require approval.
- Landowners installing greywater recycling systems will need to ensure that persons do not come into contact with sewage or effluent in their ordinary activities on the premises.
- Effluent is not to be discharged into any watercourse or onto any land other than a designated effluent application area.
- It is important that the system is well maintained and operated in a sanitary condition.
- Mass produced on-site greywater recycling systems need to be accredited by the NSW Department of Health and installed in accordance with Australian Standards AS/NZS 1547:2000 within Council approval. Purpose designed and built systems must be designed in accordance with AS/NZS 1547:2000 and be approved by Council.