

• Acknowledgements	2
• Why KidsGrow?	3
• KidsGrow sustainable gardening principles	4
<b>● Tips and ideas for industry</b>	
• How to use the KidsGrow toolkit	5
• Great ideas to help schools get kids gardening	6/7
• School garden calendar of ideas	8
• Competitions and kids' gardening activities	9
• Record sheet of school contacts	10
<b>● Important resources for schools</b>	
• KidsGrow sustainable gardening principles	11
• KidsGrow themed garden overview	12
• Garden links to learning	13
• Themed gardens support sustainable schools concepts	14
• Safety tips for learning outdoors	15
• School friendly gardening practices	16
• Safe ways to deal with common garden pests	17
• Raised bed design and construction	18
• No-dig gardening and garden tools	19
• Waterwise gardening	20
• Steps for making a native habitat pond	21
<b>Themed Gardens</b>	
<b>● Seasonal Colour Garden</b>	22
• Steps and learning opportunities	23/24/25
• Seasonal Colour Garden sample design	26
• Tips and plant suggestions	27
• Seasonal Colour Garden yearly planner	28
• Planting guide for winter/spring flowering annuals	29
<b>● Australian Habitat Haven</b>	30
• Steps and learning opportunities	31/32/33
• Australian Habitat Haven sample design	34
• Tips and plant suggestions	35
• Steps for making a native habitat pond	36
• "Who can live here?" habitat site audit summary	37
<b>● Munch and Crunch Garden</b>	38
• Steps and learning opportunities	39/40/41/42
• Waterwise gardening	43
• Munch and Crunch Garden sample design	44
• Tips and suggestions	45
• Munch and Crunch Garden yearly planner	46
• Planting guide for easy grow vegetables	47
<b>● Waterwise Sensory Maze</b>	48
• Steps and learning opportunities	49/50/51/52
• Waterwise Sensory Maze sample design	53
• Tips and plant suggestions	54
• Waterwise gardening	55
• Games ideas for your maze	56

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# KidsGrow sustainable gardening principles

3

**School gardens cultivate not only plants and animals but also the academic, personal and interpersonal skills of the students who tend them. The KidsGrow themed garden plans and ideas for teaching and learning encourage kids to engage in:**



## Purposeful gardening

- Supports active learning and development of lifelong skills
- Involves students in co-operative, real life endeavours
- Encourages outdoor recreation and improved visual amenity
- Builds communities and opportunities for service learning
- Promotes stewardship of the school grounds
- Develops self-esteem and pride in personal achievements and effort



## Smart gardening

- Involves wise plant selection
  - Choosing the right plant for the right place
  - Choosing non-invasive plants
  - Choosing low allergenic and non-poisonous plants
- Incorporates sustainable gardening practices
  - Being waterwise – mulching, encouraging healthy soil, grouping plants according to water needs
  - Using organic gardening methods wherever possible
- Considers environmental impact
  - Optimising the nature friendliness of school grounds by nurturing habitats and encouraging biodiversity
  - Minimising negative environmental impact such as nutrient and water run-off



## Connected gardening

- Connects students to nature and to each other
- Links garden learning to the whole curriculum
- Considers gardening activities as part of the School Environmental Management Plan
- Develops awareness of the school garden ecology as part of the wider environment beyond the school fence
- Involves families, the wider community and cultures



## Fun gardening

- Stimulates exploration and imagination
- Encourages artistic and creative expression
- Provides a journey for the senses
- Inspires healthy outdoor activity and play









# KidsGrow themed garden overview

Participation in the establishment and ongoing management of any of the KidsGrow themed gardens offers authentic contexts for deep learning. Not only are learning outcomes

achieved in the traditional areas of knowledge, skills, attitudes and values but also in terms of activity, problem solving, progressive behaviour, creativity, enjoyment and inspiration.

