Extract: Chemical Safety in Schools -Section 3.3.4.3 Agricultural chemicals

A wide range of chemicals is used in the teaching of agriculture. Some of these chemicals are used in experiments whilst other chemicals are linked to the growth of plants and animals. Other chemicals are used in the maintenance and running of a farm.

The four most common types of agricultural chemicals are:

- fertilisers
- insecticides
- fungicides, and
- herbicides (or weedicides).

The latter three types are commonly known as *pesticides*.

(a): Legislation and the use of agricultural chemicals

Users of agricultural chemicals need to fully understand their obligations.

Legislation relating to the use of agricultural chemicals is listed below:

National controls:

- Agricultural and Veterinary Chemicals Code Act 1994
- Agricultural and Veterinary Chemicals Code Regulations 1995

State Controls:

- Pesticides Act 1978
- Occupational Health and Safety Act 1983
- Occupational Health and Safety (Hazardous Substances) Regulation 1996
- Dangerous Goods Act 1975 and Dangerous Goods Regulation 1978
- The Public Health Act 1902: Hazardous Pesticides Regulations 1978
- Poisons Act 1966
- NSW Clean Waters Act 1970 and the Clean Waters Regulation 1972
- Environmentally Hazardous Chemicals Act 1985
- Food Act 1989
- Stock (Chemical Residues) Act 1975
- Stock Medicines Act 1989
- Agricultural and Veterinary Chemicals (NSW) Act 1994.

The *Pesticides Act* 1978 requires that a person using a registered pesticide must read the instructions on the label, or have the instructions read to them by another person, before preparing or using a pesticide. The instructions covering the concentration of the mixture and the application must be followed, unless there is a permit to do otherwise. Each pesticide registered for sale has been approved for use under the conditions specified on the label. These conditions should be considered when estimating and controlling risk.

Agricultural production covers a diverse range of enterprises and activities and there is a vast array of chemicals available for use to increase productivity or for maintenance.

Further information sources include:

- retailers of agricultural chemicals, who are obliged to provide Material Safety Data Sheets (MSDS)
- NSW Department of Agriculture
- the publication PESKEM (The University of Queensland, Gatton College), which provides a comprehensive list of agricultural chemicals.

The National Farm Chemical User Program is a nationally accredited program aimed at increasing awareness about the safe use of agricultural chemicals. Teachers trained in the Rural Industries Content Endorsed Courses (CEC) are qualified instructors of the course, which is also available through TAFE colleges.

(b): Integrated pest management (IPM)

IPM is a process of selecting a range of control strategies and using them jointly in the removal of agricultural pests, or in reducing their presence to an acceptable level.

- Pest control methods that do not rely on the use of chemicals include:
- physical or mechanical control, e.g. hand picking, fly swats, mouse traps, fly screens, using light traps, using ultrasound, the hand chipping of weeds
- cultural or managerial control, e.g. farm hygiene, crop rotation, companion planting, adjusting the time of planting and harvest, the use of sealed storage containers
- genetic control, e.g. the use of plants that are resistant to the pest
- exclusion, e.g. the erection of fences to keep out rabbits, the isolation of sick animals from a healthy herd or flock, the careful inspection of animals prior to allowing them entry to a school farm
- biological control, i.e. the use of other living organisms to minimise the activities of pests, e.g. the control of the cabbage white butterfly with the bacterium *bacillus thuringiensis.*

It is recommended that all teachers and head teachers adopt an IPM approach to the control of pests on school farms.

(c): Using agricultural chemicals in the schools

The use of agricultural chemicals in schools can be classified according to **administrative** or **curriculum** purposes.

Administrative purposes relate to the use of chemicals to develop and maintain the resources of the school. These relate to such activities as the maintenance of tools and equipment, the growth of crops, the control of pests or veterinary care of farm animals.

Curriculum purposes relate to the use of chemicals as a teaching-learning resource. Chemicals such as fertilisers or pesticides will be used in experiments and trials so that their effects can be investigated by students.

Administrative chemicals should only be used by teachers, SASS and contracted staff (see **Appendix D for operational guidelines).**

(d): Labelling of manufactured and decanted agricultural chemicals

Some products, like pesticides, are labelled in accordance with other legislation, such as, the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) and the Agricultural and Veterinary Chemicals Act 1988

(Cwlth). Such products are regarded as being appropriately labelled under the Code of practice of workplace substances and separate labelling is not required.

Decanting of hazardous agricultural substances should be avoided unless used immediately because of the difficulty of maintaining identification of the decanted contents in a new container. `Immediate use' covers such situations as the transfers of some pesticide into a spraying device so the chemical can be effectively applied.

