



Department of  
Primary Industries



# Soils through the curriculum

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NSW Department of Primary Industries Schools Program



# NSW DPI Schools Program

- 2.6 staff- state
- Priorities:
  - Teacher Professional Development
  - Syllabus mapped 'grab and go' resources Yr K-12
  - Students events
  - Careers promotion



# How do you teach soils in your school?

- Stage 1-3
  - Stage 4 TM
  - Stage 5 Ag
  - Stage 6 Ag- mandatory
  - Other e.g. STEM, Geography, Science?
- 
- Stand-alone unit?
  - Integrated with:
    - Plants
    - Systems ag
    - Other?





Home

The NSW Department of Primary Industries Schools and Education Program develops teaching resources for schools using primary industries as the context for learning across the curriculum.



## Analyse a Research Study

- Papers for all HSC Ag electives
- Extensive range of sample Australian research articles
- Past HSC Ag questions
- Research analysis scaffolds

### New resources

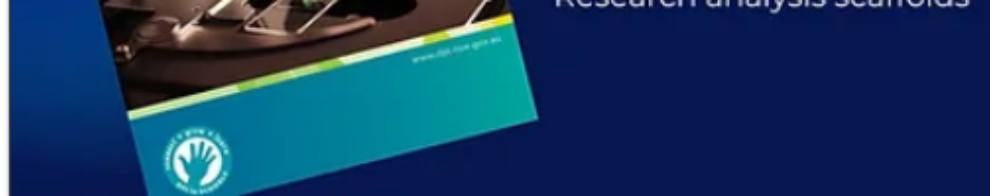
#### NSW DPI Schools Program

<b>Primary teaching resources</b>	<ul style="list-style-type: none"> <li>Syllabus map of all primary resources</li> <li>AgPatch: Growing Literacy   Years K - 8</li> <li>Biosecurity Warrior   Years K - 6</li> <li>Biosecurity   Years 5 - 10</li> <li>Investigate   Years 5 - 6</li> <li>On the Pulse Activities   Years K - 10</li> <li>PEBN Outside Learning   Years 5 - 6</li> </ul>
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# Our resources

[www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au) or





## New resources

### NSW DPI Schools Program

**Primary teaching resources** | [Syllabus map of all primary resources](#)

[AgPatch: Growing Literacy | Years K - 8](#)

[Biosecurity Warrior | Years K - 6](#)

[Biosecurity | Years 5 - 10](#)

[Investigate | Years 5 - 6](#)

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[Aboriginal Food & Fibre | Years 9 - 12](#)

[Agri-Food, Fibre & Fuel Elective | HSC](#)

[Biosecurity-Citrus & Grains | Yrs 7 - 10](#)

[Drones & Primary Industries | Yrs 7 - 10](#)

[Experimental Design | HSC](#)

[Farming for the 21st Century | HSC](#)

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[Yabby Unit | Years 7 - 10](#)

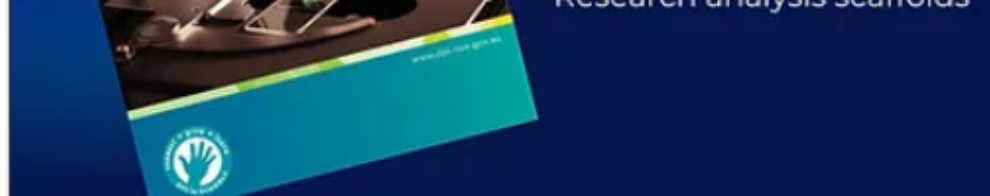
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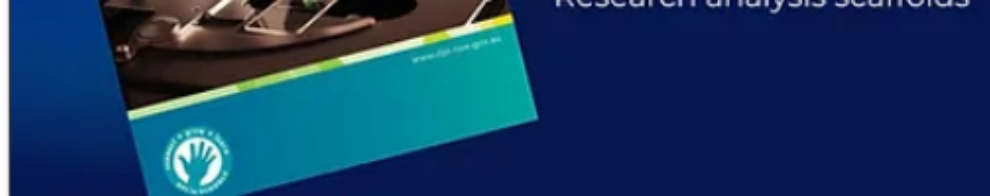




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	<b>Investigate   Years 5 - 6</b>	Investigate: aphids   Years 5 - 6
	On the Pulse Activities   Years K - 10	Investigate: bees   Years 5 - 6
	PEBN Outside Learning   Years 5 - 6	Investigate: cane toads   Years 5 - 6
<b>Secondary teaching resources</b>	Syllabus map of all secondary resources	Investigate: fire ants   Years 5 - 6
	Aboriginal Food/Fibre Tech   Yrs 7 - 8	<b>Investigate: soils   Years 5 - 6</b>
	Aboriginal Food & Fibre   Years 9 - 12	Investigate: varroa mite   Years 5 - 8
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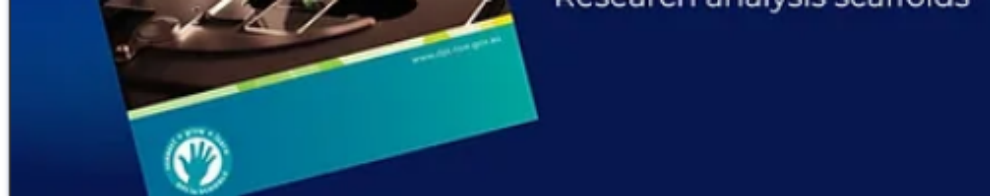