Suggested learning level	Themed garden focus	Learning outcomes
<b>Age 5–6</b> Early Stage 1 (NSW) Suite 1/Level 1 (Qld) Level 1 (Vic) Early Childhood (WA) Standard 1 (SA/TAS) Early Childhood (ACT) KGP3 (NT) 	<b>1. Seasonal Colour Garden</b>  observing sorting comparing categorising colours seasons caring for living things	<b>Students will:</b> <ul style="list-style-type: none"> <li>investigate their surroundings by observing, questioning and reporting.</li> <li>gather, classify, record and analyse information about the environment.</li> <li>recognise that the sun, air, water and soil are essential to life.</li> <li>develop and evaluate ideas using drawings, models, prototypes and examples at appropriate stages of the design process, then implement them.</li> <li>create or modify their immediate environment to suit the needs of users.</li> <li>gain some practical understanding of the life cycles of plants.</li> <li>identify and describe ways in which living things grow and change.</li> <li>experience the concept of working hard and achieving a delayed result.</li> <li>develop positive attitudes and exhibit responsible behaviour toward caring for the natural and built environment.</li> </ul>
<b>Age 7 – 8</b> Stage 1 (NSW) Suite 1/Level 2 (Qld) Level 2 (Vic) Early Childhood (WA) Standard 2 (SA/TAS) Later Childhood (ACT) Band 1 (NT) 	<b>2. Australian Habitat Haven</b>  habitats assessing caring for living things interactions and cycles life cycles environmental restoration biodiversity	<b>Students will:</b> <ul style="list-style-type: none"> <li>understand that all living things depend on Earth and its environment.</li> <li>compare and contrast natural and built features in the local area and the ways in which living things interact with these features.</li> <li>conduct investigations by observing, questioning, predicting, testing, collecting, recording, analysing data and drawing conclusions.</li> <li>develop and evaluate ideas using drawings, models, prototypes and examples at appropriate stages of the design process, then implement them.</li> <li>identify and describe ways in which living things grow and change and recognise how environments change over time.</li> <li>recognise that they can have a positive impact on the environment and adopt behaviours and practices that help to protect the environment.</li> <li>distinguish between indigenous, native and introduced plants.</li> <li>identify threats to biodiversity such as weeds.</li> </ul>
<b>Age 9 – 10</b> Stage 2 (NSW) Suite 2/Level 3 (Qld) Level 3 (Vic) Middle Childhood (WA) Standard 2 (SA/TAS) Later Childhood (ACT) Band 2 (NT) 	<b>3. Munch and Crunch Garden</b>  estimating measuring life cycles the nutrient cycle nutrition sustainable gardening practices roles and responsibilities	<b>Students will:</b> <ul style="list-style-type: none"> <li>discover interdependency between humans and the natural environmental processes including the water cycle and the nutrient cycle.</li> <li>represent key features of the school on a map and audit and assess the site.</li> <li>develop and evaluate ideas using drawings, models, prototypes and examples at appropriate stages of the design process, then implement them.</li> <li>identify and implement basic aspects of caring for plants and describe and record ways in which living things grow and change.</li> <li>develop and implement simple plans to address environmental issues in the school such as recycling waste through composting, water efficient practices.</li> <li>employ sustainable gardening practices and appreciate the satisfaction, accomplishment and value of growing and eating fresh food.</li> <li>develop understandings about the need to protect the genetic diversity of our plant foods for the future.</li> </ul>
<b>Age 11–12</b> Stage 3 (NSW) Suite 3/Level 4 (Qld) Level 4 (Vic) Middle Childhood (WA) Standard 3 (SA/TAS) Early Adolescents (ACT) Band 3 (NT) 	<b>4. Waterwise Sensory Maze</b>  research and analysis water efficiency biodiversity the senses planning and design scientific methods of investigating sustainable management	<b>Students will:</b> <ul style="list-style-type: none"> <li>select and use a range of equipment, computer technology and other resources to undertake an investigation and a variety of design tasks.</li> <li>evaluate aesthetic and functional components in the built environment.</li> <li>observe, measure, record and interpret data from the environment and construct graphs and diagrams that represent these findings.</li> <li>recognise natural processes and understand their inter-related nature.</li> <li>distinguish between indigenous, native and introduced plants.</li> <li>understand the concepts of 'biodiversity' and 'sustainable management of resources' and develop strategies to increase both in the school grounds.</li> <li>demonstrate confidence in their own ability and a willingness to solve problems and make and implement informed decisions.</li> <li>demonstrate leadership and develop a sense of personal responsibility as stewards of the school environment.</li> </ul>



# KidsGrow Garden Links to Learning

## Interdisciplinary Learning and Cross Curriculum Links

### Designing and Making

- Designing a school garden
- Produce for enterprise
- Signage and displays
- Watering systems

### Using Technology

- Databases
- Spreadsheets
- Web research
- Digital photography

### Environmental Education

- Managing ecosystems
- Environmental issues
- Diversity and complexity
- Interdependence
- Biological webs
- Cycles and dynamic balance
- Sustainable practices

### Communication

- Interviewing community members
- Substantive conversations
- Multiliteracies
- Collaborative decision making
- Sharing information

### Thinking

- Reasoning in an orderly manner
- Parts of a complex whole
- Solving problems

### Multicultural Education/LOTE/ESL

- Multilingual signage
- Cultural gardening practices
- Origins of plants

### Aboriginal Education

- Bush tucker and medicine plants
- Traditional craft plants

### Gender Equity

- Sharing roles
- Rotating jobs

## Literacy

### Reading

- Research
- Seed packet directions
- Related fiction
- Work of classmates

### Writing

- Information texts
- Research reports
- Journal entries
- Recording observations
- Creative works
- Letters of thanks
- Requests, invitations

### Handwriting

- First and final drafts

### Speaking

- Interviewing
- Expressing opinions
- Questioning
- Restating
- Summarising

### Listening

- Following directions
- Understanding sequences
- Stories

## Science

### Science skills

- Investigating
- Observing
- Recording
- Measuring
- Predicting
- Testing
- Comparing
- Concluding

### Earth and its Surroundings

- Weather
- Water cycle
- Soils and geology

### Living Things

- Plant identification
- Plant growth
- Plant biology
- Needs of living things
- Life cycles

## Personal and Social

### Health

- Personal health choices
- Nutrition education
- Cooking with plant foods

### Active Lifestyle

- Exercise
- Outdoor activity

### Safe Living

- Lifting, carrying, digging
- Safety with tools

### Personal Development

- Self esteem through success

### Interpersonal Development

- Teamwork
- Co-operative learning
- Visiting garden businesses

### Civics and Citizenship

- Developing a sense of community
- Roles, rights, responsibilities
- Stewardship
- Community service learning
  - Sharing produce
  - Flowers for seniors
  - Harvest celebration
  - Displays and exhibits