Labelling of a decanted chemical is not required if it is for immediate use, it will be controlled by the person doing the decanting and there is a low risk of any other person misusing it.

If the hazardous agricultural chemical has been decanted into a container and is not used immediately, it should be labelled with the chemical name, date of mixing, risk and safety phrases.

Other than for immediate use, a chemical must not be transferred from one container to another unless both containers are properly labelled. Never decant a hazardous substance into a food or drink container.

Figure 3.3-6: Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP)

The labelling of poisons used in agriculture is in accordance with the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP), also known as the poisons schedule. SUSDP is the recommendation of the National Health and Medical Research Council of Australia (NHMRC) regarding classification of drugs and poisons into schedules for inclusion in the relevant legislation of the States and Territories. It also includes provisions about containers and labels for scheduled poisons.

Commercially available pesticide products will have appropriate signal words and phrases, warning statements, safety directions and first-aid instructions on their labels.

table showing poison signal words and phrases	
Schedule	**Signal words to identify poisons**
S2	PHARMACY MEDICINE
S3	PHARMACIST ONLY MEDICINE
S4	PRESCRIPTION ONLY MEDICINE, or PRESCRIPTION ANIMAL REMEDY
S5	CAUTION
S6	POISON
S7	DANGEROUS POISON
S8	CONTROLLED DRUG POSSESSION WITHOUT AUTHORITY ILLEGAL

Poisons for therapeutic use (drugs) are included in Schedules 2, 3, 4 and 8 with progression through these schedules signifying increasingly strict controls.

For agricultural, domestic and industrial poisons Schedules 5, 6 and 7 represent increasingly strict container and labelling requirements with special regulatory controls over the availability of the poisons listed in Schedule 7.

Another schedule, Schedule 9, contains substances that should be available only to medical or scientific research including clinical trials conducted with the approval of Commonwealth and/or State/Territory Health Authorities.

(e): Risk assessment of agricultural chemicals

General principles

A MSDS must be kept for each hazardous substance used at the school. For agriculture, pesticides will be the most commonly used group of hazardous substance.

The use of hazardous agricultural chemicals for curriculum purposes is restricted to DET approved users under the DET risk assessment protocol (DETRA protocol).

When used, these chemicals must be applied strictly in accordance with the manufacturer's instruction. Where more dilute mixtures are used the level of control must not be reduced.

Pesticides should be kept in their original containers as supplied from the manufacturer, except when decanted for immediate use.

Procedures for risk assessment

Before using a hazardous agricultural chemical for administrative or curriculum purposes staff must assess the risks and determine usage restrictions by:

- using the DETRA protocol. For pesticides, staff should refer in Appendix D to the generic listing "PESTICIDES", in which case they will be instructed to apply the chemical strictly in accordance with the manufacturer's instructions given on the label, product instruction sheet and the MSDS
- using the results of a site specific risk assessment where the use of the DETRA protocol is inappropriate.

Note: To provide schools with advice about the administrative use of pesticides the Department has developed a separate publication titled "Pesticide use in school and school grounds". This publication includes:

- suggested practices for integrated pest management
- information on pesticides, including their toxicity and safe use
- a list of pests and the pesticides which may be used against them
- a list of organisations which can be contacted for more information.

The document outlines the procedures to be adopted if school staff intend to treat pests. It also provides advice when a licensed pest control operator is to be contracted to treat pests.

(f): General precautions for using pesticides and fertilisers

- Transport and store chemicals in an approved manner (refer to requirements under the Dangerous Goods Regulation, **Section 1.3).**
- Correctly identify a pest or problem before selecting a chemical solution.
- Select the most appropriate chemical to treat the problem or pest. Use safer alternatives where possible.
- The risk of using a product must be assessed (see **Section 1.5, 1.6). Use the results of the assessment to ensure that risks are adequately controlled for yourself and others. Read, or have read to you, the manufacturer's instructions on the label and instruction sheet before use.**
- Calibrate all application equipment correctly and avoid leftover chemical by effective calculation of the amount to be used.
- Take care when handling concentrates and powders, the time of greatest risk. Work in a well ventilated area. Stand upwind while opening, pouring and mixing. Spills should be cleaned up immediately.
- Wash any empty pesticide containers immediately after measuring and mixing. All containers should be **triple rinsed**. The water used to rinse the containers should be added to the application container. Where the containers should not be reused, punch a hole to render them unusable.
- Follow the recommended safety precautions, especially the requirements for personal protective equipment.