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	Farming for the 21st Century   HSC	
	Hamburger Unit   Years 7 - 8	
	<b>Industry Insights Posters   Years 9 -12</b>	Insights Crops & pastures   Years 9 -12
	Junior Judging Guide   Years 7 - 10	Insights Dairy production   Years 9 - 12
	Yabby Unit   Years 7 - 10	<b>Insights Plant structure   Years 9 -12</b>
<b>Total Virtual Farm</b>	Total Virtual Farm	Insights Pork Production   Years 9 -12
<b>Careers</b>	Careers in Primary Industries	Insights Poultry in NSW   Years 9-12
<b>Study Aids</b>	Study Aids	Insights Weeds in NSW   Years 9 -12
<b>Teacher Professional Development</b>	Teacher Professional Development	





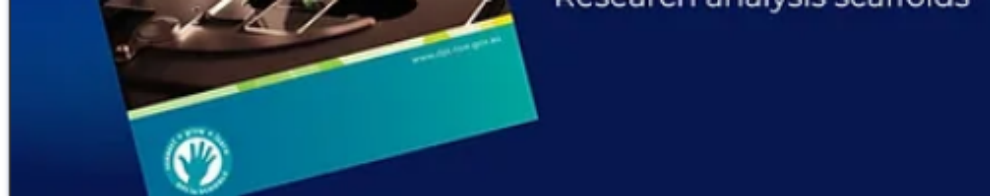
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Video transcripts
TVF Primary
TVF Secondary
Total farm picture books







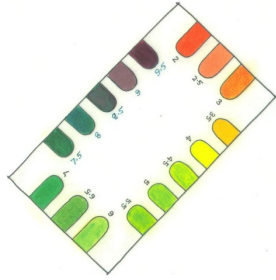
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## Soil pH

- Soil pH can be easily checked using a simple field pH kit. Test both topsoil and subsoil because they often vary.
- For most agricultural plants, the ideal soil pH range is 6 to 8 on the field kit colour card.
- Above 8, the soil is alkaline and may be deficient in some nutrients.
- Below 6, the soil is acid. Aluminium and manganese toxicity may affect plants. Treatment with lime may be needed.
- Soil pH can indicate the available nutrients in the soil. If a soil is too acid or too alkaline nutrients become unavailable to plants.



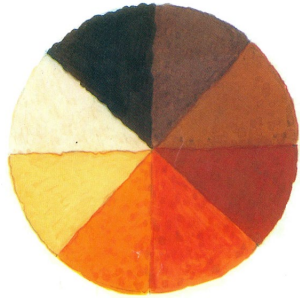
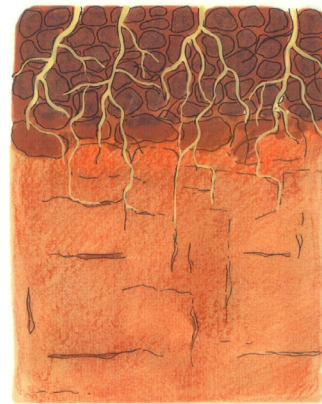
## Topsoil

- Topsoil is usually darker compared with subsoil layers because of the accumulation of organic matter. It may have a lower clay content.
- Higher levels of soil nutrients are usually found in this layer.
- Most biological activity and root growth occurs in this surface layer.
- The depth, texture and structure of the topsoil largely determines how much air and water can enter the soil.
- A deeper topsoil can store more organic material, nutrients and water.
- Topsoil depths vary but are relatively shallow (10-20 cm) in Australia.



## Subsoil

- Subsoil beneath the topsoil can be many metres deep.
- It has less organic matter, lower biological activity and lower nutrient concentrations.
- Subsoil is often paler with more clay than the topsoil.
- Subsoil is usually wetter due to infiltration and less evaporation. It is a reservoir of water for plant roots.
- Subsoil texture largely determines drainage characteristics of the soil.
- A mottled or grey coloured subsoil indicates poor drainage, while a red subsoil indicates good drainage.

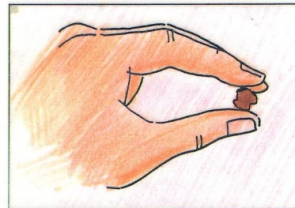


## colour

Pale colours generally indicate low fertility. Darker colours usually indicate high levels of organic matter. Red colours indicate the presence of oxidised iron (rust) which means the soil is well drained and well structured. White, pale grey and pale green colours may indicate waterlogging. Mottled soil colours may indicate intermittent waterlogging.