## Society and Environment

### Geographical knowledge

- Natural and built components
- School and local environment

### Geospatial space

- Relationships with places
- Mapping school grounds

### Historical perspectives

- History of gardening
- Timeline of school site

### Reasoning and interpretation

- Hobbies and leisure activities
- Past and present data

### Economics

- Costing a garden enterprise
- Wise resource use

## Arts and Crafts

### Visual

- Painting and sketching
- Graphic symbols
- Illustrating
- Gift cards

### Performance

- Singing
- Rhythms of gardening
- Instruments from vegetables
- Drama - role plays
- Celebration dance

### Craft

- Vegetable dyes
- Vegetable printing
- Scarecrow construction
- Mosaic pavers

**Research shows that involving students in gardening activities and natural settings in schools through collaborative, hands-on, cross-curriculum, student-centred learning can lead to:**

- Bio-psychological benefits - enjoyment, relaxation and lower stress levels.
- Environmental benefits - stewardship and care of the natural environment.
- Developmental benefits - enhanced physical, cognitive and emotional development.
- Academic benefits - better performance on standard tests, higher grade averages. (in reading, writing, maths, science, social and personal studies)
- Personal and social benefits - improved attendance, improved behaviour, reduced playground accidents, reduced boredom, reduced bullying and vandalism.



# Themed gardens support sustainable schools concepts

By implementing the KidsGrow themed gardens as outlined, schools can contribute to the school environmental management plan in all focus areas - management of resources, school grounds improvement and curriculum links.

The KidsGrow themed gardens process and resources also support relevant curriculum across all Australian states and Territories including Victorian ELS, NSW Environmental Education Policy, Education Queensland's New Basics as well as all Key Learning Areas.

KidsGrow themed gardens support the Australian Sustainable Schools Initiative. Shared principles\* include:

- Ongoing process to encourage and support ecological, sustainable development
- Best practice in sustainable education
- A social collaborative approach
- Knowledge-based planning and evaluation
- A commitment to achieving measurable outcomes

\* [www.deh.gov.au/education/sustainable-schools/#principles](http://www.deh.gov.au/education/sustainable-schools/#principles)

6

## KidsGrow Themed Gardens Support the School Environmental Management Plan (SEMP)

SEMP Focus Area	Seasonal Colour Garden	Australian Habitat Haven	Munch and Crunch Garden	Waterwise Sensory Maze
<b>Resources Management</b>				
Water	*	**	**	**
Land	*	***	*	**
Waste	*	*	**	*
<b>School Grounds Improvement</b>				
Biodiversity	*	***	*	**
Soil	*	*	**	**
Shade		*		
Human Traffic	*	*	*	*
Visual Amenity	***	***	***	***
Stormwater		*	*	*
Human usage	***	***	***	***
<b>Curriculum</b>				
Curriculum Areas WITH specific environmental outcomes	Science and Technology Humanities / SOSE / HSIE Environmental Education Civics and Citizenship	Science and Technology Humanities / SOSE / HSIE Environmental Education Civics and Citizenship	Science and Technology Humanities / SOSE / HSIE Environmental Education Civics and Citizenship	Science and Technology Humanities / SOSE / HSIE Environmental Education Civics and Citizenship
Curriculum Areas WITHOUT specific environmental outcomes	English Mathematics PD/Health/PE Creative Arts Personal Learning Interpersonal Development Design, Creativity and Technology Thinking Multiliteracies	English Mathematics PD/Health/PE Creative Arts Personal Learning Interpersonal Development Aboriginal Perspectives Design, Creativity and Technology Thinking Information and Communication Technology Thinking Multiliteracies	English Mathematics PD/Health/PE Creative Arts Personal Learning Interpersonal Development Design, Creativity and Technology Multicultural Perspectives Information and Communication Technology Thinking Multiliteracies	English Mathematics PD/Health/PE Creative Arts Personal Learning Interpersonal Development Aboriginal / Multicultural Perspectives / L.O.T.E. Design, Creativity and Technology Information and Communication Technology Thinking Multiliteracies
Special events, days, programs	Wattle Day Keep Australia Beautiful Week Schools CleanUp Day National Weedbuster Week National Science Week Children's Day Mothers Day Senior Citizens Week	World Water Day Bushcare Week Landcare Week National Threatened Species Day World Environment Day Earth day Bird Week Frog Week World Wetlands Day World Habitat Day International Day of Biodiversity National Weedbuster Week National Science Week Schools Tree Day	National Recycling Week Schools Clean Up Day National Weedbuster Week National Science Week Senior Citizens Week World Food Day	World Water Day Water Week Bushcare Week Landcare Week National Threatened Species Day World Environment Day Earth Day International Day of Biodiversity National Weedbuster Week National Science Week





# Safety tips for learning outdoors

## Class management

- Notify parents that students will be gardening. Ask them to provide information about allergies.
- Discuss safety procedures beforehand. Allow students to help determine expectations.
- Establish clear rules of behaviour for outdoor work and post them. Reward good behaviour.
- Know your agenda. Have clear assignments for the students to complete while outdoors.
- Have a clear signal for getting everyone's attention and gathering together.
- Implement 'Sun Safety' strategies and wear a hat. Identify shade areas for rest and don't garden in the hottest part of the day. Covered shoes, long sleeves and gloves are best when gardening.
- Keep a first-aid kit in the garden area and provide plenty of potable drinking water.



