

PIL501A Carry out permaculture field research

This competency standard covers the process of undertaking field research relevant to permaculture. It requires the ability to design field research relevant to permaculture., conduct field research and to assess practical application of research outcomes. Carrying out permaculture field research requires knowledge of growth habits, physiological properties and taxonomic specification of animals/plants involved in permaculture, scientific and mathematical research approaches, and reporting procedures.

Element	Performance Criteria
1 Design the field research to be undertaken	<p>1.1 Problems and/or opportunities that support undertaking field research are identified and the field research subject and projected outcomes are defined according to enterprise guidelines, market research, client requirements, cost analysis and cost benefits and permaculture principles.</p> <p>1.2 Research of available evidence is undertaken to design the research</p> <p>1.3 Field research sites are located according to design requirements and enterprise capabilities, and site factors are identified and incorporated into the research</p> <p>1.4 Approvals and/or permits that are required to conduct field research are identified and obtained.</p> <p>1.5 Data collection and recording specifications are established according to the research design, and proper conventions and controls are followed to satisfy statistical audit requirements and eliminate variables according to sound clinical practice</p>
2 Prepare to conduct field research	<p>2.1 OHS hazards associated with the implementation of field research are identified, risks assessed and controls developed according to enterprise guidelines, costed and documented in the field work</p>

			design
		2.2	Environmental implications associated with implementation of field research are identified and documented in the field work design
		2.3	Materials, tools, equipment and machinery required for field research are identified, costed and availability confirmed with suppliers, contractors and appropriate personnel
		2.4	Field work sites are established and prepared for implementation of field research according to the specifications of the field work design
		2.5	Detailed research site plans, specifications and procedures are documented clearly and comprehensively in the research design
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3	Conduct field research	3.1	Staged data collection is undertaken throughout the course of field research according to the specifications of research design
		3.2	Field research implementation is monitored for accuracy, compliance to the research design and out-of-specification procedures or events
		3.3	All monitoring and research data is recorded faithfully, promptly and accurately according to the specifications of the research design
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4	Assess practical application of research outcomes	4.1	Statistical auditing is undertaken for field research outcomes and proper conventions and controls are followed to eliminate variables according to sound clinical practice
		4.2	Conclusions are drawn from relevant information and are based on appropriate evidence and reasoned arguments
		4.3	Research outcomes are assessed for practical application, based on conclusions drawn from the field work and according to enterprise guidelines and industry best practice

Range of Variables

The Range of Variables explains the contexts within which the performance and knowledge requirements of this standard may be assessed. The scope of variables chosen in training and assessment requirements may depend on the work situations available.

<p>What problems and/or opportunities associated with a plant, product or treatment may support undertaking field research?</p>	<p>Problems and/or opportunities may include cost efficiency, end use, new plants, products and treatments, environmental problems, tolerance levels, OHS, creative use of old products, genetically modified materials, and the patenting of plants, products and treatments.</p>
<p>What field research subject may be identified?</p>	<p>Field research subjects may include animal or plant species or cultivars, specified products, treatments or applications, whose performance or responses are measured in relation to defined performance criteria. Note that the involvement of animals in field research may be covered by duty of care provisions in Animal Welfare Acts and Codes of Practices dealing with animal ethics.</p>
<p>What projected outcomes may be stated prior to the commencement of field research?</p>	<p>Projected outcomes may include a written statement about the specific outcomes that are expected from the research process and an overall concept of what the field work will achieve in terms of a practical application to enterprise objectives or industry practices.</p>
<p>What available evidence may be relevant to this standard?</p>	<p>Knowledge of research subjects, related products and treatments, and their uses and performance characteristics may be gained through consultation with team members, senior managers, industry consultants, own knowledge, specific industry, technical and research literature, supplier specifications, catalogues, local historical performance data and industry best practice guidelines.</p>
<p>What research design may be established</p>	<p>The research design will be in direct relationship to the performance criteria and field subject. It will affect decisions about elements of the research such as: number of applications, season or time of the year for field work implementation, length of field work period, measurable outcomes, and data collection and recording methods.</p>

What **site factors** may be identified?

Site factors will include all micro or macro elements of the growing environment that may affect the interaction between performance criteria and subject, including seasonality, aspect, humidity, shade, sunlight, growing systems, water application, pest and disease vulnerability. Where field research is undertaken, the site factors are identified and managed to minimise inter-site variability invalidating field work outcomes.

What **approvals and/or permits** may be required to conduct field research?

These may include approvals to involve animals in research under Animal welfare legislation and Codes of Practices on bioethics, to use trademarked and patented plants, products or treatments in the field work, to access private, community or government lands as part of the field work, or to conduct trials involving proscribed animal or plant species.

What **data collection and recording specifications** may be established?

The manner in which data is collected and recorded will relate directly to the research design and statistical audit guidelines. Comprehensive collection methods that are consistent across replications, accurate and concise will be required (eg measurable data collected from replicated experimental growing trials or pasture may be sampled and measured for growth density, growth rate, leaf colour, stress tolerance, plant profile and root establishment). Records may include costs, relationship or variables between test plants, plots or sites, field work feasibility and responses to performance criteria.

What elements may be included in the **statistical audit** of research results?