# Investigate Soils- Primary / lower secondary

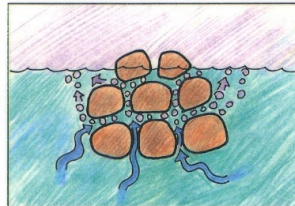
## See if your soil slakes



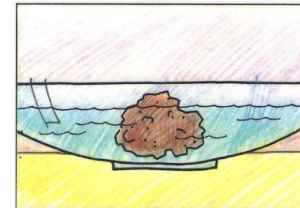
1. Take a small lump of soil, about as big as a marble.



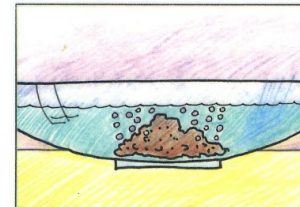
3. Watch to see whether anything happens.



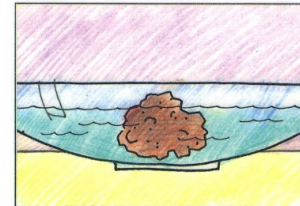
5. When soil slakes, water rushes into the air spaces in the soil, forces the air out (as bubbles) and explodes the soil particles. Slaking occurs when soil is cultivated without any organic matter going into the soil.



2. Place it carefully in a saucer of water.

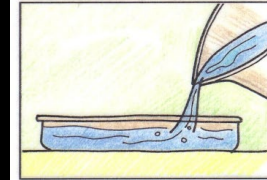


4. If small bubbles appear in the water, and the lump collapses, your soil has slaked. It has no humus or decaying organic matter to hold the soil particles together.

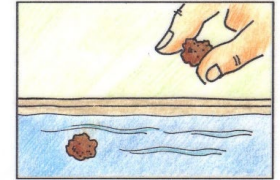


6. If nothing happens to your soil lump, it has enough organic matter in it to hold it together. It has good structure.

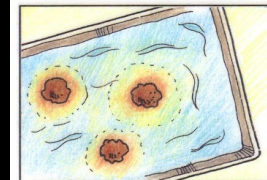
## Does your soil disperse?



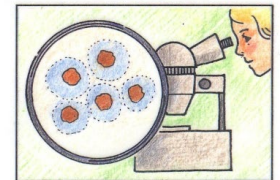
1. Pour some rainwater or distilled water into a dish placed where it will not be disturbed for several hours. (Do not use town water.)



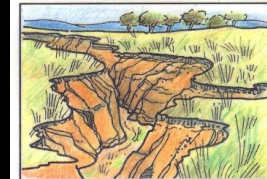
2. Drop several small lumps of dry soil into the water one at a time.



3. Check after 10 minutes whether the water around the soil has started to go cloudy. If it has, this means that the soil has started to disperse, and possibly indicates that the soil is sodic. Look again after 30 minutes, and again after 2 hours, to further check for cloudiness around the soil.



4. Sodic soil has sodium attached to the clay. When the clay is wet, the sodium attracts a water shell around each clay particle, preventing the particles from joining together. The separated (dispersed) clay particles make water look muddy or cloudy.



5. Sodic soil is a problem because it erodes easily. The individual clay particles are easily washed away by water, leaving huge gullies. The eroded particles settle into a hardsetting, crusted topsoil. It is difficult for water, air or plant roots to move through this soil.



6. Gypsum can help manage sodic soils in two ways. In the short term it provides a moderately saline soil solution which prevents dispersion. In the long term, the sodium in the clay is replaced with calcium from the gypsum. The calcium makes the soils less likely to separate into individual particles.

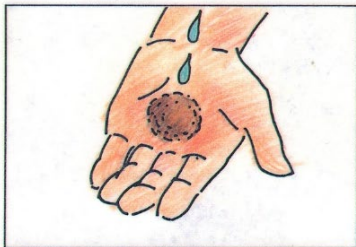




# Feel your soil texture



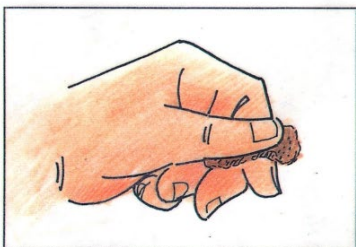
1. Take a small handful of soil.



2. Add enough water to make a ball. If you can't make a ball, the soil is very sandy.



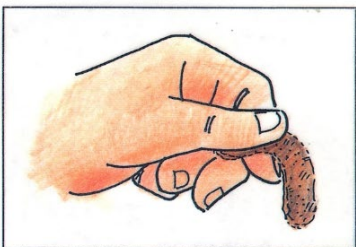
3. Feel the ball with your fingers to find out if it is gritty (sand), silky (silt) or plastic/sticky (clay).