- When talking to students outdoors make sure the sun is in your eyes rather than your students'. Move out of direct sun where possible and put the wind at your back so that the sound of your voice carries to your students.
- Plan for students to work in co-operative groups and set up 'stations' for rotating activities.

## Awareness of potential poisons in the environment

- Teach students what they can and cannot eat from the garden. Remind them to wash everything first.
- Be aware of and avoid poisonous parts of plants (see *Yates Garden Guide* p 294). All parts of some plants are poisonous including datura, Lily of the Valley, rhododendrons, azaleas, oleander. *Poisonous leaves:* Rhubarb and tomato. Others have poisonous saps, flowers, seeds, fruits or bulbs.
- Test soils for poisons like lead and asbestos if likely. Avoid using things that may contain lead paint.
- Don't use pressure-treated wood, timbers from packing cases, creosote-treated timber or railroad ties for building gardens.
- Garden organically and use natural pest control methods. [www.kidsgrow.com.au](http://www.kidsgrow.com.au)

### Useful website for poisonous plants

[www.agric.nsw.gov.au/reader/1878](http://www.agric.nsw.gov.au/reader/1878)

type in "poisonous plants" in the search box then select "Poisonous plants in the Garden"

## Safety with tools

- Provide the right size tools and teach kids how to use them. Hand forks and hand trowels are the most useful tools for young gardeners.
- Always wear protective footwear such as leather workboots.
- Hold tools with sharp edges down and walk not run when carrying them. Store with sharp edges down.
- Set up safety zones and appoint student safety officers to monitor use, care and storage of tools.
- Check condition of tools – metal parts secure, wood parts splinter free. Repair or replace as needed.
- Use spades not shovels for digging. Place the spade on the surface first before applying force.

Abide by the following rules to help prevent accidents

Tool	Safety tip
Fork	Not to be raised above the knee
Chipping hoe	Not to be raised above the knee
Steel rake	Not to be raised above the knee
Shovel	Not to be used for digging
Spade	Place on surface first before applying force
Hammer	Only to be used with adult supervision
Pick	Not recommended
Mattock	Not recommended

## Other potential risks

- Look before you feel inside empty pots, gloves etc. which may be potential hiding spots for spiders.
- Discourage snakes and spiders in the garden by controlling weeds and keeping the garden clear of rubbish, building materials and other potential hiding spots. Always look before moving anything.
- Provide water, soap and a towel so everyone can wash and dry their hands when finished in the garden.

## Safety near water

- Implement safety strategies when designing and building water features. See 'Steps for making a native habitat pond' at [www.kidsgrow.com.au](http://www.kidsgrow.com.au)
- Test water for health contaminants. Supervise children and prohibit them from drinking it.



# School friendly gardening practices

There is no mystery to growing healthy plants. It's all about good plant selection and practical gardening skills

8

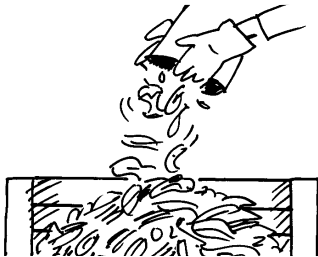
## Top tips for healthy plants

### Start with quality plants.

Always choose robust, healthy-looking plants with no sign of pests or disease.

### Build and continuously nourish the soil by adding organic matter.

Poor soils can be brought back to life with organic matter. Sandy soils will benefit from a good dose of organic matter such as compost, well-rotted manure and leaf mould to improve their ability to hold water and nutrients.



**Add organic matter and gypsum to clay soils to help improve soil structure and drainage.** Use well-rotted organic matter from your own compost heap. Almost any organic matter can be composted including leaves, straw, food scraps, lawn and garden clippings. *Ask your local garden centre for help!*

**Mulch helps to conserve moisture in the soil and keep weeds down.** There are organic and inorganic mulches. Inorganic mulches such as pebbles or crushed glass don't break down, whereas organic mulches like pea straw or lucerne, will eventually break down and nourish the soil. A layer about 7-10 cm thick is all that's needed. Organic mulches will need to be topped up each year in spring. Mulches with particles greater than 5mm are the most water efficient.

**Always choose plants that suit the conditions your garden has to offer and consider their need for water, light and fertiliser.** Your plants are less likely to experience problems with pest and disease if they are looked after with care.

## Weeds

A weed is a plant growing in the wrong place. Weeds can be both plants introduced from overseas or native plants which have spread outside their natural range.

Weeds compete with plants for water and nutrients. Be sure to avoid, or at least contain, any plants that might have the potential to become a problem beyond your school boundary e.g. plant in pots. Check with local plant experts when choosing plants for your school grounds.

Before removing weeds consider whether they are providing important habitat for wildlife or whether the weeds are stabilising soil.

## Weed control

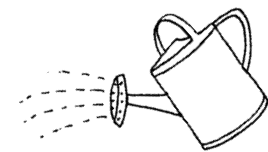
1. Identify the weed correctly.  
For younger children focus on removing one type of weed at a time to avoid confusion.
2. Choose an appropriate and safe method of weed control. In small garden beds, hand pulling is often the best method. Mulching will also help to control weeds and maintain soil moisture.
3. Carefully remove weeds to avoid re-infesting garden beds.
4. Time your weed control treatments carefully to obtain the best results. Remove before weeds flower and drop their seed.
5. Concentrate on growing plants rather than killing weeds! Weeds are quick growing and will occupy any vacant soil. Make sure soil is either mulched or growing something that you do want.