The statistical audit results will include a comprehensive analysis of research outcomes, drawing on all internal and external data collected. A statistical audit may include a weighted comparison of data blocks to minimise the effect of variable inter-site factors, confirming key results, validating the field work processes and key observations, and measuring the statistical significance of field work outcomes and their significance in relation to practical application for the enterprise.

What OHS hazards may be associated with the implementation of field research?	Hazards may include disturbance or interruption of services, solar radiation, dust, noise, air-, soil- and water-borne micro-organisms, chemicals, biological, radioactive or other hazardous substances, sharp hand tools and equipment, manual handling, slippery and uneven surfaces, and moving vehicles, machinery and machinery parts.
What controls may be introduced to minimise the risk of OHS hazards?	Controls should be introduced according to enterprise OHS policies and procedures and may include identifying hazards; assessing and reporting risks; cleaning, maintaining and storing tools, equipment and machinery; appropriate use of personal protective equipment including sun protection; safe operation of tools, equipment and machinery; safe handling, use and storage of chemicals, hazardous substances and other treatments; correct manual handling; appropriate use of safety equipment such as signage and protective barriers; basic first aid available on site; personal hygiene and reporting problems to managers.
What environmental implications may be associated with the implementation of research procedures?	Inappropriate work procedures, waste handling and disposal, and use of inadequate or inappropriate tools, equipment and machinery may produce damaging or nuisance level noise, particulate emissions and overflow of applied chemicals and water into the external natural, built and/or social environments.
How may the field research outcomes be assessed for practical application?	Decisions on whether or not to use the research outcomes may be based on cost effectiveness how effectively client requirements are met, responses to the identified problem or opportunity, statistical validity of the field work and relevance to permaculture industry practices

Evidence Guide

What evidence is required to demonstrate competence for this standard as a whole?

Competence in this unit requires evidence that a person is able to undertake field research relevant to permaculture subjects, analyse outcomes, draw conclusions and report outcomes and conclusions based on appropriate evidence and reasoned arguments.

The skills and knowledge required to undertake field research relevant to permaculture must

be **transferable** to a different work environment. For example, this could include different research subjects, objectives, assessment methods and field sites.

What specific knowledge is needed to achieve the performance criteria?

Knowledge and understanding are essential to apply this standard in the workplace, to transfer the skills to other contexts and to deal with unplanned events. The knowledge requirements for this competency standard are listed below:

- Permaculture principles and practices
- Related permaculture systems implementation and management techniques and practices
- Growth habits, physiological properties and taxonomic specification of animals/plants involved in permaculture
- Scientific and mathematical research approaches, data collection, processing and analytical techniques and procedures
- Auditing and reporting procedures
- Linkages across disciplines areas
- The enterprise business and marketing plans
- Enterprise work team management guidelines.
- Bio-ethics (where animals are involved in the field work.)

What specific skills are needed to achieve the performance criteria?

To achieve the performance criteria, appropriate literacy and numeracy levels as well as some complementary skills are required. These include the ability to:

- Communicate and negotiate orally and in writing with enterprise staff, managers, contractors, suppliers and consultants
- Research and evaluate information
- Calculate the cost and spatial and logistical requirements of components of the field research
- Enter, analyse and organise data in a mathematically sound and accurately graphed, charted or tabled representation, consistent with the research design
- Produce written reports on research outcomes and conclusions based on appropriate evidence and reasoned arguments

- Comply with legislative requirements.

What processes should be applied to this competency standard?

There are a number of processes that are learnt throughout work and life which are required in all jobs. They are fundamental processes and generally transferable to other work functions. Some of these are covered by the **key competencies**, although others may be added. The questions below highlight how these processes are applied in this competency standard. Following each question a number in brackets indicates the level to which the key competency needs to be demonstrated where 0 = not required, 1 = perform the process, 2 = perform and administer the process and 3 = perform, administer and design the process.

1. How can communication of ideas and information (3) be applied?	Oral and written communication with enterprise staff and colleagues will be required.
2. How can information be collected, analysed and organised (3) ?	Information about field research design, subject and criteria will be obtained through literature research and consultation.
3. How are activities planned and organised (3) ?	The planning and design process, implementation of the field research and organisation and presentation of outcomes should proceed in a logical, orderly and efficient manner. Timely and appropriate information needs to be available for decision making. The field research design should reflect the activities required to effectively and accurately obtain objective results.
4. How can team work (3) be applied?	The planning, conduct and auditing of the field research will involve working with other members of a team to achieve the research objectives.
5. How can the use of mathematical ideas and techniques (3) be applied?	Mathematical concepts will be required to measure quantities, distances, depth and calculate areas, resources, costs, ratios, scales and application rates, conduct statistical analysis of data from field work and interpret and create graphical information.
6. How can problem solving skills (3) be applied?	Problems relating to research design, the variable nature of field work sites, availability of materials, tools, equipment and machinery, costs, environmental issues and monitoring of the research implementation may arise as the field

work proceeds and require remedial action.

7. How can the **use of technology (3)** be applied?

Technology will be required to record, store and communicate ideas and information consistently, reliably and accurately. It will also be used to research relevant information, obtain and analyse data from site evaluation tests and to produce the research design, field work analysis and concluding report.

Are there other competency standards that could be assessed with this one?

This competency standard can be assessed on its own or in combination with other competencies relevant to the job function.

For information about assessing this competency standard for consistent performance and where and how it may be assessed, refer to the **Permaculture International Ltd Course Documentation**.