4. Reroll the ball and with your thumb gently press it out over your forefinger to make a hanging ribbon.

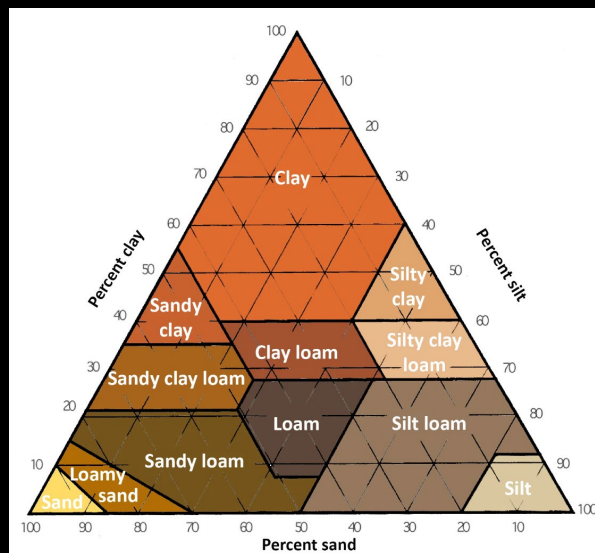


5. If you can make a short ribbon your soil texture is loamy, a mixture of sand and clay.



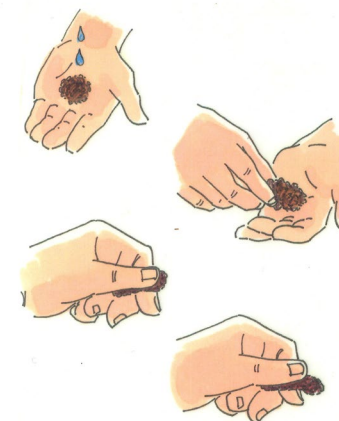
6. The longer the ribbon the more clay is in your soil.

# Investigate Soils- Primary / lower secondary



## Texture

- Texture changes down the soil profile, often with less clay at depth.
- To check soil texture, make a moist ball of soil in your hand and push it gently between thumb and forefinger to make a ribbon. The more clay in the soil the longer the ribbon. Sandy soils make little or no ribbon.
- Air and water move easily through sandy soils and they drain and dry out quickly. Clay soils take longer to get wet and are difficult to drain.
- Texture refers to proportions of clay, silt, sand and organic matter in the soil. A sandy soil feels gritty, a silty soil feels soft and silky, and a clay soil feels sticky or plastic.



## Litter layer

- This layer is found on the surface of the soil.
- It is made up of fresh and decomposed organic material such as leaves and other plant litter.
- The decomposed organic matter gives this layer its dark colour.
- It is usually very fertile because soil organisms feed on the organic matter and release nutrients into the soil.




## Soil animals


- The presence of soil organisms in a soil implies an available source of organic matter as food.
- You may see larger organisms such as earthworms, beetles, ants and slaters in your soil. Their presence is indicated by tunnels, holes, shells, webs, mucus and casts.
- A dark, moist, crumbly soil with an earthy smell indicates smaller soil organisms, such as bacteria, fungi and protozoa, are also in the soil.
- If there is no sign of biological activity check the soil pH. Most soil organisms do not like soil that is too acid or too alkaline.



# Investigate Soils- Primary / lower secondary



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## Investigate: soils (Stage 3)

Soil is a living, changing material that is made up of minerals, organic matter, water, air and living creatures. It is the basis of our food production systems as well as a vital player in the world's ecosystem, performing services including filtering water, neutralising pollutants and converting and recycling raw organic matter.

This learning sequence and investigation will assist students in understanding the value and vulnerability of soils. It is the start of ensuring that our students grow into informed consumers of the food we produce.

Students will observe that different soils are more suited to food production. They will assess the soils' characteristics and discuss how these are likely to affect plant growth. They will also make recommendations about how the soil can be improved.

Students will prepare a scientific report that aligns with outcomes from the NSW Science and Technology, English and Geography syllabuses.


The links below give you access to the teacher guide, student learning journal (in pdf or Word files so you can choose to complete electronically) and some of the images.


We hope you enjoy the program, feel free to contact us by email ([schools.program@dpi.nsw.gov.au](mailto:schools.program@dpi.nsw.gov.au)) at any time.

You only need the word document if you would like to complete the journal electronically - otherwise just use the pdfs:

[Teaching guide](#)

[Student learning journal \(pdf\)](#) [Student learning journal \(Word file\)](#) [Back to investigate page](#)






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## Stage 3 Science and Technology unit

Teacher's Handbook and Learning Sequence



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[schools.program@dpi.nsw.gov.au](mailto:schools.program@dpi.nsw.gov.au)

<https://www.dpi.nsw.gov.au/education-and-training/school-resources>







# AgPatch- Growing literacy

and

# Plant structure and Function (Industry insight poster and workbooks)



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## AgPatch: growing literacy

### Growing student understanding of primary industries Resources from Kindergarten to Stage 4

These resources are designed to help teachers deliver in-class (or in-garden!) learning activities to grow student literacy in food and fibre production.

The posters, teacher guide, PowerPoint and student workbooks are available to download below.

Printed posters are available for sale for \$50/set including postage.