## Pest and disease

Some plants are more prone to pest and disease than others, so where possible choose more resistant varieties.

Seaweed and fish-based solutions can help protect plants against pest and disease attack.

Take a wander through the garden every day and keep an eye out for signs of pest and disease – they're much easier to treat if you catch them early. See 'Safe ways to deal with common garden pests' on the KidsGrow website.



## Watering

1. Give your garden a good soak twice a week, rather than a light sprinkle every day. This encourages the roots of plants to grow deeper into the soil, improving their tolerance to dry periods. Water more frequently in dry weather if needed but always comply with local watering restrictions.
2. Water the roots of your plants not the foliage, to prevent water from blowing away in the wind and being lost through evaporation. The roots are where the plant needs water.
3. Water in the cooler part of the day.
4. In the design of your garden group plants with similar watering needs together.
5. Water saving products like wetting agents and water storing crystals help to ensure that the water is getting to your plants.

Ask your local garden centre for expert advice





# Safe ways to deal with common garden pests



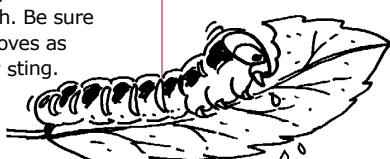


**Take a wander through the garden every day and keep an eye out for signs of pest and disease - they're much easier to treat if you catch them early.**

Not all bugs are bad. Many are natural predators, which help to keep garden pests under control. Target pests not all bugs. Get to know which bugs are friend and which are foe - for example worms are essential to soil health; most caterpillars grow into pollinating butterflies and moths; leopard slugs are carnivorous and eat plant-eating slugs; some ladybirds eat plants but most eat pests such as aphids. Small numbers of most pests should be tolerated as a sign of a healthy, organic garden and to provide food for friendly wildlife.

- Some plants are more prone to pest and disease than others, so where possible choose more resistant varieties.
  - Seaweed and fish-based solutions can help protect plants against pest and disease attack.
  - Encourage natural allies/predators. (see [www.goodbugs.org.au](http://www.goodbugs.org.au))
- Grow plants that are a source of food or habitat for predators; flowering and fragrant plants round the edge of the veggie patch will attract good bugs; spraying plants with "compost tea" will encourage helpful bacteria and fungi which protect against disease.

- Use traps and barriers that do not harm friendly wildlife around vulnerable plants.
- Protect seedlings as they are particularly vulnerable and remove weeds which provide unwanted habitat for pests.
- Grow a wide variety of plants and mix varieties together to confuse pests. Don't plant vegies in uniform or straight rows and experiment with companion planting.

**Ask your local garden centre for expert advice on organic and non-toxic products**

Pest	Characteristics	Barriers and Repellent	Removal	Trapping	Predators
<b>SLUGS AND SNAILS</b>	<p>Snails and slugs feed on the leaves of a wide variety of plants. They love leafy vegetables and can quickly devour young seedlings.</p> <p>Native snails and slugs are not usually pests and can be identified by their single set of tentacles.</p>	<ul style="list-style-type: none"> <li>• Around base of plant place wormwood tea, seashell grit, crushed egg shells, sawdust, kitty litter, hair, ash, mulched garlic plants.</li> <li>• Crush garlic into warm water and splash over snail-prone plants.</li> <li>• Cut out the base of a large plastic juice bottle and place over seedling.</li> </ul>	<p>Go on a snail hunt at night or after rain! They like hiding in cool moist places, like beneath the foliage of low-growing plants, tucked away amongst strappy leafed plants and under rocks or logs. Follow their trail to find them. Place in bucket of soapy or salty water. (Squashing may leave mature eggs to hatch.)</p>	<p>Snails are attracted to yeast. Half fill a small container such as the shell of half a grapefruit with a mixture of vegemite and water and bury up to top edge in the garden.</p> 	<p>Beetles, centipedes, frogs and toads, lizards, hens, ducks, other birds.</p>
<b>APHIDS</b>	<p>Often found on young growth, flower buds or under the leaves. Try to catch signs of them early because they breed very quickly.</p>	<ul style="list-style-type: none"> <li>• Garlic spray (see above)</li> <li>• <i>Natrasoap</i> is an all natural control for aphids.</li> </ul>	<p>Remove by hand and squash. Alternatively, hose them off.</p> 	<p>Fill small container with soapy water and a few drops of yellow food colouring (nature's attractant colour). Place under aphid-prone plants.</p>	<p>Ladybirds, praying mantises, lacewings, birds. <i>Achillea</i> will attract ladybirds. To attract birds plant Grevilleas &amp; Kangaroo paw.</p>
<b>CATERPILLARS</b>	<p>Often found on or beneath the foliage of plants, voraciously chewing their way through the leaves. Remember not all caterpillars are bad.</p>	<ul style="list-style-type: none"> <li>• Garlic spray (see above)</li> <li>• <i>Dipel</i>, a bio-insecticide (natural pest control) with low toxicity</li> <li>• <i>Success</i> is a non-toxic spray for controlling caterpillars.</li> </ul>	<p>Remove by hand and squash. Be sure to wear gloves as some may sting.</p> 		<p>Plant native shrubs to attract birds.</p>
<b>SLATERS</b>	<p>Chew on tender young seedlings. Only a problem in large numbers.</p>	<p>Cut top and bottom off a milk carton, place over seedling and push into soil.</p> 		<p>Cut a potato in half and scoop out a hole in the centre. Then partly bury it in the soil, with the hole up.</p>	
<b>CABBAGE MOTHS</b>	<p>Attracted to the brassica family of crops. Lay eggs on leaves then caterpillar eats leaves and vegetables.</p>	<p>Scatter eggshells around plants. Cut butterfly shapes from white ice cream containers and place on bamboo sticks in the veggie garden.</p>	<p>Remove caterpillars by hand and squash.</p> 		<p>Plant annuals which attract moths to lay their eggs away from your vegies.</p>