- Apply chemicals only when: - using proper and well maintained application equipment
  - others are at a safe distance
  - weather conditions are suitable.
- Avoid contact with the skin, eyes or mouth. Avoid inhalation of vapours or dust. If contamination occurs, wash the affected area immediately with copious amounts of water (if indicated by the label).
- NEVER blow or suck with your mouth to clear pipes or nozzles.
- Never eat or drink while preparation or spraying is in progress.
- Do not allow any product to be harvested or sold until the withholding period has passes.
- Thoroughly clean all equipment and clothing after use.
- Dispose of any leftover chemicals in an approved manner.
- Ensure that all people handling chemicals wash their hands thoroughly after use.
- In case of accidents, follow the first aid instructions on the label and seek appropriate medical treatment. Take the label and MSDS of the product with you if going to hospital so that hospital staff and doctors can verify the product used.

NOTE: **Triple rinsing**

An effective manual rinsing procedure is:

1. On emptying the contents into the spray tank, drain the container for an extra thirty seconds after the flow has reduced to drops.
2. Fill the container with suitable solvent to about 20% to 25% or its capacity.
3. Replace the cap securely.
4. Shake, rotate, roll and/or invert the container to wash all of the inside with rinse.
5. Remove the cap and add rinsate from the container to the spray tank. Drain the contents for an extra thirty seconds after the flow has reduced to drops.
6. Repeat steps 1 to 5 two more times.
7. Check the container thread, cap and thread, and outside surfaces, and if contaminated, rinse with a hose or hand wash.
8. Let the container dry completely and replace the cap

(g): General advice on agricultural chemical groups

Any product specific advice contained in this section is intended to supplement, but not replace the information found on the label and in the MSDS for the product. The advice is intended to assist staff to make decisions when completing risk assessments.

Insecticides

Most phosphate-based insecticides, e.g. Malathion and Dimethoate (Rogor), are insect nerve poisons, the insect equivalent of "nerve gases" used in human warfare. These insecticides have been chosen to have as low a toxicity to humans as possible, but is not surprising that some of them are still powerful poisons. Some people with rare metabolic disorders are much more sensitive to them than the general population.

The following organochlorine compounds have been banned in Australia and must not be used in schools:

Aldrin Heptachlor
BHC Hexachlorophene
Chlordane Isodrin
DDT Lindane
Dieldrin Pentachlorophenol
Endrin 2,4,5-T.

Regard all insecticides as highly poisonous, avoid skin contact (especially the concentrated liquids), and take special care when spraying not to inhale droplets.

The types of insecticides available to the general public, and likely to be used in schools, are relatively safe if used according to instructions supplied on the product label. Check usage group restrictions for the use of pesticides in Appendix D, under the generic listing "PESTICIDES". Low toxicity organophosphate insecticides include Malathion and Dimethoate, which are the active ingredients of a number of commercial products with a variety of trade names. Low toxicity carbamate insecticides include Carbary and Bendiocarb, again supplied under various trade names.

Organophosphorus and carbamate insecticides are potentially toxic if misused. Inhalation of the spray of these chemicals can lead to nausea, cramps and headaches. These insecticides should not be sprayed on windy days, when the mist can carry on the wind, or indoors in the vicinity of food or drink. Insecticides should never be decanted into soft drink containers.

Note: Beware of ammonium nitrate fertiliser. It forms dangerously explosive mixtures with combustible materials.

Fungicides

There are a large variety of chemicals used as agricultural fungicides. They are supplied in the form of powders to be dissolved or mixed with water or as emulsions. Fungicides are usually less poisonous than insecticides. Most fungicides are safe if used carefully and the directions on the products are followed.

Sulfur is sometimes used as a fungicide and is usually harmless to humans, but may cause dermatitis. Some fungicides, e.g. those used in paints to prevent mould growth, contain organic mercury compounds which are toxic.

Treat fungicides with care. Avoid skin contact with them (especially the concentrated liquids), and take special care when spraying not to inhale spray droplets. Check the MSDSs for fungicides and choose those that are least toxic.

Herbicides

The herbicide 2,4,5-T is a banned material and should not be used in schools. It is preferable to use current formulations of 2,4-D as they contain no significant level of dioxins. (Remember that trace quantities of dioxins can be found everywhere, and are even products of natural combustion processes.)

Regard all herbicides as poisonous, avoid skin contact with them (especially the concentrated liquids), and take special care when spraying them not to inhale droplets of herbicide solution. Wastes containing 2,4,5-T are Scheduled Chemical wastes which have special disposal requirements. The EPA must be consulted about the disposal of wastes containing 2,4,5-T.