For teachers looking for endorsed professional development the posters are included free to the first 50 teachers to complete our online course AgPatch: garden connections. Note: AgPatch: garden connections has been accredited under the new teacher professional development policy. Completing AgPatch: garden connections will contribute 5 hours of NSW Education Standards Authority (NESA) Accredited PD in the priority area of Delivery and Assessment of NSW Curriculum/EYLF addressing standard descriptors 2.1.2 & 3.4.2 from the Australian Professional Standards for Teachers towards maintaining Proficient Teacher Accreditation in NSW.

Enrol now

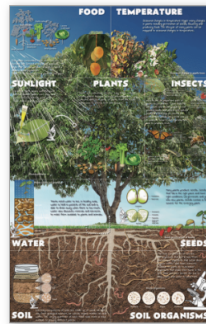
### Posters

Download posters (pdf in a zip file)

(507 MB)

Purchase hard copies of the posters

Primary resources



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## Industry insights - Plant structure and function

These resources allow students to investigate the basics of plant biology. Content covered includes:

- Basic structure of a flowering plant
- Basic structure of a flower
- Reproduction in flowering plants
- Monocotyledons vs. dicotyledons
- Growth and development
- Photosynthesis and respiration in plants
- Practical activities- plant structure, photosynthesis and respiration.

These resources are aligned to Stage 5 and 6 NSW Agriculture syllabus, and Stage 4 NSW Science Syllabus outcomes.



Plant structure and function poster.pdf



Plant structure and function worksheets.pdf



Plant structure and function answer guide.pdf



Plant trials and Experimental design.pdf

Purchase the poster

Posters are available in A1 size for \$35 each including postage and handling. Or buy a [set of Industry insight posters](#) for a discounted price. Follow the link to order a copy

# AgPatch- Growing literacy

and

# Plant structure and Function (Industry insight poster and workbooks)



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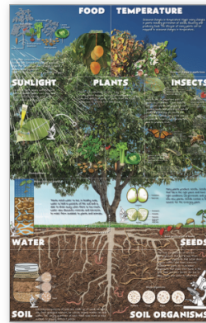
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## Plant trials and Experimental design

Supporting document

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Plant structure and  
function poster.pdf



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# Total Virtual Farm – Farm Case Study (Stage 6)


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## Total Virtual Farm support resources - Secondary School

**Farm case study- Stage 6 agriculture**  
 The following workbooks are for NSW Agriculture Stage 6 Farm Case Study.

[Farm case study workbook](#)
[Methods of ag record keeping](#)

[Measuring ag finance and performance](#)

[Soils](#)
[Calendar of operations](#)
[Systems](#)

[Answer guide - all workbooks](#)

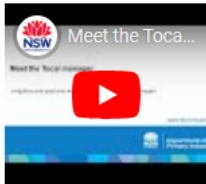
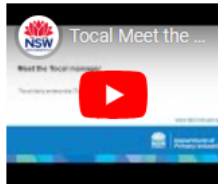
**Technology Mandatory - Stage 4**  
 Use the Total Virtual Farm for students in years 7 & 8 working towards the agricultural outcomes of the Technology Mandatory syllabus.

[Tech Mandatory workbook](#)

**Download spatial data**  
 Download the file (in KML format) and import it to student projects. Students can explore property planning and farm management.

[Google drive data file](#)
[Kahoot quiz](#)

**Meet the Total Manager webinars**

[Meet the manager worksheet](#)
[Total dairy factsheet](#)

[Monthly Total dairy financial reports](#)

[Property Planning field day workbook](#)

## Physical and biological resources of the farm:

# SOILS



 Department of Primary Industries



### Outcomes:

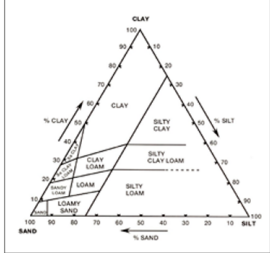
- P1.1, P1.2, P2.3- Prelim
- observe, collect and record information on the physical and biological resources of the farm, including soil, climate, vegetation, topography, water and infrastructure
  - measure and describe the features of soil including colour, texture, structure, pH, organic matter, parent material and water-holding capacity
  - identify macro and micronutrients important for plant growth
- H2.1- HSC
- describe chemical characteristics of a soil including soil pH, ion exchange capacity, soil carbon and nutrient status
  - describe physical characteristics of a soil including soil structure, texture, porosity and bulk density
  - perform a first-hand investigation to analyse and report on the physical and chemical characteristics of a soil

## Chapter 7

### Field diagnostics

**Key points**

- Soil texture affects the capacity of the soil to store water and nutrients and can be easily estimated using hand texture analysis.
- pH can be readily measured in the field by using test kits or compact pH meters.
- Salinity can be measured in the field using compact electrical conductivity (EC) meters.
- Sodicity can be estimated in the field by visually assessing dispersion of soil clods in fresh water.
- These basic soil properties provide identification of some common subsoil constraints to crop growth.