## Useful resources

"Natural Control of Garden Pests" by Jackie French  
[www.abc.net.au/gardening](http://www.abc.net.au/gardening) [www.greenharvest.com.au/pestcontrol/index.html](http://www.greenharvest.com.au/pestcontrol/index.html)  
[www.burkesbackyard.com.au](http://www.burkesbackyard.com.au) [www.sgaonline.org.au](http://www.sgaonline.org.au)



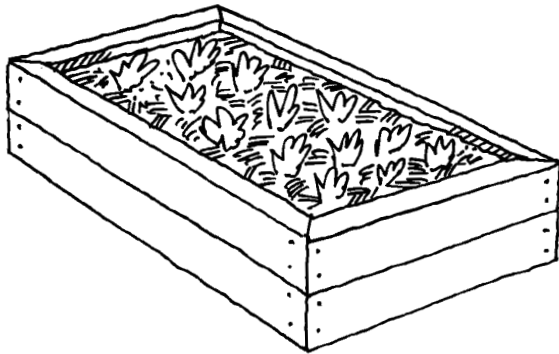
# Raised bed design and construction

'Raised bed' refers to any gardening technique that raises the growing bed higher than the surrounding open ground. It may be as simple as mounding the soil or as complicated as constructing permanent walls to contain a quantity of imported soil. The maximum width should be an 'arms reach' from either side.

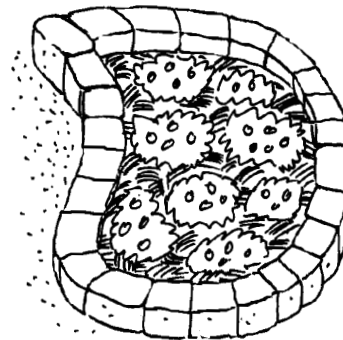
Ask your local garden centre for expert advice

10

**Example 1. Sleepers**



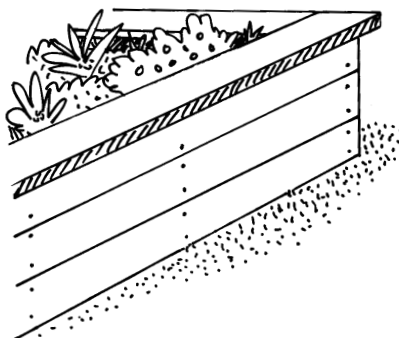
**Example 2. Stone blocks**



## Benefits of raised bed gardens

- are easy to care for
- can be shaped to fit any design
- can be built from a variety of materials
- require minimal work after construction
- provide easy access for young and old, wheelchairs and wheelbarrows
- prevent trampling and compacting of garden topsoil aiding plants' root development
- keeps soil loose and well-drained, optimising nutrient availability and food production
- help keep creeping weeds out
- support efficient use of compost
- allow intensive planting in clusters to help shade out the weeds and preserve ground moisture
- can be managed almost entirely with just one tool – the versatile chipping hoe
- are more water efficient using less water
- are not harmed by flooding rains
- provide protection for seedlings from sun, wind, insects, animals and balls
- using a suitable shade cover, offer a place to sit for class instruction or to relax and be inspired by nature
- keep gardening area neat and organised
- attractive appearance will last for many years

**Example 3. Boards with seating**



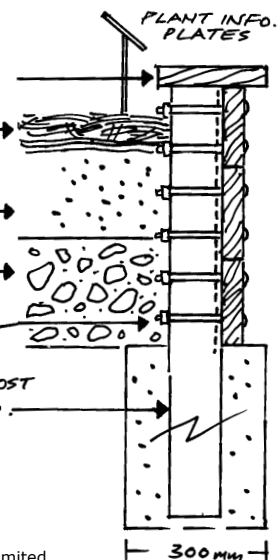
1. OPTIONAL CAP/COPING. 200X50

2. STRAW MULCH AND LAYERS OF NEWSPAPER. 75 mm

3. QUALITY GARDEN SOIL WITH WATER CRYSTALS. 150 mm

4. FREE DRAINING SUBSOIL. PLASTIC LINER INSIDE BOARDS.

5. 175 X 10 mm GALV. COACH BOLT. 150 X 50 mm HARDWOOD BOARDS FASTENED TO 100 X 100 TREATED POST CONCRETED TO 600 mm IN GROUND.