The need to use chlorinated phenoxyacetic acid, its salts and its esters should be carefully assessed.

Veterinary chemicals

Veterinary chemicals are designed for use with animals, not with humans. The standard of testing is much lower than for chemicals designed for human use, higher levels of impurities are allowed, and packaging is not as well controlled.

Never allow veterinary chemicals to be used to treat humans.

Many veterinary chemicals can drastically disrupt human metabolism and are highly poisonous as a result.

It is particularly important that these substances are used strictly in accordance with the label instructions and are stored securely.

Note: Veterinary chemicals should be considered as poisons.

Fertilisers

Generally, fertilisers consist of a mixture of inorganic salts, the main constituents being nitrates, sulphates, phosphates together with trace amounts of other elements. Fertilisers are produced as both solid and liquid formulations.

Fertilisers are generally of low toxicity, but may be irritant to the skin if contact is prolonged. Fertilisers must never be decanted to or stored in unapproved containers such as soft drink bottles or food containers. When spraying fertilisers, care should be taken to avoid contact with the sprays since it can irritate the throat and lungs and affect the eyes.

Nitrate-based fertilisers can support combustion and pose a fire/explosion hazard if mixed with organic material. Fertilisers containing nitrate salts should not be stored in the vicinity of petroleum products. The most dangerous fertiliser is ammonium nitrate. Mixed with oil, it is used as an explosive! Avoid the use of ammonium nitrate as a fertiliser in a school. Use ammonium sulphate, which is harmless and non-explosive, instead.

(h): Other safety issues for practical agriculture

Hygiene

It is recommended that students wash their hands with soap or an alternative after all agricultural lessons where contact with chemicals has occurred.

Students should wash their hands after performing practical activities which involve touching, holding, leading, etc. of animals or when working in an enclosed environment where there is animal dust.

Students should wash their hands with soap or an alternative after performing practical activities which include working with soils, compost or potting mixes.

It is strongly recommended that vegetables and fruits grown on the school farm should be washed in clean water prior to being consumed or sold. This is especially important if the produce is eaten raw.

Chemical safety with seeds

Many purchased seeds are coated in fungicide. Not all fungicides can be easily detected. All seeds on the school farm should be treated as though they are coated with poison. Students must not be allowed to place the seeds in their mouths. Students must thoroughly wash their hands after handling seeds.

Quarantine areas

When pesticide is being applied students should be kept away from the area being treated. The actual quarantine distance will depend upon the toxicity of the chemical and the prevailing weather conditions. For low toxicity chemicals, applied on a day when there is no wind it is recommended that students stay a distance of five metres away.

Students with allergies

Some students have high levels of sensitivity to things such as bee stings, ant bites and plant chemicals. There is a strong possibility that some students in your classes are asthmatic as well. Teachers should be aware that certain medical conditions may impact on the ability of the student to participate.

Students who are highly sensitive to chemicals should be warned to stay away from dangerous areas of the farm, or should not participate in activities which threaten their health.

It may be necessary to alter learning activities to ensure that allergic students are not excluded unnecessarily from activities.

Dust

Dust can be a threat to all students, not just asthmatics. Students undertaking practical activities in a dusty environment or where dust is being created by the activities, e.g. when cleaning out a broiler shed, should be supplied with an approved mask. Ensure that the dust mask is correctly fitted.

Nitrogenous fertilisers and fuels

Some nitrogenous fertilisers may form an explosive mixture when stored with fuels. This is especially so with ammonium nitrate and diesel fuel. It is important that nitrogenous fertilisers are stored separately from petroleum products.

Disposal of carcasses and offal

Animal carcasses and offal should be disposed of in an `approved manner'. The manner varies between local government areas. Teachers should contact their local meat inspector or council health inspector to obtain accurate information on the correct disposal method for their area.

Disposal of sharp objects

It is recommended that all sharps be placed in a receptacle which is designed to hold used needles. The cap should be placed on the end of the needle to reduce the chance of needle stick injury. Sharps should not be placed in a garbage bin to which students may have access or if cleaning staff may be injured.

Disposal of chemical waste

Excess chemical should be disposed of in accordance with the information provided on labels or in MSDS. Where other suitable disposal is not available for hazardous substances, wastes should be well labelled and securely stored pending collection by an approved waste contractor.

(i): Chemical records

A register must be kept of all chemicals used or produced on the school farm. Make sure that risk assessments are also completed and kept for all hazardous chemicals (see **Sections 1.5 and 1.6**). **The teacher or farm assistant can use school records to research the effectiveness of previous chemical applications and calculate the amounts needed to be sprayed.**