**Soil texture**  
 The texture of soil is important because it affects the capacity of the soil to store moisture and nutrients. Texture relates to the proportion of clay, silt and sand making up a particular soil, where the upper sizes of these components are 0.002, 0.02 and 2.0 mm respectively. The percentage of clay, silt and sand plotted on the texture triangle allows soils to be classified according to texture (Figure 7.1). The higher the clay composition within a soil the 'heavier' the texture class while the reverse also applies with 'light' soils being mainly of sand and silt. Knowing soil texture is vital to assess the severity of salinity within any particular soil, ie an  $EC_{(1:5)}$  of 0.4 dS/m may be deemed moderately saline in a sand, whereas this might be thought of as non-saline in a heavy clay. Soil texture also impacts on pH buffering capacity. Soil texture is an important factor in classifying soil, as it determines whether the profile is uniform, gradational or a duplex.

**Field estimation of texture**  
 Although the most accurate way to classify soil texture is using the hydrometer method in a laboratory, soil texture can be reliably assessed in the field using a hand texturing technique.

- Crumble a sample of soil big enough to fit easily into the palm of your hand.
- Add small quantities of water to moisten the sample. As you work or squeeze the sample until the soil-water mixture (known as a bolus) just sticks together.
- Continue to work and moisten the bolus until the feel stops changing (usually 1 – 2 minutes). Notice the resistance when working the bolus, this indicates moisture.
- Form a ribbon by pushing the soil out from between your thumb and forefinger. The feel of the bolus and the length of the ribbon determine the texture class.

Repeat this procedure a few times to get an average length and refer to Table 7.1 to classify the texture of your soil.

Field diagnostics Soil Health Manual - 2009 61

### Methods:

- Field soil texture test (ribboning)
- Soil pH
- Soil salinity (EC testing)
- Soil sodicity (field test- slaking and dispersion)






# Careers in Primary Industries- Soils scientists


NSW Department of Primary Industries Schools Program

Home

You might be surprised by what a career in primary industries can mean for you...

NSW DPI staff profiles 

View a huge range of careers videos on YouTube or click the images below to download a flyer.



Careers in Primary Industries 

## Chemist

**Purpose**  
We analyse samples, mostly from farmers, to give them data about what is happening with their soil and water. As an analytical chemist I make sure that the results that I produce for customers provide accurate information about elements in the environment.



**A typical day in your role**  
It can vary, my main role is in the laboratory running instrumentation and reporting results out to our clients. We also attend field days, give presentations, and work with school groups including going out to career workshops.

**Education and training**  
I have a bachelor's degree in science sub-majoring in chemistry from the University of Technology Sydney. I did a traineeship with CSIRO and that lead me to doing an Honours degree also at UTS.


**Quote**  
"It took me a long time to work out what I wanted to do so just do something when you finish school and do it well, people notice when you are really having a go."

**What impact do you see technology having on this work?**  
A lot of the work we do here is automated already, and that will increase. You will still need people to interpret the data and trouble shoot and fix problems and to think about the bigger picture.

For more schools resources go to: <https://www.dpi.nsw.gov.au/education-and-training/school-resources>


**Steven Leahy**  
Wollongbar Primary Industries Institute

For more detail about Steven's role watch his video 

Careers in Primary Industries 

## Coordinator Analytical Services

**Purpose**  
I oversee the soil, water and plant tissue testing laboratory. This includes ensuring accurate results are provided in a short timeframe, looking for external contracts for analytical work, supporting research projects and making sure that we have the staff and the equipment to do the analysis required.



**How does this help build stronger primary industries?**  
The information that analytical testing provides helps the Department and producers make informed decisions regarding soil health and productivity, monitor valuable resources such as water and improve sustainability of farming systems.

**Personal attributes**

- Meticulous and methodical.
- Comfortable with dealing with large amounts of data
- Able to troubleshoot so an analytical mind is beneficial.

**Quote**  
"There is always a way for you to work your way into the career you want and if you are passionate about what you do it makes it very easy to come to work."

**Education and training**  
I have an analytical sciences degree, but other staff have degrees including pure chemistry or environmental science or a Laboratory Skills course through providers like TAFE NSW.

For more schools resources go to: <https://www.dpi.nsw.gov.au/education-and-training/school-resources>

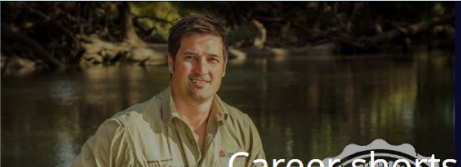
**Sarah Morison**  
NSW DPI AgEnviro Labs

For more detail about Sarah's role watch her video 

Department of Primary Industries

Careers in Primary Industries

Career shorts




# NSW DPI Soils

<https://www.dpi.nsw.gov.au/agriculture/soils>

Get 'all the dirt' on current and emerging research, current practices and content

The screenshot shows the homepage of the NSW DPI Soils website. The header includes the NSW Government logo, the Department of Primary Industries name, a search bar, and social media icons. A navigation menu lists various sectors: Fishing, Hunting, Agriculture, Animals & livestock, Forestry, Biosecurity & food safety, Climate, and Emergencies. The main content area is titled 'Soils' and features six blue tiles with white icons and text:

- Our team**: Icon of three stylized people.
- Our research and development**: Icon of a microscope and a plant growing from soil.
- AIRG**: Icon of a plant growing from soil with nitrogen (N) and phosphorus (P) symbols.
- Our webinars and newsletter**: Icon of a play button and a document.
- Soil management guides and information**: Icon of a soil mound, a document, and a pencil.
- Soil testing and analysis**: Icon of a soil mound, a magnifying glass, and a petri dish.