# No-dig gardening and garden tools

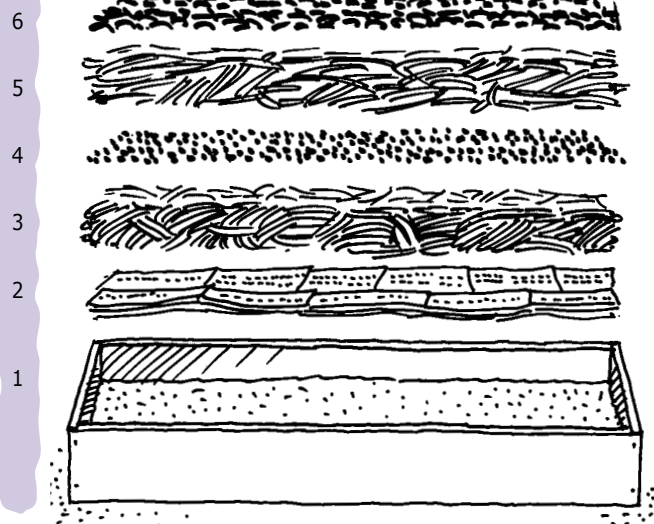
No-dig gardening is a great alternative to the traditional way of creating a garden bed and removes the need to dig. Instead it involves building the bed on the existing ground surface.

## Constructing a no-dig garden

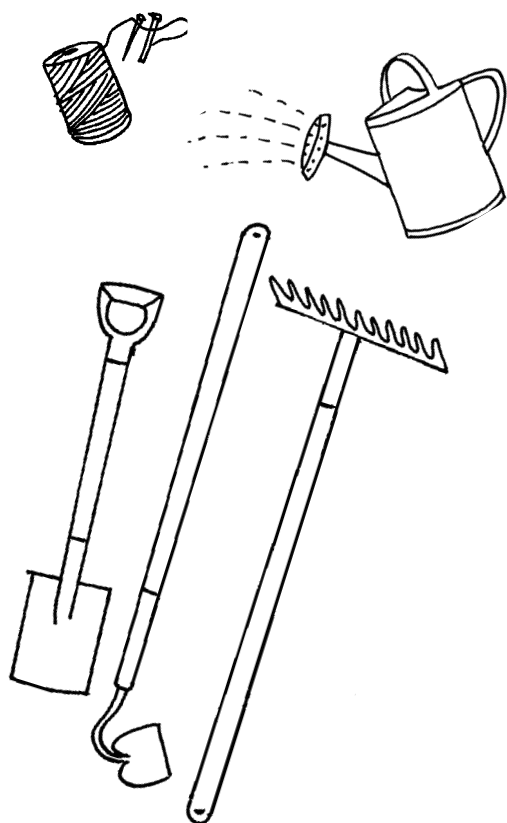
Ask your local garden centre for expert advice

1. Build a box frame with boards, timbers or bricks.
2. Cover the bottom with a 50mm thick layer of newspaper.
3. Cover with pads of lucerne hay as they come off the bale.
4. Sprinkle on a dusting of organic fertiliser.
5. Cover with 20cm of loose straw and scatter some fertiliser onto this layer.
6. Tip a circle of rich compost 10cm deep and about 45cm in diameter where seeds are to be planted.

- If on rocky ground or concrete spread a layer of decaying leaves, small sticks and seaweed to a depth of 10cm underneath the layer of newspaper at the bottom.
- Start with shallow rooted plants until your no-dig garden bed's soil depth has become established.
- A possible disadvantage of this method is that it does require additional materials which could increase the cost.



## Garden tools



### Measuring

Tape measure  
Trundle wheels  
String  
Pegs

### Watering

Hose  
Spray nozzle  
Buckets  
Watering cans

### Gardening Equipment

Gloves  
Hand forks  
Hand trowels  
Hand weeders  
Garden stakes  
Spades  
Chipping hoes  
Garden rakes  
Leaf rakes  
Wheel barrow  
Pruner  
Secateurs

- Borrow from and return to the school garden shed.
- Request second hand donations from the school community.
- When buying tools for students the two most important factors are size and durability.
- Correct sized tools are easier and lighter to use.
- Quality tools will last longer and work better.
- Clean off and wipe down after each use and store them in a safe place.

For descriptions see [www.health.qld.gov.au/ActivAte/documents/13772.pdf](http://www.health.qld.gov.au/ActivAte/documents/13772.pdf)



# Waterwise gardening

## About mounding

This gardening technique raises the growing bed higher than the surrounding open ground. Mound gardens are able to be shaped to fit any design and are easy to construct and care for. The design discourages trampling and compacting, helping to keep the soil loose and well drained. Mounded garden beds should be formed with a level surface on top to help retain water and mulch.



## Watering tips

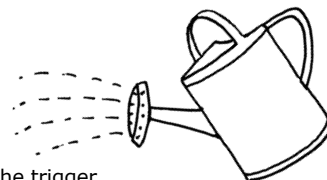
12

- Design your garden so that plants with similar watering needs are grouped together.
- Choose plants which are appropriate for the local climate and water availability.
- When planting use water saving products like wetting agents and water storing crystals.
- Water plants in the cooler part of the day and only water plants when they need it.
- Water the roots of the plant not the foliage to help prevent water loss through evaporation.
- Drought proof plants by watering them longer and less often to encourage deep root growth.

## Did you know?

Water crystals  
Wetting agents  
Trigger nozzles  
Rainwater diverter  
Soil-moisture sensor  
Drip irrigation line  
Watering cans  
Chunky mulch

retain water in the soil and release it as needed  
improve water penetration in the soil  
stop the water from the hose when you release the trigger  
redirects water from the downpipe to the garden or water tank  
probes the soil to give an accurate indication of a plant's water needs  
applies water directly and evenly to plant roots where it is needed  
with two handles and a screw on rose or nozzle are the easiest to use  
with particles > 5 mm conserves water better than finer mulches\*



\* see page 64-65 ABC Gardening Australia, December 2005

## Mulch and more mulch

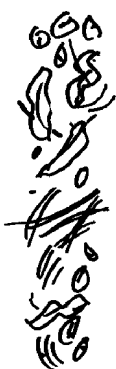
Mulch is a layer of material placed over the soil surface. It keeps soil moist, saves water, suppresses weeds, insulates roots against heat and cold and, if it is organic, adds nutrients to the soil. Using mulch reduces water loss through evaporation by up to 70%.

Mulches can be laid down 7-10cms deep or they can be built up slowly, week by week. Be careful not to mulch too close to the stems of plants to avoid their stems rotting. Recent trials by Yates\* suggest that some fine mulches absorb water and actually prevent water reaching the soil and should only be spread thinly.

There are organic and inorganic mulches. Inorganic mulches such as pebbles or crushed glass don't break down, whereas organic mulches like pea straw or lucerne hay will eventually break down and nourish the soil. Organic mulches will need to be topped up each year in spring.

Experiment by using different mulches in different sections of the garden. Keep records over time regarding initial cost, availability, break down rate, size of mulch particles and effect on plant growth and replacement cost.

The following list provides a starting point for research.



## Mulch (organic and inorganic)

<b>Compost:</b>	Adds humus to the soil, improves soil structure, good moisture penetration.
<b>Pine bark:</b>	Low nutrient, dense, acidic mulch. Slow to rot - it is good for paths.
<b>Leaf litter:</b>	Quick to break down into rich humus. Shred before use.
<b>Woodchips:</b>	Long lasting but does not add many nutrients to the soil. Allow to age before use.
<b>Pea straw:</b>	Breaks down quickly. Will contain some pea seeds that may self germinate.
<b>Lucerne hay:</b>	Ideal mulch, usually without weed seeds. High in nitrogen. Good for strawberries.
<b>Grass clippings:</b>	High in nitrogen and other nutrients. Should be dried before use. Use sparingly.
<b>Gravel:</b>	Doesn't break down. Used to provide drainage, colour and form. Good for paths.
<b>Seaweed:</b>	High in nutrients, rapidly enriches sandy soil. Wash first to remove salt.

**Other mulches to investigate:** newspaper, scoria, hessian, carpet underlay, geotextiles.





# Steps for making a native habitat pond

Ask your local garden centre for expert advice

- 1. Investigate safety management of ponds in other schools.** Strategies include installing a metal grill under the water surface; locating ponds in a well fenced off 'natural area'; placing them in a high use, high visibility area; or only having a very shallow frog bog.
- 2. Check local council and departmental requirements before planning construction.** These are usually easy to follow regulations regarding the size, depth and location of school ground water features.
- 3. Observe the direction of water flow** on the school site preferably during and after rains. The ideal location for the pond may be where run-off naturally accumulates on the grounds. Down pipe water could also be utilised. Ensure that the pond site will not receive excess nutrients from run-off.
- 4. Select a location** after considering the 'Who can live here? Habitat site audit summary'. Food, water, shelter, nesting materials, protection from predators and proximity to other similar areas are the basic requirements for attracting fauna.
- 5. Prepare a design.** An average depth of 30cm will be suitable for water creatures. If the ground is sloping a linked series of smaller ponds may be more suitable. Plan for an irregular 'shoreline' with various habitat coves and a gradually sloping beach for easy access by amphibians and other wildlife. An overflow 'wetland' area next to the pond for excess rainwater supports additional plants and wildlife to study.
- 6. Consider construction options** which include using a commercially available flexible liner, concrete or a thick layer of compacted clay. Seek advice from your local nursery or pond expert. If using concrete, it may need to be waterproofed and leach proofed. Unless the clay is naturally occurring a liner is probably the best option.
- 7. Dig out the pond shape** making sure the edges of the pond are level. Use the soil to create mounds and undulations near the pond. Before laying the liner, pad the hole with sand or old carpet. Check for any added chemicals in the local water supply before filling with water. Neutraliser may be necessary. Chlorine will dissipate in a week.
- 8. Fill the pond with water.** Place plenty of rocks and tree branches in the pond as habitat and climbing places for wildlife. For a healthy pond add a bucket of water from a nearby pond. Don't stock the pond with fish. Wildlife will eventually find the pond on their own. (Do not put in a fountain).
- 9. Select appropriate indigenous aquatic plants.** Refer to 'Australian Habitat Haven tips and plant suggestions'. Some should float while others grow tall out of the water. (Water lillies provide good habitat but require deeper water). Plant dense native grasses and shrubs along the edge for refuge and food supply. Seek the advice of a specialist for example through Landcare, Greening Australia or your local council.
- 10. Implement safety precautions.** Create a 'boundary' around the pond with a low fence, log seating or large rocks. Educate students about potential risks. Reinforce this in the school community newsletter and strategically placed student designed signage.