# NSW DPI Soils

## Soil management guides

### What is soil health?

Soil health is a concept where all aspects of soil, that is, physical structure, chemical components and biological life are considered together. A soil does not have to be agriculturally productive to be healthy. However, many agricultural practices can make soils less healthy than they were in their natural state.

By managing structure, nutrients and biology in the soil, farmers can use soils within their capability so that the soils can be used productively without being degraded.

To maintain and improve soil health, farmers need to manage their production system so that it doesn't degrade the soil by;

- maintaining soil structure
- controlling erosion
- maintaining or improving soil organic matter levels
- maintaining or improving nutrient levels and water holding capacity of the soil
- fostering beneficial soil biological activity

### What are some of the soils issues facing NSW?

Soil issues are those things that impact soil functions, reducing its health. NSW DPI has information on soil health and several of the soil issues facing agriculture today.

#### Soil erosion -

- [Soil erosion factsheets](#)
- [How to reduce stemflow in a macadamia orchard](#)
- [Saving soil - A landholder's guide to preventing and repairing soil erosion](#)
- [Macadamia harvesting with sweepers and blowers: effect on soil movement](#)

Soil acidity +

Soil biology +

Soil carbon +

Soil nutrients and fertilisers +

Soil structure and sodicity +

Soil types and condition +

Southern NSW cropping systems +



## Soils

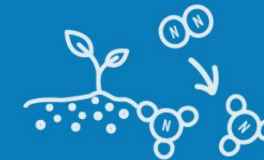
Broadacre crops



Our team



Our research and development



AIRG



Our webinars and newsletter



Soil management guides and information



Soil testing and analysis





# NSW DPI Soils

## Soil testing and analysis

Monitoring the condition of your soil is one of the most valuable activities you can do in order to manage this asset sustainably. You can carry out some of the testing and monitoring yourself by using tools such as the [Northern Rivers Soil Health Card](#). Some testing, such as chemical analysis will have to be done by in a lab.

NSW provide a fee based analytical service; our Diagnostic and Analytical services (DAS). If you need to have your soil analysed [contact DAS](#)

## Further information

- [How to interpret your soil test](#)
- [Plant nutrients in the soil](#)
- [Soil solution analysis](#)
- Videos
  - [What's new in fit for purpose soil sampling](#)
  - [Soil testing: How to get what you want](#)
  - [Understanding soils and interpreting soil tests: What do all the numbers mean?](#)
  - [Reading the landscape - not just your soil test](#)
  - [Standards in fertiliser advice: Fertcare](#)

The screenshot shows the NSW DPI Soils website. At the top, there is a navigation bar with the NSW Government logo, the Department of Primary Industries name, and a search bar. Below this is a secondary navigation menu with links for Fishing, Hunting, Agriculture, Animals & livestock, Forestry, Biosecurity & food safety, Climate, and Emergencies. The main content area is titled 'Soils' and includes a breadcrumb trail 'Home > Agriculture'. A grid of eight blue tiles is displayed, each with an icon and a text label. A yellow arrow points from the 'Further information' section of the slide to the 'Soil testing and analysis' tile in the grid.

Department of Primary Industries

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Home > Agriculture

Soils

Broadacre crops

Our team

Our research and development

AIRG

Our webinars and newsletter

Soil management guides and information

Soil testing and analysis

# NSW DPI Soils

## Webinars and newsletters

The NSW DPI Soils Unit convenes a **free** monthly webinar series; **Soil Network of Knowledge (SNoK)** and publishes a **free** quarterly e-newsletter [All the Dirt](#).

To subscribe click on the following links:



[SNoK](#)



[All the Dirt](#)

You can catch up on past webinars by watching the recordings on the [DPI Agriculture You Tube channel](#) or [GoTo stage](#)

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Search

Home > Agriculture

## Soils

Broadacre crops

- Our team
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- Soil management guides and information
- Soil testing and analysis

# NSW DPI Soils

## Our Research and Development

NSW DPI's Soil R&D develops, assesses and promotes technologies and management systems that improve soil productivity whilst enhancing its quality and protecting it from degradation.

Our R&D is industry-focused and collaborative, spanning the fundamental to the applied. Our partnerships with a range of stakeholders ensures our technical expertise and R&D findings directly contribute to improvements in on-ground management practices.

### Our key R & D themes are:

- Soil carbon sequestration and GHG emissions
- Nutrient management and biological nitrogen fixation
- Soil physical and chemical constraints
- Soil quality and ecosystem services
- Contaminants in soil and agriculture
- Sustainable management of water in agricultural landscapes
- Water productivity in irrigated and rainfed systems
- Design and efficiency of irrigated agricultural systems
- Water balance in agricultural systems

We have state of the art laboratories and controlled environment facilities as well as unique long-term field and trial sites, across a range of soils, agroecological and climatic zones.

Retired DPI soil guru Dr Mark Conyers shares his wisdom in 21 short videos in this [Playlist](#)

## Our projects

[Detection of off-target herbicide deposition](#)

[Understanding the amelioration processes of the subsoil application of amendments](#)

[Improving wheat yield on sodic soils](#)

The screenshot shows the NSW DPI Soils website interface. At the top, there is a navigation bar with the NSW Government logo, the Department of Primary Industries name, and a search bar. Below this is a secondary navigation menu with categories like Fishing, Hunting, Agriculture, Animals & livestock, Forestry, Biosecurity & food safety, Climate, and Emergencies. The main content area is titled 'Soils' and features a grid of eight blue tiles, each with an icon and a text label: 'Our team' (people icon), 'Our research and development' (microscope and plant icon), 'AIRG' (plant and nitrogen cycle icon), 'Our webinars and newsletter' (play button and document icon), 'Soil management guides and information' (soil and document icon), and 'Soil testing and analysis' (soil and magnifying glass icon). A yellow arrow points from the 'Our research and development' tile in the grid to the corresponding section in the document.

# NSW DPI Soils

## Australian Inoculants Research Group (AIRG)

Quality assured  
inoculants  
for Australian  
conditions



### AIRG assure high quality rhizobia inoculant products

Commercial rhizobia inoculants offer notable yield benefits due to their proven ability to fix and provide free Nitrogen (N) to crops and pastures. When farmers purchase a product with the Green Tick endorsement, they can trust its quality and effectiveness. This assurance comes from the rigorous and independent testing of the Australian Inoculants Research Group (AIRG).

Products with AIRG's Green Tick are guaranteed to contain the correct strain and minimum number of viable root-nodule micro-organisms (rhizobia) as indicated on the label, at the point of manufacture. In Australia, a singular elite strain of rhizobia is used for each host plant group. Strains in Green Tick endorsed products have undergone a robust evidence-based selection process by the National Rhizobium Steering Committee (NRSC, a national panel of experts) and the AIRG. Manufacturers with the Green Tick must provide clear instructions regarding storage, handling and usage so that rhizobia remain viable along the supply chain. This ensures that products perform optimally in the field, making the investment worthwhile for consumers.

The National Code of Practice for Legume Microbial Inoculant Products sets the benchmark criteria and independent testing standards for assessing these products in Australia. Inoculant manufacturers who are signatories to the Code, and who's high-quality products meet the criteria of the Code, are permitted to use the Green Tick on their products. The AIRG oversees this Code and collaborates with the National Rhizobium Steering Committee when updates to the Code are necessary, ensuring it remains relevant for future innovations in rhizobia strains and products.

The Green Tick Program stands as a mark of quality, assuring users they have the best product for Australian conditions.



#### AIRG assure high quality rhizobia inoculant products

- Australian Inoculant Quality Assurance
- Supply-chain



#### Inoculation fundamentals to maximise success

- Improved production - the soil biology fundamentals:



#### The right inoculant selection for Australian Farming conditions

- Commercial Rhizobial Strains and their best man...



#### Valuable information from trusted sources



Find them all at:

[www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au)



**i** NSW bushfires - In emergencies call 000, for agricultural and animal

**i** Varroa Mite Emergency Response - As of 19 September 2023 the V

**Schools Program resources-  
Primary, Secondary, Teacher PD,  
YouTube, Careers resources**



Courses and workshops

[School resources](#)

Library services

Total College

Total virtual farm

NSW Government trucking in emergency fodder for Tenterfield fire affected farmers

Cultural fishing thrives through Local Management Plans

**Fire Ant biosecurity ramps up to protect NSW border**

Have your say on Trout Cod Action Plan

Sheep and goat eID grants open

Varroa mite Emergency Response will transition to management



### Fire Ant biosecurity ramps up to protect NSW border

Biosecurity measures to prevent the spread of red imported fire ants into NSW are being ramped up. Residents and businesses in northern NSW should be alert for the signs of fire ants and to report any suspected detections.

#### I want

[Visit flood and storm assistance](#) >

[Go to RecoveryHub](#) >

[Go to BushfireHub](#) >

[Go to DroughtHub](#) >

[Get a fishing licence](#) >

[Check fishing rules and regulations](#) >

[Get a hunting licence](#) >



For any inquiries email us at:  
[Schools.program@dpi.nsw.gov.au](mailto:Schools.program@dpi.nsw.gov.au)

or

Join our newsletter list for updates on:

- New resources
- Student events
- Teacher PD





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# THANK YOU

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NSW Department of Primary Industries Schools Program

<https://www.nswdpi-schools-program.com/>